Senior Project

Department of Economics

How a Bad Economy
Can Affect Your Future Wages

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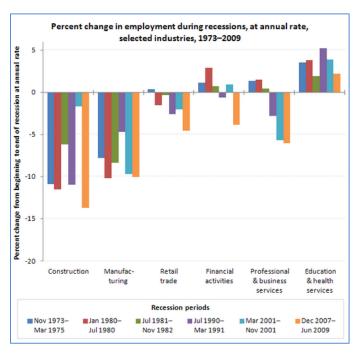
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Introduction

Recessions are major economic downturns for an extended period of time. While recessions have a negative impact on individuals' current status and initial wage upon entering the market, this impact may last beyond the time bound of the recession. This impact may lower an individual's wages and put them on a lower wage growth path throughout their career. The question is how large is this impact and how long does it last?

Between 2008 and 2009, the United States labor market lost 8.4 million jobs as a result of the Great Recession (Economic Policy Institute). More than 6% of all payroll employment was lost, the most since the Great Depression (Economic Policy Institute). This loss is substantial, especially when compared to the 1981's recession where job loss was only 3.1% of all payroll employment (Economic Policy Institute). While a number of studies have measured the effect of the 1981 recession on an individual's age-earning profile which is the average income of a worker as the individual ages, the current literature is silent about the effect of the 2008 recession.

Before we can fully understand the long term impact that the 2008 recession had on individuals, we must first understand the immediate impact. The goal of this paper is to examine the short run effect that the unemployment rate at the time of graduation has on an individual's wages. I use the National Longitudinal Survey of Youth (NLSY97) to examine the labor market conditions and the effect of wages for individuals graduating between 2000 and 2011. During this time, the economy went into and recovered from a recession. The scars left by the 2008 recession may prove to be larger and longer lasting than the effects seen in other recessions because of the changes in the labor market characteristics over the decades. These changes are discussed below.

Recessions may differ in length, magnitude and causes. The 2008 recession is considered to be worse than the recessions of 1973-1975 and 1980-1982. Ben Bernanke, former chairman of the Federal Reserve during the Great Recession, stated that the crisis of 2008 was the worst crisis in history because twelve out of the thirteen "most important financial institutions in the United

States… [failed] within a period of a week or two" (Worstall). While we know these recessions have differences, comparing these recessions can be tricky. The 2008 recession was different from prior recessions. Instead of solely hitting the struggling manufacturing companies, the 2008 recession started from the financial sector and affected many other industries (BLS, 2012). As seen in Figure 1, the largest decreases were seen in the financial, retail trade, construction, manufacturing and professional & business services industries (BLS, 2012). This switch from construction and manufacturing as the hardest hit industries in previous recessions to the financial and retail industries may prove to be a key to differences in the effects of the 2008 recession on wages.
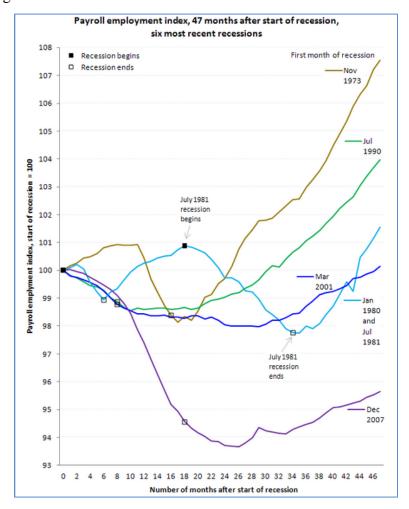

(Source: Graph from the BLS Spotlight on Statistics)

Figure 1: Employment Change by Industry

Another factor that makes the 2008 recession different from previous recessions is that the 2008 recession had a higher proportion of long-term unemployment than other recessions. During the early 1980's recession, the unemployment rate was 10.8% at its peak (BLS, 2012). At the height of the 2008 recession, the unemployment rate only reached 10.0%. While the short term unemployment rate in 2008 was comparable to the 1980's recession, the long term unemployment rate was almost double the 1980's in 2008 with rates of 2.6% and 4.4%, respectively (BLS, 2012).

The 2008 recession saw the largest decline in payroll employment which is a survey of employers that indexes level of employment over time allowing comparisons between years (EPI.org). As seen in the graph below, even after 46 months, the 2008 recession still had the lowest level of employment when compared to other recessions after the same amount of time (BLS, 2012). This delay in recovery from the 2008 recession may have an effect on the wages of individuals during this time.

(Source: Graph from the BLS Spotlight on Statistics)

Figure 2: Employment Index of Recent Recessions

Demographics were affected differently in the 2008 recession than in any other recessions. During the 2008 recession, minorities did not experience as large of an impact as they had in the 1980's recession. The effect on unemployment rates for white people were similar to the effects seen in earlier recessions (BLS, 2012). This may be because the economy was affected differently and different sectors were affected in 2008 compared to prior recessions.

In the first 5 years after entering the labor market during the 1980's recession, Kahn's (2009) study observes wage losses between 1 and 20%. This extreme range for individuals is puzzling. What causes someone to experience almost no affect from a recession while other people bear a large burden? In my paper, I look to identify an explanation for this deviation among individuals.

Because this recession seems to have been unlike any other recession in terms of the industries and demographics effected as well as the recovery period, it is important to examine the impact of this recession on individuals' wages. We cannot simply rely on previous studies that examine previous recessions and assume that the same effects will apply for the 2008 recession. This paper may bring to light important consequences of a recession and may lead policy makers to re-consider decisions about the financial state of the economy and future implications of the current state of the economy when developing economic policies. Policy makers should ensure that they are considering not only the present state of the economy, but also how the current state and the decisions to effect the current state will affect the future state of unemployment. In this study, I will estimate the initial impact and short-term effect of entering the labor market during the Great Recession in the United States on wages of college graduates across gender and races. I am interested in seeing how strong this effect is and how long this impact lasts after the recession.

Literature Review

Prior literature suggests that there will be a negative effect on the earnings of recent graduates due to a recession. The question is how strong these effects are and how long do they last. Brunner and Kahn's (2009) study of the Austrian labor market during 1978 to 2000 estimated that a one percent increase in the local unemployment rate leads to a reduction in lifetime earnings of 6.5%. The penalty of graduating in a bad year was estimated to last up to 20 years into the individual's labor market career. Another study that found similar results when it comes to the longevity of these effects was Mansour (2009). In his paper, Mansour found that once controlling for ability using the Armed Forces Qualification Test scores from the NLSY79, for every 1 percentage point increase in the unemployment rate, individuals would experience a 5%

loss in wages during the first year in the labor market. This effect on wages would fade only after 12 to 15 years from the initial impact.

Kahn (2009) presented a more conservative outlook when it came to a recession's effect on wages. Kahn uses the national unemployment rate in the year an individual turned 22 as her instrumental variable, along with a quadratic in age as the instrument for the quadratic in potential experience . Using OLS and IV estimates and data from the NLSY from 1979 to 1989, Kahn found a statistically significant initial wage loss of 6 to 7% for a 1% increase in the unemployment rate. She finds that this loss drops by ¼ of a percent each year after graduation but that the effect is still significant 15 years later at 2.5%. She finds in her analysis, a negative correlation between the national unemployment rate and occupational attainment using a prestige score. She finds that the likelihood of college graduates obtaining a higher degree increases slightly during a bad economy. She proposes that graduates should wait a few years before entering the labor market in a bad economy, but realizes the negative signaling this may present to employers.

Finally, Kondo's paper discusses the long-term effects of a recession as they vary across demographic characteristics, such as race and gender. The initial negative impact is larger for blacks than for white, but it fades faster for blacks than for whites. They also found weaker effects for women than for men and close to zero for white women. This study predicted that low skilled or disadvantaged workers have shorter negative impacts and weaker effects for those who do not have a strong attachment to the labor force. The data used in this analysis was from the National Longitudinal Survey of Youth from 1979. Through an OLS and IV model that used highest degree attained as their instrumental variable, they found that all groups see negative effects initially from a bad economy. For black men, the negative impact disappears after 6 years, while the negative impact sticks with white men for more than 12 years. Kondo found that women do not experience a significant effect.

While some of these studies predict that the effect on wages could last more than a decade, other studies found more conservative results. Stevens (2008) conducted a study of the wage implications of recessions over time and across different regions in Germany. The results of her

OLS with clustered standard errors technique found that the effect of the recession on wages was significant and negative only in the first 5 to 6 years after entering the labor market. She found that the marginal effect of the unemployment rate is stronger at regional or at a district level with a high significance level, while the marginal effect at the larger regions level saw a slightly larger parameter estimate but a lower significance level on its effect on wages. Stevens found the effect to be between 0.5 and 1.4% in lower wages during this time. Stevens also notes that early experiences of college graduate affect the probability for success in their careers. She states that high unemployment rates at the start of an individual's career can lead to less human capital (ability) accumulation. Stevens suggests that when individuals do not enter the labor force immediately after graduation, they miss out on the human capital accumulation from on the job-training. This would decrease their wages in the long run.

Using the framework of Kahn (2009), I will estimate the short term effects that unemployment rates have on wages of college graduates

Theoretical Model

There are several theories that can be applied to this study. First, the theory that an individual can make up any losses experienced early in their career by shifting jobs. The deviation in losses observed by Kahn (2009) could be explained by job movement. Finding new employment could potentially eliminate the disadvantage caused by entering the labor market during a bad economy. Kahn also mentions the theory of human capital accumulation. This theory suggests that individuals earn more based off of schooling and their experience in the work force. An individual with less experience because they did not find a job right after graduation due to a high unemployment rate will have lower wages. This individual will have missed out on on-the-job training opportunities and potential promotions. Those who received a job are gaining not only experience, but are developing industry and firm-specific skills the longer they stay at a job.

However, some of this loss can be recovered if an individual does not have a strong attachment to the labor force. Minimal attachment that can be seen in females and blacks leads to individuals being less affected by bad economic times (Kondo). These groups are not attached to

their jobs and have the ability to move jobs quickly or completely remove themselves from the labor market.

Description of Data

The data used in this study is from the NLSY97. The NLSY97 includes data on an individual's gender, ethnicity, and hourly wage, the number of weeks worked throughout the year, the year of graduation of an individual, the individual's AFQT score, and the region in which the individual lives. The state unemployment rates between 2000 and 2011 were pulled from the Bureau of Labor Statistics. These rates were then grouped into regions matching the NLSY97's regions: Northeast, North Central, South and West. The state unemployment rates were grouped into regions in order to be comparable to the location of an individual from the NLSY97. The regions were created in alignment with the regions from the NLSY97. These regional unemployment rates were used to calculate the weighted average of the unemployment rates in all the states in a particular region in a specific year, in this case, the year of an individual's graduation.

Starting with 1,318 observations, I restricted my analysis to only individuals who have received a bachelors' degree. I dropped any wage that was below \$2.00 or over \$200.00 per hour in order to eliminate any outliers. In an effort to measure the data set as fairly as possible, I used the most comprehensive variable for ability, NO_ABILITY. This variable is a section of the age-adjusted AFQT. This variable had the most comprehensive set of scores. EXP is the number of weeks worked since age 18. EXP2 is its square. I created the variable POTEXP by subtracting the graduation year of an individual by the most recent year in the data set, 2011. POTEXP2 is the squared of potential experience. I created an interaction variable between UNEMPLOY and EXP in order to measure the effects of each year after graduation. I focus on the remaining 846 observations in my analysis.

This study is based off a modification of Kahn's 2009 model:

$$\boldsymbol{lnw_{it}} = \propto_0 + \lambda_1 College_i + \lambda_2 College * Exp_{it} + \alpha AFQT_i + \gamma Y_t + \beta State_{it}^{ue} + \delta_1 Exp_{it} + \delta_2 Exp_{it}^2 + \mu_{it}$$

Where lnw_{it} is the log of the wage of an individual i in year t. College is the unemployment rate when the individual graduated from college. The interaction between the college unemployment rate and the experience (number of years since graduation, considered potential experience) shows how the initial effect of the unemployment rate on wages changes over time (Kahn, 2009). The AFQT variable is the age-adjusted Armed Forces Qualification Test score that is used as a measure of ability. Y is a "vector of contemporaneous year indicators" (Kahn, 2009). State is the unemployment rate in the state of residence during time t. Experience, as explained above, is the number of years since college graduation and Exp^2 is its square. Kahn describes this variable as potential experience.

Kahn (2009) explains issues with endogeneity within the model. First, where and when an individual graduated can be endogenous with the labor market environment. Individuals may stay in school longer or continue their education in order to avoid entering a labor market during bad economic times. She instruments for the college unemployment rate with "indicators of exogenous timing" of graduation from college. She uses the national unemployment rate from the year an individual turns 22 as this is the year most people graduate. Kahn controls for state and unemployment rate at age 14 in the 1st and 2nd stages of her regression. Kahn also states that potential experience is an endogenous variable. Since potential experience is dependent on graduation timing, Kahn instruments for "the quadratic" in potential experience with a "quadratic" in the years since an individual was 22 (Kahn, 2009). She instruments the interaction between college unemployment rate and potential experience by interacting the national unemployment rate with age (Kahn, 2009).

Empirical Model

The empirical model that this study will be based off of is the Mincer Earnings Function which says that earnings is a function of education and experience. These functions may shift as a result of bad economic times. In order to estimate the mincer earnings regression, previous studies have used the Ordinary Least Square (OLS) and Instrumental Variable (IV) techniques. An instrumental variable is necessary because potential experience is endogenous due to the fact that it is constructed off of the graduation year (Kahn, 2009). Graduation year is endogenous in

relation to the labor market: if the labor market is bad, individuals may stay in school longer or pursue an additional degree.

I hypothesize that there will be a negative impact on wages as the unemployment rate increases and for individuals with lower experience and ability levels. Compared to graduating during good economic times, these effects may last longer due to the differences in labor market conditions.

Methodology and Results

The model that I propose in order to accommodate the Mincer Function is as follows:

$$lnwage_{itr} = \propto_0 + \propto_1 UNEMPLOY_r + \propto_2 EXP_{it} + \propto_3 EXP_{it}^2 + \propto_4 NORTHCENTRAL + \propto_5 SOUTH + \propto_6 WEST + \propto_7 FEMALE_i + \propto_8 BLACK_i + \propto_9 HISPANIC_i + \propto_{10} MIXED_i + \propto_{11} ABILITY_i + \epsilon_i$$

Where lnWAGE_2011 is the hourly wage of an individual in 2011 and UNEMPLOY is the weighted average of state unemployment rates grouped into four regions during the year of an individual's graduation: Northeast, North Central, South and West. As explained above, state unemployment rates are grouped into regions in order to align with the data from the NLSY97. EXP is measured as weeks worked throughout the individual's life time. EXP2 is its square that is necessary to account for the curvature in the Mincer Equation. NORTHCENTRAL, SOUTH, and WEST are dummy variables for the region of the individual at the age of 18. FEMALE is a dummy variable for gender. The dummy variables for race are BLACK, HISPANIC, and MIXED_RACE. ABILITY is representative of the Armed Forces Qualification Test. For this study, only the NO_Ability (Numerical Operations) measurements were used because this variable had the largest number of observations.

When deciding on my model, I had the option to use real experience or potential experience. When I ran the model proposed above, the results for the real experience were not good and the results for potential experience were even worse. These results can be found in Table 1 and Table 2 in the appendix. When I ran the regression using real experience, I found that while the variable for the unemployment rate was significant, the signs on the EXP and EXP2 variables did

not coincide with the Mincer Earnings Function. I tried the regression again, but with potential experience and found that the signs of the EXP and EXP2 variables were good, that wages were increasing at a decreasing rate when for every additional year of experience. However, this model did not show the UNEMPLOY or ABILITY variables to be significant.

After careful consideration and some guidance from my advisor, I realized that because I was only looking at individuals with 12 years of experience (Bachelors' Degree) OLS was not recognizing the curvature of the earnings curve. This amount of time is only about one-third of the lifespan of a worker and would appear as a linear function to OLS. I ran the model again, this time without the squared term. The results seen in Table 3 show that with just EXP in the model, OLS now recognizes the correct direction of real experience. UNEMPLOY is significant at 95% and negative indicating that for a 1 percentage point increase in the unemployment rate, there is a 2.658% increase in the wages of an individual. EXP is now positive and significant at 99% indicating that a 1 year increase in the experience of an individual, there will be an increase of 3.957% in an individual's wages. The FEMALE variable was also significant at the 99% level and indicated that if an individual was female, there would be a reduction of wages by 12.886% when compared to males. Finally, the BLACK variable was significant at a 95% level and indicated that black individuals would experience a reduction of wages of 10.786% compared to white individuals.

It is important to note that I did run the same regression as above but with the POTEXP variable. Again, the results were not significant and produced the wrong signs for unemployment and experience. Potential experience was measured current year (2011) minus the graduation year of an individual. This potential experience measurement is not as accurate as the real experience measurements because it assumes that an individual received a job immediately after graduate. Steven's paper uses potential experience in interactions instead of a measure of real experience because she felt that real experience would not account for the time spend unemployed. She offers an alternative of using age as an interaction factor but warns that since individuals' enter college and the labor market at different ages it may group together individuals who are at different stages of their career (Stevens, 2008).

In order to analyze how long the impact of the unemployment rate on wages lasts, I interacted the unemployment rate variable with the experience variable. I was looking to see how quickly the negative effect on wages disappears. The results seen in Table 5 show that only EXP, FEMALE and BLACK are significant. The interaction term is not significant indicating that there may be a lot more variables that can affect how long the initial negative impact lasts. These variables could include, but are not limited to, the true ability of an individual, the effort an individual is willing to put into earning their wages, the professional network of an individual, and their attachment to the labor force.

Policy Implications

This paper may bring to light important consequences of a recession and may lead policy makers to re-consider decisions about the financial state of the economy. Policy makers should be highly aware of the future implications of choices they make about the current state of the economy when developing economic policies. Policy makers should ensure that they are considering not only the present state of the economy, but also how the current state and the decisions to effect the current state will affect the future state of unemployment. If our politicians are not learning from past experiences when deciding on corporate taxes, work programs, unemployment benefits, or other factors that may increase the unemployment rate, we may see overall wages decrease as a result.

Next Steps

In the future, as more data becomes available, others can analyze the long-term effect of the Great Recession on wages of individuals. This will allow the 2008 Recession to be analyzed to the same extent as previous literature on past recessions. This paper has limitations due to time constraints, availability of extensive data and my limited experience. Future economists can look at how wages of all people are affected by the unemployment rate, not just college graduates. Due to the lack of time and knowledge on my part, I was not able to estimate how long the initial negative impact will last after the recession. Future research can be done to see

how long these effects last and how these affects differ across races and genders for the 2008 Great Recession.

Conclusion

College graduates may have more to worry about than just their grade on the next exam. College graduates, as well as policy makers, need to be aware of the economic conditions in which they are graduating as the conditions may have a significant impact on their future wages. After running an OLS model based off of a modified Mincer Earnings function, I found that the impact of a one percentage point increase of the unemployment rate leads to a 2.658% decrease in the wages of an individual after graduation. I found that for every additional year of experience an individual has, they will experience a 3.957% increase in wages. These effects vary across race and gender, as well. Graduating in a bad economy, women see a decrease in wages 12.886% larger than the negative impact on men. Blacks see a decrease in wages of 10.786% when compared to their white counterpart. I was not able to successfully estimate how long these impacts last after the 2008 recession perhaps due to how relatively recent the 2008 Great Recession was to this study. This area would be an excellent topic for future research. This study brings to light that educated individuals are affected by fluctuations in the economy and that college graduates need to be aware of their economic surroundings before choosing to enter into the labor force.

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Appendix

Descriptive Statistics

Descriptive Statistics					
Variable	N	Mean	STD DEV	MIN	MAX
WAGE_2011	1318	2,108.55	1,340.03	208.00	17,483.00
UNEMPLOY	1009	5.71	1.53	4.39	10.90
EXP	1270	7.53	2.06	0.17	12.02
EXP2	1270	60.97	29.58	0.03	144.46
POTEXP	1059	5.15	2.18	0.00	12.00
POTEXP2	1059	31.30	22.41	0.00	144.00
NORTHCENTRAL	1318	0.22	0.42	0.00	1.00
SOUTH	1318	0.35	0.48	0.00	1.00
WEST	1318	0.22	0.42	0.00	1.00
FEMALE	1318	0.55	0.50	0.00	1.00
BLACK	1318	0.17	0.37	0.00	1.00
HISPANIC	1318	0.13	0.34	0.00	1.00
MIXED_RACE	1318	0.01	0.11	0.00	1.00
ABILITY	1318	19.40	5.77	2.78	39.32

Table 1: The Effect of Unemployment on Wages using EXP2

Parameter Estimates	
	OLS
UNEMPLOY	-0.02837** (0.01193)
EXP	-0.04418 (.04456)
EXP2	0.00591* (0.00308)
NORTHCENTRAL	-0.01616 (0.05928)
SOUTH	-0.01641 (0.05613)
WEST	0.08472 (0.06117)
FEMALE	-0.12386*** (0.03584)
BLACK	-0.10692** (0.05436)
HISPANIC	-0.02710 (0.05786)
MIXED_RACE	0.23770 (0.17332)
ABILITY	0.00105 (0.00328)
N	846
ADJ. R^2	0.0496
Note: Standard errors in parentheses	
	*** $p < 0.01$
	** $p < 0.05$
	* $p < 0.10$

Table 1: (Effect of Unemployment on Wages using EXP2 – Parameter Estimates)

Table 2: The Effect of Unemployment on Wages using POTEXP2

Parameter Estimates	
	OLS
UNEMPLOY	-0.00377
	(0.02103)
POTEXP	0.01699
	(.04917)
POTEXP2	0.00302
	(0.00436)
NORTHCENTRAL	-0.01021
	(0.05853)
SOUTH	-0.00963
	(0.05476)
WEST	0.07010
	(0.06028)
FEMALE	-0.12100***
	(0.03478)
BLACK	-0.08565*
	(0.05177)
HISPANIC	-0.00479
	(0.05718)
MIXED_RACE	0.21265
	(0.16342)
ABILITY	0.00111
	(0.00319)
N	872
ADJ. R^2	0.052
Note: Standard errors in parentheses	
	*** $p < 0.01$
	** $p < 0.05$
	* $p < 0.10$

Table 2: (Effect of Unemployment on Wages using POTEXP2 – Parameter Estimates)

Table 3: Effect of Unemployment on Wages WITHOUT EXP2

Parameter Estimates	
	OLS - EXP
UNEMPLOY	-0.02658**
	(0.01191)
EXP	0.03957***
	(.00928)
NORTHCENTRAL	-0.01433
	(0.05937)
SOUTH	-0.01392
	(0.05620)
WEST	0.08356
	(0.06127)
FEMALE	-0.12886***
	(0.03581)
BLACK	-0.10786**
	(0.05355)
HISPANIC	-0.02994
	(0.05793)
MIXED_RACE	0.24386
	(0.17357)
ABILITY	0.00182
	(0.00326)
N	846
ADJ. R^2	0.0465
Note: Standard errors in parentheses	
	*** $p < 0.01$
	** $p < 0.05$
	* $p < 0.10$

Table 3: (Effect of Unemployment on Wages WITHOUT EXP2 – Parameter Estimates)

Table 4: Effect of Unemployment on Wages WITHOUT POTEXP2

Parameter Estimates	
	OLS - POTEXP
UNEMPLOY	0.00739
	(0.01351)
POTEXP	0.05039***
	(.00967)
NORTHCENTRAL	-0.01625
	(0.05786)
SOUTH	-0.01075
	(0.05472)
WEST	0.06340
	(0.05948)
FEMALE	-0.12055***
	(0.03476)
BLACK	-0.08354
	(0.05167)
HISPANIC	-0.00751
	(0.05703)
MIXED_RACE	0.21131
	(0.16336)
ABILITY	0.00114
	(0.00319)
N	872
ADJ. R^2	0.0526
Note: Standard errors in parentheses	
	*** $p < 0.01$
	** $p < 0.05$
	* $p < 0.10$

Table 4: (Effect of Unemployment on Wages WITHOUT POTEXP2 – Parameter Estimates)

Table 5: Effect of Unemployment on Wages WITHOUT EXP2 with Interaction with Experience

Parameter Estimates	
	OLS - UNEMPLOY*EXP
UNEMPLOY	0.02378
	(0.04124)
EXP	0.08317*
	(.03541)
NORTHCENTRAL	-0.01091
	(0.05941)
SOUTH	-0.01442
	(0.05618)
WEST	0.08432
	(0.06125)
FEMALE	-0.12905***
	(0.03579)
BLACK	-0.10702**
	(0.05353)
HISPANIC	-0.03390
	(0.05799)
MIXED_RACE	0.24490
	(0.17351)
ABILITY	0.00201
	(0.00326)
INTERACTION_EXP	-0.00747
	(0.00586)
N	846
ADJ. R^2	0.0472
Note: Standard errors in parentheses	
	*** $p < 0.01$
	** $p < 0.05$
	* $p < 0.10$

*Table 5: (Effect of Unemployment on Wages WITHOUT EXP2 with UNEMPLOY*EXP – Parameter Estimates)*

Table 6: Effect of Unemployment on Wages WITHOUT EXP2 with Interaction with FEMALE

Parameter Estimates	
	OLS - UNEMPLOY*FEMALE
UNEMPLOY	-0.01169
	(0.01754)
EXP	0.03957***
	(.00928)
NORTHCENTRAL	-0.01430
	(0.05936)
SOUTH	-0.01624
	(0.05623)
WEST	0.08161
	(0.06128)
FEMALE	0.02277
	(0.13590)
BLACK	-0.10719**
	(0.05354)
HISPANIC	-0.03084
	(0.05793)
MIXED_RACE	0.24844
	(0.17358)
ABILITY	0.00185
	(0.00326)
INTERACTION_FEMALE	-0.02640
	(0.02282)
N	846
ADJ. R^2	0.0469
Note: Standard errors in parentheses	
	*** $p < 0.01$
	** $p < 0.05$
	* $p < 0.10$

Table 6: (Effect of Unemployment on Wages WITHOUT EXP2 with UNEMPLOY*FEMALE – Parameter Estimates)

Table 7: Effect of Unemployment on Wages WITHOUT EXP2 with Interaction with BLACK

Parameter Estimates	
	OLS - UNEMPLOY*BLACK
UNEMPLOY	-0.02538** (0.01296)
EXP	0.03957*** (.00928)
NORTHCENTRAL	-0.01504 (0.05948)
SOUTH	-0.01424 (0.05625)
WEST	0.08244 (0.06148)
FEMALE	-0.12884*** (0.03683)
BLACK	-0.06500 (0.18951)
HISPANIC	-0.03073 (0.05806)
MIXED_RACE	0.24429 (0.17368)
ABILITY	0.00184 (0.00326)
INTERACTION_BLACK	-0.00761 (0.03228)
N	846
ADJ. R^2	0.0454
Note: Standard errors in parentheses	
	*** p < 0.01
	** p < 0.05
	* p < 0.10

Table 7: (Effect of Unemployment on Wages WITHOUT EXP2 with UNEMPLOY*BLACK – Parameter Estimates)

Table 8: Effect of Unemployment on Wages with UNEMPLOY, EXP, ABILITY, Interaction with BLACK

Parameter Estimates	
	OLS - UNEMPLOY, EXP, ABILITY, UNEMPLOY*BLACK
UNEMPLOY	-0.01972* (0.01156)
EXP	0.03538*** (.00925)
ABILITY	0.00186 (0.00324)
INTERACTION_BLACK	-0.02191*** (0.00833)
N	846
ADJ. R^2	0.0303
Note: Standard errors in parentheses	
	*** $p < 0.01$
	** $p < 0.05$
	* $p < 0.10$

Table 8: (Effect of Unemployment on Wages with UNEMPLOY, EXP, ABILITY, Interaction with BLACK – Parameter Estimates)

Table 9: Effect of Unemployment on Wages with UNEMPLOY, EXP, ABILITY, Interaction with FEMALE

Parameter Estimates	
	OLS - UNEMPLOY, EXP, ABILITY, UNEMPLOY*BLACK
UNEMPLOY	-0.00912 (0.01195)
EXP	0.03838*** (.00925)
ABILITY	0.00202 (0.00322)
INTERACTION_FEMALE	-0.02337*** (0.00603)
N	846
ADJ. R^2	0.0395
Note: Standard errors in parentheses	
	*** p < 0.01
	** p < 0.05
	* p < 0.10

Table 9: (Effect of Unemployment on Wages with UNEMPLOY, EXP, ABILITY, Interaction with FEMALE – Parameter Estimates)

Table 10: Effect of Unemployment on Wages with UNEMPLOY, EXP, ABILITY, Interaction with EXP

Parameter Estimates	
	OLS - UNEMPLOY, EXP, ABILITY, UNEMPLOY*EXP
UNEMPLOY	0.02775 (0.04143)
EXP	0.07767** (0.03570)
ABILITY	0.00267 (0.00325)
INTERACTION_EXP	-0.00739 (0.00590)
N	846
ADJ. R^2	0.0241
Note: Standard errors in parentheses	
	*** p < 0.01
	** p < 0.05
	* p < 0.10

Table 10: (Effect of Unemployment on Wages with UNEMPLOY, EXP, ABILITY, Interaction with EXP – Parameter

Estimates)

SAS Code

```
options nocenter validvarname=any;

proc import datafile = '\\Client\E$\Economics Senior Honors Project
2015\Draft2\Data_Draft2\Draft2.csv'
      out = DATA0
      dbms=csv
      replace;
      getnames = yes;
run;


data DATA0;


infile '\\Client\E$\Economics Senior Honors Project
2015\Draft2\Data_Draft2\Draft2.dat' lrecl=363 missover DSD DLM=' ' print;
input
  R0000100
  R0536300
  R0536401
  R0536402
  R1235800
  R1482600
  R1770701
  R3070201
  R3070301
  R3070401
  R4355601
  R4355701
  R4355801
  R5471000
  R6031101
  R6031201
  R6031301
  R7234900
  R9705000
  R9705100
  R9705200
  R9705300
  R9705400
  R9705500
  R9705600
  R9705700
  R9705800
  R9705900
  S0443701
  S0443801
  S1549400
```

```
S2019400
S2472201
S2472301
S2472401
S3820900
S4213401
S4213501
S5421000
S5805801
S5805901
S5806001
S7522200
S7894501
S7894601
S7894701
S7894801
S7894901
T0022800
T0307801
T0307901
T0308001
T2012100
T2017700
T2324101
T2324201
T2324301
T3608100
T3850601
T3850701
T5208500
T5475201
T5475301
T5475401
T6650500
T6657300
T6658700
T6887601
T6887701
Z9065300
UNEMPLOY
ABILITY
GRAD_YEAR
GRAD_1998
GRAD_1999
GRAD_2000
GRAD_2001
GRAD_2002
GRAD_2003
GRAD_2004
GRAD_2005
GRAD_2006
GRAD_2007
GRAD_2008
GRAD_2009
GRAD_2010
GRAD_2011
POTEXP
```

```
   POTEXP2
   EXP
   EXP2
   MALE
   FEMALE
   NORTHEAST
   NORTHCENTRAL
   SOUTH
   WEST
   BLACK
   HISPANIC
   MIXED_RACE
   WHITE
   LNWAGE_2011
;
array nvarlist _numeric_;


do over nvarlist;
  if nvarlist = -1 then nvarlist = .R;  /* Refused */
  if nvarlist = -2 then nvarlist = .D;  /* Dont know */
  if nvarlist = -3 then nvarlist = .I;  /* Invalid missing */
  if nvarlist = -4 then nvarlist = .V;  /* Valid missing */
  if nvarlist = -5 then nvarlist = .N;  /* Non-interview */
end;

  label R0000100 = "PUBID - YTH ID CODE 1997";
  label R0536300 = "KEY!SEX (SYMBOL) 1997";
  label R0536401 = "KEY!BDATE M/Y (SYMBOL) 1997";
  label R0536402 = "KEY!BDATE M/Y (SYMBOL) 1997";
  label R1235800 = "CV_SAMPLE_TYPE 1997";
  label R1482600 = "KEY!RACE_ETHNICITY (SYMBOL) 1997";
  label R1770701 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 1998";
  label R3070201 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 1999";
  label R3070301 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L2 1999";
  label R3070401 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L3 1999";
  label R4355601 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 2000";
  label R4355701 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L2 2000";
  label R4355801 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L3 2000";
  label R5471000 = "CV_HRLY_PAY L1 2000";
  label R6031101 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 2001";
  label R6031201 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L2 2001";
  label R6031301 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L3 2001";
  label R7234900 = "CV_HRLY_PAY L1 2001";
  label R9705000 = "ASVAB_EI_ITEMS_COMPLETE 1999";
  label R9705100 = "ASVAB_AO_ITEMS_COMPLETE 1999";
  label R9705200 = "ASVAB_GS_ABILITY_EST_POS 1999";
  label R9705300 = "ASVAB_AR_ABILITY_EST_POS 1999";
  label R9705400 = "ASVAB_WK_ABILITY_EST_POS 1999";
  label R9705500 = "ASVAB_PC_ABILITY_EST_POS 1999";
  label R9705600 = "ASVAB_NO_ABILITY_EST_POS 1999";
  label R9705700 = "ASVAB_CS_ABILITY_EST_POS 1999";
  label R9705800 = "ASVAB_AI_ABILITY_EST_POS 1999";
  label R9705900 = "ASVAB_SI_ABILITY_EST_POS 1999";
  label S0443701 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 2002";
  label S0443801 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L2 2002";
  label S1549400 = "CV_HRLY_PAY L1 2002";
```

```
label S2019400 = "CV_HRLY_PAY L1 2003";
label S2472201 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 2003";
label S2472301 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L2 2003";
label S2472401 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L3 2003";
label S3820900 = "CV_HRLY_PAY L1 2004";
label S4213401 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 2004";
label S4213501 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L2 2004";
label S5421000 = "CV_HRLY_PAY L1 2005";
label S5805801 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 2005";
label S5805901 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L2 2005";
label S5806001 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L3 2005";
label S7522200 = "CV_HRLY_PAY L1 2006";
label S7894501 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 2006";
label S7894601 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L2 2006";
label S7894701 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L3 2006";
label S7894801 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L4 2006";
label S7894901 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L5 2006";
label T0022800 = "CV_HRLY_PAY L1 2007";
label T0307801 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 2007";
label T0307901 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L2 2007";
label T0308001 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L3 2007";
label T2012100 = "CV_CENSUS_REGION 2008";
label T2017700 = "CV_HRLY_PAY L1 2008";
label T2324101 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 2008";
label T2324201 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L2 2008";
label T2324301 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L3 2008";
label T3608100 = "CV_HRLY_PAY L1 2009";
label T3850601 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 2009";
label T3850701 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L2 2009";
label T5208500 = "CV_HRLY_PAY L1 2010";
label T5475201 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 2010";
label T5475301 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L2 2010";
label T5475401 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L3 2010";
label T6650500 = "R15 RELEASE VERSION NUMBER 2011";
label T6657300 = "EDU";
label T6658700 = "CV_HRLY_PAY L1 2011";
label T6887601 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L1 2011";
label T6887701 = "MO/YR RCV DIPLOMA/DEGREE SDLI? L2 2011";
label Z9065300 = "CVC_WKSWK_ADULT_ET";
LABEL UNEMPLOY = "UNEMPLOY";
LABEL ABILITY = "ABILITY";
LABEL GRAD_YEAR = "GRAD_YEAR";
LABEL GRAD_1998 = "GRAD_1998";
LABEL GRAD_1999 = "GRAD_1999";
LABEL GRAD_2000 = "GRAD_2000";
LABEL GRAD_2001 = "GRAD_2001";
LABEL GRAD_2002 = "GRAD_2002";
LABEL GRAD_2003 = "GRAD_2003";
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LABEL GRAD_2009 = "GRAD_2009";
LABEL GRAD_2010 = "GRAD_2010";
LABEL GRAD_2011 = "GRAD_2011";
LABEL POTEXP = "POTEXP";
```

```
   LABEL POTEXP2 = "POTEXP2";
   LABEL EXP = "EXP";
   LABEL EXP2 = "EXP2";
   LABEL MALE = "MALE";
   LABEL FEMALE = "FEMALE";
   LABEL NORTHEAST = "NORTHEAST";
   LABEL NORTHCENTRAL = "NORTHCENTRAL";
   LABEL SOUTH = "SOUTH";
   LABEL WEST = "WEST";
   LABEL BLACK = "BLACK";
   LABEL HISPANIC = "HISPANIC";
   LABEL MIXED_RACE = "MIXED_RACE";
   LABEL WHITE = "WHITE";
   LABEL LNWAGE_2011 = "LNWAGE_2011"
;

RENAME
  R0000100 = 'ID'n
  R0536300 = 'GENDER'n
  R0536401 = 'BIRTH_M'n
  R0536402 = 'BIRTH_Y'n
  R1235800 = 'SAMPLE_TYPE'n
  R1482600 = 'RACE'n
  R1770701 = 'RECDEG1_1998'n
  R3070201 = 'RECDEG1_1999'n
  R3070301 = 'RECDEG2_1999'n
  R3070401 = 'RECDEG3_1999'n
  R4355601 = 'RECDEG1_2000'n
  R4355701 = 'RECDEG2_2000'n
  R4355801 = 'RECDEG3_2000'n
  R5471000 = 'WAGE_2000'n
  R6031101 = 'RECDEG1_2001'n
  R6031201 = 'RECDEG2_2001'n
  R6031301 = 'RECDEG3_2001'n
  R7234900 = 'WAGE_2001'n
  R9705000 = 'ASVAB_EI_ITEMS_COMPLETE_1999'n
  R9705100 = 'ASVAB_AO_ITEMS_COMPLETE_1999'n
  R9705200 = 'GS_ABILITY'n
  R9705300 = 'AR_ABILITY'n
  R9705400 = 'WK_ABILITY'n
  R9705500 = 'PC_ABILITY'n
  R9705600 = 'NO_ABILITY'n
  R9705700 = 'CS_ABILITY'n
  R9705800 = 'AI_ABILITY'n
  R9705900 = 'SI_ABILITY'n
  S0443701 = 'RECDEG1_2002'n
  S0443801 = 'RECDEG2_2002'n
  S1549400 = 'WAGE_2002'n
  S2019400 = 'WAGE_2003'n
  S2472201 = 'RECDEG1_2003'n
  S2472301 = 'RECDEG2_2003'n
  S2472401 = 'RECDEG3_2003'n
  S3820900 = 'WAGE_2004'n
  S4213401 = 'RECDEG1_2004'n
  S4213501 = 'RECDEG2_2004'n
  S5421000 = 'WAGE_2005'n
  S5805801 = 'RECDEG1_2005'n
```

Senior Project – Draft #1 – O'Neill 30

```
S5805901 = 'RECDEG2_2005'n
S5806001 = 'RECDEG3_2005'n
S7522200 = 'WAGE_2006'n
S7894501 = 'RECDEG1_2006'n
S7894601 = 'RECDEG2_2006'n
S7894701 = 'RECDEG3_2006'n
S7894801 = 'RECDEG4_2006'n
S7894901 = 'RECDEG5_2006'n
T0022800 = 'WAGE_2007'n
T0307801 = 'RECDEG1_2007'n
T0307901 = 'RECDEG2_2007'n
T0308001 = 'RECDEG3_2007'n
T2012100 = 'REGION'n
T2017700 = 'WAGE_2008'n
T2324101 = 'RECDEG1_2008'n
T2324201 = 'RECDEG2_2008'n
T2324301 = 'RECDEG3_2008'n
T3608100 = 'WAGE_2009'n
T3850601 = 'RECDEG1_2009'n
T3850701 = 'RECDEG2_2009'n
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T5475201 = 'RECDEG1_2010'n
T5475301 = 'RECDEG2_2010'n
T5475401 = 'RECDEG3_2010'n
T6650500 = 'VERSION'n
    T6657300 = 'EDU'n
T6658700 = 'WAGE_2011'n
T6887601 = 'RECDEG1_2011'n
T6887701 = 'RECDEG2_2011'n
Z9065300 = 'WKSWK'n
UNEMPLOY = 'UNEMPLOY'n
ABILITY = 'ABILITY'n
GRAD_YEAR = 'GRAD_YEAR'n
GRAD_1998 = 'GRAD_1998'n
GRAD_1999 = 'GRAD_1999'n
GRAD_2000 = 'GRAD_2000'n
GRAD_2001 = 'GRAD_2001'n
GRAD_2002 = 'GRAD_2002'n
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GRAD_2004 = 'GRAD_2004'n
GRAD_2005 = 'GRAD_2005'n
GRAD_2006 = 'GRAD_2006'n
GRAD_2007 = 'GRAD_2007'n
GRAD_2008 = 'GRAD_2008'n
GRAD_2009 = 'GRAD_2009'n
GRAD_2010 = 'GRAD_2010'n
GRAD_2011 = 'GRAD_2011'n
POTEXP = 'POTEXP'n
POTEXP2 = 'POTEXP2'n
EXP = 'EXP'n
EXP2 = 'EXP2'n
MALE = 'MALE'n
FEMALE = 'FEMALE'n
NORTHEAST = 'NORTHEAST'n
NORTHCENTRAL = 'NORTHCENTRAL'n
SOUTH = 'SOUTH'n
WEST = 'WEST'n
```

```sas
  BLACK = 'BLACK'n
  HISPANIC = 'HISPANIC'n
  MIXED_RACE = 'MIXED_RACE'n
  WHITE = 'WHITE'n
  LNWAGE_2011 = 'LNWAGE_2011'n
;
run;

DATA DATA1;
     SET DATA0;

     GRAD_YEAR = MAX(OF RECDEG1_1998 RECDEG1_1999 RECDEG2_1999 RECDEG3_1999
RECDEG1_2000 RECDEG2_2000 RECDEG3_2000 RECDEG1_2001 RECDEG2_2001 RECDEG3_2001
RECDEG1_2002 RECDEG2_2002
     RECDEG1_2003 RECDEG2_2003 RECDEG3_2003 RECDEG1_2004 RECDEG2_2004
RECDEG1_2005 RECDEG2_2005 RECDEG3_2005 RECDEG1_2006 RECDEG2_2006 RECDEG3_2006
RECDEG4_2006 RECDEG5_2006
     RECDEG1_2007 RECDEG2_2007 RECDEG3_2007 RECDEG1_2008 RECDEG2_2008
RECDEG3_2008 RECDEG1_2009 RECDEG2_2009 RECDEG1_2010 RECDEG2_2010 RECDEG3_2010
RECDEG1_2011 RECDEG2_2011);

     IF GRAD_YEAR>0 THEN POTEXP = 2011 - GRAD_YEAR;
     IF GRAD_YEAR>0 THEN POTEXP2 = POTEXP*POTEXP;
     EXP = WKSWK/52;
     EXP2 = EXP*EXP;
     ABILITY = NO_ABILITY/1000;
     IF WAGE_2011<200 THEN DELETE;
     IF WAGE_2011>20000 THEN DELETE;
   LNWAGE_2011 = log(WAGE_2011);

     IF REGION = 1 AND GRAD_YEAR = 2000 THEN UNEMPLOY = 3.82;
     IF REGION = 2 AND GRAD_YEAR = 2000 THEN UNEMPLOY = 3.65;
     IF REGION = 3 AND GRAD_YEAR = 2000 THEN UNEMPLOY = 3.92;
     IF REGION = 4 AND GRAD_YEAR = 2000 THEN UNEMPLOY = 4.63;

     IF REGION = 1 AND GRAD_YEAR = 2001 THEN UNEMPLOY = 4.43;
     IF REGION = 2 AND GRAD_YEAR = 2001 THEN UNEMPLOY = 4.54;
     IF REGION = 3 AND GRAD_YEAR = 2001 THEN UNEMPLOY = 4.72;
     IF REGION = 4 AND GRAD_YEAR = 2001 THEN UNEMPLOY = 5.32;

     IF REGION = 1 AND GRAD_YEAR = 2002 THEN UNEMPLOY = 5.61;
     IF REGION = 2 AND GRAD_YEAR = 2002 THEN UNEMPLOY = 5.54;
     IF REGION = 3 AND GRAD_YEAR = 2002 THEN UNEMPLOY = 5.65;
     IF REGION = 4 AND GRAD_YEAR = 2002 THEN UNEMPLOY = 6.46;

     IF REGION = 1 AND GRAD_YEAR = 2003 THEN UNEMPLOY = 5.85;
     IF REGION = 2 AND GRAD_YEAR = 2003 THEN UNEMPLOY = 5.93;
     IF REGION = 3 AND GRAD_YEAR = 2003 THEN UNEMPLOY = 5.75;
     IF REGION = 4 AND GRAD_YEAR = 2003 THEN UNEMPLOY = 6.55;

     IF REGION = 1 AND GRAD_YEAR = 2004 THEN UNEMPLOY = 5.29;
     IF REGION = 2 AND GRAD_YEAR = 2004 THEN UNEMPLOY = 5.74;
     IF REGION = 3 AND GRAD_YEAR = 2004 THEN UNEMPLOY = 5.26;
     IF REGION = 4 AND GRAD_YEAR = 2004 THEN UNEMPLOY = 5.85;

     IF REGION = 1 AND GRAD_YEAR = 2005 THEN UNEMPLOY = 4.81;
     IF REGION = 2 AND GRAD_YEAR = 2005 THEN UNEMPLOY = 5.40;
```

```
IF REGION = 3 AND GRAD_YEAR = 2005 THEN UNEMPLOY = 4.98;
IF REGION = 4 AND GRAD_YEAR = 2005 THEN UNEMPLOY = 5.13;

IF REGION = 1 AND GRAD_YEAR = 2006 THEN UNEMPLOY = 4.58;
IF REGION = 2 AND GRAD_YEAR = 2006 THEN UNEMPLOY = 5.00;
IF REGION = 3 AND GRAD_YEAR = 2006 THEN UNEMPLOY = 4.47;
IF REGION = 4 AND GRAD_YEAR = 2006 THEN UNEMPLOY = 4.60;

IF REGION = 1 AND GRAD_YEAR = 2007 THEN UNEMPLOY = 4.51;
IF REGION = 2 AND GRAD_YEAR = 2007 THEN UNEMPLOY = 5.15;
IF REGION = 3 AND GRAD_YEAR = 2007 THEN UNEMPLOY = 4.39;
IF REGION = 4 AND GRAD_YEAR = 2007 THEN UNEMPLOY = 4.75;

IF REGION = 1 AND GRAD_YEAR = 2008 THEN UNEMPLOY = 5.51;
IF REGION = 2 AND GRAD_YEAR = 2008 THEN UNEMPLOY = 6.12;
IF REGION = 3 AND GRAD_YEAR = 2008 THEN UNEMPLOY = 5.65;
IF REGION = 4 AND GRAD_YEAR = 2008 THEN UNEMPLOY = 6.48;

IF REGION = 1 AND GRAD_YEAR = 2009 THEN UNEMPLOY = 8.41;
IF REGION = 2 AND GRAD_YEAR = 2009 THEN UNEMPLOY = 9.74;
IF REGION = 3 AND GRAD_YEAR = 2009 THEN UNEMPLOY = 9.03;
IF REGION = 4 AND GRAD_YEAR = 2009 THEN UNEMPLOY = 10.19;

IF REGION = 1 AND GRAD_YEAR = 2010 THEN UNEMPLOY = 8.62;
IF REGION = 2 AND GRAD_YEAR = 2010 THEN UNEMPLOY = 9.43;
IF REGION = 3 AND GRAD_YEAR = 2010 THEN UNEMPLOY = 9.26;
IF REGION = 4 AND GRAD_YEAR = 2010 THEN UNEMPLOY = 10.90;

IF REGION = 1 AND GRAD_YEAR = 2011 THEN UNEMPLOY = 8.19;
IF REGION = 2 AND GRAD_YEAR = 2011 THEN UNEMPLOY = 8.31;
IF REGION = 3 AND GRAD_YEAR = 2011 THEN UNEMPLOY = 8.62;
IF REGION = 4 AND GRAD_YEAR = 2011 THEN UNEMPLOY = 10.24;


IF GRAD_YEAR = 0 THEN GRAD_YEAR = .;
IF GRAD_YEAR = 1998 THEN GRAD_1998 = 1; ELSE GRAD_1998=0;
IF GRAD_YEAR = 1999 THEN GRAD_1999 = 1; ELSE GRAD_1999=0;
IF GRAD_YEAR = 2000 THEN GRAD_2000 = 1; ELSE GRAD_2000=0;
IF GRAD_YEAR = 2001 THEN GRAD_2001 = 1; ELSE GRAD_2001=0;
IF GRAD_YEAR = 2002 THEN GRAD_2002 = 1; ELSE GRAD_2002=0;
IF GRAD_YEAR = 2003 THEN GRAD_2003 = 1; ELSE GRAD_2003=0;
IF GRAD_YEAR = 2004 THEN GRAD_2004 = 1; ELSE GRAD_2004=0;
IF GRAD_YEAR = 2005 THEN GRAD_2005 = 1; ELSE GRAD_2005=0;
IF GRAD_YEAR = 2006 THEN GRAD_2006 = 1; ELSE GRAD_2006=0;
IF GRAD_YEAR = 2007 THEN GRAD_2007 = 1; ELSE GRAD_2007=0;
IF GRAD_YEAR = 2008 THEN GRAD_2008 = 1; ELSE GRAD_2008=0;
IF GRAD_YEAR = 2009 THEN GRAD_2009 = 1; ELSE GRAD_2009=0;
IF GRAD_YEAR = 2010 THEN GRAD_2010 = 1; ELSE GRAD_2010=0;
IF GRAD_YEAR = 2011 THEN GRAD_2011 = 1; ELSE GRAD_2011=0;

IF REGION = 1 THEN NORTHEAST = 1;    ELSE NORTHEAST=0;
IF REGION = 2 THEN NORTHCENTRAL = 1; ELSE NORTHCENTRAL=0;
IF REGION = 3 THEN SOUTH = 1; ELSE SOUTH=0;
IF REGION = 4 THEN WEST = 1;   ELSE WEST=0;

IF GENDER = 1 THEN MALE = 1;   ELSE MALE=0;
IF GENDER = 2 THEN FEMALE = 1;  ELSE FEMALE=0;
```

```sas
       IF RACE = 1 THEN BLACK = 1;   ELSE BLACK=0;
       IF RACE = 2 THEN HISPANIC = 1;   ELSE HISPANIC=0;
       IF RACE = 3 THEN MIXED_RACE = 1;   ELSE MIXED_RACE=0;
       IF RACE = 4 THEN WHITE = 1;   ELSE WHITE=0;

       IF EDU = 4 then BA = 1; else BA = 0;
       IF BA = 0 then delete;
       /*Added variable for highest grade: keeping everyone.  Created dummy
for individuals with 16 years of education (bachelor's degree)*/

       INTERACTION_EXP = EXP*UNEMPLOY;
       INTERACTION_POTEXP = POTEXP*UNEMPLOY;
       INTERACTION_FEMALE = FEMALE*UNEMPLOY;
       INTERACTION_BLACK = BLACK*UNEMPLOY;
run;

proc means data=DATA1 n mean min max;
run;

proc means data = DATA1;
TITLE Proc Means;
VARIABLE WAGE_2011 UNEMPLOY EXP EXP2 POTEXP POTEXP2
NORTHEAST NORTHCENTRAL SOUTH
WEST MALE FEMALE BLACK HISPANIC MIXED_RACE WHITE ABILITY;
RUN;

/*
PROC FREQ DATA = DATA1;
      TABLES GENDER MALE FEMALE;
      TITLE "CHECKING FOR DUMMY GENDER VARIABLES";
RUN;

PROC FREQ DATA = DATA1;
      TABLES RACE WHITE BLACK HISPANIC MIXED_RACE;
      TITLE "CHECKING FOR DUMMY RACE VARIABLES";
RUN;

PROC FREQ DATA = DATA1;
      TABLES REGION NORTHEAST NORTHCENTRAL WEST SOUTH;
      TITLE "CHECKING FOR DUMMY REGION VARIABLES";
RUN;

proc freq data = DATA1;
      Tables EDU;
      Title "Checking for Dummy EDU Variable";
Run;

PROC FREQ DATA = DATA1;
      TABLES GRAD_YEAR GRAD_1998 GRAD_1999 GRAD_2000 GRAD_2001
      GRAD_2002 GRAD_2003 GRAD_2004 GRAD_2005 GRAD_2006 GRAD_2007 GRAD_2008
GRAD_2009 GRAD_2010 GRAD_2011;
      TITLE "CHECKING FOR DUMMY GRAD_YEAR VARIABLES";
RUN;
*/

PROC CORR DATA = DATA1;
```

```
      VAR EXP POTEXP ;
RUN;


PROC REG DATA = DATA1;
      TITLE LOGRITHMIC REGRESSION - EFFECT OF UNEMPLOYMENT ON WAGES
      WITH DUMMIES, WAGE_2011, REAL EXPERIENCE
      WITHOUT GRAD_YEAR, EDU;
      MODEL LNWAGE_2011 = UNEMPLOY EXP EXP2
      NORTHCENTRAL SOUTH WEST /*LEFT OUT NORTHEAST_REGION BECAUSE IT WILL BE
USED AS THE REFERENCE REGION*/
      FEMALE /*LEFT OUT MALE BECAUSE IT WILL BE USED AS THE REFERENCE
GENDER*/
      BLACK HISPANIC MIXED_RACE /*LEFT OUT WHITE BECAUSE IT WILL BE USED AS
THE REFERENCE RACE*/
      ABILITY;
RUN;


PROC REG DATA = DATA1;
      TITLE LOGRITHMIC REGRESSION - EFFECT OF UNEMPLOYMENT ON WAGES
      WITH DUMMIES, WAGE_2011, POTENTIAL EXPERIENCE
      WITHOUT GRAD_YEAR, EDU;
      MODEL LNWAGE_2011 = UNEMPLOY POTEXP POTEXP2
    NORTHCENTRAL SOUTH WEST /*LEFT OUT NORTHEAR_REGION BECAUSE IT WILL BE
USED AS THE REFERENCE REGION*/
      FEMALE /*LEFT OUT MALE BECAUSE IT WILL BE USED AS THE REFERENCE
GENDER*/
      BLACK HISPANIC MIXED_RACE /*LEFT OUT WHITE BECAUSE IT WILL BE USED AS
THE REFERENCE RACE*/
      ABILITY;
RUN;


PROC REG DATA = DATA1;
      TITLE LOGRITHMIC REGRESSION - EFFECT OF UNEMPLOYMENT ON WAGES
      WITH DUMMIES, WAGE_2011, REAL EXPERIENCE
      WITHOUT GRAD_YEAR, no EXP2;
      MODEL LNWAGE_2011 = UNEMPLOY EXP
      NORTHCENTRAL SOUTH WEST /*LEFT OUT NORTHEAST_REGION BECAUSE IT WILL BE
USED AS THE REFERENCE REGION*/
      FEMALE /*LEFT OUT MALE BECAUSE IT WILL BE USED AS THE REFERENCE
GENDER*/
      BLACK HISPANIC MIXED_RACE /*LEFT OUT WHITE BECAUSE IT WILL BE USED AS
THE REFERENCE RACE*/
      ABILITY;
RUN;
PROC REG DATA = DATA1;
      TITLE LOGRITHMIC REGRESSION - EFFECT OF UNEMPLOYMENT ON WAGES
      WITH DUMMIES, WAGE_2011, POTENTIAL EXPERIENCE
      WITHOUT GRAD_YEAR, no POTEXP2;
      MODEL LNWAGE_2011 = UNEMPLOY POTEXP
      NORTHCENTRAL SOUTH WEST /*LEFT OUT NORTHEAST_REGION BECAUSE IT WILL BE
USED AS THE REFERENCE REGION*/
      FEMALE /*LEFT OUT MALE BECAUSE IT WILL BE USED AS THE REFERENCE
GENDER*/
      BLACK HISPANIC MIXED_RACE /*LEFT OUT WHITE BECAUSE IT WILL BE USED AS
THE REFERENCE RACE*/
      ABILITY;
RUN;
```

```sas
PROC REG DATA = DATA1;
      TITLE LOGRITHMIC REGRESSION - EFFECT OF UNEMPLOYMENT ON WAGES
      WITH DUMMIES, WAGE_2011, REAL EXPERIENCE
      WITHOUT GRAD_YEAR, Interaction;
      MODEL LNWAGE_2011 = UNEMPLOY EXP
      NORTHCENTRAL SOUTH WEST /*LEFT OUT NORTHEAST_REGION BECAUSE IT WILL BE
USED AS THE REFERENCE REGION*/
      FEMALE /*LEFT OUT MALE BECAUSE IT WILL BE USED AS THE REFERENCE
GENDER*/
      BLACK HISPANIC MIXED_RACE /*LEFT OUT WHITE BECAUSE IT WILL BE USED AS
THE REFERENCE RACE*/
      ABILITY INTERACTION_EXP;
RUN;

PROC REG DATA = DATA1;
      TITLE LOGRITHMIC REGRESSION - EFFECT OF UNEMPLOYMENT ON WAGES
      WITH DUMMIES, WAGE_2011, REAL EXPERIENCE
      WITHOUT GRAD_YEAR, Interaction with FEMALE;
      MODEL LNWAGE_2011 = UNEMPLOY EXP
      NORTHCENTRAL SOUTH WEST /*LEFT OUT NORTHEAST_REGION BECAUSE IT WILL BE
USED AS THE REFERENCE REGION*/
      FEMALE /*LEFT OUT MALE BECAUSE IT WILL BE USED AS THE REFERENCE
GENDER*/
      BLACK HISPANIC MIXED_RACE /*LEFT OUT WHITE BECAUSE IT WILL BE USED AS
THE REFERENCE RACE*/
      ABILITY INTERACTION_FEMALE;
RUN;

PROC REG DATA = DATA1;
      TITLE LOGRITHMIC REGRESSION - EFFECT OF UNEMPLOYMENT ON WAGES
      WITH DUMMIES, WAGE_2011, REAL EXPERIENCE
      WITHOUT GRAD_YEAR, Interaction with BLACK;
      MODEL LNWAGE_2011 = UNEMPLOY EXP
      NORTHCENTRAL SOUTH WEST /*LEFT OUT NORTHEAST_REGION BECAUSE IT WILL BE
USED AS THE REFERENCE REGION*/
      FEMALE /*LEFT OUT MALE BECAUSE IT WILL BE USED AS THE REFERENCE
GENDER*/
      BLACK HISPANIC MIXED_RACE /*LEFT OUT WHITE BECAUSE IT WILL BE USED AS
THE REFERENCE RACE*/
      ABILITY INTERACTION_BLACK;
RUN;

PROC REG DATA = DATA1;
      TITLE LOGRITHMIC REGRESSION - EFFECT OF UNEMPLOYMENT ON WAGES
      WITH DUMMIES, WAGE_2011, REAL EXPERIENCE
      WITHOUT GRAD_YEAR, Interaction with FEMALE;
      MODEL LNWAGE_2011 = UNEMPLOY EXP
      ABILITY INTERACTION_FEMALE;
RUN;

PROC REG DATA = DATA1;
      TITLE LOGRITHMIC REGRESSION - EFFECT OF UNEMPLOYMENT ON WAGES
      WITH DUMMIES, WAGE_2011, REAL EXPERIENCE
      WITHOUT GRAD_YEAR, Interaction with BLACK;
      MODEL LNWAGE_2011 = UNEMPLOY EXP
      ABILITY INTERACTION_BLACK;
```

```
RUN;

PROC REG DATA = DATA1;
      TITLE LOGRITHMIC REGRESSION - EFFECT OF UNEMPLOYMENT ON WAGES
      WITH DUMMIES, WAGE_2011, REAL EXPERIENCE
      WITHOUT GRAD_YEAR, Interaction with BLACK;
      MODEL LNWAGE_2011 = UNEMPLOY EXP
      ABILITY INTERACTION_EXP;
RUN;
```