# LABOR QUEUES, DISCRIMINATION, AND AFFIRMATIVE ACTION

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1993

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF PHILOSOPHY
December, 1997

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AFFIRMATIVE ACTION

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ACKNOWLEDMENTS

I would like to express my thanks to everyone who has helped me throughout the process of completing this research as well as completing my degree. I wish to thank my dissertation committee for contributing to this research and all of the faculty and staff of the Department of Economics who have supported me throughout my education. I would especially like to express my gratitude to Dr. Jim Fain for his unending patience and support during this research and all aspects of my graduate education.

In addition to everyone who has helped me with my graduate work, I would like to thank all of my family and friends who have supported me throughout my entire education. I would like to especially thank my wife, Jeanie, whose support, patience, and encouragement have made all of this possible.

Its been a long haul Jeanie, but we made it!

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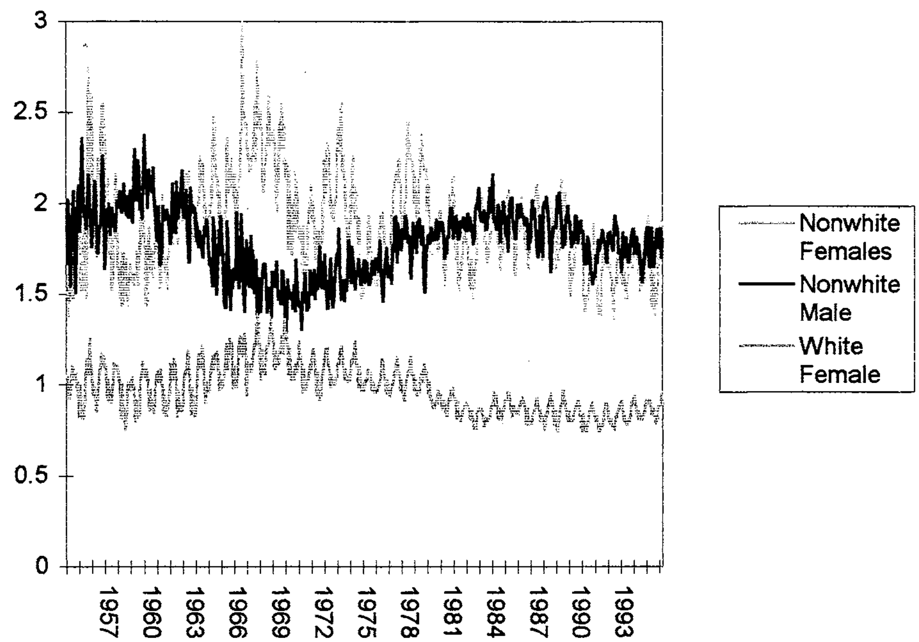
# I. INTRODUCTION

The relative status of women and racial minorities in the labor force has been undergoing significant change for decades. The most notable of these changes in recent history originated as early as the late 1950s and early 1960s. Throughout this time period the status of these groups underwent changes not only relative to white males, but also relative to one another. One such change in the relative status of women and racial minorities is demonstrated through relative unemployment rates.

As is illustrated in Figure 1, the unemployment burden of white females relative to nonwhite males and nonwhite females has varied over time. Prior to the late 1960s, the status of nonwhite individuals (especially nonwhite males) relative to white females was improving significantly. However, beginning in the late 1960s this trend began to reverse. This is especially interesting given the fact that while the status of white women relative to racial minorities improved in terms of unemployment during this period, women were entering the labor force in unprecedented numbers. The question of what caused this shift in the unemployment burden in the late 1960s has yet to be thoroughly addressed and will be examined in the following chapters.

During this time of change in the relative unemployment burdens of these groups, beginning in the mid 1960s and continuing primarily into the early 1970s, civil rights legislation was passed aimed at ending labor force discrimination and promoting labor force advances by women and racial minorities. Although numerous explanations of this

**Figure 1**
**Unemployment Share/Share of Labor Force**



trend reversal are possible, the concurrent nature of the shift in the unemployment burden and the introduction of civil rights legislation raises the question of whether the civil rights legislation of the 1960s had some perverse effect in terms of the status of racial minorities relative to white women. The current knowledge of the forces driving labor force changes and the impact of civil rights legislation is simply not sufficient to answer these questions.

The current state of the literature is such that it is difficult to discern whether a relationship between civil rights legislation and relative unemployment burdens exists. While opinions on the merit of racial and gender equality in the United States have been converging in recent decades, serious conflict arises when the issue of correcting existing inequalities is addressed. For the question at hand, it is essential to note that significant disagreement exists regarding whether or not past legislation has been successful in lowering the level of inequality in the workplace. While the passing of civil rights legislation in the 1960s and early 1970s was a major attempt by the United States government to end inequality in the labor force, a general consensus regarding the effectiveness of these programs has yet to be reached in the literature. Several previous studies have examined this issue focusing on the absolute gains of minorities and women as well as gains made relative to white males (Burstein 1979, Leonard 1984, Smith and Welch 1984, Heckman and Wolpin 1976, Goldstein and Smith 1976). Nevertheless most have failed to examine possible changes in the position of certain minority groups relative to one another. In addition, past research fails to examine the effects of such legislation on unemployment rates and therefore overlooks a possibly unexpected result of civil rights legislation, that being the advance of white females at the expense of racial minority populations. Furthermore, many of these studies have employed less than optimal methods of analysis. Correcting these inadequacies by thoroughly examining changes in relative employment status is the focus of this research.

## II. LITERATURE REVIEW

The following review of the literature will focus on those studies which are most closely related to the topic of this study. Therefore it will focus on those studies which aid in understanding the cause of the change in relative unemployment burdens experienced in the post 1968 period and the possible role played by civil rights legislation in that change. Past research has failed to examine this issue specifically. Those studies which are most closely related to this research topic typically take one of two forms. The first of these simply examine the determinants of unemployment rate differentials (usually the differential between white men and women/racial minorities), but typically fail to consider the possible impact of civil rights legislation on this differential. The second type examine the impact of civil rights legislation on earnings and employment shares (among other things) of women and racial minorities but fail to consider its possible impact on the overall status of women and racial minorities in the labor market as a whole, or its impact on the status of women and racial minorities relative to one another. Despite the fact that previous work has not addressed several relevant issues, a basic understanding of past findings is essential to the current work at hand. The following literature review will examine the major studies in the areas mentioned above and will provide background information on civil rights legislation and the trends in the labor force status of women and racial minorities.

## A. Legislation

The first major legislative step designed to deter discrimination in the United States occurred with the passage of the Civil Rights Act of 1964 which prohibits discrimination in all aspects of employment by race and sex. Title VII of that act established the Equal Employment Opportunity Commission (EEOC) which provides a means through which adherence to the elements of Title VII can be effectively monitored. In 1965, by executive Order No. 11246, the Office of Federal Contract Compliance (OFCC) was established which was designed to enforce the provisions within that order. Executive Order No. 11246 prohibits discrimination by race among government contractors and applies to all firms who contract with the federal government in an amount of $50,000 or more, and employ at least 50 workers. In 1966 the EEOC began requiring all firms in the private sector with at least 100 employees, and all contractors with the federal government who have contracts of at least $50,000 or have at least 50 employees (expanded to 15 employees in 1972), to report detailed employment numbers by race and gender. In 1967, Order No. 11246 was amended by Order No. 11375 to include the prohibition of discrimination by gender. Enforcement of these orders was taken to an unprecedented level in 1968 when the OFCC began requiring federal contractors to develop and present an affirmative action plan designed to take direct steps in correcting past inequities in labor market practices. Order No. 4 from the Secretary of Labor in 1970 and its revision in 1971 brought additional focus to the definition of affirmative action. The revision to Order No. 4 in 1971 added emphasis on sex discrimination and led to the implementation of specific affirmative action guidelines by 1972. Also in 1972, the Equal Employment Opportunity Act was passed which amended the Title VII of the Civil Rights Act in a way which strengthened the EEOC in a number of ways and aided in correcting for past deficiencies in enforcement powers (Smith 1984).

**B. <u>Unemployment Differentials by Race and Gender</u>**

Several studies have examined unemployment rate differentials by race and gender, the causes of these differentials, and how they have changed over time. While methods are diverse and the manner in which discrimination is measured varies widely across studies, a brief examination of these works can add valuable insight.

**i. <u>Empirical Evidence on the Determinants of Unemployment Differentials</u>**

Richard B. Freeman examined the relative status of black Americans is his paper entitled "Changes in the Labor Market for Black Americans, 1948-1972". Although this paper has a much broader scope than just employment effects, it does include several interesting notes on employment. First of all, Freeman notes that although significant advances occurred for black Americans over the time period observed, gains in terms of the unemployment rate were disappointing. In fact he notes that the unemployment rate for blacks was roughly twice that of whites for most of the time period in question (similar results are found with respect to white women (Ehrenberg 1980)). According to Freeman, the black/white unemployment rate ratio for men appears to have peaked in 1962 and then began a downward trend. On the other hand, the same ratio for women appears to have risen in the early 1950's (as was the case for men) fallen in the late 1950's and leveled off in the 1960s. Another fact noted by Freeman is the greater sensitivity of black employment to short term changes in GNP relative to white employment. This is found to be the case for white women as well (Ehrenberg 1980). Black women were found to experience a more rapid labor market advance than black men throughout the period, although black women started the period in a relatively worse position. The relative labor force participation rates for both black men and women were falling over the period. The labor force participation rate of black women is shown to rise during a recession which is opposite of the behavior of white women.

Freeman further examines the labor market throughout this period by examining possible changes in the demand and supply for minority workers. He notes that the demand for black workers may have changed considerably due to the decreases in the demand for discrimination (possibly due to civil rights legislation), changes in attitudes toward discrimination, and the expansion of relatively nondiscriminatory sectors of the economy. Supply side shifts such as an increase in the level of schooling achieved by blacks and a shift of black workers to occupations with better employment opportunities are also pointed out by the author. Upon analyzing demand and supply shifts separately, Freeman concludes tentatively that the Civil Rights Act of 1964 had a positive effect on the relative position of blacks in the labor market in terms of earnings and occupational position. It is necessary to note, however, that the issue of the relative status between minorities and women in terms of unemployment is not examined.

Upon reviewing the literature it is apparent that many factors influence differences in unemployment rates. A reasonably typical study on this matter which uses 1990 census data was presented by Leslie Stratton in her 1993 article titled "Racial Differences in Men's Unemployment". According to Stratton, her results are consistent with previous work in finding that only 20-40% of men's racial unemployment differential can be explained by "variables other than race". However, demographic factors such as education, age, and marital status are significant determinants. These results suggest that in 1990, race still played an important role in determining unemployment rate differentials. Other authors have noted that blacks may experience higher unemployment rates due to a higher level of job turnover. (Barrett and Morgenstern 1974)

An article by Lora Holcombe (1988) examines the black/white unemployment rate differential over the period of 1950-1980, with a focus on the determinants of this differential and how they have changed over time. Holcombe uses microcensus data from the years 1950, 1960, 1970, and 1980. From this data, she attempts to analyze the probability of unemployment by demographic group through the use of a Blinder decomposition. The primary focus of this paper is the finding that in 1950 blacks were less likely to be unemployed, both males and females, than were whites. On the other hand, in 1960, 1970 and 1980 whites were less likely to be unemployed than blacks. In her analysis, Holcombe controls for age, education, classification of worker (private employment, government employment, self employed etc.) and other demographic characteristics and finds that most characteristics, including education, contribute significantly to changing the probability of unemployment.

The Blinder decomposition applied by Holcombe offers two possible "effects" accounting for the difference in unemployment probabilities. The first of these is the "endowment effect" which represents differences in mean demographic characteristics between groups. The second contributing factor is the "residual effect" which is attributable to differing labor force relationships. The decomposition reveals that the endowment effect is almost entirely responsible for blacks having a lower unemployment probability than whites in 1950. In other words, blacks were less likely to be unemployed than whites in 1950 because of differing demographic characteristics. By 1980 most of the unemployment rate differential was due to the residual effect (represented by differing coefficients) which implies that blacks had relatively worse labor force ties, suggesting the existence of discrimination.

Holcombe offers two possible explanation for the change in the unemployment probabilities of blacks and whites. She attributes one possible explanation to the work of Murray (1984) who focuses on the civil rights legislation of the 1960s and its possible effect on disincentives to minorities in terms of acquiring the skills necessary for employment. A second possible explanation is the effect of labor market desegregation that has occurred since 1950. For example, as labor markets became less segregated, it is possible that blacks who previously worked for black employers (along with other black individuals) may have found themselves competing against whites for jobs provided by white employers. Thus in a way desegregation may have opened a door to discrimination.

Measuring asymmetry in the labor force can also be accomplished through the use of wage differentials and occupational segregation. For the purpose of this study, the effect of these measures of inequality on unemployment rate differentials is the relevant issue. Previous work has suggested that occupational segregation may account for as much as half of the unemployment rate differential, but the effect of wage inequality on these differentials is less clear (Flanagan, 1978). According to Flanagan, traditional demand side theories of discrimination have suggested that as wage differentials narrow unemployment differentials should increase. Flanagan shows however, that wage differential may have important supply side effects as well in terms of labor market turnover. In fact, he argues that higher wage differentials increase the black quit rate and raise the probability that blacks who quit will become unemployed. He also finds some evidence that younger black workers are assigned relatively less stable jobs. From his statistical analysis he concludes that narrowing wage differentials should narrow unemployment differentials for experienced workers (similar results are implied in terms of the duration of unemployment differentials by Nord and Ting, 1994). Flanagan's results are less conclusive concerning the impact on labor force entrants. This research, at the very least, makes it apparent that wage differentials are an important factor in determining racial unemployment differentials.

Gender unemployment differentials have received considerable attention in the literature as well. The majority of the literature in this area reaches similar conclusions and can therefore be summarized in a reasonably concise manner.

In the 1974 article titled "The Female-Male Differential in Unemployment Rates" Beth Niemi (1974) hypothesizes that the unemployment rate differential is most likely to be attributable to any of three causes. These possible causes are: 1) relatively more frequent movement of women into and out of the labor force 2) women receiving relatively less specific training and 3) the occupational and geographical immobility of women. The author finds that during the period under study each of the hypothesized causes was significant, but that the primary cause of the female-male unemployment rate differential was the extensive movement of women into and out of the labor force.

Other studies on the female-male unemployment rate differential dissect the unemployment rate into the duration of unemployment spells and the frequency of unemployment spells. These studies typically find that the primary cause of this differential is that women experience a higher level of job turnover relative to men.

Indeed, research in this area typically finds that women experience shorter duration of unemployment than do their male counterparts (Sandell (1980), Bowers and Harkess (1979), Marston, (1976)). In addition to finding that women experience more frequent and shorter spells of unemployment, Stephen Marston demonstrates that the primary driving force behind the cyclical nature of the female unemployment rate is failure to achieve successful labor force entry.

An interesting approach to studying the female-male unemployment rate was undertaken by Janet Johnson in her 1983 article entitled "Sex Differentials in Unemployment Rates: A Case for No Concern". The author finds that the gender unemployment differential is procylical which she argues provides evidence against discrimination being the driving force behind the unemployment rate differential. In addition, the author concludes that if women and men had the same characteristics during the time period under consideration, women would be less likely to be unemployed than their male cohorts.

**ii. Labor Queues**

A common phenomenon noted in the literature that is related to the existence of unemployment rate differentials, and therefore to this topic of this research, is the existence of labor queues. The literature notes that unemployed individuals essentially have to "wait in line" for jobs. Given this fact, one possible explanation for the observed unemployment rate differentials is that for whatever reason, there may be an ordering in the queue regarding who firms prefer to hire first (Reskin 1990). Although labor queues can be used to explain many labor market phenomena they can be especially useful in explaining differences in unemployment rates (Thurow 1975). If it is true that the preferences of firms are related to race and gender, much of the unemployment differential could be explained. Essentially if firms discriminate in hiring from pools of unemployed people by hiring from those groups that they prefer the most first, then those groups furthest down the labor queue will have to wait the longest for jobs. This relationship between labor queues and discrimination in hiring formalizes the relationship between unemployment rate differentials and discrimination and is essential in understanding unemployment rate differentials.

An insightful attempt to explain differences in unemployment rates among demographic groups that focuses on labor queues and is related to the hypothesis of this paper was presented by Shulman (1986). Shulman has two basic points that are relevant to this topic. First of all he argues that gains in human capital made by disadvantaged groups may not be helpful during times of high unemployment if discrimination exists. During times of high unemployment, the cost of discriminations falls as high numbers of qualified white individuals are available for work. In essence, as nonwhite individuals attempt to work up the labor queue they are continually bumped back during bad economic times as qualified white individuals enter unemployment. Secondly, according to Shulman, in recent years discrimination has simply shifted more towards discrimination in employment from wage discrimination. In fact, according to Shulman, it is possible that firms simply decided to obey the wage discrimination portion of Title VII and to "shirk" on the employment side. Thus in the presence of labor queues generated by discrimination, Federal legislation that works to help eliminate wage differentials would just worsen employment discrimination as the cost of hiring minority groups increases[1].

The research discussed above has examined the trends in labor force status as well as determinants of unemployment rate differentials, however past research has failed in two key areas. First, past research has failed to examine the possible effects of civil rights legislation. Secondly, it fails to examine possible changes which may have occurred during the period under question regarding the status of women and racial minorities relative to one another. Therefore, in the search for literature which takes these factors into consideration, the next section will focus on studies which have actually examined the effects of civil rights legislation.

## C. Effects of Civil Rights Legislation

The most abundant literature dealing with the effects civil right legislation does not deal with unemployment differentials per se, rather such studies tend to focus on changes in employment shares and employment growth. Often such studies restrict themselves to examining changes in the employment status of women and/or racial minorities relative to white men. Alternatively, some authors examine the difference between the increases of employment shares of women and racial minorities in firms "covered" by the EEOC as opposed to "non-covered" firms. The following section will present the results of the major studies in this area and provide a general picture of the status of research on the topic.

[1] Note that this is similar to Becker discrimination where employers will only hire certain groups at a discounted wage. If a discriminating employer cannot hire those groups at that discounted wage, it may not hire them at all.

A thorough examination of the trends in the relative status of minorities and women in the labor force is presented by James P. Smith and Finis Welch (1984). In their article entitled "Affirmative Action and Labor Markets", Smith and Welch examine the status of women and racial minorities in the years 1966, 1970, 1974, 1978, and 1980. The authors utilize data from the EEOC (EEO-1 data) reported by firms in the above mentioned years and data from the Current Population Survey. The primary hypothesis of this paper is that through the relevant years minority representation should experience more growth in firms that are required to report to the EEOC as opposed to firms that are not required to report to the EEOC. In addition, it is hypothesized that the gains will be the largest among reporting firms that are federal contractors.

An interesting note made by Smith and Welch is that the percent of black workers, both male and female, who were employed in covered firms rose dramatically during the time period, especially in the period from 1966 to 1974. The percent of white women working in covered firms, on the other hand, changed little during the time period mentioned above. The authors also examine the occupational and wage differences by race and gender through the period, however, these results are less relevant to the purpose of this research and will not be discussed in this section. The primary method used by the authors in testing their hypotheses is a simple comparison of the growth rates and/or shares of employment of each demographic group in EEO-1 reporting and non EEO-1 reporting firms. The authors conclude that substantial gains were made by women and especially minorities in the period examined, although they question the validity of the EEO-1 data. Specifically they find that women and racial minorities experienced the greatest advances in covered firms, especially in those which were government contractors. However, to the surprise of the authors most of the gains were made in the pre-1974 period, a period in which the authors suggest that the enforcement powers of the EEOC and the OFCC were weak if not insufficient.

In determining the impact of civil rights legislation, several authors have turned their attention toward Affirmative Action. Such studies therefore focus on the efforts of the OFCC and its relative impact on government contracting and non-contracting firms.

Goldstein and Smith (1976) specifically examine the "impact of the antidiscrimination program aimed at federal contractors." They employ a simple firm level cross-sectional examination of the change in the relative status of women and racial minorities in contractor versus non-contractor firms in the time period from 1970-1972. It is appropriate to note that the authors acknowledge the limitations of this technique with regard to the absence of data back to the start of the program (prior to 1970), and the exclusion of possible effects of anti-discriminatory policies on non-contractor firms.

The authors explore possible changes in wages as well as changes in employment shares. For the purpose of this research, the interest lies in the results on changes in employment shares. The authors regress variables such as total employment at a plant, the change in employment at a given plant, the employment share of other race-sex groups in 1970, and dummy variables for presence of government contract and the occurrence of a compliance review, on the employment share of a given race-sex group.

The results of the Goldstein and Smith paper are as follows. First, the authors find that the relative change in black employment share was greater (and positive) in contractor firms as opposed to non-contractor and even more so in firms subjected to a compliance review. The results for black females, however, show no statistically significant difference in contractor firms as opposed to non-contractor firms. The story for the impact of antidiscrimination policy on whites is quite different. Goldstein and Smith find that white males gained from such policies, a fact that the authors have difficulty in explaining. Also, they find that white females were actually hurt by such policies in that their employment shares actually grew by less in contractor firms relative to non-contractor firms. The authors suggest that the overall impact of Affirmative Action on women in general is not surprising given the fact that the focus of Affirmative Action was on racial minorities rather than women prior to 1972.

A similar analysis was undertaken by James Heckman and Kenneth Wolpin (1976). Their analysis was centered around firm level data in the Chicago area. The method used by Heckman and Wolpin is similar to that used by Goldstein and Smith. However, the authors point out that previous work may be flawed (also noting the caveats presented by Goldstein and Smith) primarily in terms of the treatment of the contract award process. The authors point out that government agencies may indeed often award contract to firms who had a high relative minority-women employment ratio regardless of contract status. Therefore, any differential between contractor versus non-contractor may be due simply to a "successful selection process" and not to a change in the employment practices of firms. In turn, the authors attempt to control for this in their study.

The results of this research can be summarized as follows. First of all, firms with government contracts are likely to employ more blacks males than identical no-contractor firms. On the other hand, the authors find that contractor firms hire somewhat fewer black females and fewer white females as well. Contractor firms are also more likely to hire individuals in the "other" racial category.

Thus it appears as though there is a general consensus regarding the effects of Affirmative Action during the during the first few years of the 1970's in terms of employment shares. Specifically, it appears as though in terms of employment black males were helped by such policies, whereas black females may have been hurt. White males may have benefited and white females probably suffered adverse consequences associated with affirmative action in terms of employment shares. However, the early 1970's is not the only relevant time period; several other studies have focused on other time periods since the passing of the civil rights legislation of the 1960's.

Jonathan Leonard (1984) has examined the effects of Affirmative Action extensively. Unlike previous authors, Leonard examines the effects of Affirmative Action during the 1974-1980 period. However, his primary measure of the effectiveness of Affirmative Action is once again simply a comparison of contractor and non-contractor firms. He hypothesizes that if Affirmative Action was effective through the 1974-1980 period, the "rate of change of protected groups' employment share will be higher in contractor establishments than in non-contractor establishments, ceteris paribus." He notes that 1974 was an important year in terms Affirmative Action's focus on women and its enforcement power.

Leonard observes that during the time period in question black and female employment did indeed grow faster in contractor firms than it did in non-contractor firms. To confirm this observation the author employs the use of a regression in order to determine the effect of contractor status and compliance review on the employment share of a given demographic group. He controls for establishment size, industry, region, and occupational and corporate structure. The results of this regression show that during the time period in question the employment share grew 3.8% faster in contractor establishments than in non-contractor establishments for black males, 7.9% faster for other minority males, 2.8% faster for white females, and 12.3% faster for black females. White male employment share grew 1.2% slower in contractor firms. Compliance reviews are found to increase the employment share of black males by an additional 7.9%, other minority males by 15.2%, and black females by 6.1%. Compliance reviews caused white female share to grow more slowly among contracting firms, but had no significant impact on white male employment shares. Leonard also attempts to present his results in terms of demand shifts. He assumes that Affirmative Action has not altered labor demand among non-contractors, that demand elasticities are equal among contractors and non-contractors, and that all firms face the same supply curve. Leonard concludes that Affirmative Action has increased the demand for women and racial minorities relative to white males. The effects are largest for non-black minority males and black females. The effects are somewhat smaller for black males and white females.

A more unique approach to examining the effects of antidiscrimination legislation is presented by James Heckman and Brook Payner (1979) in the article entitled "Determining the Impact of Federal Antidiscrimination Policy on the Economic Status of Blacks: A Study of South Carolina." This article differs from past research in that it attempts to explain a observed time-series phenomenon. Specifically, it examines the changes that occurred in the relative status of blacks in manufacturing, primarily during the 1960's. The authors point out that almost precisely at the year 1965, the economic status of blacks began to improve significantly both in terms of employment and wages. The question raised by the authors is whether or not this improvement can be attributed directly to federal antidisrimination legislation, or if there were other forces at work bringing about this change.

The authors explore several competing explanations for the sudden and rapid improvement in black economic status that began circa 1965, aside from the contribution of antidiscrimination policy. These explanations are summarized by the authors as "human capital stories, supply shift stories, and tight labor market stories." (Heckman and Payner 1979, 138) Upon considering the impact of several items unique to the South Carolina labor market at the time, the authors set out to test each one of these explanations separately. The authors conclude that changes in educational attainment and changes in industrial structure could not entirely explain the improvements in the labor force status of blacks. The authors also conclude that tight labor markets alone are not likely to be the sole determinant of this change of black status, although this hypothesis could not be directly tested. The authors also recognize the fact that the tight labor market hypothesis cannot be rejected with certainty. Indeed the authors acknowledge the fact that the labor market in South Carolina in the 1960s was unusually tight and that employers may simply have used federal antidiscrimination policy as an "excuse to do what they wanted to do anyway" (Heckman and Payner 1979, 174), that is, tap a plentiful reserve of low wage labor. They attempt to explain the change in black economic status through the use of econometric techniques and attribute any "unexplained" (the residual) change in status to government policy and find that the "residual" (and therefore government activity) plays a significant role.

It is apparent that Heckman and Payner's results are not entirely conclusive, nor are they likely to be generalizable, however, they do suggest that federal antidiscrimination legislation did indeed have an impact on the economic status of blacks in South Carolina.

**D. Summary**

The most salient points of literature review presented in the previous sections can be summarized as follows: 1) unemployment differentials experienced by minorities have persisted for many years, 2) unemployment differentials are probably caused by demographic characteristics as well as discrimination (possibly in the form of labor queues), 3) during the 1960-1980 period, blacks experienced large unemployment differentials due primarily to differing labor force ties , 4) civil rights legislation probably helped black males in terms of employment shares, 5) civil rights legislation probably improved the status of white women as well as black women in terms of employment shares, although the evidence is mixed, 6) the effects of such legislation on the employment share of white males is uncertain.

There indeed is no shortage of research involving unemployment rate differentials by race and gender, nor is there a shortage regarding the impact of civil rights legislation on employment. However, the literature is lacking in several ways. Research has not been undertaken to specifically examine the change in the relative burden of unemployment between females and racial minorities which began in the late 1960s. In addition, civil rights legislation has rarely been mentioned as a cause of changes in unemployment differentials, and seldom, if ever, been used as an explanation for the changes in the unemployment rate burden mentioned above.

Studies which have previously examined determinants of unemployment rate differentials have focused primarily on demographic differences between race-gender groups. Others have focused on differences in labor force attachment. However, even the most thorough of studies tend to overlook changes in the differential between females (especially white females) and racial minority groups and the determinants of such changes.

Research that has focused on the effects of civil rights legislation (especially affirmative action) has been limited in scope as well. First of all, research in this area does not address the possibility of gains made by white females at the expense of minority groups. Secondly, such studies often focus simply on employment shares of race-gender groups in contractor versus non-contractor firms, while overlooking the effects of civil rights legislation on the status of race-gender group in the economy as a whole. It is quite possible, for instance, that if nonwhite employment grows faster in firms who contract with the government, the unemployment rate for that group may still worsen, or at the very least may be worse than it would have been in the absence of such legislation. Indeed, such a measure of the impact of legislation does not consider changes in the labor force growth of various demographic groups, changes in hiring and firing practices of firms, the effects that such legislation may have on the non-contracting or non-reporting sectors of the economy, or any other factor related to unemployment. For example, is it accurate to note that civil rights legislation actually hurt white females given the fact that their labor force participation grew dramatically during the time period while their relative unemployment position improved? Might it be possible that the employment growth rate for white females, for example, was lower in contracting firms than it was in non-contacting firms because they simply experienced tremendous growth in employment with non-contracting firms who wanted to appear to be non-discriminating? Therefore, the examination of mere employment growth and employment shares in particular firms or industries does not provide sufficient information to measure the overall impact of any piece of legislation.

These mentioned shortcomings in the current state of the literature lead to the purpose of this current work. It is apparent that research is necessary that considers two things beyond what is currently provided in the current literature. First, a thorough analysis of changes in unemployment burdens must be developed. Secondly, this analysis must consider the possible role of civil rights legislation in shifting the unemployment burden.

## III. HYPOTHESIS

### A. Origins of the Hypothesis

While several authors have examined differences in employment by race and gender, few have offered explanations that are capable of explaining the aforementioned trend reversal in unemployment burdens. For instance, human capital arguments are often used to explain unemployment gaps. In order to explain this trend reversal using a human capital explanation one of two things would have to be true. First, either large changes in relative human capital would have had to occur, or secondly, it would behave to be true that in order to meet affirmative action requirements firms simply hired individuals with the most human capital and those individuals just happened to be white females. However, neither of these appear to be likely candidates for explaining this trend reversal because during this time the human capital gap between minorities and white males was narrowing for nonwhite individuals, and nearly constant for white females (Burstein, 1979). These trends in the human capital gap are not consistent with a widening unemployment gap. Other authors have focused on changes in the wage gap as a factor in determining the employment gap. Although the effects of the wage gap may not be thoroughly understood, one would suspect that, in the absence of employment discrimination, changes in the wage gap would have similar effects on employment for all groups relative to white males. However, this is not the observed phenomenon. While median wage and salary income for nonwhite individuals relative to white males did increase significantly during this time period, the trend began well before 1968. Also in a trend that started before 1968 the white female/white male ratio of wage and salary income fell somewhat. (Burstein 1979) Noting that both of these trends began well before 1968, it is unlikely that they are responsible for the trend reversal that occurred at 1968. Rather if discrimination existed it is likely that the narrowing of the wage gap simply aggravated the problem. Still other authors have focused on tight labor market theories and theories of occupational segregation. However these theories are unlikely candidates for explaining such an abrupt and sustained change as the observed reversal. These points suggest the possibility of employment discrimination as the driving force behind the trend reversal which, and leads to the primary hypothesis of this research.

## B. The Hypothesis

The hypothesis of this research stems from previous work to a certain degree. One possible explanation for the trend reversal in unemployment burdens mentioned previously is that civil rights legislation may have had an unexpected and perverse effect. It is possible that the addition of affirmative action to the existing civil rights legislation of the time may have influenced the decision making of discriminating employers in that they now viewed protected groups as substitutes in fulfilling the "good faith effort" required by affirmative action. This interpretation of the law could be used by contracting firms in an attempt to meet affirmative action requirements and by non-contracting firms to attempt to be perceived as non-discriminating firms. Indeed if employers have preferences in discrimination such that they prefer to hire white males (most employers were white males at the time) over all demographic groups and also have preferences between other demographic groups, it is possible that affirmative action could affect various demographic groups differently.

In terms of the familiar "Becker employer discrimination", discriminating firms behave as though the wage for those against whom the firm discriminates is $w(1 + d)$ where $w$ is the market wage rate and $d$ is a discrimination coefficient (Becker 1957). In these terms, a primary goal of anti-discrimination legislation would be to force firms to behave as though $d_i = 0$ for all groups. In terms of this research, the possibility that the discriminating employer has a different discrimination coefficient, $d_i$, for each group that it discriminates against is explored[2]. The following preferences are assumed to hold where the subscript $ww$ = white women, $nww$ = nonwhite women, $wm$ = white men,and the subscript $nwm$ = nonwhite men:

$$1)\ d_{ww} < d_{nwm} < d_{nwf}$$

$$2)\ d_{wm} = 0$$

This implies that discriminating employers discriminate first by race and then by gender. This in turn leads to a labor queue of the same order, ceteris paribus.

In the presence of discrimination and the resulting labor queue, if a firm must meet "quotas" in compliance with EEOC guidelines or simply hires members of certain groups

[2] This ordering may be influenced by pressures faced by the employer due to employee discrimination.

to avoid discrimination lawsuits, employers may be willing to hire as many of the group with the lowest $d_i$ as possible in order to achieve their goals. However, if an employer could hire enough members of the group with the lowest $d_i$ to meet its needs, then it would have little or no incentive to hire members of other minority groups. In other words, it simply practices discrimination of a different sort. If there are not enough members of the group with the lowest $d_i$ (in this case, white women) to meet its needs, then a firm will hire nonwhite men, and eventually nonwhite women. However, it is interesting to note that during the relevant time period, white women were entering the labor force in large numbers. Whether this is an effect of legislation or not is questionable, but it is obvious that if the hypothesis of this research is correct, the existence of a large pool of white women available to the labor market would have a significant negative impact on nonwhite individuals.

The hypothesis of this research stems from the fact that as labor markets became more integrated upon the passage of civil rights legislation, more women and racial minorities attempted to gain employment from discriminating firms. If employers prefer to hire white females over other protected groups, members of other minority groups are put at a relative disadvantage and therefore must search for a longer period of time to find employment. In this case, labor market desegregation would hurt those groups who are the furthest down the labor queue. In addition, in the presence of this type of discrimination, affirmative action through specifying that a "good faith effort" must be made might cause discriminating firms to meet the good faith effort by simply hiring the members of the group that it discriminates against the least. Given the hypothesized employer preferences, this would cause the unemployment burden of white females to improve, but it would cause the relative burden of nonwhite males and perhaps nonwhite females to worsen due to the increased amount of time required to successfully obtain employment[3].

The primary hypothesis of this research is that affirmative action altered the nature of discrimination (through altering the discrimination coefficients of the relevant groups) rather than eliminating it. In other words, it altered the manner in which labor market desegregation occurred in a way that helped some groups and harmed others, perhaps even reversing improvements that were made in the pre-affirmative action period. This change in discrimination impacted the relative unemployment burdens of protected groups in two ways. First of all, it gave employers an incentive to hire more white females in order to make a "good faith effort" (thus lowering the discrimination coefficient of white females) at the expense of racial minorities. Secondly, affirmative action may have altered the relative status of nonwhite women and nonwhite men in the labor queue. Specifically, by allowing nonwhite women to be counted as "double minorities" affirmative action may have lowered the discrimination coefficient of nonwhite women, thus improving their position in the queue. If this change was large enough, it may in fact have pushed nonwhite men further down the labor queue and therefore magnified the negative effect of affirmative action on nonwhite men. It is hypothesized that this in turn caused the unemployment burden of nonwhite men to worsen during the time period under consideration due to longer unemployment spells. Nonwhite women may have been

[3] It is also possible that the longer duration of nonwhite individuals was magnified by a change in the job queue for protected groups. For example, due to civil rights legislation protected groups may have perceived better probabilities associated with getting preferred jobs and therefore spent more time searching for such jobs. However, in the face of discrimination, the higher probability of employment in one of the more preferred jobs may only have been realized by those groups with the lowest $d_i$.

helped if the offsetting effect of being counted twice for the purpose of affirmative action is enough to lower their discrimination coefficient and bump them up in the labor queue. In addition, if employment discrimination is present, the narrowing of the wage gap could potentially magnify all of these results.

## IV. METHODOLOGY

The basic method employed in the analysis of the relationship between discrimination, legislation, and the shift in the relative unemployment burdens of women and nonwhite individuals will be composed of two parts. The first portion of the analysis will be purely econometric in nature utilizing vector autoregression. The second method employed will consist of an analysis of unemployment duration and incidence by demographic group during the post-1968 period.

### A. Econometric Analysis

The complexity of labor market dynamics in the macro sense enhances the attractiveness and worth of non-theoretical methods of analysis. One such widely accepted method is the use of vector autoregression (VAR). VAR is simply an econometric method that treats each variable in the model as endogenous. Each variable of the model is assumed to be a function of lagged values of itself as well as lagged values of all other variables in the model. In turn, vector autoregression does not require a theoretical specification of the model.

A representative work of the application of a VAR that closely mirrors the analysis undertaken in the following chapters is presented by John Abell in his 1991 article entitled "Distributional Effects of Monetary and Fiscal Policy". In this article Abell attempts to investigate the possibility that monetary and fiscal policy have differing effects for individual demographic groups. He notes that while most authors focus upon the effects of such policy on aggregate measures such as unemployment, few actually look at the distributional effects of such policy across race and gender groups. Abell presents a macro-oriented method designed to test for this possibility. The author follows the method of Sims (1980) in terms of the VAR techniques employed. According to Abell this method is "well suited to the task of identifying the temporal response of an economic variable, such as an unemployment rate, to an unanticipated shock, or innovation, to a policy variable" (Abell 1991, 274). The author estimates separate VAR models for each demographic group in which lagged values of the policy variable (the money supply measured by M2 and changes in cyclically adjusted government budget deficit) are regressed on each group's unemployment rate in order to determine the responsiveness of that group's unemployment rate to a shock in the policy variable. In addition, in order to account for changes brought about by the Reagan administration, Abell divides his data into two periods, 1974-1980 and 1981-1987. The results of the author's Chow test indicate that the two time periods do indeed require separation. Through the use of impulse response functions Abells shows that the unemployment rates of different demographic do indeed respond differently to changes in macroeconomic policy over time.

Abell's research implies that the effect of a policy shock on a given group's unemployment rate can be analyzed through the use of a VAR and that each response can be compared to that of other groups. In addition, the author's work demonstrates that the response of a group's unemployment rate to a shock in a policy variable can be analyzed and compared for two separate time periods as distinguished by a Chow test.

The intent of this work is to apply macro-oriented techniques similar to those of Abell in order to determine the differing impact of affirmative action on various demographic groups. The primary difference from Abell's work is that all of the unemployment rates and macro variables will be included in the VAR in order to account for the complex interactions between the variables. Separate equations will be run for the time period before April of 1968 (approximately the date at which affirmative action was implemented) and the time period from April of 1968 forward and the results compared. This technique should reveal the ordering of the labor queue, if it existed, in each time period. For example, if a labor queue existed, a positive shock in the unemployment rate for any group should have the largest adverse impact on the groups furthest down the labor queue from the group that experienced the shock as the number of most preferred individuals available for employment increases. Specifically, if the hypothesized ordering existed and a shock in the unemployment rate for white males occurred, for example, the largest impact should be felt by nonwhite females, the next largest by nonwhite males, and the smallest by white females. The effects of affirmative action should be manifested by a change in, or the elimination of, the ordering of the labor queue during the time period after its passage.

## B. Analysis of Duration and Incidence

Changes in the unemployment rate for any given time period can be attributed to two basic causes. First, it is possible that the length of unemployment spells changes (a change in duration). Secondly, it is possible that the number of people who enter unemployment during a given time period may change (a change in incidence). The relative importance of these two causes may have significant policy implications. As noted in the previous section, changes in unemployment duration and incidence provide valuable information. However, such an analysis has not been done in a way that will satisfy the needs of this work. The methodology employed here will be a combination of previous work, some of which is presented in this section.

Evidence of the relative importance of unemployment duration and incidence can shed light on the validity of the hypothesis stated previously. If this hypothesis is true, the duration of unemployment for nonwhite men, and perhaps nonwhite women, should be a significant force behind the relatively worsening position of these groups in the labor force after 1968. This stems from the fact that nonwhite individuals are further down the labor queue. Given the fact that white females were entering the labor force in large numbers during this time period, employers had an ample supply of individuals to hire in order to appear as though they were making a good faith effort in making more jobs available for protected groups. In turn, as labor markets became more integrated and nonwhite individuals found themselves competing with white females for jobs, nonwhite individuals would have to wait (revealed by longer unemployment duration) until employers found it "necessary" to hire more of their respective demographic group (this effect would be magnified for nonwhite males as they were "bumped" down the labor queue). Therefore, if after 1968 changes in unemployment duration for different demographic groups had the hypothesized ordering, the hypothesis of this paper would find support.

The likely role played by changes in unemployment incidence is unclear. If employers were to fire members of demographic groups disproportionately, this would simply be due to discrimination in employment termination. It is believed however that firms would be less likely to practice discrimination in firing due to the high risks associated with it. In addition, it is likely that if a discriminating firm has found its optimal race/gender mix, it is likely to try preserve that mix when firing is necessary. Although this may or may not be the case, the importance of changes in incidence is ancillary to the focus of this paper but provides useful information. If it is found that an increase in incidence relative to duration was the primary force causing the changes in the relative unemployment burden of white females and nonwhite individuals, the hypothesis of this presented here is unlikely to be accurate. If it is found that the incidence rate became relatively more important after 1968, it is possible that affirmative action had a different perverse effect than the one hypothesized. For example, it may be the case that affirmative action successfully prevented discrimination in hiring, but did not prevent discrimination in firing. In other words, it is possible that firms hired demographic groups according to their representation in the entire population (or perhaps even favored protected groups), but it may also be that firms discriminated by firing certain demographic groups at higher rates thus increasing the incidence rate of certain demographic groups.

The duration and incidence of unemployment by demographic group has been examined to some extent in the literature. A representative study of the literature on the incidence and duration of unemployment was presented by Hal Sider in 1985. Sider's work was unique at the time in that it recognized the need for a method of analysis that did not rely upon steady state assumptions. Sider's work is typical in that it simply examines duration and incidence for the entire labor force. The author uses unpublished data from the Current Population Survey for the years 1967-1982 in order to analyze trends in the relative importance of duration and incidence in the determination of the unemployment rate. Sider finds that over the period the long run increase in the unemployment rate was nearly equally attributable to increases in duration and incidence, but that cyclical variations were due primarily to changes in spell duration.

A similar study was undertaken by Michael Baker in his article entitled "Unemployment Duration: Compositional Effects and Cyclical Variability". Baker applies non-steady state techniques to data from 1980-1988 by race and gender. He finds that during the 1980s increased duration was the primary cause of higher unemployment rates for most demographic groups during recessions. The author notes that this results differs from the results of most studies using data from the 1960s and 1970s that employed steady state assumptions.

In addition to the work mentioned above, numerous studies have been conducted that examine similar but not identical topics. For example, research such as that by Bowers and Harkess (1979) examines duration by age and sex, whereas Butler and McDonald (1986) examine trends in unemployment duration for the entire labor force from 1948-1980. However, the research mentioned above fails to examine both duration and incidence by race and sex for the time period under examination in this research and fails to consider the possible effects of civil rights legislation.

The literature to date on unemployment duration and incidence has failed to provide the information needed for this current work in several ways. First of all, until the work of Hal Sider in 1985, much of the research in this area relied upon the use of steady state assumptions, implying that the flows into unemployment and out of unemployment are constant over time. The work of Sider demonstrated that this technique is not optimal. Secondly, researchers employing non-steady state techniques have not examined unemployment duration and incidence by demographic group over the relevant time period. Therefore, in order analyze unemployment duration and incidence the research presented here will employ non-steady state techniques similar to those of Sider, but will focus on changes experienced by different demographic groups as was the case with Baker (1992) and Bowers and Harkess (1979).

## V. DATA

This research involves two separate types of analysis (the VAR and the analysis of unemployment duration and incidence) each of which requires a unique data set.

The VAR technique requires standard aggregate economic data on unemployment rates, GDP, M2, and the cyclically adjusted budget deficit. Data of this type is readily available for the time period under consideration. The unemployment data was downloaded from the Bureau of Labor Statistics web site. A potential limitation of this data is the limited racial categories provided during the earlier portion of the time period under consideration. Specifically, there are only two racial categories provided, those being "white" and "nonwhite". However, this limitation is not expected to be a major obstacle in testing the hypothesis stated previously. The data on M2 was downloaded from the FRED (Federal Reserve Economic Data) database located at the web site maintained by the St. Louis Federal Reserve. Data for the cyclically adjusted budget deficit was collected form the Survey of Current Business (1986). None of the data for this analysis is seasonally adjusted.

The data required for the analysis of the duration and incidence of unemployment spells is a bit less common. Conducting a non-steady state analysis of this sort requires the use of unpublished Current Population Survey data on the duration of current unemployment spells by individual weeks (0-99) by race and gender. This data underlies the published intervals and has been collected since 1967. It is available only on microfiche at the Bureau of Labor Statistics in Washington DC. The data used in this research is an unofficial copy of the data provided on these microfiche.[4]

## VI. ANALYSIS

### A. Vector Autoregression

#### i. Stationarity

It is a well-documented fact that time series data need to be stationary in order for time series relationships to be correctly modeled (Hsiao 1981). Therefore, for the purpose of this research the data sample was split at the April 1968 point and the data series for the two time periods were tested for stationarity. Inspection of the autocorrelation functions indicate several of the series may not be stationary and indeed warrant further testing. Perhaps the most common test applied to this problem is the augmented Dickey-Fuller test. The augmented Dickey-Fuller test is provided in the SAS/ETS software and is applied to the data used in this research. Each data series was tested for a unit and second roots as well as a twelve month seasonal unit root. The test provided in the SAS software provides some flexibility in the specification of the Dickey-Fuller test. Specifically, the TREND option allows for three different possibilities: 1) TREND=0 "assumes the series has a zero mean" 2) TREND=1 "includes an intercept term" 3) TREND=2 "specifies an intercept and a linear time trend". After visual inspection of the data it was determined that the following routine would provide the most accurate test for stationarity. This routine is as follows: First each series was tested for a unit root with the TREND=2

[4] This unofficial BLS data was provided by Mike Horrigan.

option in order to allow for the trend that was apparent in the data. If no unit root was found the series was tested for a seasonal root. This testing for a seasonal root was done first with the TREND=0 option and then with the TREND=1 option. On the other hand, if a unit root was found to exist in the original test, the series was differenced and checked for a second root using all three TREND options. If no second root was found (no second roots where found to exist for any of the data series) but a unit root had been found, the series was differenced and tested for a seasonal root using the TREND=1 option. It was found that all of the unemployment series and the deficit series required first differencing only. The GDP and M2 variables were presented as growth rates and were stationary, thus requiring no differencing.

**ii. Lag Lengths**

Following Enders (1995), determining the lag lengths to use in a VAR is important for several reasons. First of all, given the nature of a VAR, degrees of freedom are quickly used up as the number of lags included is increased. Recalling that a VAR has a total of $n^2p + n$ parameters, where $p$ is the number of lags used for each of $n$ variables, the number of parameters that must be estimated in the system increases by a factor of $n^2$ when the lag length is increased by one time period. Therefore, in a system such as the one currently under consideration increasing the lag length by one time period increase the number of parameters to be estimated by a total of 49. Therefore, the researcher must be careful not to consume degrees of freedom unnecessarily. The importance of this is magnified in studies such as this one where the sample size is relatively small, recalling that the sample was split at the April 1968 point and that some data series are only available back to July of 1959. On the other hand, if the researcher does not include enough lags in the model, the model will be misspecified. In order to avoid this misspecification as well as avoid wasting degrees of freedom, Enders suggest several possible methods for testing for the appropriate lag lengths. Perhaps the most useful, and most common, tests for lag lengths that do not rely upon asymptotic theory are the "mutivariate generalizations" of the Akaike Information Criteria (AIC) and the Schwartz-Bayesian Criteria (SBC). Both of these tests were used to determine the appropriate lengths in this model, but the SBC was found to provide more consistent results and was therefore the primary statistical tool to analyze lag lengths. The SBC is presented in Enders as:

$$SBC = T \log |\Sigma| + N \log(T)$$

where $|\Sigma|$ is the determinant of the variance/covariance matrix of the residuals and N is the total number of parameters estimated in all equations of the system and T is the number of usable observations. A search of 3, 6, 9, and 12 (where possible) lags was conducted for this model for each of the time periods. The minimum SBC was found to be at a lag length of three months for both time periods and therefore was chosen as the appropriate lag length for all variables in each time period.

### iii. Verification of the Sample Split

The hypothesis of this research relies upon the assumption that the basic structure of the relationship between the unemployment rates of certain demographic groups changed after the introduction of affirmative action. This is an assumption that can easily be tested with the use of Chow tests.

Following Pindyck and Rubinfeld (1991), in order to test the hypothesis that the coefficients for regressions in two different time periods are identical (i.e. the sample should not be split because the basic relationships are the same in each time period), the following F statistic should be computed:

$$F_{k,N+m-2k} = ((ESS_R - ESS_{UR})/k)/(ESS_{UR}/(N + M - 2k))$$

Where k is the number of restrictions, N is the number of observations in the first time period and M is the number of observations in the second time period. Also, $ESS_R$ is the error sum of squares for the restricted model and $ESS_{UR}$ is the error sum of squares for the unrestricted model. In this case, the restricted model is the model which does not split the sample, thus restricting the coefficients in the two time periods to be equal. Each model was run with three lags on each variable as was explained in the previous section. The critical F values for $F_{23,213}$ is approximately 1.5. The F statistics calculated for each equation in the VAR are as follows: GDP = 2.34, Deficit = 10.07, M2 = 1.99, White Male = 2.29, White Female = 3.39, Nonwhite Male = 2.87, Nonwhite Female = 4.27. In turn, the null hypothesis of equal coefficients in the two time periods is rejected in each case and the sample split is thus verified. This supplies statistical confirmation of the break in the data and supports the notion that the relationship between the variables changed significantly after the introduction of affirmative action.

**iv. The Model**

As stated previously, vector autoregression is an excellent method for analyzing the relationships between variables, especially over time. This research is primarily concerned with the relative well being of different demographic groups in terms of unemployment rates during two different time periods. As is often noted, the VAR itself does not require the use of a specific theoretical model. As stated by Enders (1995) the primary role of the economist is simply to choose which variables are to be included in the model. However, a bit of caution is warranted in the selection of the variables to be included in a VAR. Due to the nature of a VAR, the number of parameters that must be estimated tends to be large. In fact the number of parameters estimated in a VAR with $n$ variables and $p$ lags on each variable is $n^2p + n$. Therefore, it is important to choose variables in a parsimonious fashion as the addition of extra variables will consume a large number of degrees of freedom. The variables chosen for the model in this current work largely reflect those of Abell, with a few minor exceptions. Unlike the work by Abell mentioned previously, this current work includes unemployment rates for all groups in the VAR thus acknowledging the complex interrelationships involved in each series. In addition to the unemployment rates, the growth rate of M2 (as a measure of monetary policy), the cyclically unadjusted budget deficit (as a measure of fiscal policy), and the growth rate of real GDP are included in the model. As pointed out by Abell (1991), both monetary and fiscal policy have a differing impact among demographic groups in terms of unemployment and therefore are appropriate variables to be included in any model which attempts to analyze the relationship between the unemployment rates of different demographic groups. GDP was also included in the model, unlike Abell, as it seemed to be a prime candidate for enhancing the explanatory power of the model. The equations applied to each time period are identical and are as follows:

$$\begin{aligned}GDP_t = {} & \beta_o + \beta_{GDP,t-1}GDP_{t-1} + \beta_{GDP,t-2}GDP_{t-2} + \beta_{GDP,t-3}GDP_{t-3} + \\ & \beta_{DEF,t-1}DEF_{t-1} + \beta_{DEF,t-2}DEF_{t-2} + \beta_{DEF,t-3}DEF_{t-3} + \beta_{M2,t-1}M2_{t-1} + \\ & \beta_{M2,t-2}M2_{t-2} + \beta_{M2,t-3}M2_{t-3} + \beta_{WM,t-1}WM_{t-1} + \beta_{WM,t-2}WM_{t-2} + \\ & \beta_{WM,t-3}WM_{t-3} + \beta_{WF,t-1}WF_{t-1} + \beta_{WF,t-2}WF_{t-2} + \beta_{WF,t-3}WF_{t-3} +\end{aligned}$$

$$\beta_{NWM,t-1}NWM_{t-1} + \beta_{NWM,t-2}NWM_{t-2} + \beta_{NWM,t-3}NWM_{t-3} +$$

$$\beta_{NWF,t-1} NWF_{t-1} + \beta_{NWF,t-2}NWF_{t-2} + \beta_{NWF,t-3} NWF_{t-3} + \beta_{SD,t-1}SD$$ [5]

$$DEF_t = \beta_o + \beta_{GDP,t-1}GDP_{t-1} + \beta_{GDP,t-2}GDP_{t-2} + \beta_{GDP,t-3}GDP_{t-3} +$$

$$\beta_{DEF,t-1}DEF_{t-1} + \beta_{DEF,t-2}DEF_{t-2} + \beta_{DEF,t-3}DEF_{t-3} + \beta_{M2,t-1}M2_{t-1} +$$

$$\beta_{M2,t-2}M2_{t-2} + \beta_{M2,t-3}M2_{t-3} + \beta_{WM,t-1}WM_{t-1} + \beta_{WM,t-2}WM_{t-2} +$$

$$\beta_{WM,t-3}WM_{t-3} + \beta_{WF,t-1}WF_{t-1} + \beta_{WF,t-2}WF_{t-2} + \beta_{WF,t-3}WF_{t-3} +$$

$$\beta_{NWM,t-1}NWM_{t-1} + \beta_{NWM,t-2}NWM_{t-2} + \beta_{NWM,t-3}NWM_{t-3} +$$

$$\beta_{NWF,t-1} NWF_{t-1} + \beta_{NWF,t-2}NWF_{t-2} + \beta_{NWF,t-3} NWF_{t-3} + \beta_{SD,t-1}SD$$

$$M2_t = \beta_o + \beta_{GDP,t-1}GDP_{t-1} + \beta_{GDP,t-2}GDP_{t-2} + \beta_{GDP,t-3}GDP_{t-3} +$$

$$\beta_{DEF,t-1}DEF_{t-1} + \beta_{DEF,t-2}DEF_{t-2} + \beta_{DEF,t-3}DEF_{t-3} + \beta_{M2,t-1}M2_{t-1} +$$

$$\beta_{M2,t-2}M2_{t-2} + \beta_{M2,t-3}M2_{t-3} + \beta_{WM,t-1}WM_{t-1} + \beta_{WM,t-2}WM_{t-2} +$$

$$\beta_{WM,t-3}WM_{t-3} + \beta_{WF,t-1}WF_{t-1} + \beta_{WF,t-2}WF_{t-2} + \beta_{WF,t-3}WF_{t-3} +$$

$$\beta_{NWM,t-1}NWM_{t-1} + \beta_{NWM,t-2}NWM_{t-2} + \beta_{NWM,t-3}NWM_{t-3} +$$

$$\beta_{NWF,t-1} NWF_{t-1} + \beta_{NWF,t-2}NWF_{t-2} + \beta_{NWF,t-3} NWF_{t-3} + \beta_{SD,t-1}SD$$

$$WM_t = \beta_o + \beta_{GDP,t-1}GDP_{t-1} + \beta_{GDP,t-2}GDP_{t-2} + \beta_{GDP,t-3}GDP_{t-3} +$$

$$\beta_{DEF,t-1}DEF_{t-1} + \beta_{DEF,t-2}DEF_{t-2} + \beta_{DEF,t-3}DEF_{t-3} + \beta_{M2,t-1}M2_{t-1} +$$

$$\beta_{M2,t-2}M2_{t-2} + \beta_{M2,t-3}M2_{t-3} + \beta_{WM,t-1}WM_{t-1} + \beta_{WM,t-2}WM_{t-2} +$$

$$\beta_{WM,t-3}WM_{t-3} + \beta_{WF,t-1}WF_{t-1} + \beta_{WF,t-2}WF_{t-2} + \beta_{WF,t-3}WF_{t-3} +$$

[5] Each equation includes monthly seasonal dummy variables.

$$\beta_{NWM,t-1}NWM_{t-1} + \beta_{NWM,t-2}NWM_{t-2} + \beta_{NWM,t-3}NWM_{t-3} +$$

$$\beta_{NWF,t-1} NWF_{t-1} + \beta_{NWF,t-2}NWF_{t-2} + \beta_{NWF,t-3} NWF_{t-3} + \beta_{SD,t-1}SD$$

$$WF_t = \beta_o + \beta_{GDP,t-1}GDP_{t-1} + \beta_{GDP,t-2}GDP_{t-2} + \beta_{GDP,t-3}GDP_{t-3} +$$

$$\beta_{DEF,t-1}DEF_{t-1} + \beta_{DEF,t-2}DEF_{t-2} + \beta_{DEF,t-3}DEF_{t-3} + \beta_{M2,t-1}M2_{t-1} +$$

$$\beta_{M2,t-2}M2_{t-2} + \beta_{M2,t-3}M2_{t-3} + \beta_{WM,t-1}WM_{t-1} + \beta_{WM,t-2}WM_{t-2} +$$

$$\beta_{WM,t-3}WM_{t-3} + \beta_{WF,t-1}WF_{t-1} + \beta_{WF,t-2}WF_{t-2} + \beta_{WF,t-3}WF_{t-3} +$$

$$\beta_{NWM,t-1}NWM_{t-1} + \beta_{NWM,t-2}NWM_{t-2} + \beta_{NWM,t-3}NWM_{t-3} +$$

$$\beta_{NWF,t-1} NWF_{t-1} + \beta_{NWF,t-2}NWF_{t-2} + \beta_{NWF,t-3} NWF_{t-3} + \beta_{SD,t-1}SD$$

$$NWM_t = \beta_o + \beta_{GDP,t-1}GDP_{t-1} + \beta_{GDP,t-2}GDP_{t-2} + \beta_{GDP,t-3}GDP_{t-3} +$$

$$\beta_{DEF,t-1}DEF_{t-1} + \beta_{DEF,t-2}DEF_{t-2} + \beta_{DEF,t-3}DEF_{t-3} + \beta_{M2,t-1}M2_{t-1} +$$

$$\beta_{M2,t-2}M2_{t-2} + \beta_{M2,t-3}M2_{t-3} + \beta_{WM,t-1}WM_{t-1} + \beta_{WM,t-2}WM_{t-2} +$$

$$\beta_{WM,t-3}WM_{t-3} + \beta_{WF,t-1}WF_{t-1} + \beta_{WF,t-2}WF_{t-2} + \beta_{WF,t-3}WF_{t-3} +$$

$$\beta_{NWM,t-1}NWM_{t-1} + \beta_{NWM,t-2}NWM_{t-2} + \beta_{NWM,t-3}NWM_{t-3} +$$

$$\beta_{NWF,t-1} NWF_{t-1} + \beta_{NWF,t-2}NWF_{t-2} + \beta_{NWF,t-3} NWF_{t-3} + \beta_{SD,t-1}SD$$

$$NWF_t = \beta_o + \beta_{GDP,t-1}GDP_{t-1} + \beta_{GDP,t-2}GDP_{t-2} + \beta_{GDP,t-3}GDP_{t-3} +$$

$$\beta_{DEF,t-1}DEF_{t-1} + \beta_{DEF,t-2}DEF_{t-2} + \beta_{DEF,t-3}DEF_{t-3} + \beta_{M2,t-1}M2_{t-1} +$$

$$\beta_{M2,t-2}M2_{t-2} + \beta_{M2,t-3}M2_{t-3} + \beta_{WM,t-1}WM_{t-1} + \beta_{WM,t-2}WM_{t-2} +$$

$$\beta_{WM,t-3}WM_{t-3} + \beta_{WF,t-1}WF_{t-1} + \beta_{WF,t-2}WF_{t-2} + \beta_{WF,t-3}WF_{t-3} +$$

$$\beta_{NWM,t-1}NWM_{t-1} + \beta_{NWM,t-2}NWM_{t-2} + \beta_{NWM,t-3}NWM_{t-3} +$$

$$\beta_{NWF,t-1} NWF_{t-1} + \beta_{NWF,t-2} NWF_{t-2} + \beta_{NWF,t-3} NWF_{t-3} + \beta_{SD,t-1} SD.$$

As can be seen, the variables on the right hand side of each equation are identical. Therefore there is no advantage to using seemingly unrelated regressions techniques as it would involve no efficiency gains over ordinary least squares estimation.

**v. Impulse Response Functions**

Due to the complexity of a vector autoregressive system and the associated difficulties in the interpretation of the parameter estimates, certain methods have been developed to provide a more informative representation of the relationships between the variables in a VAR. One of the most common methods, and the one that is employed here, is the impulse response function. In the most basic sense, following Enders, the impulse response function traces out over time the effects of a shock in one variable on the level of the other variables contained within the system. For instance, a one standard deviation shock in a variable may have a contemporaneous effect on the level of some other variable in the system. However, over time, the overall impact of the shock in this variable will be greater than just this initial shock. In other words this shock may have secondary effects that are felt throughout the system both contemporaneously and in future periods. Given the fact that in a VAR each variable is assumed to be a function of its own lagged values and the lagged values of the other variables in the system it is apparent that this contemporaneous shock will have additional effects in future time periods. For example, in a two variable VAR, if a variable, $A$, experiences a one standard deviation shock in time period one, that shock may have a contemporaneous impact on a variable, $B$. In the two variable example the impact of this shock will be felt in time period two because the magnitude of $A$ in time period two is a function of the levels of $A$ & $B$ in time period one. Similarly, if the VAR contains at least two lags, in time period three the size of the shock to variables $A$ & $B$ will be determined by the size of the impact of the initial shock in time periods one and two. If the system is stable, the impact of this shock should approach zero as the number of time periods increases. It is this basic "tracing out" procedure that leads to the impulse response function.

To derive an impulse response function one must first estimate the values of the parameters of the system, for it is the value of these parameters that will determine how a shock in one variable is distributed throughout the system over time. Once the parameters have been estimated one can introduce a shock in one variable at time period one and see how it "changes" the levels of the other variables over time. The magnitude of these changes are determined by the estimated parameters. It is assumed that this shock occurs only at time period one and returns to zero in time period two.

There are two basic problems that must be resolved before impulse response functions can be derived. First, if one is to introduce a one standard deviation shock to a system, one must first be able to measure the size of the shock. Secondly, given the nature of a VAR, it is necessary to identify the contemporaneous nature of the shocks in the variables within the model. The answers to these questions are closely related. The first of these questions is straight forward. Given that fact that the value of a variable is assumed to be explained by past values of that variable and past values of the other variables in the system, the observed residuals from the equation represent shocks that have occurred to that variable in the current time period. Therefore the shock introduced to the system is simply a one standard deviation shock in the residuals for a given equation. The answer to the second problem, following Enders, is a bit more complex noting that it is necessary to determine the contemporaneous nature of the shocks in the variables of the model in order to trace out the effects of a shock throughout the entire system. The most common way to approach this problem is to impose a structure on the relationship between the shocks. Perhaps the most common of these "decompositions" is the Cholesky decomposition. Such a decomposition is relatively easy to implement, but clearly arbitrary. A Cholesky decomposition was imposed on the system at hand, but it was found that when the ordering was reversed, the resulting impulse response functions were altered substantially. As is warned by Enders, this result indicates that the researcher should look for another decomposition, as the decomposition preferably should not dictate the outcome of the research. Keeping with the spirit of a VAR, the decomposition chosen was simply the one revealed by the data. In other words, the significance of the contemporaneous correlations between the observed shocks were tested, and those which were found to be significant were included as a component of the observed shock. The decomposition that was found to be appropriate for the relevant equations is as follows.

Time Period one, July 1959 - March 1968:

$$e_{wmt} = \varepsilon_{wmt} + \rho_{gdpt,wmt}\varepsilon_{gdpt} + \rho_{wft,wmt}\varepsilon_{wft} + \rho_{nwmt,wmt}\varepsilon_{nwmt} + \rho_{nwft,wmt}\varepsilon_{nwf}$$

$$e_{wft} = \varepsilon_{wft} + \rho_{wmt,wft}\varepsilon_{wmt} + \rho_{nwmt,wft}\varepsilon_{nwmt} + \rho_{nwft,wft}\,\varepsilon_{nwft}$$

$$e_{nwmt} = \varepsilon_{nwmt} + \rho_{wmt,nwmt}\varepsilon_{wmt} + \rho_{wft,nwmt}\,\varepsilon_{wft} + \rho_{nwft,nwmt}\,\varepsilon_{nwft}$$

$$e_{nwft} = \varepsilon_{nwft} + \rho_{wmt,nwft}\varepsilon_{wmt} + \rho_{wft,nwft}\,\varepsilon_{wft} + \rho_{nwmt,nwft}\,\varepsilon_{nwmt}$$

Time Period two, April 1968 - December 1980:

$$e_{wmt} = \varepsilon_{wmt} + \rho_{gdpt,wmt}\varepsilon_{gdpt} + \rho_{deft,wmt}\,\varepsilon_{def} + \rho_{m2t,wmt}\,\varepsilon_{m2} + \rho_{wft,wmt}\,\varepsilon_{wft} + \rho_{nwmt,wmt}\,\varepsilon_{nwmt}$$

$$e_{wft} = \varepsilon_{wft} + \rho_{gdpt,wft}\varepsilon_{gdpt} + \rho_{m2t,wft}\,\varepsilon_{m2t} + \rho_{wmt,wft}\,\varepsilon_{wmt} + \rho_{nwmt,wft}\,\varepsilon_{nwmt} + \rho_{nwft,wft}\,\varepsilon_{nwf}$$

$$e_{nwmt} = \varepsilon_{nwmt} + \rho_{gdpt,nwmt}\varepsilon_{gdpt} + \rho_{m2t,nwmt}\,\varepsilon_{m2} + \rho_{wmt,nwmt}\,\varepsilon_{wmt} + \rho_{nwmt,nwmt}\,\varepsilon_{wft}$$

$$e_{nwft} = \varepsilon_{nwft} + \rho_{wmt,nwft}\varepsilon_{wmt} + \rho_{wft,nwft}\,\varepsilon_{wft}$$

Where $e$ is the observed residual for the given variable in time period $t$, $\varepsilon$ is the "structural" shock in the variable in time $t$, and $\rho$ is the contemporaneous correlation coefficient between the two observed shocks.

From this point, deriving the impulse response function for a shock in a variable is a straightforward process. First a shock is introduced equal in size to one standard deviation of the observed residual for the variable. The contemporaneous portion of this shock is distributed through the system is fashion consistent with the decomposition listed above. The effects of this shock in subsequent periods are then traced out over time in a manner consistent with the estimated parameters of the VAR.

### vi. VAR Results

As stated previously, a VAR is designed to reveal the relationship between certain variables. In this case, the primary tool used to do this is the impulse response function. If the hypothesis that civil rights legislation altered the relationship between the unemployment rates of certain demographic groups is true, this change should be apparent in the impulse response function associated with the two time periods. For example, when a positive shock occurs in a given unemployment rate, the unemployment rate for those individuals further down the labor queue should experience an increase in their unemployment rates. In fact, if labor queues arranged by race and gender do indeed exist, then the group furthest down the labor queue should experience the largest impact on its unemployment rate, followed next in magnitude by the group second to last in the labor queue, and so on. In fact, all of the necessary information regarding labor queues will be presented in the unemployment rate impulse response functions and therefore these functions will be the focus of this research. If the hypothesis of this research is correct, it is first of essential that the impulse response function reveal a definite ordering of the labor queue. Secondly, the impulse response functions for the two time periods should differ in a way that is consistent with a worsening of the position of nonwhite males in the labor queue, an improvement for white females, while the effect on nonwhite females will depend upon the magnitude of the effect of that group being a "double minority". The results of the VAR analysis regarding unemployment rates are provided in the following paragraphs, whereas cumulative impulse response functions for all variables are presented in the appendixes B and C.

### 1. cumulative impulse response functions prior to affirmative action

As can be seen in Figure 2, a shock in the unemployment rate of white males provides a fairly clear picture of the structure of the labor queue. First of all, a one standard deviation shock in the unemployment rate of white males causes all of the other unemployment rates to increase and remain at a level that is higher than they were before the shock. The cumulative effects of this shock are such that nonwhite females experience the largest increase in unemployment rates, followed by nonwhite males and then nonwhite females. The first evidence of labor queues thus suggests an ordering in the time period prior to affirmative action along the lines of white female, nonwhite male, nonwhite female. However, shocks in all unemployment rates must be considered before definite conclusions are reached.

**Figure 2**
**Shock in White Male Unemplyment Rate, 1959-1967.**

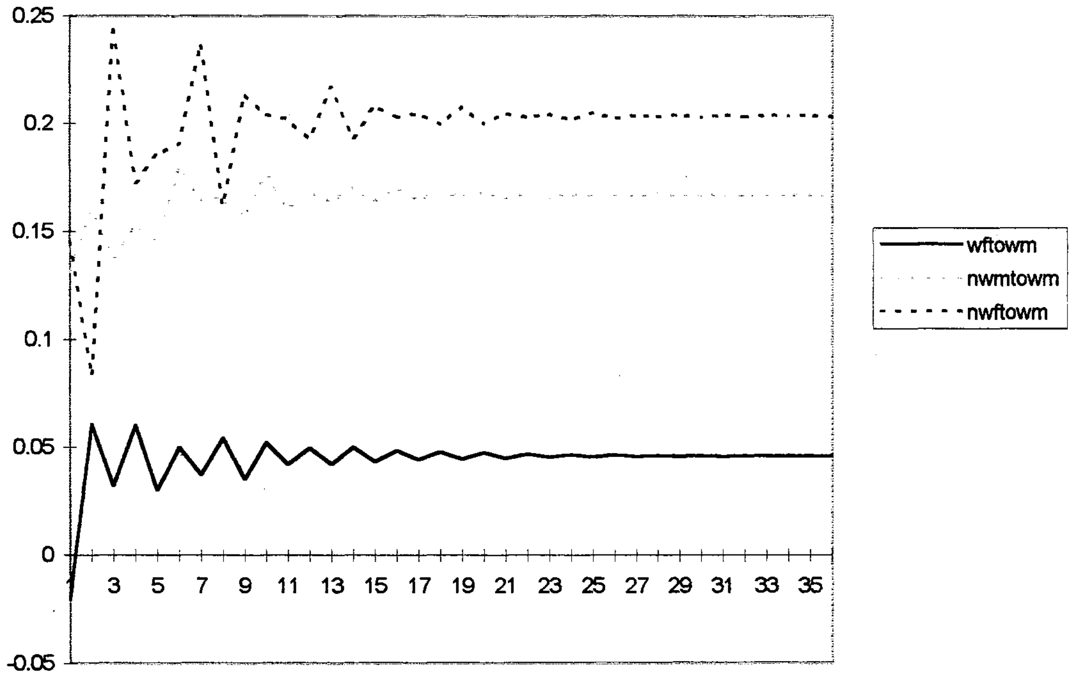
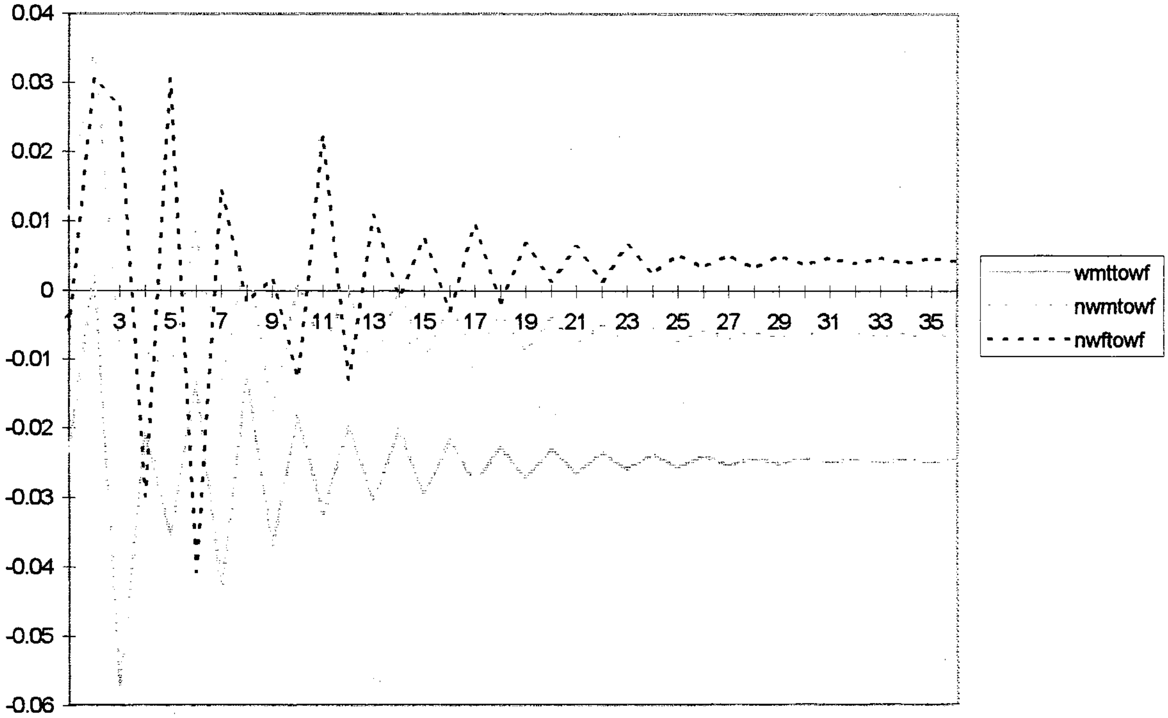


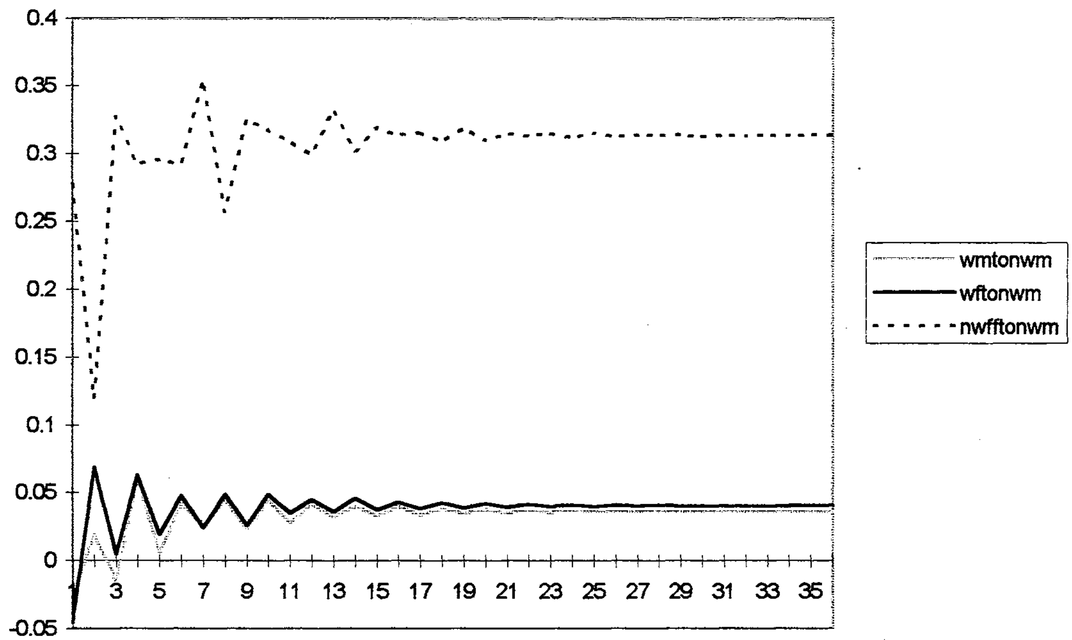
**Figure 3**
**Shock in White Female Unemployment Rate, 1959-1967.**



The cumulative impulse response functions for a one standard deviation shock in the first time period to the unemployment rate of white females is presented in Figure 3. The effects of this shock are a bit less clear than the effect for a shock to the unemployment rate of white males, but a reasonably clear picture can still be drawn. First of all, the responses of the relevant unemployment rates to this shock are a bit more volatile. The effects of the shock tend to be the largest for white males, however, in this first time period the unemployment rate for white males actually falls slightly as the unemployment rate of white females increases. Here it is necessary to note that the impact of such a shock on those groups ahead in the labor queue of the group that experiences the shock is uncertain. The overall effects of this shock on the unemployment rates of nonwhite individuals are relatively small, as well as volatile in the early time periods. Over time, however, the unemployment situation of nonwhite males improves by a very small amount and the unemployment rate for nonwhite males worsens slightly. The relevant point for the research at hand is that regardless of the sign of the overall impact of this shock, the ordering is consistent with the hypothesis of this research which also is supported by the evidence from a shock to the white male unemployment rate in the same time period. The implied ordering is: white male, nonwhite male, nonwhite female.

Figure 4 shows the cumulative impulse response functions for a shock in the nonwhite male unemployment rate. These impulse response functions once again show a clear picture. A shock in the nonwhite male unemployment rate has the largest impact on nonwhite females with the unemployment rate for nonwhite females increasing by a total

**Figure 4**
**Shock in Nonwhite Male Unemplyment Rate, 1959-1967.**

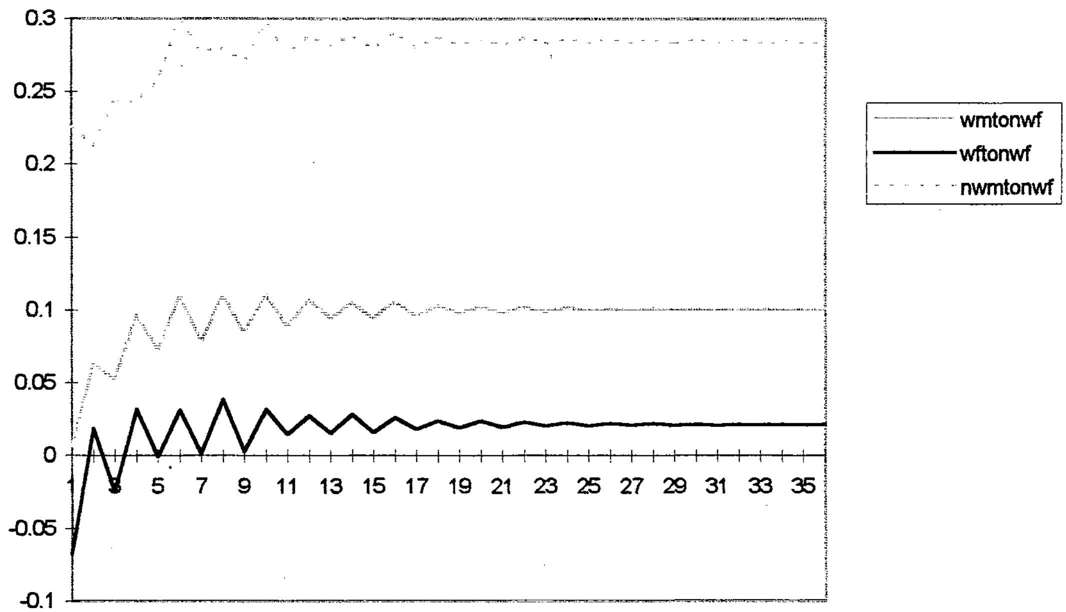


of over 30 basis points during the 36 month period. The impact of this shock on the unemployment rates of white males and white females are very similar in this case. With the exception of the very early response to this shock, the response of white males and white females are nearly identical with the overall impact being a relatively small increase in the unemployment rate of each group. The implied ordering of the labor queue in this case is: white males/white females, nonwhite males.

A shock in the unemployment rate of nonwhite females, as is presented in Figure 5, is once again reasonably consistent with previous results. A shock in the unemployment rate of nonwhite females brings about a rather large increase in the unemployment rate of nonwhite males. The relationship between white males and white females is different from the one implied in previous paragraphs. In this case, the shock in the unemployment rate of nonwhite females hurts white males more than it hurts white females. The ordering implied here is: white females, white males, nonwhite females.

The previous paragraphs have led to the conclusion that prior to the implementation of affirmative action, there was a labor queue in which race and gender were a factor. Specifically, white individuals were at relative advantage with white females probably being a bit better off than white males. Nonwhite individuals were at a relative disadvantage with nonwhite males being better off than nonwhite females. The ordering thus implied in this time period is: white females, white males, nonwhite males, nonwhite females.

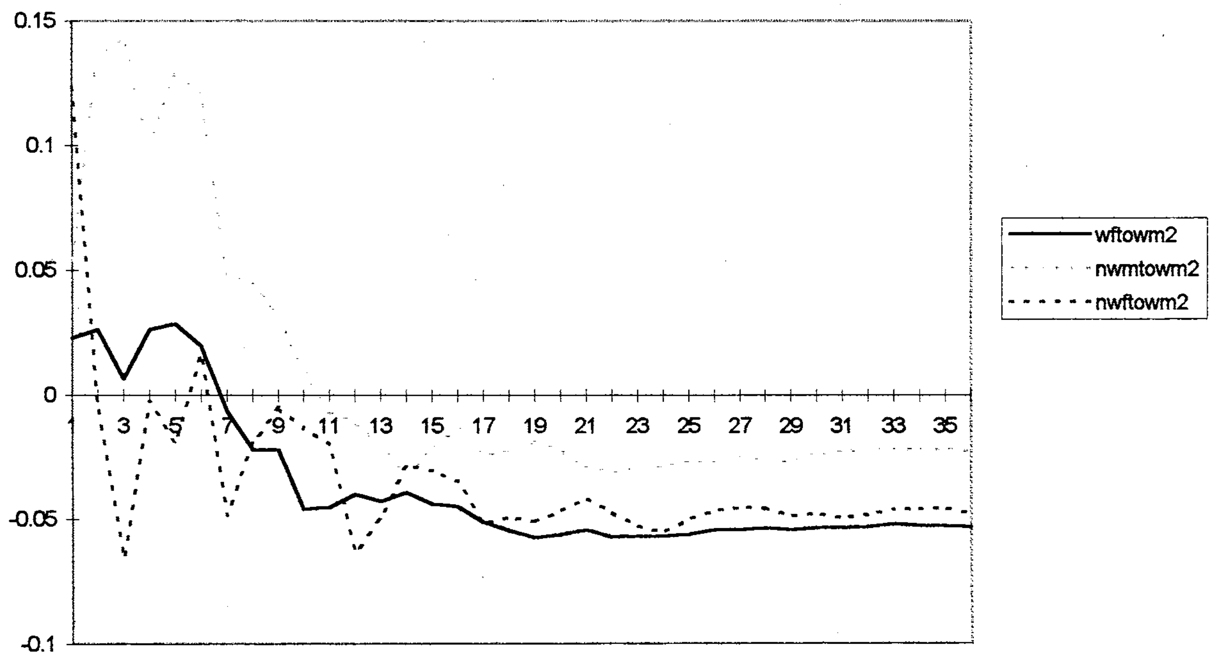
**Figure 5**
**Shock in Nonwhite Female Unemployment Rate,**
**1959-1967.**



### 2. cumulative impulse response functions after affirmative action

A few notes are necessary before analysis of the second period impulse response functions can begin, as the structure of the impulse response functions isn't nearly as clear as it was for the first period. First of all, the ordering is not as clear, which in itself suggests that affirmative action did have some effect. Secondly, unlike the first time period the effects of the given shocks tend to be large in the early time periods but gradually dissipate over time, possibly due to differing levels of policy activity. These facts however do not greatly reduce of the significance of the conclusions drawn. Because the shape of these impulse response functions differs from that of the first time period the interpretation requires a little more effort. Specifically if the differing responses of certain demographic groups is due to the labor queue ordering, the logical response would be for unemployment rates to increase in the short run in a manner consistent with the labor queue ordering. During subsequent periods, the cumulative effect will settle to a level determined by the forces within the system, such as economic policy. Thus given a structure such as this it is believed that the most valuable information regarding labor queues should be found in months immediately following the shock. Any subsequent changes, and thus ultimate relative positions, could be determined by a number of things, including economic policy. The results of this analysis are however the same regardless of the reasons for the shape of the curves. In other words, while the structure of the impulse response functions in this time period may cause the picture to be slightly less clear, closer examination reveals a consistent interpretation.

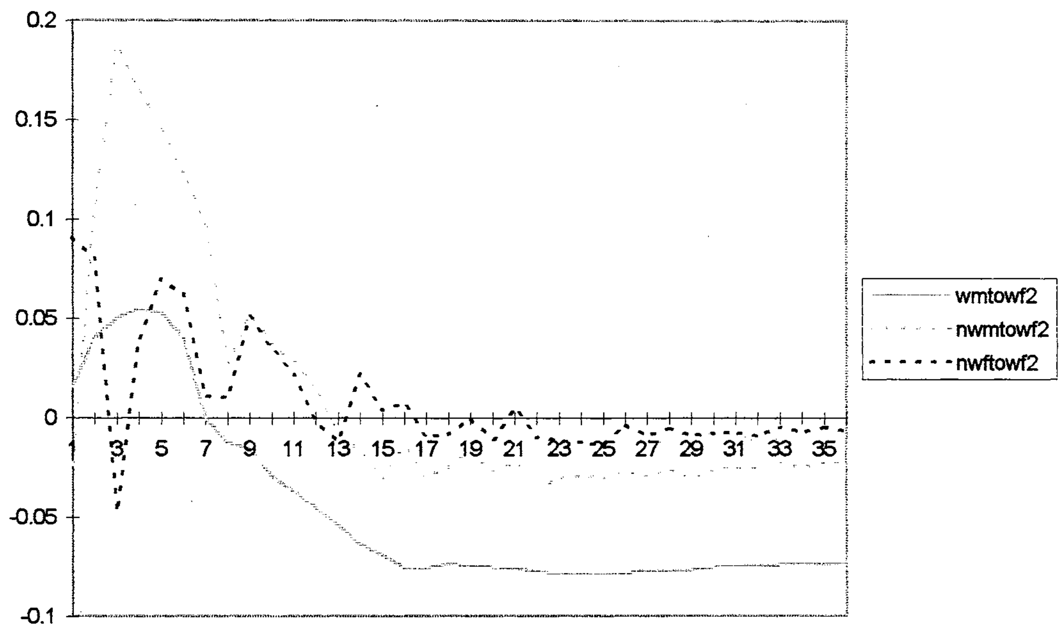
**Figure 6**
**Shock in White Male Unemployment Rate, 1968-1980.**



The first group of impulse response functions under examination for the second time period is for the response to a shock in the unemployment rate of white males. As can be seen in the Figure 6, a shock in the unemployment rate of white males causes the unemployment rates for white females, nonwhite males and nonwhite females to increase immediately, and then to decrease at varying rates. Perhaps the most noticeable attribute of this graph is the reaction of the unemployment rate of nonwhite males to this shock. Nonwhite males are hurt the worst by far in the early stages, suggesting that they are the furthest down the labor queue. Nonwhite females are hurt only during the initial time period but immediately experience an improvement in their unemployment situation. White females experience a small increase in their unemployment rate in the early periods following the shock but gradually end up in a position where their unemployment rate is lower than it was before the shock. Although the ordering is not as clear as was the case in the first time period, it is obvious that nonwhite males are relative worse off than either nonwhite females or white females. There is no clear ordering regarding the unemployment rates of nonwhite females and white females, in fact they appear to follow a similar pattern. The ordering therefore appears to be white females/nonwhite females, nonwhite males.

The responses to a one standard deviation shock in the unemployment rate of white females are presented in Figure 7. These impulse response functions tell a story that is similar to the one that has been seen throughout this analysis. First of all, nonwhite males are hurt substantially by the shock in the unemployment rate of white females. Both

**Figure 7**
**Shock in White Female Unemployment Rate, 1968-1980.**

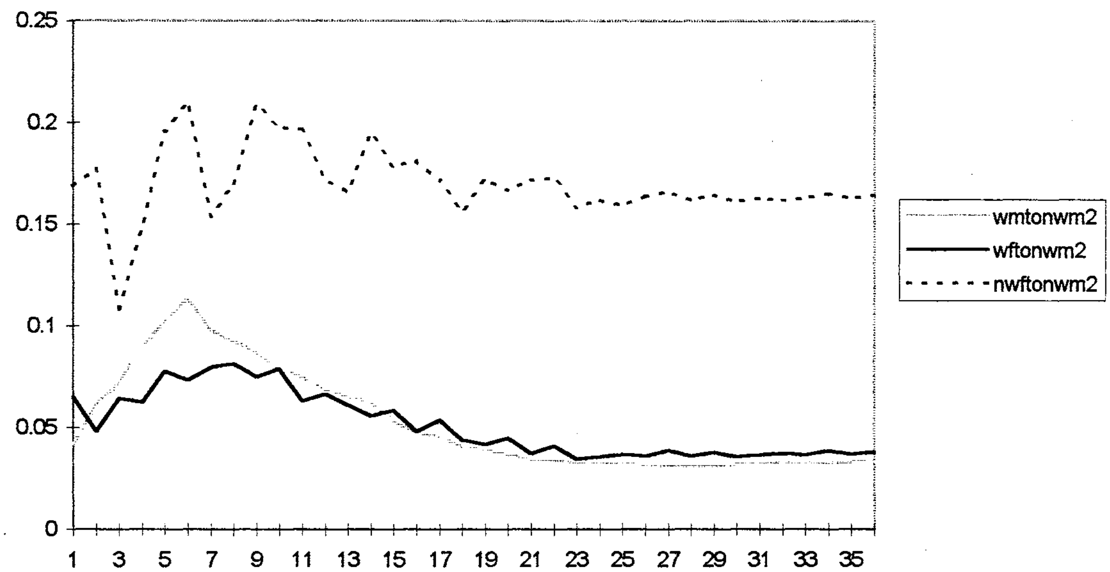


white males and nonwhite females are hurt as well, but to a lesser degree. It is unclear whether white males or nonwhite females are hurt more initially, but it is apparent that the negative effects are felt for a shorter period of time for white males and eventually white males are helped the most. However, once again the one thing that is clear is that nonwhite males seem to be hurt the most. The ordering implied by Figure 7 is as follows: white males/nonwhite females, nonwhite males.

A shock to the unemployment rate of nonwhite males produces results consistent with other shocks during this time period. From Figure 8 it is clear that nonwhite females experience the largest adverse effects due to this shock. The relationship between the effects of this shock on the unemployment rates of white males and white females suggests a slight advantage to white females, although the response of the two variables is very close throughout much of the 36 month response period. The ordering implied by these functions is: white female/white male, nonwhite female.

In the time period after the implementation of affirmative action, a shock in the unemployment rate of nonwhite females reveals a relationship that is reasonable consistent with those presented in previous paragraphs. As can be seen in Figure 9, a shock in the unemployment rate of nonwhite females leads to a relatively large worsening of the position of nonwhite men in terms of unemployment rates. The implied ordering in terms of white males and white females is once again less clear. It appears as though there is little difference in the reaction of the unemployment rates of the two groups in the early time periods. This would imply little difference in terms of the labor queue. The ordering implied here is therefore: white females/white males, nonwhite males.

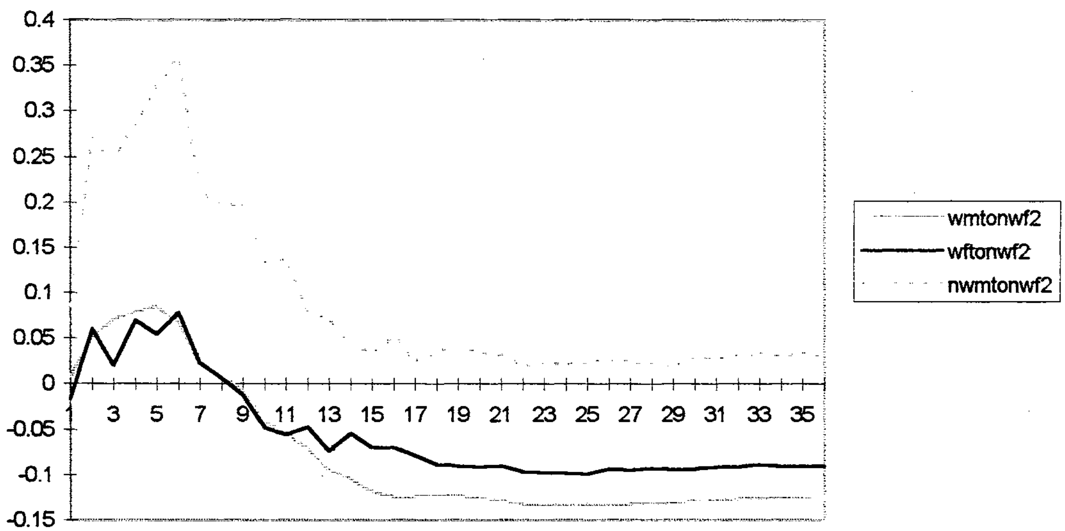
**Figure 8**
**Shock in Nonwhite Male Unemployment Rate, 1968-1980.**



The time period following affirmative action has a much less clear ordering than the time period preceding affirmative action. The one consistent result throughout all of the shocks is that nonwhite males were harmed the most by each shock. The rest of the ordering of the labor queue is less clear. The reason for this could be that the labor queue between those groups largely disappeared, however, looking at the graphs as a whole rather than examining each one separately could reveal some conclusions. While in some cases the relationship between the unemployment rates of certain groups is unclear, in other cases there are pronounced differences. In fact, if the impulse response functions presented heretofore are viewed as a whole and one examines how "on average" each group is affected, these impulse response functions imply that the ordering of the labor queue during the time period from March of 1968 through December of 1980 was as follows: white females, white males, nonwhite females, nonwhite males.[1] This suggests that a primary change in the labor queue after the implementation of affirmative action was the worsening position of nonwhite males. It is also interesting to note that the gains made by nonwhite females white females appear to be at the expense of nonwhite males, rather than white males.

[1] This conclusion assumes that if two groups have a nearly equal response to a shock in the unemployment rate of another, the relative ordering of these two groups can be determined by an unequal response to a shock in another unemployment rate.

**Figure 9**
**Shock in Nonwhite Female Unemployment Rate, 1968-1980.**



### 3. conclusion of VAR analysis

It is clear from the previous paragraphs that the responses of the unemployment rates of demographic groups to shocks in the unemployment rate of other groups changed after the implementation of affirmative action. It is hypothesized that this is the case because affirmative action would encourage firms to hire groups that it discriminated against the least (white females) first, and eventually other groups. It was also suspected that nonwhite females would experience an improvement in their relative status due to that group being classified as a double minority. This hypothesis finds some support in the VAR analysis. According to this analysis the labor queue ordering changed from:
1) white female 2) white male 3) nonwhite male 4) nonwhite female, to an ordering of:
1) white female 2) white male 3) nonwhite female 4) nonwhite male. This implies that the major impact of affirmative action, in terms of unemployment rates was to bump nonwhite males further down the labor queue, while helping nonwhite females. Little evidence is found for the relative improvement of white females, although given the fact that white females are at the top of the labor queue for time both periods this effect would be difficult to measure unless their advance was due to a worsening position of white males, but this trade-off was not hypothesized, nor found.

Although fiscal policy and monetary policy are not major topics of this research, the differing impulse response functions across time periods and demographic groups may be related to such policy and are therefore items for further research.

## B. Analysis of Unemployment Duration and Incidence

As mentioned previously, while changes in unemployment are caused by changes in unemployment duration and incidence, unemployment duration and incidence need not both change or even move in the same direction. Given this fact, the analysis of the relative importance of unemployment duration and incidence for each demographic group should shed more light on the driving forces behind the trend reversal involving the relative unemployment burdens of these groups. If the hypothesized relationship between labor queues, discrimination, and affirmative action was the driving force behind this trend reversal, it is likely that changes in the relative importance of unemployment duration for the relevant groups will have an ordering that is similar to the one found in the previous section. Although incidence may have increased if termination discrimination became relatively more important over the time, in terms of the primary hypothesis of this research, the more important point is that duration should have increased significantly for those groups furthest down the labor queue. Specifically, nonwhite males should have experienced the biggest increase in duration, followed by nonwhite females, white males and finally white females. While it would be interesting to compare the duration and incidence of unemployment for the relevant groups both before and after the implementation of affirmative action, the data necessary for the analysis of unemployment duration and incidence is only available during the post 1967 period and therefore does not allow such a comparison.

**i. Technique for Estimating Unemployment Duration**

While many techniques have been developed to measure unemployment duration and incidence, most have relied upon steady-state assumptions which can cause serious bias in these calculations. (Sider 1985) A technique which does not rely upon these restrictive assumptions was developed by Sider in his 1985 article entitled "Unemployment Duration and Incidence: 1968-82". This technique is a non-steady-state synthetic cohort approach and is the primary tool used in this portion of the current analysis. Sider's technique is outlined in the following paragraphs.

The lack of a an accurate, published, measure of unemployment duration and incidence has led researchers to derive such a measure from the available data. While the Bureau of Labor Statistics provides data on the length of current in progress unemployment spells, the numbers themselves provide little useful information regarding the actual length of completed spells. The method used here is one that relies upon the data which underlie the intervals of current spell length that are provided by the Bureau of Labor Statistics. Following Sider, if a cohort entering unemployment can be traced over time, the average duration for that cohort can be determined. The basic reasoning behind this is that in each time period the number of people from the cohort that remain unemployed can be compared to the number of people from that cohort who were unemployed during the previous time period. The difference between these two numbers provides a measure of the number of people whose unemployment spell ended during the time period between the two surveys. If this cohort is followed until none of the group remains unemployed, a simple average of their completed unemployment spell can be calculated. More formally, and once again following Sider, allow $f(0)$ to be the size of an cohort entering unemployment where the vector $f(x)$, $0 < x < n$, is the number of members of the cohort who remain unemployed after each time period. Here there are a total of $x$ time periods, with a maximum of $n$ periods possible. Sider's equation (1) provides a calculation of the average duration ($S$) of this cohort using the notation provided. This equation is:

$$S = \sum_{x=1}^{n} [x(f(x-1) - f(x))/f(o)]$$

For the purpose of applying Sider's method, it is helpful to note that this is equivalent to stating that :

$$S = (1-p_1) + 2\,p_1(1-p_2) + 3\,p_1\,p_2(1-p_3) + \ldots,$$

$$= 1 + p_1 + p_1\,p_2 + p_1\,p_2p_3 + \ldots,$$

where $p_x = f(x)/f(x-1)$. From this point Sider generalizes to (equation 3) the following measure of unemployment duration:

$$S = \sum_{x=1}^{n} g(x)\,[\,\prod_{j=0}^{x-1} p_j](1-p_x)$$

Here "$p_0$ is the probability of being in the initial cohort, (and equals unity). The product of the $p_j$'s and $(1-p_x)$ is the share of the original cohort that exists in unemployment after $x$ periods. The function $g(x)$ weights exiting individuals by their completed spell" (Sider, 1985, 462).

This method therefore requires the specification of both $p_x$ and $g(x)$. The specification of $g(x)$ simply signifies when during a given time period the average unemployment spell ends. Here it is assumed that $g(x) = .5$ which implies that spells end in the middle of the time period. As is noted by Sider, this introduces a slight bias that will be addressed during the estimation process. The specification of $p_x$ relies upon a technique which is often referred to as the "synthetic cohort approach". This approach relies upon the reasoning presented earlier regarding tracing a cohort over time and comparing the number in adjacent time periods to determine the probability of an individual continuing on in unemployment into the next time period. Here $p_x = f(x)/f(x-1)$

and will be referred to as the continuation probability. The synthetic portion of this method arises from the fact that researches do not have the luxury of having access to data which traces out the experience of an actual cohort over time. Rather, the Bureau of Labor Statistics conducts monthly random surveys and publishes monthly estimates for the length of current unemployment spells arranged in the following intervals: < 5 weeks, 5-10 weeks, 11-14 weeks, 15-26 weeks, 27 + weeks. Intervals such as these can be used to trace a synthetic cohort over time if they are specified properly. Unfortunately, rather than the published intervals, the synthetic cohort approach requires intervals that roughly correspond to the BLS' monthly sampling window. Therefore, once again following Sider, the CPS data which underlies the published BLS statistics were used to reconstruct these intervals which more closely correspond to the sampling window. Specifically, the following intervals were constructed for the length of current unemployment spells: < 5 weeks, 5-8 weeks, 9-12 weeks, 13-26 weeks, 27-39 weeks, 40-52 weeks, 53-75 weeks, 76-99 weeks. The synthetic cohort approach can then be used to see what the probability is that a individual will continue, for instance, from the category of < 5 weeks in time period $t$ to 5-8 weeks in time period $t + 1$, where $t$ is measured in months. However, this is not a measurement of an actual group of people as no such measure exists. In other words, the CPS does not survey the same people every month[2], thus any cohort must be synthetic in nature. This method can be used to calculate the continuation probability for each interval specified. Once the necessary continuation probabilities have been calculated, the average duration of unemployment of a synthetic cohort can then be calculated using Sider's equation 3.

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[2] Technically, the survey is a rolling sample where the same people are surveyed for four months. Thus,

### ii. Duration Estimates

The first step necessary in calculating unemployment duration is the determination of the relevant continuation probabilities. Due to spikes in the data, Sider, recommends using the following intervals in calculating the continuation probabilities:

< 5 weeks in month *t-1* continuing to 5-8 weeks in month *t*

5-8 weeks in month *t-1* continuing to 9-12 weeks in time *t*

9-12 weeks in month *t-1* continuing to 13-16 weeks in time *t*

13-26 weeks in month *t-3* continuing to 27-39 weeks in time *t*

27-39 weeks in month *t-3* continuing to 40-52 weeks in time *t*

40-52 weeks in month *t-3* continuing to 53-65 weeks in time *t*

52-75 weeks in month *t-6* continuing to 76-99 weeks in time *t*

76-99 weeks in month *t-6* continuing to 100 + weeks in time *t*

However, due to the low numbers of certain demographic groups, it was necessary to combine several of the intervals of longer duration. Specifically, the last 4 intervals were combined to:

27-52 weeks in month *t-6* continuing to 53-75 weeks in time *t*

---

in any given month ¾ of the group surveyed were in the previous month's sample.

53-99 weeks in month *t-12* continuing to 100 + weeks in time *t*

where the 100 + category is defined as ½ of the total for the 99 + week interval. The continuation probabilities for these intervals are reported in Table 1.

Having derived these transition probabilities, the calculation of unemployment duration is relatively simple. The only real complication is that due to the spikes in the data, it was necessary to have interval lengths longer than one month. Therefore, in order to calculate the monthly continuation probabilities for the individual months in these longer intervals, it is necessary to assume that not only is the exit rate from unemployment constant throughout the month, but that the exit rate is constant throughout the interval. This is similar to assuming that economic conditions are constant throughout the interval. In other words, for continuation rate of $p$ calculated for an interval of $x$ months, the monthly continuation rate would simply be $p^{1/x}$. The formulation of the intervals in this manner also allows for the spikes in the data to be smoothed. The method employed by Sider and the one used here acknowledges that spikes in the data are likely to be due as much to over reporting as they are to under reporting. Therefore, the appropriate method is to simply distribute the total number in each transition week equally across its actual interval and the one adjacent to it.

The specification of $g(x)$ designates the average point during the month that an unemployment spell ends. As is noted by Sider, if the average unemployment spell ends in the middle of the month, in month one $g(1)$ would equal .5, in month two $g(2)$ would equal 1.5, in month 3 $g(3)$ would equal 2.5, etc. Sider notes that the actual time of

Table 1
Continuation Rates for Selected Groups

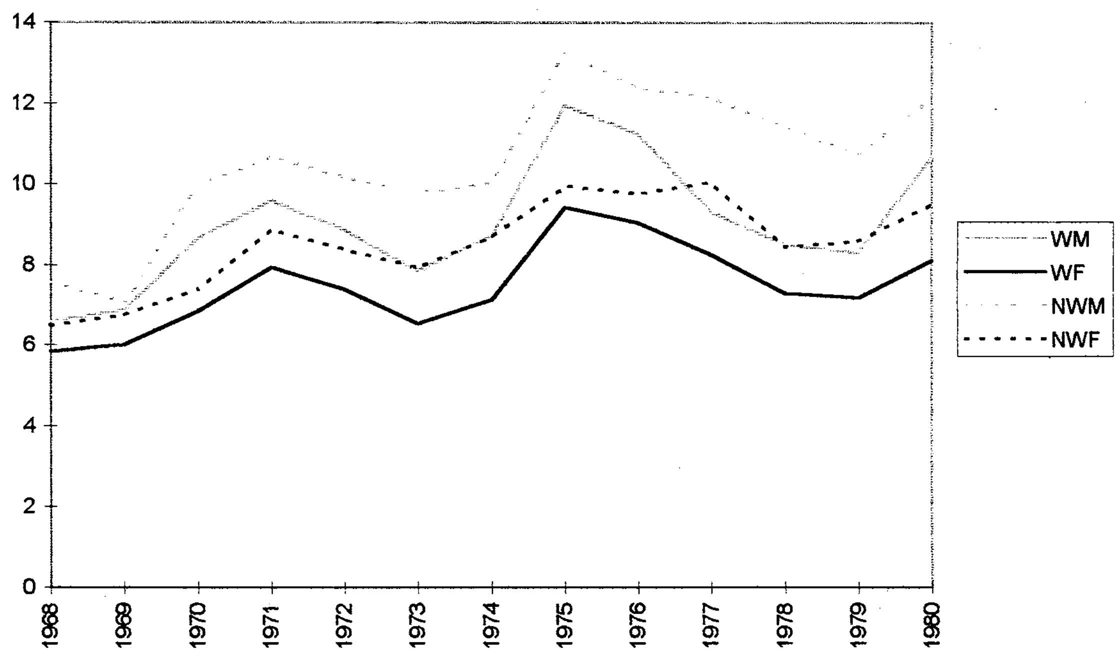
| Year | Interval | WM | WF | NWM | NWF | Year | Interval | WM | WF | NWM | NWF |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1968** | <5 to 5-8 | 0.4 | 0.4 | 0.52 | 0.41 | **1969** | <5 to 5-8 | 0.44 | 0.38 | 0.46 | 0.41 |
| | 5-8 to 9-12 | 0.5 | 0.5 | 0.56 | 0.51 | | 5-8 to 9-12 | 0.51 | 0.49 | 0.58 | 0.54 |
| | 9-12 to 13-16 | 0.5 | 0.6 | 0.52 | 0.59 | | 9-12 to 13-16 | 0.6 | 0.59 | 0.57 | 0.66 |
| | 13-26 to 27-39 | 0.6 | 0.6 | 0.61 | 0.62 | | 13-26 to 27-39 | 0.63 | 0.59 | 0.57 | 0.6 |
| | 27-52 to 53-75 | 0.8 | 0.7 | 0.76 | 0.76 | | 27-52 to 53-75 | 0.79 | 0.76 | 0.79 | 0.82 |
| | 53-99 to 100+ | 0.9 | 0.9 | 0.87 | 0.85 | | 53-99 to 100+ | 0.88 | 0.87 | 0.91 | 0.91 |
| **1970** | <5 to 5-8 | 0.5 | 0.4 | 0.55 | 0.47 | **1971** | <5 to 5-8 | 0.57 | 0.46 | 0.6 | 0.54 |
| | 5-8 to 9-12 | 0.6 | 0.5 | 0.64 | 0.52 | | 5-8 to 9-12 | 0.58 | 0.56 | 0.61 | 0.55 |
| | 9-12 to 13-16 | 0.7 | 0.6 | 0.69 | 0.62 | | 9-12 to 13-16 | 0.71 | 0.67 | 0.75 | 0.77 |
| | 13-26 to 27-39 | 0.7 | 0.6 | 0.67 | 0.66 | | 13-26 to 27-39 | 0.69 | 0.69 | 0.72 | 0.69 |
| | 27-52 to 53-75 | 0.8 | 0.8 | 0.88 | 0.79 | | 27-52 to 53-75 | 0.82 | 0.82 | 0.81 | 0.83 |
| | 53-99 to 100+ | 0.9 | 0.9 | 0.91 | 0.88 | | 53-99 to 100+ | 0.92 | 0.9 | 0.93 | 0.95 |
| **1972** | <5 to 5-8 | 0.5 | 0.4 | 0.63 | 0.53 | **1973** | <5 to 5-8 | 0.51 | 0.43 | 0.57 | 0.49 |
| | 5-8 to 9-12 | 0.6 | 0.5 | 0.65 | 0.51 | | 5-8 to 9-12 | 0.53 | 0.48 | 0.57 | 0.57 |
| | 9-12 to 13-16 | 0.7 | 0.6 | 0.54 | 0.75 | | 9-12 to 13-16 | 0.65 | 0.59 | 0.78 | 0.64 |
| | 13-26 to 27-39 | 0.7 | 0.7 | 0.7 | 0.63 | | 13-26 to 27-39 | 0.62 | 0.64 | 0.67 | 0.61 |
| | 27-52 to 53-75 | 0.8 | 0.8 | 0.82 | 0.79 | | 27-52 to 53-75 | 0.76 | 0.75 | 0.75 | 0.83 |
| | 53-99 to 100+ | 0.9 | 0.9 | 0.9 | 0.89 | | 53-99 to 100+ | 0.86 | 0.81 | 0.86 | 0.87 |
| **1974** | <5 to 5-8 | 0.5 | 0.4 | 0.59 | 0.54 | **1975** | <5 to 5-8 | 0.62 | 0.51 | 0.68 | 0.56 |
| | 5-8 to 9-12 | 0.6 | 0.5 | 0.65 | 0.57 | | 5-8 to 9-12 | 0.66 | 0.62 | 0.69 | 0.55 |
| | 9-12 to 13-16 | 0.7 | 0.7 | 0.72 | 0.65 | | 9-12 to 13-16 | 0.76 | 0.69 | 0.8 | 0.84 |
| | 13-26 to 27-39 | 0.7 | 0.6 | 0.66 | 0.67 | | 13-26 to 27-39 | 0.74 | 0.74 | 0.77 | 0.7 |
| | 27-52 to 53-75 | 0.8 | 0.8 | 0.77 | 0.75 | | 27-52 to 53-75 | 0.9 | 0.87 | 0.84 | 0.84 |
| | 53-99 to 100+ | 0.9 | 0.8 | 0.94 | 0.88 | | 53-99 to 100+ | 0.93 | 0.93 | 0.95 | 0.93 |
| **1976** | <5 to 5-8 | 0.6 | 0.5 | 0.66 | 0.55 | **1977** | <5 to 5-8 | 0.54 | 0.48 | 0.72 | 0.59 |
| | 5-8 to 9-12 | 0.6 | 0.6 | 0.69 | 0.61 | | 5-8 to 9-12 | 0.56 | 0.58 | 0.62 | 0.64 |
| | 9-12 to 13-16 | 0.7 | 0.7 | 0.72 | 0.66 | | 9-12 to 13-16 | 0.71 | 0.64 | 0.66 | 0.59 |
| | 13-26 to 27-39 | 0.7 | 0.7 | 0.72 | 0.71 | | 13-26 to 27-39 | 0.69 | 0.68 | 0.71 | 0.69 |
| | 27-52 to 53-75 | 0.8 | 0.8 | 0.83 | 0.85 | | 27-52 to 53-75 | 0.8 | 0.8 | 0.83 | 0.84 |
| | 53-99 to 100+ | 0.9 | 0.9 | 0.91 | 0.89 | | 53-99 to 100+ | 0.86 | 0.84 | 0.88 | 0.88 |
| **1978** | <5 to 5-8 | 0.5 | 0.5 | 0.67 | 0.53 | **1979** | <5 to 5-8 | 0.52 | 0.45 | 0.66 | 0.56 |
| | 5-8 to 9-12 | 0.6 | 0.5 | 0.62 | 0.58 | | 5-8 to 9-12 | 0.55 | 0.55 | 0.59 | 0.54 |
| | 9-12 to 13-16 | 0.6 | 0.6 | 0.74 | 0.6 | | 9-12 to 13-16 | 0.68 | 0.6 | 0.67 | 0.6 |
| | 13-26 to 27-39 | 0.7 | 0.6 | 0.65 | 0.65 | | 13-26 to 27-39 | 0.64 | 0.62 | 0.66 | 0.64 |
| | 27-52 to 53-75 | 0.8 | 0.8 | 0.83 | 0.8 | | 27-52 to 53-75 | 0.8 | 0.8 | 0.85 | 0.84 |
| | 53-99 to 100+ | 0.9 | 0.8 | 0.87 | 0.89 | | 53-99 to 100+ | 0.89 | 0.87 | 0.87 | 0.88 |
| **1980** | <5 to 5-8 | 0.6 | 0.5 | 0.65 | 0.58 | | | | | | |
| | 5-8 to 9-12 | 0.6 | 0.5 | 0.67 | 0.56 | | | | | | |
| | 9-12 to 13-16 | 0.7 | 0.6 | 0.71 | 0.64 | | | | | | |
| | 13-26 to 27-39 | 0.7 | 0.7 | 0.72 | 0.69 | | | | | | |
| | 27-52 to 53-75 | 0.8 | 0.8 | 0.86 | 0.84 | | | | | | |
| | 53-99 to 100+ | 0.9 | 0.9 | 0.9 | 0.87 | | | | | | |

departure from unemployment is actually slightly before the middle of the month because "as the month progresses, fewer members of the original group remain and the absolute size of the outflow declines". However, it is suspected that this bias slight and it is assumed that the average spell simply ends in the middle of the month. To verify this, slight variations of $g(x)$ were used and the results are presented along with the other duration estimates in appendix D. Upon specifying $p_x$ and $g(x)$, the values are plugged into Sider's equation 3, and the calculation of the average duration of completed unemployment spells is straightforward. These estimates are presented in the following table and accompanying chart.

**Table 2**
**Estimated Unemployment Duration (weeks).**

| | WM | WF | NWM | NWF |
|---|---|---|---|---|
| **1968** | 6.58 | 5.82 | 7.57 | 6.48 |
| **1969** | 6.88 | 6.00 | 7.06 | 6.75 |
| **1970** | 8.65 | 6.84 | 9.96 | 7.39 |
| **1971** | 9.58 | 7.93 | 10.68 | 8.87 |
| **1972** | 8.86 | 7.39 | 10.17 | 8.38 |
| **1973** | 7.85 | 6.53 | 9.77 | 7.94 |
| **1974** | 8.72 | 7.14 | 10.06 | 8.68 |
| **1975** | 11.95 | 9.42 | 13.24 | 9.95 |
| **1976** | 11.24 | 9.04 | 12.39 | 9.76 |
| **1977** | 9.31 | 8.25 | 12.14 | 10.04 |
| **1978** | 8.50 | 7.28 | 11.40 | 8.45 |
| **1979** | 8.29 | 7.17 | 10.75 | 8.59 |
| **1980** | 10.67 | 8.11 | 12.15 | 9.51 |

**Figure 10**
**Estimated Unemployment Duration, 1968-1980.**



**iii. Interpretation of Duration Results**

The importance of the increase of the duration of unemployment in the relative worsening of demographic groups is apparent in Table 2 and Figure 10. If the hypothesis of this research is correct, groups furthest down the labor queue should have experienced the largest increases in the duration of unemployment during this time period. Specifically, upon the passage of civil rights legislation as labor markets become less segregated and more individuals attempt to gain employment from discriminating firms, those individuals furthest down the labor queue will have to wait longer for employment as firms choose to first hire those individuals that they discriminate against the least. In addition, affirmative action may have altered the labor queue by allowing nonwhite females to count as "double minorities". If discrimination of the hypothesized type was the driving force behind the relative worsening of the position of certain groups, then increases in the duration of unemployment should have been the driving force behind this worsening.

From the chart above it is apparent that the ordering of the labor queue is consistent with that found in the VAR analysis. While the duration of all groups increased significantly during this time period, those groups furthest down the queue had the largest increase in the duration of unemployment as well. Specifically, from 1969-1979 (business cycle peak to peak) the unemployment duration of nonwhite males increased by 52.2%, nonwhite females by 27.3% , white males by 20.6% and white females by 19.6%. These results are consistent with the results of the VAR analysis in that they imply an ordering in the labor queue of: 1) white females 2) white males 3) nonwhite females 4) nonwhite males. While the actual ordering of the absolute duration of unemployment contradicts this slightly, implying an ordering of 1) white females 2) nonwhite females 3) white males 4) nonwhite males, it is necessary to note that this measure of duration does not consider the reason for leaving unemployment (it could be that individuals simply leave the labor force), which could reflect differing labor force ties among groups. If differing labor force ties do not provide a sufficient explanation for these differences this would be the first evidence provided by this analysis to suggest that white males may have been hurt by civil rights legislation, as their average duration was longer than both white females and nonwhite females during the time period following the implementation of affirmative action. However, given the arguments presented in this research, the absolute levels of unemployment duration are not an accurate measure of the impact of affirmative action. Rather, it is most important that changes in unemployment duration were the primary cause of the worsening relative position of the relevant groups. Nevertheless, these results indicate that an increase in duration was an important factor in the increases in unemployment experienced during this time period.

**iv. Technique for Estimating Unemployment Incidence**

The estimation of unemployment incidence, following Sider, is a straightforward process. If it is assumed that the continuation rate for unemployment is constant over the course of a month, then an estimation of the weekly incidence can be derived from the number of individuals stating that their current unemployment spell is less that five weeks at time period $t$. Using Sider's notation, $h(0,t)$ "can be considered the result of a renewal process that reflects a weekly continuation rate $p_1^*$ ...... and the number of individuals, $N$, that entered unemployment each week over the course of the month" (Sider 1985, 466).

In other words, if there are four weeks in a month, $h(0,t) = N(1 + p_1^* + (p_1^*)^2 + (p_1^*)^3)$, where each $p^*$ is derived from the monthly continuation rate. In turn solving for $N$ yields an estimate of weekly incidence. More precisely, given that there are on average approximately 4.33 weeks in a month, this formula generalizes to $h(0,t) = N(1/3 + (p_1^*)^{1/3} + (p_1^*)^{4/3} + (p_1^*)^{7/3} + (p_1^*)^{10/3})$. It is also necessary to account for rounding in this calculation. Specifically, the group reporting unemployment duration of 0-5 weeks more closely represents those with an unemployment duration of 0-4.5 weeks. The necessary number for calculating unemployment incidence during the course of a month is 0-4.3 weeks which calls for an adjustment of the "4 weeks" category of -20% of the reported value.

## v. Incidence Results

The results of the incidence analysis require a bit more interpretation than their duration counterparts. Due to the fact that the size of the demographic groups under consideration vary greatly in size, a direct comparison of unemployment incidence is less valuable, especially as the relative size of the given labor forces change over time. However, the incidence rate, defined as the estimated weekly incidence divided by the group's labor force can yield valuable insights in to the causes of the changes in unemployment. The results of this analysis are presented in Table 3.

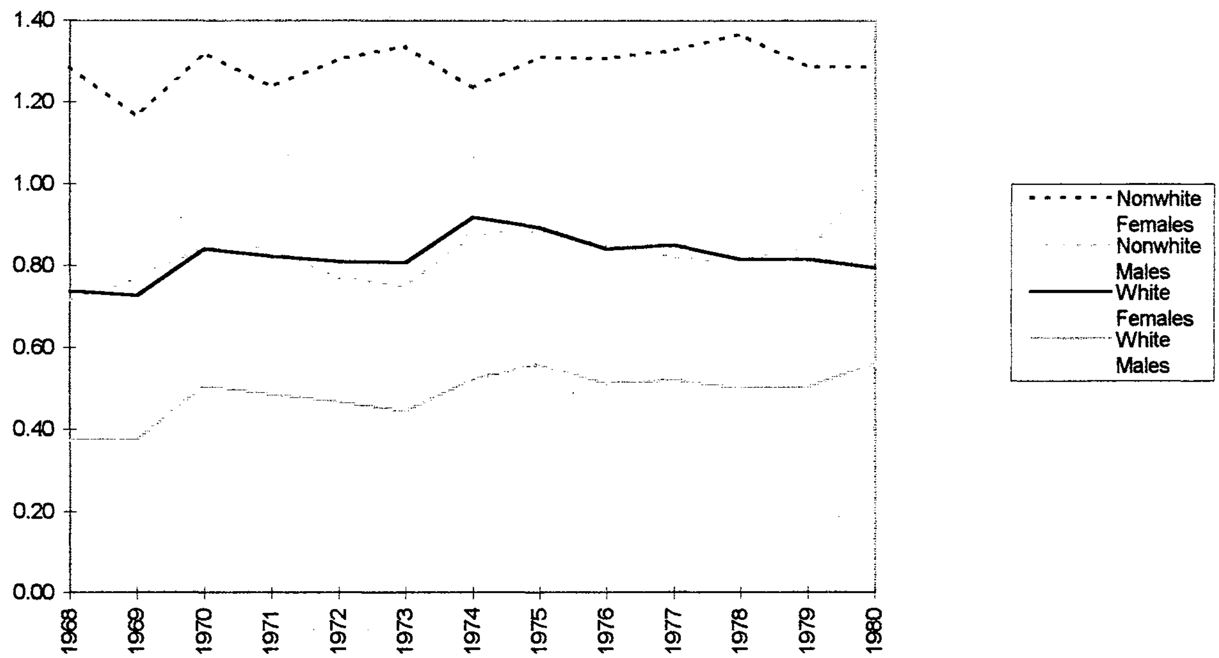
These numbers reveal a pattern that is strikingly different from those found in the analysis of unemployment duration. Primarily it is apparent that unemployment incidence, while increasing for all groups under consideration, was nearly equally important for all groups in determining changes in the level of unemployment. While the incidence rate for nonwhite females is consistently the highest, nonwhite males and white females have nearly the same incidence rate and white males have the lowest. The incidence rate seems to have less cyclical variability than duration and the relative position of the relevant demographic groups change little. Following Sider, it may be useful to examine the

Table 3
Incident Rates for Selected Groups (%)

| | Nonwhite Females | Nonwhite Males | White Females | White Males |
|---|---|---|---|---|
| 1968 | 1.29 | 0.72 | 0.74 | 0.38 |
| 1969 | 1.16 | 0.77 | 0.73 | 0.37 |
| 1970 | 1.32 | 0.84 | 0.84 | 0.51 |
| 1971 | 1.24 | 0.84 | 0.82 | 0.48 |
| 1972 | 1.31 | 0.77 | 0.81 | 0.47 |
| 1973 | 1.34 | 0.75 | 0.81 | 0.44 |
| 1974 | 1.24 | 0.87 | 0.92 | 0.52 |
| 1975 | 1.31 | 0.89 | 0.89 | 0.56 |
| 1976 | 1.31 | 0.85 | 0.84 | 0.51 |
| 1977 | 1.33 | 0.82 | 0.85 | 0.52 |
| 1978 | 1.37 | 0.81 | 0.81 | 0.50 |
| 1979 | 1.29 | 0.84 | 0.81 | 0.50 |
| 1980 | 1.29 | 1.01 | 0.79 | 0.56 |
| 79/69 | 1.10 | 1.10 | 1.12 | 1.35 |

changes in incidence from the one business cycle peak to another. This entails an analysis of the period 1969-1979. In this case, white females, nonwhite females and nonwhite males all experience about 10% growth in incidence, while white males experience a 35% increase. This leads to the conclusion that changes in incidence were not the driving force behind the changes of the relative status of demographic groups, although the consistently differing incidence rates for demographic groups is interesting.

**Figure 11**
**Selected Incident Rates,**
**1968-1980**



## vi. Summary and Conclusions of Duration and Incidence Analysis

From the preceding paragraphs it is apparent that while changes in unemployment incidence were felt nearly equally across all demographic groups from the period 1968-1980. As can be seen in table 4, the driving force behind the diverging unemployment rates of these demographic groups was unemployment duration.

While white males experienced adverse conditions regarding unemployment incidence, the other groups under examination did not. With regards to unemployment duration however, nonwhite males experienced the worst changes by far, followed by nonwhite females, white males, and white females. These facts suggest two essential things. First, that the ordering of the job queue implied by the percentage increase in duration is 1)white females 2) white males 3) nonwhite females 4) nonwhite males. Second, that the worsening position of nonwhite males relative to other groups was due an increase in unemployment duration over this time period.

| Table 4 | | | | | | |
|---|---|---|---|---|---|---|
| Duration and Incidence Summary, 1968-1980. | | | | | | |
| | Unemployment Rate | Average Unemployment Level | Civilian Labor Force | Spell Duration | Weekly Incidence | Incidence Rate (%) |
| NONWHITE FEMALES | | | | | | |
| 1968 | 8.3 | 313 | 3780 | 6.48 | 48.66 | 1.29 |
| 1969 | 7.8 | 304 | 3918 | 6.75 | 45.62 | 1.16 |
| 1970 | 9.3 | 374 | 4024 | 7.39 | 53.17 | 1.32 |
| 1971 | 10.9 | 450 | 4142 | 8.87 | 51.25 | 1.24 |
| 1972 | 11.4 | 491 | 4323 | 8.38 | 56.44 | 1.31 |
| 1973 | 10.6 | 484 | 4576 | 7.94 | 61.19 | 1.34 |
| 1974 | 10.8 | 514 | 4772 | 8.68 | 58.96 | 1.24 |
| 1975 | 13.9 | 692 | 4967 | 9.95 | 65.07 | 1.31 |
| 1976 | 13.6 | 713 | 5249 | 9.76 | 68.56 | 1.31 |
| 1977 | 13.9 | 766 | 5505 | 10.04 | 73.05 | 1.33 |
| 1978 | 13 | 774 | 5951 | 8.45 | 81.38 | 1.37 |
| 1979 | 12.3 | 759 | 6168 | 8.59 | 79.35 | 1.29 |
| 1980 | 13.1 | 830 | 6359 | 9.51 | 81.83 | 1.29 |
| NONWHITE MALES | | | | | | |
| 1968 | 5.6 | 277 | 4979 | 7.57 | 35.63 | 0.72 |
| 1969 | 5.3 | 267 | 5037 | 7.06 | 38.70 | 0.77 |
| 1970 | 7.3 | 380 | 5193 | 9.96 | 43.88 | 0.84 |
| 1971 | 9.1 | 481 | 5277 | 10.68 | 44.33 | 0.84 |
| 1972 | 8.9 | 486 | 5438 | 10.17 | 42.00 | 0.77 |
| 1973 | 7.7 | 440 | 5705 | 9.77 | 42.72 | 0.75 |
| 1974 | 9.2 | 544 | 5896 | 10.06 | 51.53 | 0.87 |
| 1975 | 13.6 | 815 | 5976 | 13.24 | 52.91 | 0.89 |
| 1976 | 12.7 | 779 | 6142 | 12.39 | 52.12 | 0.85 |
| 1977 | 12.3 | 784 | 6363 | 12.14 | 52.16 | 0.82 |
| 1978 | 11 | 731 | 6667 | 11.40 | 54.07 | 0.81 |
| 1979 | 10.4 | 714 | 6870 | 10.75 | 57.90 | 0.84 |
| 1980 | 13.2 | 922 | 6981 | 12.15 | 70.41 | 1.01 |
| WHITE FEMALES | | | | | | |
| 1968 | 4.3 | 1084 | 25423 | 5.82 | 187.49 | 0.74 |
| 1969 | 4.2 | 1123 | 26593 | 6.00 | 192.89 | 0.73 |
| 1970 | 5.4 | 1482 | 27521 | 6.84 | 231.24 | 0.84 |
| 1971 | 6.3 | 1777 | 28060 | 7.93 | 230.70 | 0.82 |
| 1972 | 5.9 | 1733 | 29159 | 7.39 | 236.11 | 0.81 |
| 1973 | 5.3 | 1606 | 30229 | 6.53 | 244.11 | 0.81 |
| 1974 | 6.1 | 1927 | 31438 | 7.14 | 288.62 | 0.92 |
| 1975 | 8.6 | 2794 | 32508 | 9.42 | 289.81 | 0.89 |
| 1976 | 7.9 | 2656 | 33734 | 9.04 | 283.29 | 0.84 |
| 1977 | 7.3 | 2558 | 35108 | 8.25 | 298.26 | 0.85 |
| 1978 | 6.2 | 2287 | 36679 | 7.28 | 298.83 | 0.81 |
| 1979 | 5.9 | 2260 | 38067 | 7.17 | 309.92 | 0.81 |
| 1980 | 6.5 | 2540 | 39127 | 8.11 | 310.54 | 0.79 |
| WHITE MALES | | | | | | |
| 1968 | 2.6 | 1142 | 44553 | 6.58 | 167.33 | 0.38 |
| 1969 | 2.5 | 1137 | 45185 | 6.88 | 168.39 | 0.37 |
| 1970 | 4 | 1857 | 46035 | 8.65 | 233.36 | 0.51 |
| 1971 | 4.9 | 2309 | 46904 | 9.58 | 227.47 | 0.48 |
| 1972 | 4.5 | 2173 | 48117 | 8.86 | 224.37 | 0.47 |
| 1973 | 3.8 | 1836 | 48921 | 7.85 | 217.32 | 0.44 |
| 1974 | 4.4 | 2169 | 49843 | 8.72 | 259.83 | 0.52 |
| 1975 | 7.2 | 3627 | 50324 | 11.95 | 280.97 | 0.56 |
| 1976 | 6.4 | 3258 | 51033 | 11.24 | 260.38 | 0.51 |
| 1977 | 5.5 | 2883 | 52033 | 9.31 | 270.85 | 0.52 |
| 1978 | 4.6 | 2411 | 52955 | 8.50 | 264.95 | 0.50 |
| 1979 | 4.5 | 2405 | 53857 | 8.29 | 271.16 | 0.50 |
| 1980 | 6.1 | 3345 | 54472 | 10.67 | 304.80 | 0.56 |

## VII. CONCLUDING REMARKS

Prior to 1968, the status of nonwhite males in terms of unemployment burden relative to that white females was improving. In fact, the burden of nonwhite males was improving in absolute terms and the burden of white females was worsening in absolute terms. Then in 1968, at the time when affirmative action was first implemented, this trend was reversed. The status of nonwhites (especially males) began to worsen relative to white women. Standard explanations of relative unemployment burdens such as human capital differences and wage gaps fail to explain this trend reversal.

The purpose of this research is to examine this trend reversal more closely and investigate the possibility that civil rights legislation played some role in reversing the trend. Specifically, a theoretical explanation for labor queues related to discrimination is presented and then viewed within the context of affirmative action. It is hypothesized that given the structure of labor queues and the nature of discrimination, the introduction of affirmative action skewed the labor queue in a way that harmed nonwhite males and possibly nonwhite females and helped white females. A VAR is employed to determine the nature of the labor queue, if it existed, in both the time period before and the time period after affirmative action was implemented. If affirmative action had the intended effects the labor queues should have been eliminated. If affirmative action had no effect, or had some perverted effect, then this change should be revealed in the VAR as well. In addition to the VAR analysis, unemployment duration and incidence are analyzed for the time period under consideration in order to help explain the possible role of civil rights legislation. Specifically, if changes in labor queues are to explain changes in unemployment rate differentials, those individuals furthest down the labor queue should experience the largest increases in duration of unemployment when the unemployment rate differential widens. In turn, it is hypothesized that if civil rights legislation distorted labor queues in a way that it had the effect of helping some at the expense of others, then those that were harmed would experience a relative worsening in their position in the labor queue made manifest by a longer duration of unemployment.

The results of this research support the hypothesis in that a labor queue was found to exist with an ordering reasonably consistent with the one hypothesized. In addition, through both the VAR and duration analysis, it was found that the ordering of the labor queue changed in a way that harmed nonwhite males, but helped nonwhite females. Therefore it is likely that affirmative action, perhaps by inducing discriminating employers to view all protected groups as equally capable of filling "quotas", hurt the group that is discriminated against the most, which after 1968 was nonwhite males. The evidence found also implies that affirmative action helped white females at the expense of other groups. Given the assumed nature of discrimination, at a time when discriminating employers were seeking white females in order to make a good faith effort, white females were entering the labor force in large numbers without experiencing much difficulty in finding jobs. This suggests that as white females were at the top of the labor queue and employers were anxious to hire them, other groups would have to wait longer for firms to find it necessary to hire from other demographic groups.

Although the evidence found does not correspond perfectly to the hypothesis of this work, it is possible to use the results from this research to tell a story that is very closely related to the hypothesized results. First of all, it is found that prior to 1968 a labor queue existed with an ordering reasonably consistent with what was expected. After

1968, a labor queue still existed but it had changed in a way that harmed nonwhite males the most. This labor queue after 1968 was supported by evidence from duration data which also showed that nonwhite males were in the relatively worst position in the labor queue. In order to provide a consistent explanation one need merely acknowledge that in the face of discrimination those groups furthest down the labor queue will be hurt the most when labor markets are forced to become more desegregated. Given the ordering prior to 1968, this implies that nonwhite females and nonwhite males would be hurt by labor market desegregation if discrimination was not eliminated. Secondly, if legislation such as affirmative action is introduced that may manipulate the manner in which labor markets are desegregated in a way that does not benefit all groups equally, the structure of the labor queue may change and distort the manner in which desegregation of labor markets affects different groups. Specifically in this case, nonwhite males, who were far down the labor queue to begin with, were hurt more during a time of labor market desegregation than would have been the case if affirmative action had not been implemented because affirmative action played a role in bumping them down the queue.

The results of this research imply that affirmative action distorted the nature of discrimination, but did not prevent it. In fact it distorted it in a way that hurt nonwhite males, a group that it was intended to help. These results demonstrate the possibility of unintended secondary effects which may result from any legislation that fails to address all of the relevant information.

# BIBLIOGRAPHY


Abell, John D., (1991) "Distributional Effects of Monetary and Fiscal Policy" *American Journal of Economics and Sociology* v. 50, no. 3, pp. 269-282, July.

Baker, Michael, (1992) "Unemployment Duration: Compositional Effects and Cyclical Variability", *American Economic Review*, 82, pp. 313-321.

Barrett, Nancy S. and Richard D. Morgenstern, (1974) "Why Do Blacks and Women Have High Unemployment Rates?" *Journal of Human Resources* 9, pp. 452-64, Fall.

Becker, Gary S. (1957) "The Economics of Discrimination" The University of Chicago Press, Chicago, Illinois.

Blanchard, Olivier Jean, and Peter Diamond, (1990) "The Cyclical Behavior of the Gross Flows of U.S. Workers", *Brookings Papers on Economic Activity* no. 2, pp. 85-143.

Bowers, J. K., and D. Harkess, (1979) "Duration of Unemployment by Age and Sex" *Economica,* 46, pp. 239-260, August.

Burstein, Paul (1979) "Equal Employment Opportunity Legislation and the Income of Women and Nonwhites" *American Sociological Review* v. 44, pp. 367-391, June.

Butler, Richard J., and James B. McDonald (1986) "Trends in Unemployment Duration Data" *Review of Economics and Statistics* 68, pp. 545-57, November.

Ehrenberg, Ronald G. (1980) "The Demographic Structure of Unemployment Rates and Labor Market Transition Probabilities" *Research in Laor Economics* v. 3, pp. 241-291.

Enders, Walter, (1995) Applied Econometric Time Series, New York: Wiley.

Flanagan, Robert J. (1978) "Discrimination Theory, Labor Turnover, and Racial Unemployment Differentials" *The Journal of Human Resources* v. 13 n. 3 pp. 187-207.

Freeman, Richard B., (1973) "Changes in the Labor Market for Black Americans, 1948-72" *Brookings Papers on Economic Activity* no. 1, pp. 67-120.

Goldstein, Morris and Robert S. Smith, (1976) "The Estimated Impact of the Antidiscrimination Program Aimed at Federal Contractors" *Industrial and Labor Relations Review* 29, pp. 523-543, July.

Heckman, James J. and Brook S. Payner, (1979) "Determining the Impact of Federal Antidiscrimination Policy on the Economic Status of Blacks: A study of South Carolina" *The American Economic Review* v. 79 no.1, pp. 138-177.

Heckman, James J. and Kenneth I. Wolpin, (1976) "Does the Contract Compliance Program Work? An Analysis of Chicago Data" *Industrial and Laor Relations Review* 29, pp. 544-564, July.

Holcombe, Lora P. (1988) "Demographic Factors Affecting the Black/White Unemployment Differential: 1958-1980" v. 9, no. 3, pp. 23-31.

Hsiao, C., (1981) "Autoregresive Modelling and Money-Income Causality Detection" *Journal of Monetary Economics* v. 7, pp. 85-106.

Johnson, Janet L., (1983) "Sex Differentials in Unemployment Rates: A Case for No Concern" *Journal of Political Economy* v. 91, no. 2, pp. 293-303.

Leonard, Jonathan S., (1984) "The Impact of Affirmative Action on Employment" *Journal of Labor Economics,* v.2, no. 4, pp. 439-463, October.

Marston, Stephen T., (1976) "Employment Instability and High Unemployment" *Brookings Papers on Economic Activity* 1, pp. 169-210.

Myatt, Anthony and David Murrell, (1990) "The Female/Male Unemployment Rate Differential" *Canadian Journal of Economics* v. 23, no. 2, 312-322.

Niemi, Beth, (1974) "The Female-Male Differential in Unemployment Rates" *Industrial and Labor Relations Review* 27, pp. 331-350, April.

Nord, Stephen and Yuan Ting, (1994) "Discrimination and the Unemployment Duration of White and Black Males" *Applied Econometrics* v.26, no. 10, pp. 969-979.

Pindyck, Robert S. and Daniel L. Rubinfeld, (1991) Econometric Methods and Economic Forecasts, 3rd edition, New York: McGraw-Hill.

Reskin, Barbara, F. and Patricia A. Roos, (1990) Job Queues , Gender Queues Temple University Press, Philadelphia, PA.

Sandell, Steven, H., (1980) "Is the Unemployment Rate for Women Too Low? A Direct Test of the Economic Theory of Job Search" *Review of Economics and Statistics* 62, pp. 634-638, November.

Shulman, Steven., (1986) "Discrimination, Human Capital, and Black-White Unemployment" *The Journal of Human Resources,* XXII, 3, pp. 361-376.

Sider, Hal, (1985) "Unemployment Duration and Incidence: 1968-82", *American Economic Review* 75, pp. 461-72, June.

Sims, C. (1980) " Macroeconomics and Reality" *Econometrica*, 48, pp. 1-48, January.

Smith, James P. and Finis Welch, (1984) "Affirmative Action and Labor Markets" *Journal of Labor Economics* v. 2, no. 2, pp. 269-301, October.

Stratton, Leslie S. (1993) "Racial Differences in Men's Unemployment" *Industrial and Labor Relations Review,* v. 46 no. 3, pp. 461-463, April.

Survey of Current Business (1986) March, vol. 66, no. 3.

Thurow, Lester C., (1975) <u>Generating Inequality: Mechanisms of Distribution in the U.S. Economy</u> , New York: Basic Books.

## APPENDIX A

Table 5
VAR Parameter Estimates

Period 1, 1959-1967

GDP Equation

| Variable | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | 4.799687 | 1.03463 | 4.639 | 0.0001 |
| L1GDP | -0.575618 | 0.102532 | -5.614 | 0.0001 |
| L2GDP | -0.192476 | 0.12078 | -1.594 | 0.1157 |
| L3GDP | 0.197568 | 0.092822 | 2.128 | 0.0369 |
| L1DEF | 0.175006 | 0.213502 | 0.82 | 0.4153 |
| L2DEF | -0.159026 | 0.270507 | -0.588 | 0.5586 |
| L3DEF | -0.186085 | 0.194888 | -0.955 | 0.343 |
| L1M2 | 0.680646 | 0.356291 | 1.91 | 0.0603 |
| L2M2 | -0.656077 | 0.355416 | -1.846 | 0.0693 |
| L3M2 | 0.404783 | 0.339335 | 1.193 | 0.2371 |
| L1WM | -0.467967 | 0.34972 | -1.338 | 0.1853 |
| L2WM | -0.563628 | 0.373258 | -1.51 | 0.1357 |
| L3WM | 0.572258 | 0.352103 | 1.625 | 0.1087 |
| L1WF | 0.242108 | 0.248372 | 0.975 | 0.3331 |
| L2WF | 0.183836 | 0.263326 | 0.698 | 0.4875 |
| L3WF | -0.495592 | 0.232426 | -2.132 | 0.0366 |
| L1NWM | 0.071102 | 0.109534 | 0.649 | 0.5184 |
| L2NWM | -0.055677 | 0.120628 | -0.462 | 0.6459 |
| L3NWM | 0.054769 | 0.111357 | 0.492 | 0.6244 |
| L1NWF | -0.076987 | 0.087223 | -0.883 | 0.3805 |
| L2NWF | -0.030006 | 0.09717 | -0.309 | 0.7584 |
| L3NWF | -0.070917 | 0.089713 | -0.79 | 0.432 |
| JA | -2.034056 | 1.449404 | -1.403 | 0.1651 |
| F | -9.703105 | 1.371045 | -7.077 | 0.0001 |
| AP | -5.149432 | 1.956732 | -2.632 | 0.0105 |
| M | -0.871121 | 1.665623 | -0.523 | 0.6027 |
| JN | -9.107265 | 1.154154 | -7.891 | 0.0001 |
| JL | -3.29617 | 1.25256 | -2.632 | 0.0105 |
| AU | -3.385539 | 1.275242 | -2.655 | 0.0099 |
| S | -6.405545 | 1.077181 | -5.947 | 0.0001 |
| O | -5.353323 | 0.977784 | -5.475 | 0.0001 |

| | | | | |
|---|---|---|---|---|
| N | -6.539261 | 1.446702 | -4.52 | 0.0001 |
| D | -0.243344 | 1.068267 | -0.228 | 0.8205 |

Deficit Equation

| Variable | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | 0.274889 | 0.412855 | 0.666 | 0.5078 |
| L1GDP | -0.035584 | 0.040914 | -0.87 | 0.3875 |
| L2GDP | -0.072498 | 0.048196 | -1.504 | 0.1372 |
| L3GDP | -0.11439 | 0.03704 | -3.088 | 0.0029 |
| L1DEF | 0.687805 | 0.085195 | 8.073 | 0.0001 |
| L2DEF | 0.304319 | 0.107942 | 2.819 | 0.0063 |
| L3DEF | -0.457852 | 0.077768 | -5.887 | 0.0001 |
| L1M2 | 0.168599 | 0.142173 | 1.186 | 0.2398 |
| L2M2 | 0.10266 | 0.141824 | 0.724 | 0.4716 |
| L3M2 | -0.091584 | 0.135407 | -0.676 | 0.5011 |
| L1WM | -0.181566 | 0.139551 | -1.301 | 0.1976 |
| L2WM | 0.233611 | 0.148944 | 1.568 | 0.1214 |
| L3WM | -0.292088 | 0.140502 | -2.079 | 0.0414 |
| L1WF | 0.054785 | 0.09911 | 0.553 | 0.5822 |
| L2WF | -0.065353 | 0.105077 | -0.622 | 0.5361 |
| L3WF | 0.175739 | 0.092746 | 1.895 | 0.0624 |
| L1NWM | -0.096283 | 0.043708 | -2.203 | 0.031 |
| L2NWM | -0.040222 | 0.048135 | -0.836 | 0.4063 |
| L3NWM | 0.024008 | 0.044436 | 0.54 | 0.5908 |
| L1NWF | -0.004656 | 0.034805 | -0.134 | 0.894 |
| L2NWF | 0.062618 | 0.038774 | 1.615 | 0.111 |
| L3NWF | -0.009838 | 0.035799 | -0.275 | 0.7843 |
| JA | -0.04544 | 0.578366 | -0.079 | 0.9376 |
| F | 0.169955 | 0.547097 | 0.311 | 0.757 |
| AP | -0.183042 | 0.780808 | -0.234 | 0.8154 |
| M | -1.076605 | 0.664645 | -1.62 | 0.1099 |
| JN | 0.472777 | 0.46055 | 1.027 | 0.3083 |
| JL | -0.650686 | 0.499818 | -1.302 | 0.1974 |
| AU | -0.564016 | 0.508868 | -1.108 | 0.2716 |
| S | -0.357737 | 0.429835 | -0.832 | 0.4082 |
| O | -0.478873 | 0.390172 | -1.227 | 0.2239 |
| N | -0.548993 | 0.577287 | -0.951 | 0.345 |
| D | -0.762733 | 0.426278 | -1.789 | 0.078 |

M2 Equation

| | Parameter | Standard | T for H0: | |
|---|---|---|---|---|

| Variable | Estimate | Error | Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | 0.118026 | 0.23775 | 0.496 | 0.6212 |
| L1GDP | 0.003401 | 0.023561 | 0.144 | 0.8857 |
| L2GDP | -0.013861 | 0.027754 | -0.499 | 0.6191 |
| L3GDP | 0.004745 | 0.02133 | 0.222 | 0.8246 |
| L1DEF | 0.064061 | 0.049061 | 1.306 | 0.196 |
| L2DEF | -0.155937 | 0.06216 | -2.509 | 0.0145 |
| L3DEF | -0.013588 | 0.044784 | -0.303 | 0.7625 |
| L1M2 | 0.270646 | 0.081873 | 3.306 | 0.0015 |
| L2M2 | 0.064261 | 0.081672 | 0.787 | 0.4341 |
| L3M2 | 0.38265 | 0.077976 | 4.907 | 0.0001 |
| L1WM | 0.082414 | 0.080363 | 1.026 | 0.3087 |
| L2WM | -0.104915 | 0.085772 | -1.223 | 0.2255 |
| L3WM | 0.04693 | 0.080911 | 0.58 | 0.5638 |
| L1WF | -0.045579 | 0.057074 | -0.799 | 0.4273 |
| L2WF | -0.02582 | 0.06051 | -0.427 | 0.6709 |
| L3WF | -0.062434 | 0.05341 | -1.169 | 0.2465 |
| L1NWM | 0.010999 | 0.02517 | 0.437 | 0.6635 |
| L2NWM | 0.029564 | 0.027719 | 1.067 | 0.2899 |
| L3NWM | -0.026834 | 0.025589 | -1.049 | 0.298 |
| L1NWF | 0.003386 | 0.020043 | 0.169 | 0.8663 |
| L2NWF | -0.023464 | 0.022329 | -1.051 | 0.2971 |
| L3NWF | 0.013282 | 0.020615 | 0.644 | 0.5216 |
| JA | -0.189277 | 0.333061 | -0.568 | 0.5717 |
| F | -1.142794 | 0.315055 | -3.627 | 0.0005 |
| AP | 0.412306 | 0.449641 | 0.917 | 0.3624 |
| M | -0.345594 | 0.382747 | -0.903 | 0.3698 |
| JN | 0.626192 | 0.265215 | 2.361 | 0.0211 |
| JL | 0.059036 | 0.287828 | 0.205 | 0.8381 |
| AU | 0.112222 | 0.29304 | 0.383 | 0.7029 |
| S | 0.365657 | 0.247528 | 1.477 | 0.1442 |
| O | 0.143648 | 0.224687 | 0.639 | 0.5248 |
| N | -0.01875 | 0.33244 | -0.056 | 0.9552 |
| D | 0.548598 | 0.245479 | 2.235 | 0.0287 |

White Male Equation

| Variable | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | 0.240127 | 0.31399 | 0.765 | 0.4471 |
| L1GDP | -0.009702 | 0.031117 | -0.312 | 0.7562 |
| L2GDP | -0.118477 | 0.036654 | -3.232 | 0.0019 |
| L3GDP | -0.099203 | 0.02817 | -3.522 | 0.0008 |

| | | | | |
|---|---|---|---|---|
| L1DEF | -0.03789 | 0.064794 | -0.585 | 0.5606 |
| L2DEF | 0.066048 | 0.082094 | 0.805 | 0.4239 |
| L3DEF | 0.011896 | 0.059145 | 0.201 | 0.8412 |
| L1M2 | 0.093705 | 0.108127 | 0.867 | 0.3892 |
| L2M2 | 0.098983 | 0.107862 | 0.918 | 0.362 |
| L3M2 | -0.097771 | 0.102982 | -0.949 | 0.3458 |
| L1WM | -0.176245 | 0.106133 | -1.661 | 0.1014 |
| L2WM | 0.002665 | 0.113277 | 0.024 | 0.9813 |
| L3WM | -0.073873 | 0.106857 | -0.691 | 0.4917 |
| L1WF | -0.075208 | 0.075376 | -0.998 | 0.3219 |
| L2WF | 0.051079 | 0.079915 | 0.639 | 0.5249 |
| L3WF | -0.192897 | 0.070537 | -2.735 | 0.008 |
| L1NWM | 0.04201 | 0.033241 | 1.264 | 0.2106 |
| L2NWM | -0.017967 | 0.036608 | -0.491 | 0.6252 |
| L3NWM | 0.009374 | 0.033795 | 0.277 | 0.7823 |
| L1NWF | 0.068732 | 0.026471 | 2.597 | 0.0115 |
| L2NWF | 0.058964 | 0.029489 | 2 | 0.0495 |
| L3NWF | 0.101689 | 0.027226 | 3.735 | 0.0004 |
| JA | 0.374708 | 0.439866 | 0.852 | 0.3973 |
| F | 0.018031 | 0.416086 | 0.043 | 0.9656 |
| AP | -1.422864 | 0.593831 | -2.396 | 0.0193 |
| M | -0.417826 | 0.505485 | -0.827 | 0.4114 |
| JN | 0.896021 | 0.350264 | 2.558 | 0.0128 |
| JL | -0.730716 | 0.380128 | -1.922 | 0.0588 |
| AU | -1.101143 | 0.387012 | -2.845 | 0.0059 |
| S | -0.312932 | 0.326904 | -0.957 | 0.3418 |
| O | 0.001366 | 0.296739 | 0.005 | 0.9963 |
| N | -0.320633 | 0.439046 | -0.73 | 0.4677 |
| D | 0.38619 | 0.324199 | 1.191 | 0.2377 |

White Female Equation

| Variable | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | -0.01807 | 0.40162 | -0.045 | 0.9642 |
| L1GDP | -0.019703 | 0.039801 | -0.495 | 0.6222 |
| L2GDP | -0.064842 | 0.046884 | -1.383 | 0.1712 |
| L3GDP | -0.130405 | 0.036032 | -3.619 | 0.0006 |
| L1DEF | -0.107983 | 0.082877 | -1.303 | 0.197 |
| L2DEF | 0.120139 | 0.105005 | 1.144 | 0.2566 |
| L3DEF | 0.03381 | 0.075651 | 0.447 | 0.6564 |
| L1M2 | 0.059078 | 0.138304 | 0.427 | 0.6706 |
| L2M2 | 0.27538 | 0.137964 | 1.996 | 0.0499 |
| L3M2 | -0.158959 | 0.131722 | -1.207 | 0.2317 |

| | | | | |
|---|---|---|---|---|
| L1WM | -0.015259 | 0.135754 | -0.112 | 0.9108 |
| L2WM | 0.325052 | 0.14489 | 2.243 | 0.0281 |
| L3WM | 0.137629 | 0.136679. | 1.007 | 0.3175 |
| L1WF | -0.386965 | 0.096413 | -4.014 | 0.0002 |
| L2WF | 0.017719 | 0.102217 | 0.173 | 0.8629 |
| L3WF | -0.152678 | 0.090223 | -1.692 | 0.0952 |
| L1NWM | 0.024532 | 0.042519 | 0.577 | 0.5659 |
| L2NWM | -0.029593 | 0.046825 | -0.632 | 0.5295 |
| L3NWM | -0.036253 | 0.043226 | -0.839 | 0.4046 |
| L1NWF | 0.011834 | 0.033858 | 0.35 | 0.7278 |
| L2NWF | -0.026449 | 0.037719 | -0.701 | 0.4856 |
| L3NWF | 0.00402 | 0.034825 | 0.115 | 0.9085 |
| JA | 0.842907 | 0.562626 | 1.498 | 0.1387 |
| F | -0.094203 | 0.532209 | -0.177 | 0.86 |
| AP | -0.070066 | 0.75956 | -0.092 | 0.9268 |
| M | -0.579796 | 0.646558 | -0.897 | 0.373 |
| JN | 2.687974 | 0.448017 | 6 | 0.0001 |
| JL | -0.439998 | 0.486216 | -0.905 | 0.3687 |
| AU | -0.965738 | 0.495021 | -1.951 | 0.0552 |
| S | 0.043112 | 0.418138 | 0.103 | 0.9182 |
| O | 0.266157 | 0.379554 | 0.701 | 0.4855 |
| N | -0.49607 | 0.561578 | -0.883 | 0.3802 |
| D | -1.142457 | 0.414678 | -2.755 | 0.0075 |

Nonwhite Male Equation

| Variable | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | -0.458823 | 1.033765 | -0.444 | 0.6586 |
| L1GDP | -0.064981 | 0.102446 | -0.634 | 0.528 |
| L2GDP | -0.233246 | 0.120679 | -1.933 | 0.0574 |
| L3GDP | -0.105007 | 0.092745 | -1.132 | 0.2615 |
| L1DEF | 0.104876 | 0.213324 | 0.492 | 0.6246 |
| L2DEF | -0.170014 | 0.270281 | -0.629 | 0.5314 |
| L3DEF | 0.013267 | 0.194725 | 0.068 | 0.9459 |
| L1M2 | -0.217553 | 0.355993 | -0.611 | 0.5432 |
| L2M2 | 0.411336 | 0.355118 | 1.158 | 0.2508 |
| L3M2 | 0.212227 | 0.339052 | 0.626 | 0.5334 |
| L1WM | 0.856494 | 0.349428 | 2.451 | 0.0168 |
| L2WM | 0.481701 | 0.372946 | 1.292 | 0.2009 |
| L3WM | 0.146902 | 0.351809 | 0.418 | 0.6776 |
| L1WF | -0.160761 | 0.248164 | -0.648 | 0.5193 |
| L2WF | 0.07154 | 0.263106 | 0.272 | 0.7865 |
| L3WF | -0.120733 | 0.232231 | -0.52 | 0.6048 |

| | | | | |
|---|---|---|---|---|
| L1NWM | -0.432025 | 0.109442 | -3.948 | 0.0002 |
| L2NWM | -0.365887 | 0.120527 | -3.036 | 0.0034 |
| L3NWM | -0.355329 | 0.111264 | -3.194 | 0.0021 |
| L1NWF | 0.240291 | 0.08715 | 2.757 | 0.0075 |
| L2NWF | 0.104128 | 0.097089 | | 0.2873 |
| L3NWF | 0.176855 | 0.089638 | 1.073 | 0.0526 |
| JA | 1.74637 | 1.448192 | 1.973 | 0.232 |
| F | 0.985808 | 1.369899 | 1.206 | 0.4742 |
| AP | -1.621434 | 1.955097 | 0.72 | 0.4098 |
| M | 1.150339 | 1.664231 | -0.829 | 0.4918 |
| JN | 1.565665 | 1.15319 | 0.691 | 0.1791 |
| JL | 0.05965 | 1.251513 | 1.358 | 0.9621 |
| AU | -0.478856 | 1.274176 | 0.048 | 0.7082 |
| S | -0.647021 | 1.076281 | -0.376 | 0.5497 |
| O | 0.174425 | 0.976967 | -0.601 | 0.8588 |
| N | -0.096097 | 1.445493 | 0.179 | 0.9472 |
| D | 0.674901 | 1.067374 | -0.066 | 0.5293 |
| | | | 0.632 | |

Nonwhite Female Equation

| Variable | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | -0.215372 | 1.200583 | -0.179 | 0.8582 |
| L1GDP | 0.227472 | 0.118978 | 1.912 | 0.0601 |
| L2GDP | 0.044797 | 0.140153 | 0.32 | 0.7502 |
| L3GDP | 0.207002 | 0.107711 | 1.922 | 0.0588 |
| L1DEF | 0.124028 | 0.247748 | 0.501 | 0.6183 |
| L2DEF | -0.508602 | 0.313896 | -1.62 | 0.1098 |
| L3DEF | 0.382978 | 0.226148 | 1.693 | 0.0949 |
| L1M2 | 0.270289 | 0.413439 | 0.654 | 0.5155 |
| L2M2 | -0.92804 | 0.412424 | -2.25 | 0.0277 |
| L3M2 | 0.365036 | 0.393764 | 0.927 | 0.3572 |
| L1WM | 0.909444 | 0.405815 | 2.241 | 0.0283 |
| L2WM | 0.153005 | 0.433128 | 0.353 | 0.725 |
| L3WM | 1.016362 | 0.40858 | 2.488 | 0.0153 |
| L1WF | -0.189951 | 0.288211 | -0.659 | 0.5121 |
| L2WF | 0.168657 | 0.305564 | 0.552 | 0.5828 |
| L3WF | -0.229352 | 0.269707 | -0.85 | 0.3981 |
| L1NWM | 0.208926 | 0.127103 | 1.644 | 0.1048 |
| L2NWM | 0.018098 | 0.139977 | 0.129 | 0.8975 |
| L3NWM | -0.111382 | 0.129219 | -0.862 | 0.3917 |
| L1NWF | -0.505431 | 0.101214 | -4.994 | 0.0001 |
| L2NWF | -0.324466 | 0.112756 | -2.878 | 0.0053 |
| L3NWF | 0.124844 | 0.104103 | 1.199 | 0.2346 |

| | | | | |
|---|---|---|---|---|
| JA | -0.826073 | 1.681887 | -0.491 | 0.6249 |
| F | 0.127649 | 1.590959 | 0.08 | 0.9363 |
| AP | -4.022191 | 2.270591 | -1.771 | 0.081 |
| M | 2.272544 | 1.932788 | 1.176 | 0.2438 |
| JN | 1.225008 | 1.33928 | 0.915 | 0.3636 |
| JL | 1.304845 | 1.453469 | 0.898 | 0.3725 |
| AU | 0.045925 | 1.47979 | 0.031 | 0.9753 |
| S | -0.66812 | 1.24996 | -0.535 | 0.5947 |
| O | 0.188795 | 1.13462 | 0.166 | 0.8683 |
| N | 1.136827 | 1.678751 | 0.677 | 0.5006 |
| D | 1.596341 | 1.239616 | 1.288 | 0.2022 |

Period 2, 1968-1980

GDP Equation

| Variable | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | 4.320684 | 0.952851 | 4.534 | 0.0001 |
| L1GDP | -0.493397 | 0.092399 | -5.34 | 0.0001 |
| L2GDP | 0.118799 | 0.103528 | 1.148 | 0.2535 |
| L3GDP | 0.153292 | 0.077809 | 1.97 | 0.0512 |
| L1DEF | -0.146073 | 0.083797 | -1.743 | 0.084 |
| L2DEF | 0.128837 | 0.110504 | 1.166 | 0.246 |
| L3DEF | -0.095864 | 0.083583 | -1.147 | 0.2538 |
| L1M2 | 0.958901 | 0.22589 | 4.245 | 0.0001 |
| L2M2 | -1.003346 | 0.267199 | -3.755 | 0.0003 |
| L3M2 | 0.765897 | 0.234611 | 3.265 | 0.0014 |
| L1WM | 0.254891 | 0.448537 | 0.568 | 0.5709 |
| L2WM | 0.602958 | 0.428527 | 1.407 | 0.1621 |
| L3WM | 0.485992 | 0.415664 | 1.169 | 0.2447 |
| L1WF | -0.74464 | 0.300644 | -2.477 | 0.0147 |
| L2WF | -0.588145 | 0.319354 | -1.842 | 0.0681 |
| L3WF | -0.767299 | 0.298662 | -2.569 | 0.0115 |
| L1NWM | 0.200283 | 0.135486 | 1.478 | 0.142 |
| L2NWM | -0.021165 | 0.149971 | -0.141 | 0.888 |
| L3NWM | -0.30848 | 0.126647 | -2.436 | 0.0164 |
| L1NWF | 0.120123 | 0.117122 | 1.026 | 0.3072 |
| L2NWF | 0.073326 | 0.125267 | 0.585 | 0.5594 |
| L3NWF | -0.218724 | 0.111391 | -1.964 | 0.052 |
| JA | -3.592198 | 1.182082 | -3.039 | 0.0029 |
| F | -12.21019 | 1.390703 | -8.78 | 0.0001 |
| AP | -3.294376 | 1.330829 | -2.475 | 0.0148 |
| M | -2.859014 | 1.275212 | -2.242 | 0.0269 |

| | | | | |
|---|---|---|---|---|
| JN | -6.945953 | 0.934864 | -7.43 | 0.0001 |
| JL | -4.869051 | 1.10207 | -4.418 | 0.0001 |
| AU | -2.626319 | 1.121065 | -2.343 | 0.0208 |
| S | -5.21477 | 1.020282 | -5.111 | 0.0001 |
| O | -4.058878 | 0.80712 | -5.029 | 0.0001 |
| N | -5.684636 | 1.2457 | -4.563 | 0.0001 |
| D | -1.857308 | 1.017159 | -1.826 | 0.0704 |

Deficit Equation

| Variable | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | 1.612934 | 0.905967 | 1.78 | 0.0776 |
| L1GDP | 0.172988 | 0.087853 | 1.969 | 0.0513 |
| L2GDP | -0.024356 | 0.098434 | -0.247 | 0.805 |
| L3GDP | -0.039334 | 0.07398 | -0.532 | 0.596 |
| L1DEF | 0.996259 | 0.079674 | 12.504 | 0.0001 |
| L2DEF | -0.504799 | 0.105067 | -4.805 | 0.0001 |
| L3DEF | -0.173617 | 0.079471 | -2.185 | 0.0309 |
| L1M2 | -0.113552 | 0.214775 | -0.529 | 0.598 |
| L2M2 | 0.005242 | 0.254051 | 0.021 | 0.9836 |
| L3M2 | -0.384292 | 0.223067 | -1.723 | 0.0876 |
| L1WM | -0.121605 | 0.426468 | -0.285 | 0.776 |
| L2WM | -0.695091 | 0.407442 | -1.706 | 0.0907 |
| L3WM | 0.100295 | 0.395212 | 0.254 | 0.8001 |
| L1WF | 0.202357 | 0.285851 | 0.708 | 0.4804 |
| L2WF | -0.747865 | 0.303641 | -2.463 | 0.0152 |
| L3WF | -0.559725 | 0.283967 | -1.971 | 0.0511 |
| L1NWM | -0.113204 | 0.12882 | -0.879 | 0.3813 |
| L2NWM | -0.128462 | 0.142592 | -0.901 | 0.3695 |
| L3NWM | 0.02902 | 0.120415 | 0.241 | 0.81 |
| L1NWF | 0.058847 | 0.111359 | 0.528 | 0.5982 |
| L2NWF | -0.020937 | 0.119104 | -0.176 | 0.8608 |
| L3NWF | 0.001362 | 0.10591 | 0.013 | 0.9898 |
| JA | -1.329869 | 1.123919 | -1.183 | 0.2391 |
| F | -1.521275 | 1.322275 | -1.15 | 0.2523 |
| AP | -1.486746 | 1.265347 | -1.175 | 0.2424 |
| M | -2.438017 | 1.212467 | -2.011 | 0.0467 |
| JN | -1.482033 | 0.888865 | -1.667 | 0.0981 |
| JL | -2.044261 | 1.047844 | -1.951 | 0.0535 |
| AU | -0.161334 | 1.065904 | -0.151 | 0.88 |
| S | -1.22065 | 0.97008 | -1.258 | 0.2108 |
| O | -1.750026 | 0.767406 | -2.28 | 0.0244 |
| N | -0.906582 | 1.184407 | -0.765 | 0.4456 |

| | | | | |
|---|---|---|---|---|
| D | -1.50659 | 0.967111 | -1.558 | 0.122 |

M2 Equation

| Variable | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | 0.247003 | 0.301326 | 0.82 | 0.4141 |
| L1GDP | 0.012404 | 0.02922 | 0.425 | 0.672 |
| L2GDP | 0.038243 | 0.032739 | 1.168 | 0.2452 |
| L3GDP | 0.09137 | 0.024606 | 3.713 | 0.0003 |
| L1DEF | -0.012583 | 0.0265 | -0.475 | 0.6358 |
| L2DEF | -0.028533 | 0.034945 | -0.817 | 0.4159 |
| L3DEF | 0.029896 | 0.026432 | 1.131 | 0.2604 |
| L1M2 | 0.504214 | 0.071435 | 7.058 | 0.0001 |
| L2M2 | -0.075132 | 0.084498 | -0.889 | 0.3758 |
| L3M2 | 0.349564 | 0.074192 | 4.712 | 0.0001 |
| L1WM | 0.177457 | 0.141844 | 1.251 | 0.2134 |
| L2WM | 0.318216 | 0.135516 | 2.348 | 0.0206 |
| L3WM | 0.334147 | 0.131448 | 2.542 | 0.0123 |
| L1WF | -0.072406 | 0.095075 | -0.762 | 0.4479 |
| L2WF | -0.184787 | 0.100991 | -1.83 | 0.0699 |
| L3WF | 0.075748 | 0.094448 | 0.802 | 0.4242 |
| L1NWM | -0.00229 | 0.042846 | -0.053 | 0.9575 |
| L2NWM | 0.062462 | 0.047426 | 1.317 | 0.1904 |
| L3NWM | -0.008933 | 0.04005 | -0.223 | 0.8239 |
| L1NWF | -0.032685 | 0.037038 | -0.882 | 0.3794 |
| L2NWF | 0.009944 | 0.039614 | 0.251 | 0.8023 |
| L3NWF | 0.033019 | 0.035226 | 0.937 | 0.3505 |
| JA | -0.733783 | 0.373817 | -1.963 | 0.052 |
| F | -1.207263 | 0.43979 | -2.745 | 0.007 |
| AP | -0.128463 | 0.420856 | -0.305 | 0.7607 |
| M | -0.486289 | 0.403268 | -1.206 | 0.2303 |
| JN | 0.337132 | 0.295638 | 1.14 | 0.2565 |
| JL | 0.257061 | 0.348514 | 0.738 | 0.4623 |
| AU | -0.452701 | 0.354521 | -1.277 | 0.2042 |
| S | -0.156207 | 0.32265 | -0.484 | 0.6292 |
| O | 0.044704 | 0.25524 | 0.175 | 0.8613 |
| N | 0.197393 | 0.393935 | 0.501 | 0.6173 |
| D | 0.461607 | 0.321662 | 1.435 | 0.154 |

White Male Equation

| | Parameter | Standard | T for H0: | |
|---|---|---|---|---|

| Variable | Estimate | Error | Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | -1.030298 | 0.229404 | -4.491 | 0.0001 |
| L1GDP | -0.065605 | 0.022246 | -2.949 | 0.0039 |
| L2GDP | -0.026061 | 0.024925 | -1.046 | 0.2979 |
| L3GDP | 0.03048 | 0.018733 | 1.627 | 0.1064 |
| L1DEF | 0.021352 | 0.020175 | 1.058 | 0.2921 |
| L2DEF | -0.046304 | 0.026604 | -1.74 | 0.0844 |
| L3DEF | 0.024733 | 0.020123 | 1.229 | 0.2215 |
| L1M2 | -0.21827 | 0.054384 | -4.013 | 0.0001 |
| L2M2 | 0.140458 | 0.06433 | 2.183 | 0.031 |
| L3M2 | -0.126493 | 0.056484 | -2.239 | 0.027 |
| L1WM | -0.024212 | 0.107988 | -0.224 | 0.823 |
| L2WM | 0.093021 | 0.10317 | 0.902 | 0.3691 |
| L3WM | -0.079957 | 0.100073 | -0.799 | 0.4259 |
| L1WF | 0.040928 | 0.072382 | 0.565 | 0.5729 |
| L2WF | 0.031083 | 0.076886 | 0.404 | 0.6868 |
| L3WF | 0.075051 | 0.071905 | 1.044 | 0.2988 |
| L1NWM | 0.041692 | 0.032619 | 1.278 | 0.2037 |
| L2NWM | 0.036319 | 0.036106 | 1.006 | 0.3166 |
| L3NWM | 0.058997 | 0.030491 | 1.935 | 0.0554 |
| L1NWF | 0.002129 | 0.028198 | 0.076 | 0.9399 |
| L2NWF | -0.001013 | 0.030159 | -0.034 | 0.9733 |
| L3NWF | 0.032534 | 0.026818 | 1.213 | 0.2275 |
| JA | 2.468989 | 0.284593 | 8.676 | 0.0001 |
| F | 1.384479 | 0.334819 | 4.135 | 0.0001 |
| AP | 1.168138 | 0.320404 | 3.646 | 0.0004 |
| M | 1.029222 | 0.307014 | 3.352 | 0.0011 |
| JN | 1.456358 | 0.225074 | 6.471 | 0.0001 |
| JL | 1.184077 | 0.265329 | 4.463 | 0.0001 |
| AU | 0.613072 | 0.269903 | 2.271 | 0.025 |
| S | 0.979636 | 0.245638 | 3.988 | 0.0001 |
| O | 1.090684 | 0.194318 | 5.613 | 0.0001 |
| N | 1.669553 | 0.299909 | 5.567 | 0.0001 |
| D | 1.466519 | 0.244887 | 5.989 | 0.0001 |

White Female Equation

| Variable | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | -0.556792 | 0.311506 | -1.787 | 0.0765 |
| L1GDP | 0.03792 | 0.030207 | 1.255 | 0.2119 |
| L2GDP | 0.052532 | 0.033845 | 1.552 | 0.1234 |
| L3GDP | 0.051258 | 0.025437 | 2.015 | 0.0462 |

| | | | | |
|---|---|---|---|---|
| L1DEF | 0.030882 | 0.027395 | 1.127 | 0.2619 |
| L2DEF | -0.057011 | 0.036126 | -1.578 | 0.1173 |
| L3DEF | 0.030833 | 0.027325 | 1.128 | 0.2615 |
| L1M2 | -0.322702 | 0.073848 | -4.37 | 0.0001 |
| L2M2 | 0.202147 | 0.087353 | 2.314 | 0.0224 |
| L3M2 | -0.071446 | 0.076699 | -0.932 | 0.3535 |
| L1WM | 0.34526 | 0.146636 | 2.355 | 0.0202 |
| L2WM | -0.034597 | 0.140094 | -0.247 | 0.8054 |
| L3WM | -0.077951 | 0.135889 | -0.574 | 0.5673 |
| L1WF | -0.420721 | 0.098287 | -4.281 | 0.0001 |
| L2WF | 0.046684 | 0.104403 | 0.447 | 0.6556 |
| L3WF | 0.074781 | 0.097639 | 0.766 | 0.4453 |
| L1NWM | 0.100342 | 0.044293 | 2.265 | 0.0253 |
| L2NWM | 0.06202 | 0.049029 | 1.265 | 0.2084 |
| L3NWM | 0.103247 | 0.041403 | 2.494 | 0.0141 |
| L1NWF | 0.005899 | 0.038289 | 0.154 | 0.8778 |
| L2NWF | 0.022886 | 0.040952 | 0.559 | 0.5774 |
| L3NWF | -0.017493 | 0.036416 | -0.48 | 0.6319 |
| JA | 1.398852 | 0.386446 | 3.62 | 0.0004 |
| F | 0.417986 | 0.454649 | 0.919 | 0.3598 |
| AP | 0.610703 | 0.435075 | 1.404 | 0.1631 |
| M | 0.756881 | 0.416893 | 1.816 | 0.072 |
| JN | 1.453415 | 0.305626 | 4.756 | 0.0001 |
| JL | 1.1119 | 0.360289 | 3.086 | 0.0025 |
| AU | 0.378725 | 0.366499 | 1.033 | 0.3036 |
| S | 0.668028 | 0.333551 | 2.003 | 0.0475 |
| O | 0.429618 | 0.263864 | 1.628 | 0.1062 |
| N | 0.499245 | 0.407245 | 1.226 | 0.2227 |
| D | 0.021625 | 0.33253 | 0.065 | 0.9483 |

Nonwhite Male Equation

| Variable | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | -2.505632 | 0.617146 | -4.06 | 0.0001 |
| L1GDP | -0.160279 | 0.059845 | -2.678 | 0.0085 |
| L2GDP | -0.064802 | 0.067054 | -0.966 | 0.3358 |
| L3GDP | 0.07301 | 0.050395 | 1.449 | 0.1501 |
| L1DEF | -0.00492 | 0.054274 | -0.091 | 0.9279 |
| L2DEF | -0.039107 | 0.071572 | -0.546 | 0.5858 |
| L3DEF | 8.609E-05 | 0.054135 | 0.002 | 0.9987 |
| L1M2 | -0.244287 | 0.146305 | -1.67 | 0.0977 |
| L2M2 | 0.023702 | 0.17306 | 0.137 | 0.8913 |
| L3M2 | -0.026188 | 0.151953 | -0.172 | 0.8635 |

| | | | | |
|---|---|---|---|---|
| L1WM | 0.575776 | 0.29051 | 1.982 | 0.0498 |
| L2WM | 0.717118 | 0.27755 | 2.584 | 0.011 |
| L3WM | 0.071591 | 0.269219 | 0.266 | 0.7908 |
| L1WF | -0.407017 | 0.194722 | -2.09 | 0.0388 |
| L2WF | -0.101818 | 0.206841 | -0.492 | 0.6235 |
| L3WF | 0.169211 | 0.193439 | 0.875 | 0.3835 |
| L1NWM | -0.47696 | 0.087752 | -5.435 | 0.0001 |
| L2NWM | -0.161832 | 0.097134 | -1.666 | 0.0984 |
| L3NWM | 0.012369 | 0.082027 | 0.151 | 0.8804 |
| L1NWF | 0.047903 | 0.075858 | 0.631 | 0.529 |
| L2NWF | 0.169637 | 0.081134 | 2.091 | 0.0387 |
| L3NWF | 0.047372 | 0.072146 | 0.657 | 0.5127 |
| JA | 4.208325 | 0.765615 | 5.497 | 0.0001 |
| F | 4.061335 | 0.900735 | 4.509 | 0.0001 |
| AP | 2.591197 | 0.861956 | 3.006 | 0.0032 |
| M | 2.841939 | 0.825934 | 3.441 | 0.0008 |
| JN | 4.309767 | 0.605496 | 7.118 | 0.0001 |
| JL | 3.925055 | 0.713793 | 5.499 | 0.0001 |
| AU | 1.085696 | 0.726095 | 1.495 | 0.1376 |
| S | 1.935589 | 0.66082 | 2.929 | 0.0041 |
| O | 2.313715 | 0.522758 | 4.426 | 0.0001 |
| N | 3.270005 | 0.806819 | 4.053 | 0.0001 |
| D | 2.907396 | 0.658797 | 4.413 | 0.0001 |

Nonwhite Female Equation

| Variable | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > \|T\| |
|---|---|---|---|---|
| INTERCEPT | -0.095489 | 0.727979 | -0.131 | 0.8959 |
| L1GDP | 0.081756 | 0.070593 | 1.158 | 0.2492 |
| L2GDP | 0.033105 | 0.079096 | 0.419 | 0.6763 |
| L3GDP | -0.045756 | 0.059446 | -0.77 | 0.443 |
| L1DEF | 0.067204 | 0.064021 | 1.05 | 0.296 |
| L2DEF | -0.028335 | 0.084425 | -0.336 | 0.7378 |
| L3DEF | 0.039772 | 0.063858 | 0.623 | 0.5346 |
| L1M2 | -0.381311 | 0.17258 | -2.209 | 0.0291 |
| L2M2 | 0.378097 | 0.20414 | 1.852 | 0.0665 |
| L3M2 | 0.012527 | 0.179243 | 0.07 | 0.9444 |
| L1WM | 0.651378 | 0.342683 | 1.901 | 0.0598 |
| L2WM | -0.373886 | 0.327395 | -1.142 | 0.2558 |
| L3WM | -0.467213 | 0.317568 | -1.471 | 0.1439 |
| L1WF | 0.309566 | 0.229693 | 1.348 | 0.1804 |
| L2WF | 0.645722 | 0.243987 | 2.647 | 0.0093 |
| L3WF | 0.184394 | 0.228178 | 0.808 | 0.4207 |

| | | | | |
|---|---|---|---|---|
| L1NWM | 0.009162 | 0.103512 | 0.089 | 0.9296 |
| L2NWM | 0.189602 | 0.114578 | 1.655 | 0.1007 |
| L3NWM | 0.237176 | 0.096758 | 2.451 | 0.0157 |
| L1NWF | -0.661639 | 0.089481 | -7.394 | 0.0001 |
| L2NWF | -0.382808 | 0.095704 | -4 | 0.0001 |
| L3NWF | -0.221184 | 0.085103 | -2.599 | 0.0106 |
| JA | 0.763422 | 0.903112 | 0.845 | 0.3997 |
| F | -0.580544 | 1.062499 | -0.546 | 0.5858 |
| AP | 0.289774 | 1.016755 | 0.285 | 0.7762 |
| M | -0.030518 | 0.974264 | -0.031 | 0.9751 |
| JN | 3.130114 | 0.714237 | 4.382 | 0.0001 |
| JL | 1.091734 | 0.841983 | 1.297 | 0.1973 |
| AU | -1.133477 | 0.856495 | -1.323 | 0.1883 |
| S | -0.677345 | 0.779496 | -0.869 | 0.3867 |
| O | -0.278993 | 0.61664 | -0.452 | 0.6518 |
| N | -0.461998 | 0.951716 | -0.485 | 0.6283 |
| D | -0.890844 | 0.777111 | -1.146 | 0.254 |

**Table 6**
**Cumulative 36 Month Impulse Response Functions,**
**1959-1967.**

| Month | wftowm | nwmtowm | nwftowm | wmtowf | nwmtowf | nwftowf |
|---|---|---|---|---|---|---|
| 1 | -0.020182 | 0.131103 | 0.145348 | -0.0234128 | 0.0110271 | -0.00568423 |
| 2 | 0.060508 | 0.160354 | 0.083266 | 0.0029868 | 0.0350414 | 0.030573 |
| 3 | 0.032343 | 0.137669 | 0.243273 | -0.057323 | -0.007332 | 0.026489 |
| 4 | 0.060011 | 0.152534 | 0.172951 | -0.0207856 | -0.008875 | -0.0298093 |
| 5 | 0.029964 | 0.145834 | 0.185489 | -0.0354463 | -0.011532 | 0.0304194 |
| 6 | 0.049978 | 0.179198 | 0.190467 | -0.0133126 | 0.0085113 | -0.0406293 |
| 7 | 0.037259 | 0.164354 | 0.236747 | -0.0428388 | -0.013113 | 0.0144341 |
| 8 | 0.053968 | 0.165257 | 0.162199 | -0.012418 | 0.0054528 | -0.00173253 |
| 9 | 0.035068 | 0.156559 | 0.21334 | -0.0369083 | -0.017568 | 0.00179943 |
| 10 | 0.052143 | 0.17681 | 0.204136 | -0.0181317 | 0.0006743 | -0.0126737 |
| 11 | 0.042036 | 0.160386 | 0.202137 | -0.0322234 | -0.008198 | 0.0222601 |
| 12 | 0.049665 | 0.168623 | 0.192853 | -0.0195414 | -5.35E-05 | -0.0128432 |
| 13 | 0.042119 | 0.163974 | 0.216638 | -0.0303989 | -0.011278 | 0.0108226 |
| 14 | 0.05 | 0.170385 | 0.193053 | -0.0200458 | 0.0001857 | -0.00089492 |
| 15 | 0.043273 | 0.163942 | 0.207913 | -0.0295557 | -0.009457 | 0.00758483 |
| 16 | 0.048535 | 0.170499 | 0.202957 | -0.0216322 | -0.002624 | -0.00290407 |
| 17 | 0.044138 | 0.164587 | 0.204792 | -0.027851 | -0.008875 | 0.00950428 |
| 18 | 0.047653 | 0.168753 | 0.199656 | -0.0226359 | -0.003763 | -0.00173447 |
| 19 | 0.044458 | 0.165852 | 0.208091 | -0.0271745 | -0.008545 | 0.00670294 |
| 20 | 0.047403 | 0.168241 | 0.199992 | -0.0229944 | -0.004149 | 0.00150277 |
| 21 | 0.044862 | 0.165444 | 0.204615 | -0.0263868 | -0.007911 | 0.00620203 |
| 22 | 0.046933 | 0.168195 | 0.202904 | -0.0235073 | -0.004896 | 0.00143476 |
| 23 | 0.045368 | 0.166064 | 0.20442 | -0.0258624 | -0.007338 | 0.00648351 |
| 24 | 0.046737 | 0.167599 | 0.201842 | -0.0237566 | -0.005155 | 0.00249939 |
| 25 | 0.045466 | 0.166446 | 0.205117 | -0.0255792 | -0.007232 | 0.00528176 |
| 26 | 0.046606 | 0.167583 | 0.202543 | -0.0240057 | -0.005514 | 0.00328587 |
| 27 | 0.045642 | 0.166452 | 0.20394 | -0.0252981 | -0.006966 | 0.00523079 |
| 28 | 0.046382 | 0.167449 | 0.203211 | -0.0242224 | -0.005853 | 0.00321884 |
| 29 | 0.04577 | 0.166658 | 0.203998 | -0.0251139 | -0.006842 | 0.00512601 |
| 30 | 0.046301 | 0.167221 | 0.202862 | -0.0243141 | -0.005971 | 0.00371188 |
| 31 | 0.045817 | 0.16674 | 0.204036 | -0.0249986 | -0.00676 | 0.00474897 |
| 32 | 0.046247 | 0.167193 | 0.203188 | -0.0243972 | -0.006092 | 0.00397975 |
| 33 | 0.045897 | 0.166759 | 0.203664 | -0.0248804 | -0.006633 | 0.00477094 |
| 34 | 0.04618 | 0.167132 | 0.20336 | -0.024472 | -0.006197 | 0.00400788 |
| 35 | 0.045948 | 0.166851 | 0.203732 | -0.0248121 | -0.006579 | 0.00469834 |
| 36 | 0.046152 | 0.16707 | 0.203286 | -0.0245105 | -0.006247 | 0.00418498 |

| | wmtonwm | wftonwm | nwfftonwm | wmtonwf | wftonwf | nwmtonwf |
|---|---|---|---|---|---|---|
| **1** | -0.024822 | -0.04568 | 0.277289 | 0.0064214 | -0.068172 | 0.226686 |
| **2** | 0.019242 | 0.06876 | 0.11981 | 0.0629988 | 0.0182822 | 0.212702 |
| **3** | -0.015392 | 0.00482 | 0.326811 | 0.0525026 | -0.024765 | 0.24302 |
| **4** | 0.061328 | 0.062866 | 0.292276 | 0.0974446 | 0.0313976 | 0.242948 |
| **5** | 0.005496 | 0.019151 | 0.295573 | 0.0729376 | -0.001042 | 0.257349 |
| **6** | 0.042165 | 0.047741 | 0.292334 | 0.110367 | 0.0311622 | 0.299639 |
| **7** | 0.024884 | 0.024161 | 0.353512 | 0.0785662 | 0.0011423 | 0.278004 |
| **8** | 0.044875 | 0.048776 | 0.257284 | 0.110409 | 0.0382416 | 0.279856 |
| **9** | 0.023202 | 0.026076 | 0.324509 | 0.0852347 | 0.0024742 | 0.271232 |
| **10** | 0.044654 | 0.048977 | 0.317379 | 0.110285 | 0.0313754 | 0.296832 |
| **11** | 0.027792 | 0.034994 | 0.309087 | 0.0887859 | 0.0144425 | 0.276121 |
| **12** | 0.041565 | 0.045017 | 0.29924 | 0.106949 | 0.0270836 | 0.288408 |
| **13** | 0.032253 | 0.035884 | 0.331753 | 0.0948102 | 0.0149427 | 0.280464 |
| **14** | 0.040037 | 0.045904 | 0.302306 | 0.104926 | 0.0279318 | 0.289242 |
| **15** | 0.033064 | 0.037359 | 0.318182 | 0.0947428 | 0.0153732 | 0.279957 |
| **16** | 0.040247 | 0.043253 | 0.31396 | 0.105727 | 0.0258223 | 0.290565 |
| **17** | 0.033697 | 0.03823 | 0.315567 | 0.0960473 | 0.0177082 | 0.280055 |
| **18** | 0.038303 | 0.042393 | 0.308718 | 0.103291 | 0.0236391 | 0.287296 |
| **19** | 0.034878 | 0.038533 | 0.319137 | 0.098137 | 0.0185254 | 0.282837 |
| **20** | 0.037854 | 0.042052 | 0.309672 | 0.10242 | 0.0234723 | 0.28637 |
| **21** | 0.034904 | 0.039173 | 0.31449 | 0.0983625 | 0.0189331 | 0.281968 |
| **22** | 0.037629 | 0.041558 | 0.313188 | 0.102382 | 0.0226997 | 0.286654 |
| **23** | 0.035526 | 0.039833 | 0.314864 | 0.0989163 | 0.0197971 | 0.28273 |
| **24** | 0.037179 | 0.041369 | 0.311626 | 0.101701 | 0.0221978 | 0.285544 |
| **25** | 0.035876 | 0.0399 | 0.315655 | 0.0996152 | 0.0200127 | 0.283526 |
| **26** | 0.037067 | 0.041202 | 0.312736 | 0.10139 | 0.0219733 | 0.285307 |
| **27** | 0.035941 | 0.040099 | 0.314063 | 0.0997577 | 0.0202703 | 0.283455 |
| **28** | 0.036912 | 0.040909 | 0.313392 | 0.101266 | 0.0216122 | 0.285192 |
| **29** | 0.036122 | 0.040233 | 0.31427 | 0.100004 | 0.0205249 | 0.283735 |
| **30** | 0.036715 | 0.040831 | 0.312869 | 0.101004 | 0.0214485 | 0.284772 |
| **31** | 0.036218 | 0.040288 | 0.314263 | 0.100208 | 0.0206067 | 0.283945 |
| **32** | 0.036678 | 0.040776 | 0.313339 | 0.100916 | 0.0213634 | 0.284698 |
| **33** | 0.036259 | 0.040392 | 0.313807 | 0.100277 | 0.0207306 | 0.283955 |
| **34** | 0.036622 | 0.040704 | 0.313512 | 0.100849 | 0.0212352 | 0.284616 |
| **35** | 0.036341 | 0.040448 | 0.313944 | 0.100388 | 0.020825 | 0.284095 |
| **36** | 0.036567 | 0.040675 | 0.31341 | 0.100759 | 0.0211781 | 0.284485 |

APPENDIX C

**Table 7**
**Cumulative 36 Month Impulse Response Functions, 1968-1980.**

| Month | wftowm | nwmtowm | nwftowm | wmtowf | nwmtowf | nwftowf |
|---|---|---|---|---|---|---|
| 1 | 0.0228155 | 0.0539486 | 0.123292 | 0.015394 | -0.0238473 | 0.0909864 |
| 2 | 0.0261467 | 0.135054 | -0.00563 | 0.040553 | 0.105382 | 0.0802769 |
| 3 | 0.0065675 | 0.143566 | -0.06553 | 0.050227 | 0.187819 | -0.047221 |
| 4 | 0.0260679 | 0.0988014 | -0.00277 | 0.054739 | 0.165601 | 0.039097 |
| 5 | 0.0284239 | 0.129152 | -0.01936 | 0.053005 | 0.145094 | 0.0700402 |
| 6 | 0.0195692 | 0.121436 | 0.016207 | 0.040386 | 0.123978 | 0.0625004 |
| 7 | -0.006172 | 0.0480881 | -0.04823 | 0.00012 | 0.0990693 | 0.011212 |
| 8 | -0.021931 | 0.0449785 | -0.01901 | -0.01238 | 0.0277071 | 0.0105944 |
| 9 | -0.02209 | 0.031506 | -0.0053 | -0.01508 | 0.0516178 | 0.0508446 |
| 10 | -0.045912 | 0.0092827 | -0.01316 | -0.0295 | 0.0382902 | 0.0348662 |
| 12 | -0.045333 | -0.006799 | -0.01967 | -0.03671 | 0.0279447 | 0.0219993 |
| 13 | -0.040076 | -0.010851 | -0.0631 | -0.04478 | 0.0157632 | -0.001197 |
| 14 | -0.042987 | -0.019448 | -0.04972 | -0.05389 | -0.0072006 | -0.011575 |
| 15 | -0.03925 | -0.032932 | -0.0281 | -0.06381 | -0.0170003 | 0.0218498 |
| 16 | -0.043875 | -0.021963 | -0.03045 | -0.0691 | -0.0296258 | 0.0043916 |
| 17 | -0.045034 | -0.01307 | -0.03496 | -0.07555 | -0.0142175 | 0.0071395 |
| 18 | -0.051111 | -0.023662 | -0.05158 | -0.07593 | -0.0299105 | -0.00896 |
| 19 | -0.054677 | -0.022586 | -0.04905 | -0.07318 | -0.0248089 | -0.008149 |
| 20 | -0.057484 | -0.018799 | -0.05101 | -0.07501 | -0.0166701 | -4.45E-05 |
| 21 | -0.056094 | -0.021782 | -0.04676 | -0.07526 | -0.0264654 | -0.010391 |
| 22 | -0.054349 | -0.028917 | -0.0417 | -0.07611 | -0.0219461 | 0.00454 |
| 23 | -0.05723 | -0.031579 | -0.04741 | -0.0773 | -0.0353358 | -0.009257 |
| 24 | -0.056731 | -0.029569 | -0.05274 | -0.07892 | -0.0301568 | -0.011466 |
| 25 | -0.056956 | -0.028576 | -0.05531 | -0.07812 | -0.028949 | -0.011817 |
| 26 | -0.056111 | -0.026434 | -0.0499 | -0.07823 | -0.0299711 | -0.013215 |
| 27 | -0.054315 | -0.027061 | -0.04649 | -0.07833 | -0.0274864 | -0.003064 |
| 28 | -0.054223 | -0.025229 | -0.04544 | -0.07693 | -0.0288032 | -0.008735 |
| 29 | -0.053644 | -0.026121 | -0.0457 | -0.07758 | -0.0256427 | -0.0052 |
| 30 | -0.054385 | -0.027111 | -0.04864 | -0.07637 | -0.0300755 | -0.00859 |
| 31 | -0.05349 | -0.023489 | -0.0478 | -0.07511 | -0.0256594 | -0.007371 |
| 32 | -0.053489 | -0.022974 | -0.04959 | -0.0748 | -0.0249702 | -0.007087 |
| 33 | -0.052908 | -0.021682 | -0.0481 | -0.07437 | -0.0251902 | -0.009013 |
| 34 | -0.052079 | -0.021636 | -0.04606 | -0.07405 | -0.0226886 | -0.004334 |
| 35 | -0.052821 | -0.022208 | -0.04604 | -0.07385 | -0.0246377 | -0.007063 |
| 36 | -0.052872 | -0.022061 | -0.04547 | -0.07385 | -0.0224344 | -0.004605 |

| | wmtonwm | wftonwm | nwftonwm | wmtonwf | wftonwf | nwmtonwf |
|---|---|---|---|---|---|---|
| **1** | 0.041804 | 0.0649797 | 0.168702 | 0.007768 | -0.0170712 | 0.0848877 |
| **2** | 0.0613576 | 0.0481295 | 0.177527 | 0.05103 | 0.0603931 | 0.268616 |
| **3** | 0.0719703 | 0.0644259 | 0.108068 | 0.070571 | 0.0199286 | 0.243875 |
| **4** | 0.0896416 | 0.0623364 | 0.148856 | 0.079039 | 0.0693852 | 0.28589 |
| **5** | 0.102355 | 0.0777174 | 0.195724 | 0.085172 | 0.0542476 | 0.326967 |
| **6** | 0.113395 | 0.0733839 | 0.209967 | 0.067628 | 0.0776595 | 0.358507 |
| **7** | 0.097843 | 0.0795858 | 0.154209 | 0.022578 | 0.022989 | 0.213493 |
| **8** | 0.092692 | 0.0816777 | 0.170221 | 0.006486 | 0.0058586 | 0.197193 |
| **9** | 0.0870342 | 0.0747493 | 0.208905 | -0.00706 | -0.0124591 | 0.198363 |
| **10** | 0.0791381 | 0.0788997 | 0.197824 | -0.04088 | -0.04806 | 0.133795 |
| **12** | 0.0752425 | 0.0629034 | 0.196705 | -0.05417 | -0.0557046 | 0.136162 |
| **13** | 0.0691176 | 0.0664798 | 0.171823 | -0.07092 | -0.0474948 | 0.0807504 |
| **14** | 0.0652755 | 0.0610236 | 0.166096 | -0.09473 | -0.073474 | 0.0686938 |
| **15** | 0.0626983 | 0.0556162 | 0.195018 | -0.10499 | -0.0547409 | 0.0425826 |
| **16** | 0.0535254 | 0.0586362 | 0.178786 | -0.11844 | -0.0705021 | 0.0343127 |
| **17** | 0.0478495 | 0.0480678 | 0.181441 | -0.12409 | -0.0699053 | 0.0525754 |
| **18** | 0.0457719 | 0.0538837 | 0.17157 | -0.12363 | -0.078434 | 0.0252555 |
| **19** | 0.0407946 | 0.0440091 | 0.156662 | -0.12267 | -0.0889834 | 0.0355253 |
| **20** | 0.0392241 | 0.04181 | 0.17214 | -0.12291 | -0.0904733 | 0.0427086 |
| **21** | 0.0369318 | 0.044954 | 0.166954 | -0.12546 | -0.0912615 | 0.0327794 |
| **22** | 0.0343599 | 0.0372482 | 0.17185 | -0.12864 | -0.0898156 | 0.0326677 |
| **23** | 0.033948 | 0.0411898 | 0.172974 | -0.13188 | -0.096406 | 0.0200377 |
| **24** | 0.032879 | 0.0344882 | 0.158509 | -0.13365 | -0.0978734 | 0.0228452 |
| **25** | 0.0322391 | 0.0357501 | 0.162254 | -0.13293 | -0.0981645 | 0.022323 |
| **26** | 0.032414 | 0.0369177 | 0.159487 | -0.13228 | -0.0995195 | 0.0248028 |
| **27** | 0.0318049 | 0.0358771 | 0.16393 | -0.13271 | -0.0935779 | 0.0249093 |
| **28** | 0.0310238 | 0.0386995 | 0.166095 | -0.13218 | -0.0952978 | 0.0243398 |
| **29** | 0.0311276 | 0.0358884 | 0.162182 | -0.13242 | -0.0931957 | 0.0241213 |
| **30** | 0.0311976 | 0.0377795 | 0.164736 | -0.13123 | -0.094487 | 0.0203528 |
| **31** | 0.0322706 | 0.0358249 | 0.161324 | -0.12858 | -0.0937543 | 0.0288846 |
| **32** | 0.0329 | 0.0366236 | 0.163136 | -0.12768 | -0.0918103 | 0.0292951 |
| **33** | 0.033096 | 0.0376785 | 0.162259 | -0.12666 | -0.0918474 | 0.0310566 |
| **34** | 0.0334101 | 0.0367624 | 0.163442 | -0.12595 | -0.0889433 | 0.0340298 |
| **35** | 0.0332014 | 0.0387866 | 0.165418 | -0.12609 | -0.0908584 | 0.0309336 |
| **36** | 0.0334889 | 0.0369998 | 0.163101 | -0.12566 | -0.0906638 | 0.0341055 |

APPENDIX D

| Table 8<br>Estimated Unemployment Duration with Various Values of g(x). | | WM | WF | NWM | NWF |
|---|---|---|---|---|---|
| **1968** | g(x)=.5 | 6.58363 | 5.82292 | 7.56926 | 6.4816 |
| | g(x)=.4 | 6.1504 | 5.38936 | 7.13574 | 6.048 |
| | g(x)=.45 | 6.36702 | 5.60614 | 7.3525 | 6.2648 |
| **1969** | g(x)=.5 | 6.87949 | 5.99842 | 7.05954 | 6.74923 |
| | g(x)=.4 | 6.44626 | 5.56488 | 6.62642 | 6.31654 |
| | g(x)=.45 | 6.66287 | 5.78165 | 6.84298 | 6.53288 |
| **1970** | g(x)=.5 | 8.64706 | 6.84318 | 9.96278 | 7.39159 |
| | g(x)=.4 | 8.2163 | 6.40991 | 9.53339 | 6.95852 |
| | g(x)=.45 | 8.43168 | 6.62655 | 9.74809 | 7.17506 |
| **1971** | g(x)=.5 | 9.58094 | 7.93418 | 10.6838 | 8.8706 |
| | g(x)=.4 | 9.15042 | 7.50196 | 10.2541 | 8.44218 |
| | g(x)=.45 | 9.36568 | 7.71807 | 10.4689 | 8.65639 |
| **1972** | g(x)=.5 | 8.86121 | 7.39159 | 10.1676 | 8.37952 |
| | g(x)=.4 | 8.42866 | 6.95856 | 9.73604 | 7.94635 |
| | g(x)=.45 | 8.64494 | 7.17507 | 9.95181 | 8.16293 |
| **1973** | g(x)=.5 | 7.85064 | 6.5288 | 9.77118 | 7.93511 |
| | g(x)=.4 | 7.41698 | 6.09505 | 9.33748 | 7.50198 |
| | g(x)=.45 | 7.63381 | 6.31193 | 9.55433 | 7.71854 |
| **1974** | g(x)=.5 | 8.72093 | 7.13564 | 10.0583 | 8.68004 |
| | g(x)=.4 | 8.28858 | 6.70201 | 9.62674 | 8.24664 |
| | g(x)=.45 | 8.50475 | 6.91882 | 9.84251 | 8.46334 |
| **1975** | g(x)=.5 | 11.9509 | 9.42066 | 13.2373 | 9.95454 |
| | g(x)=.4 | 11.5284 | 8.99306 | 12.8165 | 9.52538 |
| | g(x)=.45 | 11.7396 | 9.20686 | 13.0269 | 9.73996 |
| **1976** | g(x)=.5 | 11.236 | 9.03737 | 12.3917 | 9.76196 |
| | g(x)=.4 | 10.8043 | 8.60463 | 11.9626 | 9.33075 |
| | g(x)=.45 | 11.0201 | 8.821 | 12.1771 | 9.54635 |
| **1977** | g(x)=.5 | 9.3078 | 8.2498 | 12.14 | 10.0442 |
| | g(x)=.4 | 8.87466 | 7.81633 | 11.7084 | 9.61211 |
| | g(x)=.45 | 9.09123 | 8.03307 | 11.9242 | 9.82815 |
| **1978** | g(x)=.5 | 8.49963 | 7.28222 | 11.4011 | 8.44877 |
| | g(x)=.4 | 8.06611 | 6.8485 | 10.9684 | 8.01587 |
| | g(x)=.45 | 8.28287 | 7.06536 | 11.1848 | 8.23232 |
| **1979** | g(x)=.5 | 8.29415 | 7.17218 | 10.7473 | 8.59452 |
| | g(x)=.4 | 7.86112 | 6.7388 | 10.3151 | 8.16192 |
| | g(x)=.45 | 8.07764 | 6.95549 | 10.5312 | 8.37822 |
| **1980** | g(x)=.5 | 10.6724 | 8.1143 | 12.1487 | 9.50644 |
| | g(x)=.4 | 10.2422 | 7.6812 | 11.7198 | 9.07399 |
| | g(x)=.45 | 10.4573 | 7.89775 | 11.9342 | 9.29021 |

APPENDIX E

Human Subjects Approval

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

**Date:** 11-18-97 **IRB#:** BU-98-013

**Proposal Title: LABOR QUEUES, DISCRIMINATION AND AFFIRMATIVE ACTION**

**Principal Investigator(s):** Jim Fain, Timothy O. Bisping

**Reviewed and Processed as:** Exempt

**Approval Status Recommended by Reviewer(s):** Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING, AS WELL AS ARE SUBJECT TO MONITORING AT ANY TIME DURING THE APPROVAL PERIOD.
APPROVAL STATUS PERIOD VALID FOR DATA COLLECTION FOR A ONE CALENDAR YEAR PERIOD AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.
ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

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**Comments, Modifications/Conditions for Approval or Disapproval are as follows:**

Signature: John H. Wyckoff

Chair of Institutional Review Board

cc: Timothy O. Bisping

Date: November 19, 1997

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# VITA

Timothy O. Bisping

Candidate for the Degree of

Doctor or Philosophy

Dissertation: Labor Queues, Discrimination, and Affirmative Action

Major Field: Economics

Education: Graduated from Linn High School, Linn, Kansas in May of 1988; received Bachelor of Business Administration in Economics for Wichita State University in December of 1991; received Master of Arts degree in Economics from Wichita State University in August of 1993. Completed the requirements for the Doctor of Philosophy degree with a major in Economics from Oklahoma State University in December of 1997.

Experience: Employed by Wichita State University as a research assistant form January of 1992 to July of 1993. Employed as a Teaching Associate at Oklahoma State University Department of Economics from August of 1993 to present and by the Department of Sociology as a research associate from March of 1995 to May of 1997. Employed as an adjunct lecturer in economics at the University of Central Oklahoma during the fall semesters of 1996 and 1997. Employed by the Poverty Research Grant, Oklahoma State University, Department of Sociology as a consultant from October of 1997 to present.

Professional Memberships: American Economic Association, Southern Economic Association, Missouri Valley Economic Association.