

*Senior Project*  
*Department of Economics*



**“Discrimination’s Link to Unemployment  
Duration”**

Chad Schroeder  
May 2013

Advisors: *Francesco Renna*

## Abstract

This paper analyzes unemployment duration and what effect discrimination has on it. To do this data from the National Longitudinal Survey of Youth is utilized. The paper looks to fill in how discrimination affects unemployment duration and will utilize the Oaxaca Decomposition to better understand the gap that currently exists between blacks and whites. It finds an unexplained gap in the range of 15% that can be attributed to discrimination. Although actions have been taken to rid the labor market of discrimination, it has not been successful and to do so would require further measures.

## Table of Contents

|       |                                       |    |
|-------|---------------------------------------|----|
| I.    | Introduction .....                    | 3  |
| II.   | Review of the Literature .....        | 4  |
| III.  | Theoretical Model .....               | 7  |
| IV.   | Empirical Model .....                 | 7  |
| V.    | Data .....                            | 9  |
| VI.   | Results and Analysis .....            | 10 |
| VII.  | Conclusions .....                     | 12 |
| VIII. | Limitations and Future Research ..... | 13 |
| IX.   | Appendices .....                      | 15 |
| X.    | References .....                      | 19 |

## Discrimination's Link to Unemployment Duration

### I. Introduction

Longer durations of unemployment have been found to be a cause of long-lasting effects on a person's earning potential, health, and the outlook of their children (Sullivan and Wachter, 2004; Oreopoulos, Page and Stevens, 2008; Sullivan, Song and Manchest, 2009). The Bureau of Labor Statistics (BLS) shows that in 2003 there was an unemployment duration gap between blacks and whites of almost. With the average black unemployed for 22.7 weeks and the average white unemployed for 18 weeks, a 26% difference. This gap can also be seen in the median duration of unemployment of blacks and whites, the medians being 12.9 and 9.4 respectively. Due to the possible lasting effects on a person's life, it is important to understand why the unemployment gap exists.

This paper attempts to estimate the effect of discrimination on the unemployment gap by analyzing the differences in unemployment duration of individuals based on their race while controlling for other factors. Understanding how discrimination may affect the duration of unemployment could help in determining if more anti-discriminatory policy could be necessary. *like what*

In this paper I will run Ordinary Least Squares (OLS) regressions on both blacks and whites to estimate how a person's race affects unemployment duration. Then, I shall use the Oaxaca Decomposition to study the difference in means between the black and white groups, to estimate discrimination's effect on unemployment duration. The goal of this paper is to test the role that race plays in determining the duration of an individual's unemployment period. To carry out this analysis data will be taken from the National Longitudinal Survey of Youth 1979 cohort.

## II. Review of the Literature

The labor market is of large concern in the economic research and theory as findings and subsequent policies can affect millions of people in the U.S. and billions of people throughout the world. Differences in the labor market such as pay, professions, and patterns of employment generally come from varying preferences and skills that people possess. This “preferences/human capital” hypothesis is the fundamental theory behind empirical research that looks into race differences in the labor market (Altonji and Blank 1999). This hypothesis is the null hypothesis for most research into discrimination, and differences in the labor market that are not explained through these factors may be attributable to discrimination (Altonji and Blank 1999).

Gary Becker (1971) introduced the first economic model of discrimination. He said that some employers had a “taste” for discrimination. This meant workers who were being discriminated against would have to be more productive at a certain wage, or accept a lower wage, in order to for discriminating employers to hire them. Becker also pointed out that if there were enough non-discriminating firms, competition would drive discrimination out of the market. This occurs because the discriminating firms pay more for the same productivity and has higher marginal costs.

Phelps (1972) and Arrow (1973) developed the idea that firms often have very little information about well a future worker will perform. This uncertainty can cause firms to use easily observable characteristics to help them predict how a worker may perform if hired. Firms using an easily observable characteristic such as race to predict performance and determine who to hire is statistical discrimination. Discriminating in this way is illegal however rational a forecaster of this type may be, but it can be hard to detect if a firm is statistically discriminating

(Altonji and Blank 1999). The idea that firms face uncertainty about a worker's productivity has been reproduced in empirical studies from Farber and Gibbons (1996) as well as Altonji and Pierret (1997) that find consistent results backing up this idea.

George Stigler (1962) continued to theorize about the labor market and introduced the idea of non-costless information that is experienced by individuals while looking for work. Stigler stated that a rational person would search for a job, to find the highest paying position for which they were qualified, until the marginal cost of looking equaled the marginal benefit from further searching. This began a branch of the theoretical labor market called search theory that looks at how individuals act when they are unemployed and looking for work. Search theory has been further developed and research has been done into finding out what factors affect a person's search for a job and how long they will be unemployed for.

Research has built off these foundations to be able to look into discrimination's involvement with unemployment duration. Ritter and Taylor (2011) look into the premarket measures of a worker's ability. They use a negative binomial regression to estimate the number of weeks a person will be unemployed based off of factors such as mother and father's education, AFQT scores, and school suspensions and expulsions. Ritter and Taylor found that premarket factors do not cover the black-white unemployment differential and attribute the extra gap to a person's race.

A theoretical model was laid out by Ehrenberg and Oaxaca (1976) to show what should affect unemployment duration and how it will be affected. In this model, Ehrenberg and Oaxaca summarize five assumptions of job search theory, on what is expected to affect the length of an individual's unemployment duration. (i) Things that lessen the cost of being unemployed will cause an increase in an individual's expected unemployment duration. (ii) Decreases in an

individual's expected time to retirement will decrease the expected duration of unemployment. (iii) Increases in an individual's skill level will have an ambiguous effect on the unemployment duration. (iv) Anything that increases the discount rate of an individual will reduce the expected duration of unemployment. (v) Factors that affect the distribution of an individual's potential wage offers will influence the expected length of unemployment, with increased wages increasing the duration. Ehrenberg and Oaxaca look to find out how Unemployment insurance (UI) effects unemployment duration. They find that since UI decreases the cost of being unemployed, people are incentivized to stay unemployed longer, increasing unemployment duration for those who receive UI.

More recently, Lang and Lehman (2011) look at unemployment duration differences between blacks and whites after controlling for personal characteristics and find that there is still about a 25 percent gap. Lang and Lehman (2011) look at the differences in unemployment duration and can partially attribute it towards the difference in the job offer rate towards blacks, which leads them on a longer job search. The paper also points out that since blacks receive lower wage offers, compared to a similar white worker, they are more likely to choose leisure over work.

In this paper, I expand upon Ehrenberg and Oaxaca's work by using the decomposition to look into the explained and unexplained parts of the unemployment duration model while focusing on discrimination rather than UI. I also examine how large the gap is and compare it Lang and Lehman's result of 25 percent.

### III. Theoretical Model

The past work in theoretical research around racial difference in labor market outcomes has provided guidelines for how to carry out the econometric work of this paper. The “preferences/human capital” hypothesis provides the null hypothesis for this paper, and most other empirical research on racial discriminations. This null hypothesis theorizes that differences in employment patterns are caused by differing preferences and skill rather than discrimination. These differences can arise in people’s preference for leisure or particular types of work.

As mentioned earlier, Ehrenberg and Oaxaca summarized five assumptions of job search theory that affect the length of an individual’s unemployment duration ( $U(D)$ ). I call things that affect the cost of unemployment  $c$ , time to retirement  $n$ , skill level  $s$ , discount rate  $r$ , and wage distribution  $d$ . Combining these, Ehrenberg and Oaxaca develop a theoretical model of expected unemployment duration, equation (1).

$$U(D) = f(c, n, s, r, d) \tag{1}$$

### IV. Empirical Model

This papers model is based on the above theoretical model. Two OLS regressions are run, these regress blacks and whites separately so I can compare the results. I control for the variables male, age, married, net worth, wage, urban, education, benefits, and occupation, which I discuss in the data section<sup>1</sup>. The equation I use is shown in equation (2).



The expected signs on the variables are shown in equation (2), with the exception of occupation and married, which are ambiguous. Male is expected to be positive as men have a longer duration of unemployment than women at 19.8 weeks to women's 18.4 as shown by 2003 BLS data. Age is expected to be negative according to the theory laid out by Ehrenberg and Oaxaca that says as a person's time until retirement decreases they will accept lower paying jobs quicker. Married has an ambiguous effect because it would depend on whether the spouse was working or not and what percentage of the family income the unemployed partner was bringing home. Networth is expected to increase the duration of unemployment as these people can better provide for themselves if they become unemployed for a time and the urgency of getting a job is less present than for people living paycheck to paycheck. Wage is expected to be positive as a person with a higher previous wage rate can expect a larger range of possible offers, so they will wait longer to find and accept a higher wage. Urban is negative because there are more job opportunities in densely populated areas. Education is negative because more education increases the skill level of an individual, increasing demand for their skills in the market. Benefits is positive as UI decreases the cost of being unemployed so the rush to find a job is decreased, holding true with Ehrenberg and Oaxaca's theoretical model. Lastly, occupation represents dummy variables for 10 different occupational categories and it is ambiguous.

$$\begin{aligned} \log(\text{Unemployment Duration}) = & (\beta_1 + \beta_2(\text{Male}_i) - \beta_3(\text{Age}_i) + \beta_4(\text{Married}_i) + \\ & \beta_5(\log(\text{NetWorth}_i)) + \beta_6(\log(\text{Wage}_i)) - \beta_7(\text{Urban}_i) - \beta_8(\text{Education}_i) + \\ & \beta_9(\text{Benefits}_i) + \beta_{10}\text{Occupation}_i) + \varepsilon_i \end{aligned} \quad (2)$$

I next use the Oaxaca Decomposition to find the explained and unexplained parts of the difference in the natural logarithmic mean duration of unemployment between the black and white groups. By using the decomposition I am able to see what the average natural log mean

duration of blacks would be if they had the same characteristics of whites. It also shows how much of the difference is explained by control variables, and what is left unexplained that can be attributed to discrimination. Equations (3) and (4) outline my starting equations for the decomposition, with  $D$  representing the duration of unemployment,  $x$  representing the means of my variables, and  $\beta$  representing the coefficients estimated using OLS. Following the decomposition procedure, I subtract equation (4) from equation (3), add and subtract equation (5), and simplify to get equation (6). Equation (7) represents the explained portion of the decomposition and equation (8) represents the unexplained portion.

$$D_w = x_w \beta_w \tag{3}$$

$$D_b = x_b \beta_b \tag{4}$$

$$x_w \beta_b \tag{5}$$

$$\Delta D = \beta_w(x_w - x_b) + x^b(\beta_w - \beta_b) \tag{6}$$

$$\beta_w(x_w - x_b) \tag{7}$$

$$x^b(\beta_w - \beta_b) \tag{8}$$

## V. Data

The data used in this paper comes from the National Longitudinal Survey of Youth 1979 cohort from the years 2000 to 2003. Table 1 in the appendix shows the variables I use, along with a description, the mean, as well as the minimum and maximum. There are a total of 806 observations with 484 being white and 322 being black. I control for personal characteristics

with the variables male, age, married, networth, wage, urban, education, benefits, occupation, and black. Male is a dummy variable for the sex of the individual with a value of one representing males. Age is the individual's age at the time of interview in 2000. Married a dummy variable for the marriage status of a person, with married equaling one meaning the individual is married with their spouse present, otherwise it is zero. Networth is the natural logarithm of a person's net worth in 2000. Wage represents the natural logarithm a person's pre-unemployment wage. Urban is a dummy variable for whether an individual resides in an urban or rural residence with a value of one representing urban residence. Education measure the number of years of schooling the individual has received. Benefits represents the number of years a person received unemployment benefits over the duration this paper looks at. Occupation is a set of 10 dummy variables that represent the census code for the individual's most recent job in 2000, each specified in Table 1 and 2. Finally, black is a dummy variable of an individual's race, with a value of one when the individual is black and zero when the individual is white. The summary statistics are given in Table 1 and 2.

## **VI. Results and Analysis**

So far, this paper has presented a framework of my research. This research has set forth to test the hypothesis that discrimination causes an increased unemployment duration for the group discriminated against, blacks. Using the Oaxaca Decomposition on OLS regressions of both groups of interest, I am able to distinguish between the explained and unexplained portions of my results to see what roll discrimination plays.

In the first two OLS regressions, seen in Table 3, I find benefits to be positive and statistically significant at the 99% level, as well as economically significant. For whites receiving an additional year of UI increases the duration of unemployment by 37.4% and for blacks this additional year increases the duration by 25.8%. This agrees with the literature I reviewed, as UI benefits decrease the cost of unemployment, enticing people to stay unemployed for longer periods of time.

Wage is also statistically significant at the 95% level in the regression on whites. It has a positive coefficient indicating that the higher a person's pre-unemployment wage, the longer unemployment duration they experienced. This also is in line with Ehrenberg and Oaxaca's (1976) work that outlines the theoretical model for this paper as well as Stigler's (1962) work that predicted rational individuals would look for employment until the marginal benefit to their post-employment wages equaled the marginal cost of continuing to look. A higher pre-unemployment wage would increase the range of offers and individual could receive so a longer search period could yield greater results for the person.

The regression on only blacks had *occ2* significant at the 99% level as well as *male* and *occ5* significant at the 90% level. The statistically significant result for *male* is interesting because it is opposite of the predicted direction. It suggests that black females find work 24.1% faster than their male counterparts. This counters conventional thinking but may represent a preference for leisure such as that suggested by Lang and Lehman (2011) when they pointed out that because of lower wages, blacks are more likely to choose leisure, and this may be true if black male's wages were lower or they had an immeasurable innate preference for leisure. The two statistically significant occupation variables for blacks, compared to none for whites, may indicate that blacks be pushed into certain occupations. The coefficients are negative on the

variables occ2, technical professions, and occ5, service professions, and represent a significant duration decrease of 79.4% and 40.2% respectively.

Using the two sets of means from Table 1 and 2 as well as the coefficients estimated from the two regressions, I am able to use to the framework laid out in the empirical model section for the Oaxaca Decomposition. As seen in Table 4, the explained part of the model is 0.017 and the unexplained part is -0.166. The explained part represents the differences in the means between the two group's control variables. It shows that the two groups are extremely similar and not much of the difference in mean duration is because of the observed differences between the groups. The unexplained portion shows the differences in the parameter estimates among the blacks and whites. This difference shows how employers "value" certain characteristics differently between the groups. The unexplained part accounts for almost the entire gap between the white and black mean duration.

## **VII. Conclusions**

From these results we can assume that the 15% difference between the mean duration of unemployment between blacks and whites comes from discrimination. The Oaxaca Decomposition says that this discrimination comes from employers valuing characteristics differently between blacks and whites. This allows me to accept the alternate hypothesis that discrimination does contribute to increased unemployment durations for black workers.

The gap of 15% that I found was less than the 25% that Lang and Lehman found and the BLS shows but still a profound difference that says discrimination does exist and it is an issue that has not yet been addressed. To combat this discrimination a number of ideas have been set forth by Lang and Lehman. These include a focus on fixing premarket factors that affect workers

skills going into the labor force, providing a way for better information about high school grad productivity as college grads are more focused and have many more measures in place, and the controversial idea of a hiring quota or enforcing hiring practices based on different criteria. I would support the varying hiring practices dependent upon race as they present as it would help correct the values that discriminating employers put on characteristics of blacks and whites that I identified earlier. Drawbacks to this line of action however include high costs of implementing and enforcing. This may be able to get help lower discrimination in today's markets, but it may hurt blacks in the long run as they could face increased discrimination outside of the workforce that broadens in society as they are receiving special treatment.

### **VIII. Limitations and Future Research**

The methods I use in this study have limited what it can accomplish. The first limit is only being able to look at people who have a definite length of unemployment spells. This greatly reduced the number of individuals this study could use. A possible solution to this is to use a hazard rate function that is able to deal indefinite unemployment spells, allowing a greater number of observations in the study. The second is that in this study I could not control for the change in variables over time. Looking at a period of more than a few years while basing the control variables of individuals off of a set point in time can skew the results as population's characteristics can change in a few years.

An interesting area of future research that could be done is looking into discrimination or employment cycles and how occupational differences occur between races. This could be looked at through premarket factors that blacks and whites face and why a group gets "pushed" towards

certain areas. It might also look into how various occupation sectors handle their hiring or firing methods to see how much of a role a sector plays in affecting a groups employment cycles.

## IX. Appendices

**Table 1**

| Variable Definitions and Summary Statistics for Whites, 484 Observations |                                       |                    |                  |                  |
|--|---------------------------------------|--------------------|------------------|------------------|
| <b>Variable</b>  | <b>Description</b>                    | <b>Mean Whites</b> | <b>Minimum W</b> | <b>Maximum W</b> |
| duration   | Duration of unemployment (weeks)      | 19.3966942         | 1.0000           | 141.0000         |
| mduration  | Mean duration of unemployment         | 12.3241391         | 1.0000           | 73.0000          |
| lmduration   | Log mean duration of unemployment     | 2.0040663          | 0.0000           | 4.2905           |
| male   | Sex of individual 1=Male 0=Female     | 0.4834711          | 0.0000           | 1.0000           |
| age  | Age of individual in 2000             | 38.8657025         | 35.0000          | 43.0000          |
| married  | Marital Status of individual in 2000  | 0.5743802          | 0.0000           | 1.0000           |
| networth   | Log of individual's net worth in 2000 | 8.3054857          | -13.0193         | 13.5754          |
| wage   | Log of individual's wage in 2000      | 7.1425765          | 5.3613           | 9.2103           |
| urban  | Residence of individual 1=Urban       | 0.6487603          | 0.0000           | 1.0000           |
| education  | Number of years of education          | 13.2438017         | 6.0000           | 20.0000          |
| benefits   | Number of years receiving UI          | 0.4194215          | 0.0000           | 3.0000           |
| occ1   | Managerial & Professional             | 0.2809917          | 0.0000           | 1.0000           |
| occ2   | Technical                             | 0.0227273          | 0.0000           | 1.0000           |
| occ3   | Sales                                 | 0.0991736          | 0.0000           | 1.0000           |
| occ4   | Administrative Support / Clerical     | 0.1384298          | 0.0000           | 1.0000           |
| occ5   | Service                               | 0.1053719          | 0.0000           | 1.0000           |
| occ6   | Farming, Forestry and Fishing         | 0.0144628          | 0.0000           | 1.0000           |
| occ7   | Precision Production, Craft, Repair   | 0.1280992          | 0.0000           | 1.0000           |
| occ8   | Operators - Machine, Assemblers       | 0.0971074          | 0.0000           | 1.0000           |
| occ9   | Operators - Transportation, Moving    | 0.0619835          | 0.0000           | 1.0000           |
| occ10  | Operators - Handlers, Helpers, Labore | 0.0433884          | 0.0000           | 1.0000           |



**Table 2**

| Variable Definitions and Summary Statistics for Blacks, 322 Observations |   |             |                |                |
|--|---|-------------|----------------|----------------|
| <b>Variable</b>  | <b>Description</b>                      | <b>Mean</b> | <b>Minimum</b> | <b>Maximum</b> |
| duration   | Duration of unemployment (weeks)        | 23.0186335  | 1.0000         | 157.0000       |
| mduration  | Mean duration of unemployment           | 14.010559   | 1.0000         | 87.0000        |
| lmduration   | Log mean duration of unemployment       | 2.1521658   | 0.0000         | 4.4659         |
| male   | Sex of individual 1=Male 0=Female       | 0.4751553   | 0.0000         | 1.0000         |
| age  | Age of individual in 2000               | 38.8478261  | 35.0000        | 43.0000        |
| married  | Marital Status of individual in 2000    | 0.3509317   | 0.0000         | 1.0000         |
| networth   | Log of individual's net worth in 2000   | 6.4680668   | -11.9779       | 13.0170        |
| wage   | Log of individual's wage in 2000        | 6.9050416   | 5.1120         | 8.5809         |
| urban  | Residence of individual 1=Urban         | 0.8291925   | 0.0000         | 1.0000         |
| education  | Number of years of education            | 12.8850932  | 7.0000         | 20.0000        |
| benefits   | Number of years receiving UI            | 0.4130435   | 0.0000         | 3.0000         |
| occ1   | Managerial & Professional               | 0.173913    | 0.0000         | 1.0000         |
| occ2   | Technical                               | 0.0310559   | 0.0000         | 1.0000         |
| occ3   | Sales                                   | 0.0559006   | 0.0000         | 1.0000         |
| occ4   | Administrative Support / Clerical       | 0.1490683   | 0.0000         | 1.0000         |
| occ5   | Service                                 | 0.1956522   | 0.0000         | 1.0000         |
| occ6   | Farming, Forestry and Fishing           | 0.0124224   | 0.0000         | 1.0000         |
| occ7   | Precision Production, Craft, Repair     | 0.0869565   | 0.0000         | 1.0000         |
| occ8   | Operators - Machine, Assemblers         | 0.136646    | 0.0000         | 1.0000         |
| occ9   | Operators - Transportation, Moving      | 0.0714286   | 0.0000         | 1.0000         |
| occ10  | Operators - Handlers, Helpers, Laborers | 0.0869565   | 0.0000         | 1.0000         |

**Table 3**

| OLS Results: Coefficients and P-Values |                     |                      |
|--|---------------------|----------------------|
| Variable                               | White               | Black                |
| lmduration                             | 1.2015 (0.2652)     | 1.79269 (0.1933)     |
| male                                   | -0.01565 (0.8855)   | 0.24071 (0.0870)*    |
| age                                    | -0.00721 (0.7304)   | 0.04159 (0.1035)     |
| married                                | -0.09071 (0.3692)   | -0.12 (0.3403)       |
| networth                               | -0.01027 (0.1730)   | 0.01319 (0.1510)     |
| wage                                   | 0.20683 (0.0419)**  | -0.18661 (0.1884)    |
| urban                                  | 0.00764 (0.9404)    | -0.12445 (0.4678)    |
| education                              | -0.03615 (0.1227)   | 0.0041 (0.8925)      |
| benefits                               | 0.37436 (<.0001)*** | 0.25754 (0.0067)***  |
| occ1                                   | 0.04846 (0.8374)    | -0.18622 (0.4822)    |
| occ2                                   | 0.06595 (0.8654)    | -0.79404 (0.0075)*** |
| occ3                                   | 0.2428 (0.3563)     | 0.2226 (0.4761)      |
| occ4                                   | 0.23091 (0.3218)    | -0.07183 (0.7980)    |
| occ5                                   | -0.02099 (0.9359)   | -0.40201 (0.0763)*   |
| occ6                                   | -0.04915 (0.9053)   | -0.74442 (0.1101)    |
| occ7                                   | 0.04918 (0.8482)    | 0.00367 (0.9894)     |
| occ8                                   | -0.07352 (0.7734)   | -0.23873 (0.3485)    |
| occ9                                   | -0.00409 (0.9882)   | -0.07727 (0.8070)    |
| Adjusted R-Squared                     | 0.0543              | 0.0456               |
| F-Value                                | 2.3                 | 1.9                  |
| Observations                           | 484                 | 322                  |

\*\*\* p<.01 99%    \*\* p<.05 95%    \* p<.1 90%

**Table 4**  
Oaxaca Decomposition Results

|                                | <b>xW</b> | <b>xB</b> | <b>bW</b>      | <b>bB</b> | <b>bw*(xW-xB)</b> | <b>xB*(bW-bB)</b>           |
|--------------------------------|-----------|-----------|----------------|-----------|-------------------|-----------------------------|
| <b>Observations</b>            | 484       | 322       | 484            | 322       |                   |                             |
| lmduration                     | 2.0040663 | 2.152166  | 1.2015         | 1.79269   |                   | -0.59119                    |
| male                           | 0.4834711 | 0.475155  | -0.01565       | 0.24071   | -0.000130142      | -0.121810813                |
| age                            | 38.865703 | 38.84783  | -0.00721       | 0.04159   | -0.000128889      | -1.895773914                |
| married                        | 0.5743802 | 0.350932  | -0.09071       | -0.12     | -0.020269013      | 0.010278789                 |
| lnetworth00                    | 8.3054857 | 6.468067  | -0.01027       | 0.01319   | -0.018870292      | -0.151740847                |
| lwage00                        | 7.1425765 | 6.905042  | 0.20683        | -0.18661  | 0.049129343       | 2.716719567                 |
| urban00                        | 0.6487603 | 0.829193  | 0.00764        | -0.12445  | -0.001378502      | 0.109528037                 |
| education02                    | 13.243802 | 12.88509  | -0.03615       | 0.0041    | -0.012967312      | -0.518625001                |
| benefits                       | 0.4194215 | 0.413044  | 0.37436        | 0.25754   | 0.002387668       | 0.048251742                 |
| occ1                           | 0.2809917 | 0.173913  | 0.04846        | -0.18622  | 0.005189034       | 0.040813903                 |
| occ2                           | 0.0227273 | 0.031056  | 0.06595        | -0.79404  | -0.000549271      | 0.026707763                 |
| occ3                           | 0.0991736 | 0.055901  | 0.2428         | 0.2226    | 0.010506684       | 0.001129192                 |
| occ4                           | 0.1384298 | 0.149068  | 0.23091        | -0.07183  | -0.002456536      | 0.045128937                 |
| occ5                           | 0.1053719 | 0.195652  | -0.02099       | -0.40201  | 0.001894983       | 0.074547401                 |
| occ6                           | 0.0144628 | 0.012422  | -0.04915       | -0.74442  | -0.000100286      | 0.008636922                 |
| occ7                           | 0.1280992 | 0.086957  | 0.04918        | 0.00367   | 0.002023398       | 0.00395739                  |
| occ8                           | 0.0971074 | 0.136646  | -0.07352       | -0.23873  | 0.002906878       | 0.022575286                 |
| occ9                           | 0.0619835 | 0.071429  | -0.00409       | -0.07727  | 3.86305E-05       | 0.005227145                 |
| occ10                          | 0.0433884 | 0.086957  |                |           | <b>explained</b>  | <b>unexplained</b>          |
| Difference in lmduration means |           |           | <b>-0.1481</b> |           | 0.017226376       | -0.165638499 <b>-0.1484</b> |

## X. References

- Abraham, Katharine G., Robert Shimer (2001), "Changes in Unemployment Duration and Labor Force Attachment", Working paper no. 8513 (NBER, Cambridge, MA).
- Altonji, Joseph G. and Charles R. Pierret, "Employer learning and statistical discrimination." Working Paper (NBER, Cambridge, MA).
- Altonji, J.G. and R.M. Blank, "Race and Gender in the Labor Market," *Handbook of Labor Economics*, Volume 3, Elsevier Science B.V., 1999.
- Arrow, Kenneth, "The Theory of Discrimination", in: O.A. Ashenfelter and A. Rees, eds., *Discrimination in labor markets*, Princeton University Press, Princeton, NJ pp. 3-33, 1973.
- Becker, Gary S., "The Economics of Discrimination", 2<sup>nd</sup> edition The University of Chicago Press, Chicago, IL, 1971.
- Blanchard, Olivier Jean, Peter Diamond (1990), "Ranking, Unemployment Duration, and Wages", Working paper no. 3387 (NBER, Cambridge, MA).
- Bureau of Labor Statistics, U.S. Department of Labor. National Longitudinal Survey of Youth 1979 cohort, 1979-2010[computer file]. Produced and distributed by the Center for Human Resource Research, The Ohio State University. Columbus, OH: 2011.  
(<ftp://ftp.bls.gov/pub/special.requests/lf/aa2003/aat31.txt>)
- Ehrenberg, Ronald G., Ronald L. Oaxaca, "Unemployment Insurance, Duration of Unemployment, and Subsequent Wage Gain", *American Economic Review*, 1976, vol. 66 no. 5:754-766. Print.
- Farber, H. and R. Gibbons, "Learning and Wage Dynamics." *Quarterly Journal of Economics*, 1996:1007-1047.
- Flanagan, Robert J, "Discrimination Theory, Labor Turnover, and Racial Unemployment Differentials." *Journal of Human Resources*, 1978, vol. 13, 187-207. Print.
- Fryer, Roland G. Jr (2010), "Racial Inequality in the 21<sup>st</sup> Century: The Declining Significance of Discrimination", Working paper no. 16256 (NBER, Cambridge, MA).
- Fryer, Roland G. Jr., Devah Pager, Jorg L. Spenkuch (2011), "Racial Disparities in Job Finding and Offered Wages", Working paper no. 17462 (NBER, Cambridge, MA).
- Gneezy, Uri, John List, Michael K. Price (2012), "Toward an Understanding of Why People Discriminate: Evidence from a series of Natural Field Experiments", Working paper no. 17855 (NBER, Cambridge, MA).

Lang, Kevin, Jee-Yeon K. Lehmann (2011), "Racial Discrimination in the Labor Market: Theory and Empirics", Working paper no. 17450 (NBER, Cambridge, MA).

Okatenko, Anna. "The Impact of the Reason for Layoff on the Subsequent Unemployment Duration." *Annals of Economics and Statistics*, 1976, 99/100: 285-315. Print.

Oreopoulos, Philip, Marianne Page, Ann Huff Stevens, "The Intergenerational Effects of Worker Displacement." *Journal of Labor Economics*, 2008, vol. 26, no. 3, 455-483.

Phelps, Edmund S., "Sex Difference in College Major", *Industrial and Labor Relations Review*, 1972, vol. 31 no. 4, 498-508.

Ritter, Joseph A., Lowell J. Taylor, "Racial Disparity in Unemployment." *The Review of Economics and Statistics*, February 2011, vol. 93 no. 1: 30-42

Sueyoshi G. T., "A Class of Binary Response Models for Grouped Duration Data", *Journal of Applied Econometrics*, 1995, vol. 10 no. 4, 411-43.

Sullivan, Daniel, Till Von Wachter, "Job Displacement and Mortality: An Analysis Using Administrative Data." *The Quarterly Journal of Economics*, August 2009, vol. 124 no. 3, 1265-1306.

United States. Bureau of Labor Statistics. "Unemployed persons by age, sex, race, Hispanic or Latino ethnicity, marital status, and duration of unemployment." 2003. Web.

Wachter, Till von, Jae Song, Joyce Manchest "Long-Term Earnings Losses due to Mass Layoffs During the 1982 Recession: An Analysis Using U.S. Administrative Data from 1974 to 2004." Working Paper, Columbia University, 1976.

```
DATA chad.one;
set chad.age;
spell=0;
if w1=4 then delete;

if w2=4 then un1=1; else un1=0;
if un1=1 then spell=1;

if w3=4 then un2=un1+1; else un2=un1;

if w4=4 then un3=un2+1; else un3=un2;
if un3>un2 & un2=un1 then spell=spell+1;

if w5=4 then un4=un3+1; else un4=un3;
if un4>un3 & un3=un2 then spell=spell+1;

if w6=4 then un5=un4+1; else un5=un4;
if un5>un4 & un4=un3 then spell=spell+1;

if w7=4 then un6=un5+1; else un6=un5;
if un6>un5 & un5=un4 then spell=spell+1;

if w8=4 then un7=un6+1; else un7=un6;
if un7>un6 & un6=un5 then spell=spell+1;

if w9=4 then un8=un7+1; else un8=un7;
if un8>un7 & un7=un6 then spell=spell+1;

if w10=4 then un9=un8+1; else un9=un8;
if un9>un8 & un8=un7 then spell=spell+1;

if w11=4 then un10=un9+1; else un10=un9;
if un10>un9 & un9=un8 then spell=spell+1;

if w12=4 then un11=un10+1; else un11=un10;
if un11>un10 & un10=un9 then spell=spell+1;

if w13=4 then un12=un11+1; else un12=un11;
if un12>un11 & un11=un10 then spell=spell+1;

if w14=4 then un13=un12+1; else un13=un12;
if un13>un12 & un12=un11 then spell=spell+1;

if w15=4 then un14=un13+1; else un14=un13;
if un14>un13 & un13=un12 then spell=spell+1;

if w16=4 then un15=un14+1; else un15=un14;
if un15>un14 & un14=un13 then spell=spell+1;
```

if w17=4 then un16=un15+1; else un16=un15;  
if un16>un15 & un15=un14 then spell=spell+1;

if w18=4 then un17=un16+1; else un17=un16;  
if un17>un16 & un16=un15 then spell=spell+1;

if w19=4 then un18=un17+1; else un18=un17;  
if un18>un17 & un17=un16 then spell=spell+1;

if w20=4 then un19=un18+1; else un19=un18;  
if un19>un18 & un18=un17 then spell=spell+1;

if w21=4 then un20=un19+1; else un20=un19;  
if un20>un19 & un19=un18 then spell=spell+1;

if w22=4 then un21=un20+1; else un21=un20;  
if un21>un20 & un20=un19 then spell=spell+1;

if w23=4 then un22=un21+1; else un22=un21;  
if un22>un21 & un21=un20 then spell=spell+1;

if w24=4 then un23=un22+1; else un23=un22;  
if un23>un22 & un22=un21 then spell=spell+1;

if w25=4 then un24=un23+1; else un24=un23;  
if un24>un23 & un23=un22 then spell=spell+1;

if w26=4 then un25=un24+1; else un25=un24;  
if un25>un24 & un24=un23 then spell=spell+1;

if w27=4 then un26=un25+1; else un26=un25;  
if un26>un25 & un25=un24 then spell=spell+1;

if w28=4 then un27=un26+1; else un27=un26;  
if un27>un26 & un26=un25 then spell=spell+1;

if w29=4 then un28=un27+1; else un28=un27;  
if un28>un27 & un27=un26 then spell=spell+1;

if w30=4 then un29=un28+1; else un29=un28;  
if un29>un28 & un28=un27 then spell=spell+1;

if w31=4 then un30=un29+1; else un30=un29;  
if un30>un29 & un29=un28 then spell=spell+1;

if w32=4 then un31=un30+1; else un31=un30;  
if un31>un30 & un30=un29 then spell=spell+1;

if w33=4 then un32=un31+1; else un32=un31;  
if un32>un31 & un31=un30 then spell=spell+1;

if w34=4 then un33=un32+1; else un33=un32;  
if un33>un32 & un32=un31 then spell=spell+1;

if w35=4 then un34=un33+1; else un34=un33;  
if un34>un33 & un33=un32 then spell=spell+1;

if w36=4 then un35=un34+1; else un35=un34;  
if un35>un34 & un34=un33 then spell=spell+1;

if w37=4 then un36=un35+1; else un36=un35;  
if un36>un35 & un35=un34 then spell=spell+1;

if w38=4 then un37=un36+1; else un37=un36;  
if un37>un36 & un36=un35 then spell=spell+1;

if w39=4 then un38=un37+1; else un38=un37;  
if un38>un37 & un37=un36 then spell=spell+1;

if w40=4 then un39=un38+1; else un39=un38;  
if un39>un38 & un38=un37 then spell=spell+1;

if w41=4 then un40=un39+1; else un40=un39;  
if un40>un39 & un39=un38 then spell=spell+1;

if w42=4 then un41=un40+1; else un41=un40;  
if un41>un40 & un40=un39 then spell=spell+1;

if w43=4 then un42=un41+1; else un42=un41;  
if un42>un41 & un41=un40 then spell=spell+1;

if w44=4 then un43=un42+1; else un43=un42;  
if un43>un42 & un42=un41 then spell=spell+1;

if w45=4 then un44=un43+1; else un44=un43;  
if un44>un43 & un43=un42 then spell=spell+1;

if w46=4 then un45=un44+1; else un45=un44;  
if un45>un44 & un44=un43 then spell=spell+1;

if w47=4 then un46=un45+1; else un46=un45;  
if un46>un45 & un45=un44 then spell=spell+1;

if w48=4 then un47=un46+1; else un47=un46;  
if un47>un46 & un46=un45 then spell=spell+1;



if w49=4 then un48=un47+1; else un48=un47;  
if un48>un47 & un47=un46 then spell=spell+1;

if w50=4 then un49=un48+1; else un49=un48;  
if un49>un48 & un48=un47 then spell=spell+1;

if w51=4 then un50=un49+1; else un50=un49;  
if un50>un49 & un49=un48 then spell=spell+1;

if w52=4 then un51=un50+1; else un51=un50;  
if un51>un50 & un50=un49 then spell=spell+1;

if w53=4 then un52=un51+1; else un52=un51;  
if un52>un51 & un51=un50 then spell=spell+1;

if w54=4 then un53=un52+1; else un53=un52;  
if un53>un52 & un52=un51 then spell=spell+1;

if w55=4 then un54=un53+1; else un54=un53;  
if un54>un53 & un53=un52 then spell=spell+1;

if w56=4 then un55=un54+1; else un55=un54;  
if un55>un54 & un54=un53 then spell=spell+1;

if w57=4 then un56=un55+1; else un56=un55;  
if un56>un55 & un55=un54 then spell=spell+1;

if w58=4 then un57=un56+1; else un57=un56;  
if un57>un56 & un56=un55 then spell=spell+1;

if w59=4 then un58=un57+1; else un58=un57;  
if un58>un57 & un57=un56 then spell=spell+1;

if w60=4 then un59=un58+1; else un59=un58;  
if un59>un58 & un58=un57 then spell=spell+1;

if w61=4 then un60=un59+1; else un60=un59;  
if un60>un59 & un59=un58 then spell=spell+1;

if w62=4 then un61=un60+1; else un61=un60;  
if un61>un60 & un60=un59 then spell=spell+1;

if w63=4 then un62=un61+1; else un62=un61;  
if un62>un61 & un61=un60 then spell=spell+1;

if w64=4 then un63=un62+1; else un63=un62;  
if un63>un62 & un62=un61 then spell=spell+1;

if w65=4 then un64=un63+1; else un64=un63;  
if un64>un63 & un63=un62 then spell=spell+1;

if w66=4 then un65=un64+1; else un65=un64;  
if un65>un64 & un64=un63 then spell=spell+1;

if w67=4 then un66=un65+1; else un66=un65;  
if un66>un65 & un65=un64 then spell=spell+1;

if w68=4 then un67=un66+1; else un67=un66;  
if un67>un66 & un66=un65 then spell=spell+1;

if w69=4 then un68=un67+1; else un68=un67;  
if un68>un67 & un67=un66 then spell=spell+1;

if w70=4 then un69=un68+1; else un69=un68;  
if un69>un68 & un68=un67 then spell=spell+1;

if w71=4 then un70=un69+1; else un70=un69;  
if un70>un69 & un69=un68 then spell=spell+1;

if w72=4 then un71=un70+1; else un71=un70;  
if un71>un70 & un70=un69 then spell=spell+1;

if w73=4 then un72=un71+1; else un72=un71;  
if un72>un71 & un71=un70 then spell=spell+1;

if w74=4 then un73=un72+1; else un73=un72;  
if un73>un72 & un72=un71 then spell=spell+1;

if w75=4 then un74=un73+1; else un74=un73;  
if un74>un73 & un73=un72 then spell=spell+1;

if w76=4 then un75=un74+1; else un75=un74;  
if un75>un74 & un74=un73 then spell=spell+1;

if w77=4 then un76=un75+1; else un76=un75;  
if un76>un75 & un75=un74 then spell=spell+1;

if w78=4 then un77=un76+1; else un77=un76;  
if un77>un76 & un76=un75 then spell=spell+1;

if w79=4 then un78=un77+1; else un78=un77;  
if un78>un77 & un77=un76 then spell=spell+1;

if w80=4 then un79=un78+1; else un79=un78;  
if un79>un78 & un78=un77 then spell=spell+1;

if w81=4 then un80=un79+1; else un80=un79;  
if un80>un79 & un79=un78 then spell=spell+1;

if w82=4 then un81=un80+1; else un81=un80;  
if un81>un80 & un80=un79 then spell=spell+1;

if w83=4 then un82=un81+1; else un82=un81;  
if un82>un81 & un81=un80 then spell=spell+1;

if w84=4 then un83=un82+1; else un83=un82;  
if un83>un82 & un82=un81 then spell=spell+1;

if w85=4 then un84=un83+1; else un84=un83;  
if un84>un83 & un83=un82 then spell=spell+1;

if w86=4 then un85=un84+1; else un85=un84;  
if un85>un84 & un84=un83 then spell=spell+1;

if w87=4 then un86=un85+1; else un86=un85;  
if un86>un85 & un85=un84 then spell=spell+1;

if w88=4 then un87=un86+1; else un87=un86;  
if un87>un86 & un86=un85 then spell=spell+1;

if w89=4 then un88=un87+1; else un88=un87;  
if un88>un87 & un87=un86 then spell=spell+1;

if w90=4 then un89=un88+1; else un89=un88;  
if un89>un88 & un88=un87 then spell=spell+1;

if w91=4 then un90=un89+1; else un90=un89;  
if un90>un89 & un89=un88 then spell=spell+1;

if w92=4 then un91=un90+1; else un91=un90;  
if un91>un90 & un90=un89 then spell=spell+1;

if w93=4 then un92=un91+1; else un92=un91;  
if un92>un91 & un91=un90 then spell=spell+1;

if w94=4 then un93=un92+1; else un93=un92;  
if un93>un92 & un92=un91 then spell=spell+1;

if w95=4 then un94=un93+1; else un94=un93;  
if un94>un93 & un93=un92 then spell=spell+1;

if w96=4 then un95=un94+1; else un95=un94;  
if un95>un94 & un94=un93 then spell=spell+1;

if w97=4 then un96=un95+1; else un96=un95;  
if un96>un95 & un95=un94 then spell=spell+1;

if w98=4 then un97=un96+1; else un97=un96;  
if un97>un96 & un96=un95 then spell=spell+1;

if w99=4 then un98=un97+1; else un98=un97;  
if un98>un97 & un97=un96 then spell=spell+1;

if w100=4 then un99=un98+1; else un99=un98;  
if un99>un98 & un98=un97 then spell=spell+1;

if w101=4 then un100=un99+1; else un100=un99;  
if un100>un99 & un99=un98 then spell=spell+1;

if w102=4 then un101=un100+1; else un101=un100;  
if un101>un100 & un100=un99 then spell=spell+1;

if w103=4 then un102=un101+1; else un102=un101;  
if un102>un101 & un101=un100 then spell=spell+1;

if w104=4 then un103=un102+1; else un103=un102;  
if un103>un102 & un102=un101 then spell=spell+1;

if w105=4 then un104=un103+1; else un104=un103;  
if un104>un103 & un103=un102 then spell=spell+1;

if w106=4 then un105=un104+1; else un105=un104;  
if un105>un104 & un104=un103 then spell=spell+1;

if w107=4 then un106=un105+1; else un106=un105;  
if un106>un105 & un105=un104 then spell=spell+1;

if w108=4 then un107=un106+1; else un107=un106;  
if un107>un106 & un106=un105 then spell=spell+1;

if w109=4 then un108=un107+1; else un108=un107;  
if un108>un107 & un107=un106 then spell=spell+1;

if w110=4 then un109=un108+1; else un109=un108;  
if un109>un108 & un108=un107 then spell=spell+1;

if w111=4 then un110=un109+1; else un110=un109;  
if un110>un109 & un109=un108 then spell=spell+1;

if w112=4 then un111=un110+1; else un111=un110;  
if un111>un110 & un110=un109 then spell=spell+1;

if w113=4 then un112=un111+1; else un112=un111;  
if un112>un111 & un111=un110 then spell=spell+1;

if w114=4 then un113=un112+1; else un113=un112;  
if un113>un112 & un112=un111 then spell=spell+1;

if w115=4 then un114=un113+1; else un114=un113;  
if un114>un113 & un113=un112 then spell=spell+1;

if w116=4 then un115=un114+1; else un115=un114;  
if un115>un114 & un114=un113 then spell=spell+1;

if w117=4 then un116=un115+1; else un116=un115;  
if un116>un115 & un115=un114 then spell=spell+1;

if w118=4 then un117=un116+1; else un117=un116;  
if un117>un116 & un116=un115 then spell=spell+1;

if w119=4 then un118=un117+1; else un118=un117;  
if un118>un117 & un117=un116 then spell=spell+1;

if w120=4 then un119=un118+1; else un119=un118;  
if un119>un118 & un118=un117 then spell=spell+1;

if w121=4 then un120=un119+1; else un120=un119;  
if un120>un119 & un119=un118 then spell=spell+1;

if w122=4 then un121=un120+1; else un121=un120;  
if un121>un120 & un120=un119 then spell=spell+1;

if w123=4 then un122=un121+1; else un122=un121;  
if un122>un121 & un121=un120 then spell=spell+1;

if w124=4 then un123=un122+1; else un123=un122;  
if un123>un122 & un122=un121 then spell=spell+1;

if w125=4 then un124=un123+1; else un124=un123;  
if un124>un123 & un123=un122 then spell=spell+1;

if w126=4 then un125=un124+1; else un125=un124;  
if un125>un124 & un124=un123 then spell=spell+1;

if w127=4 then un126=un125+1; else un126=un125;  
if un126>un125 & un125=un124 then spell=spell+1;

if w128=4 then un127=un126+1; else un127=un126;  
if un127>un126 & un126=un125 then spell=spell+1;

if w129=4 then un128=un127+1; else un128=un127;  
if un128>un127 & un127=un126 then spell=spell+1;

if w130=4 then un129=un128+1; else un129=un128;  
if un129>un128 & un128=un127 then spell=spell+1;

if w131=4 then un130=un129+1; else un130=un129;  
if un130>un129 & un129=un128 then spell=spell+1;

if w132=4 then un131=un130+1; else un131=un130;  
if un131>un130 & un130=un129 then spell=spell+1;

if w133=4 then un132=un131+1; else un132=un131;  
if un132>un131 & un131=un130 then spell=spell+1;

if w134=4 then un133=un132+1; else un133=un132;  
if un133>un132 & un132=un131 then spell=spell+1;

if w135=4 then un134=un133+1; else un134=un133;  
if un134>un133 & un133=un132 then spell=spell+1;

if w136=4 then un135=un134+1; else un135=un134;  
if un135>un134 & un134=un133 then spell=spell+1;

if w137=4 then un136=un135+1; else un136=un135;  
if un136>un135 & un135=un134 then spell=spell+1;

if w138=4 then un137=un136+1; else un137=un136;  
if un137>un136 & un136=un135 then spell=spell+1;

if w139=4 then un138=un137+1; else un138=un137;  
if un138>un137 & un137=un136 then spell=spell+1;

if w140=4 then un139=un138+1; else un139=un138;  
if un139>un138 & un138=un137 then spell=spell+1;

if w141=4 then un140=un139+1; else un140=un139;  
if un140>un139 & un139=un138 then spell=spell+1;

if w142=4 then un141=un140+1; else un141=un140;  
if un141>un140 & un140=un139 then spell=spell+1;

if w143=4 then un142=un141+1; else un142=un141;  
if un142>un141 & un141=un140 then spell=spell+1;

if w144=4 then un143=un142+1; else un143=un142;  
if un143>un142 & un142=un141 then spell=spell+1;

if w145=4 then un144=un143+1; else un144=un143;  
if un144>un143 & un143=un142 then spell=spell+1;

if w146=4 then un145=un144+1; else un145=un144;  
if un145>un144 & un144=un143 then spell=spell+1;

if w147=4 then un146=un145+1; else un146=un145;  
if un146>un145 & un145=un144 then spell=spell+1;

if w148=4 then un147=un146+1; else un147=un146;  
if un147>un146 & un146=un145 then spell=spell+1;

if w149=4 then un148=un147+1; else un148=un147;  
if un148>un147 & un147=un146 then spell=spell+1;

if w150=4 then un149=un148+1; else un149=un148;  
if un149>un148 & un148=un147 then spell=spell+1;

if w151=4 then un150=un149+1; else un150=un149;  
if un150>un149 & un149=un148 then spell=spell+1;

if w152=4 then un151=un150+1; else un151=un150;  
if un151>un150 & un150=un149 then spell=spell+1;

if w153=4 then un152=un151+1; else un152=un151;  
if un152>un151 & un151=un150 then spell=spell+1;

if w154=4 then un153=un152+1; else un153=un152;  
if un153>un152 & un152=un151 then spell=spell+1;

if w155=4 then un154=un153+1; else un154=un153;  
if un154>un153 & un153=un152 then spell=spell+1;

if w156=4 then un155=un154+1; else un155=un154;  
if un155>un154 & un154=un153 then spell=spell+1;

if w157=4 then un156=un155+1; else un156=un155;  
if un156>un155 & un155=un154 then spell=spell+1;

if w158=4 then un157=un156+1; else un157=un156;  
if un157>un156 & un156=un155 then spell=spell+1;

if w159=4 then un158=un157+1; else un158=un157;  
if un158>un157 & un157=un156 then spell=spell+1;

if w160=4 then un159=un158+1; else un159=un158;  
if un159>un158 & un158=un157 then spell=spell+1;

if w161=4 then un160=un159+1; else un160=un159;  
if un160>un159 & un159=un158 then spell=spell+1;

if w162=4 then un161=un160+1; else un161=un160;  
if un161>un160 & un160=un159 then spell=spell+1;

if w163=4 then un162=un161+1; else un162=un161;  
if un162>un161 & un161=un160 then spell=spell+1;

if w164=4 then un163=un162+1; else un163=un162;  
if un163>un162 & un162=un161 then spell=spell+1;

if w165=4 then un164=un163+1; else un164=un163;  
if un164>un163 & un163=un162 then spell=spell+1;

if w166=4 then un165=un164+1; else un165=un164;  
if un165>un164 & un164=un163 then spell=spell+1;

if w167=4 then un166=un165+1; else un166=un165;  
if un166>un165 & un165=un164 then spell=spell+1;

if w168=4 then un167=un166+1; else un167=un166;  
if un167>un166 & un166=un165 then spell=spell+1;

if w169=4 then un168=un167+1; else un168=un167;  
if un168>un167 & un167=un166 then spell=spell+1;

if w170=4 then un169=un168+1; else un169=un168;  
if un169>un168 & un168=un167 then spell=spell+1;

if w171=4 then un170=un169+1; else un170=un169;  
if un170>un169 & un169=un168 then spell=spell+1;

if w172=4 then un171=un170+1; else un171=un170;  
if un171>un170 & un170=un169 then spell=spell+1;

if w173=4 then un172=un171+1; else un172=un171;  
if un172>un171 & un171=un170 then spell=spell+1;

if w174=4 then un173=un172+1; else un173=un172;  
if un173>un172 & un172=un171 then spell=spell+1;

if w175=4 then un174=un173+1; else un174=un173;  
if un174>un173 & un173=un172 then spell=spell+1;

if w176=4 then un175=un174+1; else un175=un174;  
if un175>un174 & un174=un173 then spell=spell+1;



if w177=4 then un176=un175+1; else un176=un175;  
if un176>un175 & un175=un174 then spell=spell+1;

if w178=4 then un177=un176+1; else un177=un176;  
if un177>un176 & un176=un175 then spell=spell+1;

if w179=4 then un178=un177+1; else un178=un177;  
if un178>un177 & un177=un176 then spell=spell+1;

if w180=4 then un179=un178+1; else un179=un178;  
if un179>un178 & un178=un177 then spell=spell+1;

if w181=4 then un180=un179+1; else un180=un179;  
if un180>un179 & un179=un178 then spell=spell+1;

if w182=4 then un181=un180+1; else un181=un180;  
if un181>un180 & un180=un179 then spell=spell+1;

if w183=4 then un182=un181+1; else un182=un181;  
if un182>un181 & un181=un180 then spell=spell+1;

if w184=4 then un183=un182+1; else un183=un182;  
if un183>un182 & un182=un181 then spell=spell+1;

if w185=4 then un184=un183+1; else un184=un183;  
if un164>un163 & un163=un162 then spell=spell+1;

if w186=4 then un185=un184+1; else un185=un184;  
if un185>un184 & un184=un183 then spell=spell+1;

if w187=4 then un186=un185+1; else un186=un185;  
if un186>un185 & un185=un184 then spell=spell+1;

if w188=4 then un187=un186+1; else un187=un186;  
if un167>un166 & un166=un165 then spell=spell+1;

if w189=4 then un188=un187+1; else un188=un187;  
if un188>un187 & un187=un186 then spell=spell+1;

if w190=4 then un189=un188+1; else un189=un188;  
if un189>un188 & un188=un187 then spell=spell+1;

if w191=4 then un190=un189+1; else un190=un189;  
if un190>un189 & un189=un188 then spell=spell+1;

if w192=4 then un191=un190+1; else un191=un190;  
if un191>un190 & un190=un189 then spell=spell+1;

```
if w193=4 then un192=un191+1; else un192=un191;
if un192>un191 & un191=un190 then spell=spell+1;
```

```
if w194=4 then un193=un192+1; else un193=un192;
if un193>un192 & un192=un191 then spell=spell+1;
```

```
if w195=4 then un194=un193+1; else un194=un193;
if un194>un193 & un193=un192 then spell=spell+1;
```

```
if w196=4 then un195=un194+1; else un195=un194;
if un195>un194 & un194=un193 then spell=spell+1;
```

```
if w197=4 then un196=un195+1; else un196=un195;
if un196>un195 & un195=un194 then spell=spell+1;
```

```
if w198=4 then un197=un196+1; else un197=un196;
if un197>un196 & un196=un195 then spell=spell+1;
```

```
run;
```

```
data chad.two;
set chad.one;
```

```
if spell=0 then delete;
duration=un197;
if w199=4 then duration=.;
mduration=duration/spell;
if mduration < 1 then delete;
lmduration=log(mduration);
```

```
if race=1 then delete;
if race=3 then black =0;
if race=2 then black=1;
```

```
if networth00 =-5 then delete;
if networth00 >2000000 then delete;
if networth00 <-900000 then delete;
if networth00>0 then lnetworth00=log(networth00);
if networth00<0 then lnetworth00=-log(-networth00);
```

```
if children98 < 0 then children98 = .;
```

```
If education02 < 0 then education02= .;
If education00 < 0 then education00= .;
```

```
if marital00 < 0 then married = .;
```

```
if marital00 =0 then married = 0;
if marital00 =1 then married =1;
if marital00 >1 then married =0;

if urban00 = 2 then urban00 =.;
if urban00 < 0 then urban00 =.;

if age <0 then delete;

if wage00 < 100 then wage00 =.;
if wage00>15000 then wage00 =.;
lwage00 = log(wage00);

if urban00=. & urban02<2 & urban02 >0 then urban00=urban02;

if benefit00 <=0 then benefit00=.;
if benefit01 <=0 then benefit01=.;
if benefit02 <=0 then benefit02=.;
if benefit00 = . then benefit00 = 0;
if benefit01 = . then benefit01 = 0;
if benefit02 = . then benefit02 = 0;
benefits = benefit00 + benefit01 + benefit02;

if sex = 2 then sex = 0;
if sex=1 then male=1;
else male=0;

if duration=. then delete;
if lnetworth00=. then delete;
if urban00=. then delete;
if lwage00=. then delete;
if education02=. then delete;

if occupation >= 3 & occupation <= 199 then occ1=1;
else occ1=0;
if occupation >= 203 & occupation <= 235 then occ2=1;
else occ2=0;
if occupation >= 243 & occupation <= 285 then occ3=1;
else occ3=0;
if occupation >= 303 & occupation <= 389 then occ4=1;
else occ4=0;
if occupation >= 403 & occupation <= 469 then occ5=1;
else occ5=0;
if occupation >= 473 & occupation <= 499 then occ6=1;
else occ6=0;
if occupation >= 503 & occupation <= 699 then occ7=1;
else occ7=0;
if occupation >= 703 & occupation <= 799 then occ8=1;
```

```

else occ8=0;
if occupation >= 803 & occupation <= 859 then occ9=1;
else occ9=0;
if occupation >= 863 & occupation <= 889 then occ10=1;
else occ10=0;

run;

proc sort data=chad.two;
by mduration;
run;

proc means data = chad.two;
var duration mduration lmduration male age married lnetworth00 lwage00 urban00 education02
benefits occ1 occ2 occ3 occ4 occ5 occ6 occ7 occ8 occ9 occ10 ;
by black;
run;
proc reg data = chad.two;
model lmduration = male age married lnetworth00 lwage00 urban00 education02 benefits occ1 occ2
occ3 occ4 occ5 occ6 occ7 occ8 occ9 / acov;
by black;
run;
proc reg data = chad.two;
model lmduration = male age married lnetworth00 lwage00 urban00 education02 benefits black occ1
occ2 occ3 occ4 occ5 occ6 occ7 occ8 occ9 / acov;
run;

```