Comparing the Labor Market Return to An Associate Degree and to A Bachelor's Degree

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Abstract

College education has been shown to improve the labor market success of young people. Using data from the 1997 National Longitudinal Survey of Youth, I estimate a wage model and an unemployment model where respondents are grouped according to their degree attainment and college attendance. I find that associate degrees recipients get paid by 21-23 percent more than high school graduates while a bachelor's degree is associated with an even higher wage premium. Similarly, college-educated people have a lower probability of unemployment. However, after controlling for types of colleges attended (two-year or four-year), a bachelor's degree is no longer more beneficial than an associate degree in some years.

1 Introduction

Many scholars have shown that postsecondary education and labor market success are positively related (Becker 1967; Card 2001). Fang (2006) has disentangled the wage premium into productivity enhancement and signaling effect of college education. However, questions including whether each type of postsecondary education brings similar economic returns and which groups of students receive the college wage premium remain to be explored. This information would be helpful for evaluating education policies such as President Obama's recent proposal to make community colleges free.[1] In this paper, I explore the differences in the labor market returns to an associate and to a bachelor's degree. Students receive associate degrees from community colleges after completing a two-year curriculum. The curriculum is mostly similar to that in a four-year college with general education courses as well as requirements for specific majors or vocations. Four-year colleges provide bachelor's degrees.

[1] See Allie Bidwell (2015) for more details.

Community colleges have been criticized for having no economic returns by Brint & Karbel (1989) and Pincus (1980). In later research done by Grubb (1997), an associate degree was found to be correlated with a significant increase in average earnings, but not as much as what a bachelor's degree brings. Similarly, Kane and Rouse (1995) conclude that people with two-year college on average earn significantly more than those without any college education based on their exploration of three datasets: the National Longitudinal Survey of the High School Class of 1972, the 1979 National Longitudinal Survey of Youth (NLSY-79) and the Current Population Survey of corresponding years. Jepsen et al. (2014) use the administrative data from Kentucky Community and Technical College System (KCTCS) to explore the economic returns of community college education by type of award (associate degree, diploma or certificate) and field of major study. Using quarterly earnings data KCTCS collected from the state's unemployment insurance system, the authors find that associate degrees and diplomas have benefits of nearly $1,500 in recipients' quarterly earnings.

Economists have also discussed about different controls to include when estimating wage premiums. They have proven that some gender disparities in the college wage premium exist. Kane and Rouse's results suggest that the wage premium of one year of college credit is 4-7 percent for men and 7-10 percent for women. Moreover, four-year college credits bring higher economic returns than two-year's. Grubb finds that more years of college attendance without completing a degree benefit men more than women. In addition, Grubb claims that receiving a college diploma is important. He finds that a bachelor's degree is correlated with a higher earnings return than four-year college without a degree does. Light and Strayer (2004) delves into the question even further. In addition to degree attainment (associate, bachelor or none) and school types (two-year or four-year), they also consider students' transfer status. They conclude that transfer students receive some additional wage benefits because changing schools allows them to obtain more skill investment opportunities.

The current literature suggests that students who begin their education at a two-year college are very different from those who go directly to a four-year college. In addition to differences in high school GPA and SAT scores, Bowen et al. (2009) find the existence of "undermatches." They suspect that a lot of students who start at two-year schools, especially those from low socioeconomic status backgrounds, do so even though they could have attended a four-year college. To control for the self-selection bias problem, Kane and Rouse use standardized test scores, high school class rank and parents' annual income. With controls for family background and ability, Kane and Rouse's estimated results changed. They find that a four-year college credit is correlated with a lower wage premium than a two-year college credit does for female workers. Light and Strayer control availability of public colleges in state and durations of enrollment in college, combined with the factors suggested by Kane and Rouse.

This paper adopts Light and Strayer's model, but focuses on the economic returns of different college degrees and different types of schools. Light and Strayer use the NLSY-79 dataset to form their samples with and without transfer students. This study is based on the 1997 National Longitudinal Survey of Youth (NLSY-97), a more recent longitudinal dataset. I use an ordinary least squares (OLS) regression model to estimate the college wage premium. Most of the variables are the same as those in Light and Strayer's model. However, I do not include those transfer status variables because my analysis focuses on wage premiums of different college degrees. I add to their model regional variables that are shown to be significantly correlated with wage rates by Kane and Rouse. Light and Strayer focus on the working population by excluding those who do not have any employment information after graduation from their sample. However, unemployment rates can also reflect people's performance in the labor market. Therefore, in addition to the wage model, I use a logistic regression model to estimate how the average probability of unemployment among young people is correlated with their college education.

The remainder of the paper is organized as follows. Section 2 describes the data and methodology used with a thorough discussion of variables included. Section 3 presents the results of regression models while Section 4 summarizes and concludes the paper.

2 Data and Model

2.1 Data

The 1997 National Longitudinal Survey of Youth (15 rounds of annual interviews conducted by Bureau of Labor Statistics from 1997 to 2012) provides demographic, education, employment and household information about a cohort of young people born between 1980 and 1984. The respondents were 12- to 18-year-old during the first round of interview and 26 to 32 at the time of round 15. The NLSY-97 is comprised of two subsamples: a cross-sectional sample of 6,748 respondents designed to represent people living in the US during the first survey round, and a supplemental sample of 2,236 respondents designed to oversample Hispanic or Latino and black people living in the US during the first survey round. In total, about 51.9% of the sample are non-black/non-Hispanic, 26% are non-Hispanic black and 21.2% are Hispanic or Latino. The survey does not include any Asian Americans.

The NLSY-97 program interviewed 8,984 individuals in the first survey round and 7,423 retained in the program in round 15. The most updated NLSY-97 data have information about respondents' annual income earned from 1997 to 2010, which is the time period this paper focuses on. As suggested by Light and Strayer, the regression sample for the wage equation includes multiple wages reported by workers after receiving their highest degree. For the unemployment

equation, each individual may have different employment status corresponding to different survey years (for example, employed in 2008 and unemployed in 2009). Similarly, these multiple values of employment status are included in the regression sample for the unemployment equation. For both regressions, I draw a cross-section based on a specific calendar year. As the sample size for earlier years is so small that estimations are not significant, I only run regressions for years 2006, 2008 and 2010.

The wage regression model excludes those not working while the unemployment model includes them. However, if the person was not in the labor force in a certain year, his employment state for that year is not included in the sample for the unemployment equation. Moreover, the models try to analyze people's employment status and income only after they received their highest degree. Their employment information before graduation is represented by their work experience, but how much they earned before graduation is not important to this study. When cleaning the dataset, 27 observations without any records of education history are dropped. For individuals having any kinds of school certificates or degrees, only those receiving their highest degree before 2011 are included in the sample. In total, my wage regression sample contains 7,514 workers while my unemployment regression sample contains 8,493 respondents.

2.2 Model

An OLS regression model is used to estimate the correlation between people's after-college earnings and the types of college degrees that they received. The dependent variable is the natural logarithm of real hourly wage. I calculate each respondent's wage rate as their annual income divided by the number of hours worked in that year. Both the annual income and the number of hours worked are taken directly from the NLSY-97 dataset. For each year, the survey asks respondents, including those self-employed, to give the number of hours usually worked in a week, the starting date and the ending date of each of their jobs to calculate the number of hours worked annually. For this study, each person's hourly wage is indexed by the annual price index for personal consumption expenditures from Bureau of Economic Analysis.[2] I further restrict allowable log hourly wage observations to include only respondents who earn between $2/hour and $250/hour because other respondents either did not have any records of earnings or could not represent the population of workers well. The coefficients in the wage equation can be transformed to give us the percent change in real hourly wage associated with each level of education and other independent factors described below.

For the second part of this study, I use a logistic regression model. The dependent variable is a dummy variable for unemployment, which equals one if the person was unemployed for 15 weeks

[2]Bureau of Economic Analysis uses 2009 as the index base year.

or more in that year.[3] The independent variables can be categorized into three sets: educational variables, background variables and controls for the self-selection bias problem. The equations estimated are the following:

$$ln(wage_i) = \alpha + \sum_{k=1}^{10} (\beta_k D_{ik}) + \delta' X_i + \gamma' Z_i + \varepsilon_i \quad (1)$$

$$Unemployment_i = A + \sum_{k=1}^{10} (B_k D_{ik}) + \Delta' X_i + \Gamma' Z_i + \varepsilon_i \quad (2)$$

where D_{ik} represents one of the ten educational variables in the model: having no high school diploma, passing the General Educational Development (GED) test, attending some college without receiving an degree (consider two-year college only, four-year college only, both two-year and four-year colleges), receiving an associate degree (consider two-year college only, both two-year and four-year colleges), receiving a bachelor's degree (consider four-year college only, both two-year and four-year colleges), and receiving a higher degree. Those having a high school diploma consist the eleventh education cohort, which is omitted. Standing for all the background controls, X_i includes a dummy variable for male, a dummy variable for non-Hispanic black, a dummy variable for Hispanic or Latino, dummies for region of residence (Northeast, North Central, South and West (omitted) as defined in the Census Population Survey), age, number of years of work experience before age 20, number of years of work experience after age 20 and squares of work experiences. At last, Z_i is the set of controls for the selection bias problem, which includes standardized test score percentile, the natural log of household net wealth and parents' education. Summary statistics for the variables used in the models are presented in Table 1.

Values for the educational variables are taken from the education section of NLSY, which collects information about respondents' highest degree received with options of high school, Associate, Bachelor, Master, PhD and other professional degrees (JD, MD). The model controls for those attending some college but receiving no degree because of the credential effect shown by Grubb. I would like to control for region of college and region of work separately, but NLSY has information on region of residence only. Each wage or unemployment observation is associated with the current region of residence reported by the respondent in that year. The model controls for work experience before and after age 20 separately because failure to control for in-school work experience, usually happening before age 20, would cause its wage effects to be absorbed by the college variables (Light 2001).

Similar to Light and Strayer, I use ASVAB math/verbal score percentile complied by the NLS

[3]This definition of unemployment is consistent with how the Current Population Survey conducted by Bureau of Labor Statistics measures annual unemployment rate. See "The Unemployment Rate and Beyond: Alternative Measures of Labor Underutilization". http://www.bls.gov/opub/ils/pdf/opbils67.pdf.

Table 1: Summary Statistics for Variables in the Regressions

Variable	Mean	S.D.	Min	Max
Natural log of real hourly wage	2.4897	.6475	.6937	5.5134
Real hourly wage	15.1022	13.9836	2.0010	248.0014
1 if unemployed	.0861	.2805	0	1
1 if no GED or high school diploma	.0804	.2719	0	1
1 if passed the GED test	.0765	.2658	0	1
1 if attended some 2-year college, received no degree	.1637	.3700	0	1
1 if attended some 4-year college, received no degree	.0953	.2937	0	1
1 if attended some 2- and 4-year colleges, received no degree	.0516	.2213	0	1
1 if received associate degree, attended 2-year college only	.0310	.1733	0	1
1 if received associate degree, attended 2- and 4-year colleges	.0172	.1301	0	1
1 if received bachelor's degree, attended 4-year college	.1407	.3477	0	1
1 if received bachelor's degree, attended 2- and 4-year colleges	.0355	.1851	0	1
1 if received master's doctorate or professional degrees	.0277	.1642	0	1
1 if male	.5364	.4987	0	1
1 if black	.2147	.4106	0	1
1 if Hispanic	.2219	.4156	0	1
1 if Northeast	.1459	.3530	0	1
1 if North Central	.2198	.4141	0	1
1 if South	.3579	.4794	0	1
Age	24.0729	3.1930	13	30
Number of years of work experience before age 20	1.5754	1.2622	0	9.4145
Number of years of work experience since age 20	3.4104	3.1353	0	24.356
Standardized test score percentile	47.6282	28.0727	0	100
Natural log of real household net wealth	10.6792	1.7627	3.6656	13.5363
Real household net wealth	117,063.9	171,325.8	-1,178,982	756,362.9
Father's highest grade completed	12.5225	3.1278	1	20
Mother's highest grade completed	12.4514	2.9341	1	20

Note: this summary is subject to the time period from 1997 to 2010.

Program as the control for standardized test score.[4] Observations with missing test score percentiles are excluded from the sample. In addition, the model controls for the household net wealth reported by parents in 1997 and the person's residential father's and mother's highest grades completed within a range from 1 to 20. If the residential parents' education levels are missing, I use their biological parents' information instead. Parents influence their children's college enrollment and degree completion because depending on their wealth and education they invest in their children's human capital differently. The NLSY program calculates the household net wealth as the value of total assets subtracted by the value of total debts. The model controls for the natural log of household net wealth after discarding observations with missing or negative net wealth, which consist about 6% of the overall sample. I originally controlled for parents' income but decided to drop this variable. Parents' income does not explain the variance in their children's earnings well; when including this variable, the model's adjusted R-squared becomes smaller. In addition, it may cause the multicollinearity problem as parents' income would be correlated with the household wealth.

3 Results

3.1 Wage Effects of Education

The estimates of the wage effects of college degrees and school types in 2006, 2008 and 2010 are summarized in Table 2. In Column 1 of each year's results, I did not consider what type of schools the workers attended. Comparing to high school graduates, associate degrees recipients get paid by 21-23 percent more on average. A Bachelor's degree is correlated with a 22-33 percent increase in hourly wage. These results are much lower than those estimated by Light and Strayer using NLSY-79 data. By using data for 1979-96, they estimate 33% and 62% wage increases correlated with an associate degree and a bachelor's degree, respectively. This decline in wage premium is possibly due to changes in supply-and-demand fundamentals and economic conditions. The slowdown in the growth of the relative supply of college workers around 1980 was a major reason for the boost in the college wage premium (Goldin and Katz 2007). The college wage premium narrows down

[4]NLS Program staff calculated ASVAB math/verbal score percentile within each three-month age cohort. That is, the oldest cohort included those born from January through March of 1980, while the youngest were born from October through December 1984 (a total of 20 cohorts, with an average of about 350 respondents per cohort). Within each three-month age cohort and using the sampling weights, they assigned percentiles for the theta scores for the tests on Mathematical Knowledge (MK), Arithmetic Reasoning (AR), Word Knowledge (WK), and Paragraph Comprehension (PC) based on the weighted number of respondents scoring below each score. They added the percentile scores for WK and PC to get an aggregate Verbal score (V) for which an intra-group percentile was then computed. NLS Program staff then added the percentile scores for MK, AR and two times the aggregated percentile for V. Finally, within each group they computed a percentile score, using the weights, yielding a final value between zero and 99.

after 2000. Due to the recession, wages of college degree holders increased by only 1% from 2000 to 2012, while their productivity grew by 24.9% (Mishel and Shierholz 2013).

If disentangling education cohorts further, we can find the differences in the wage premium of attending two-year versus four-year colleges. For each year, the results with specification of school types are presented in Column 2. For example, in 2010, associate degree holders attending both two-year and four-year colleges earned 20% more than those attending a two-year college only. After controlling for the type of colleges attended, a bachelor's degree no longer has a more dominant effect on wage than an associate degree does. In 2008, associate degrees recipients after attending two-year colleges actually received higher wage premium than workers attending four-year colleges only and receiving bachelor's degrees. For those studying in both two-year and four-year colleges, associate degrees recipients benefit from higher wage premium than bachelor's degrees recipients in 2010.

3.2 Unemployment Effects of Education

For the second part of this study, a logistic regression model is used to estimate the effects of college degrees on average probability of being unemployed. Results are presented in Table 3 where Column 1 does not specify what types of college the respondent enrolled in and Column 2 specifies that. In terms of lowering unemployment, a bachelor's degree's value has improved from 2006 to 2010. On the other hand, an associate degree is correlated with a smaller decrease in the odds of unemployment in 2010 than in 2006. An associate degree reaches its highest value in 2008 when those recipients' odds of unemployment are 61% lower than high school graduates'. In 2010, compared to high school diplomas, an associate degree is linked to 20% - 34% decrease in the odds of unemployment while a bachelor's degree is correlated with 67% - 78% decrease.

Having some college education, even receiving no degrees, makes young people have a better chance to be employed. However, the effect is statistically insignificant. For those non-degree recipients, attending both two-year and four-year colleges decrease their odds of unemployment less or even increase the odds compared to those attending one type of college only. Master's, doctorate and professional programs lower average unemployment substantially, but the effect is not statistically significant.

3.3 Non-education Variables

The effects of background variables on wage and unemployment are summarized in Table 4 and 5. Table 4 presents parameter estimates of background variables in the wage equation while Table 5 presents those in the unemployment equation. Again, in both tables, Column 1 represents regression results when college types are not specified while Column 2 presents those when college

types are specified in the model. In 2010, the estimated gender pay gap is about 14%, i.e. men on average get paid by 14% more than women. However, men have higher odds of unemployment except in 2008. According to Bureau of Labor Statistics, men experienced higher unemployment rates than women in 2009 and 2010.[5] The recession hit men harder since they were concentrated in the sectors, like manufacturing and construction, that experienced high job losses (Sahin et al. 2009).

Minority groups have different labor market experiences. On average, Hispanics have higher wage and lower odds of unemployment compared to whites. On the other hand, blacks are disadvantaged in the labor market in consideration of both average wage and probability of unemployment. For instance, Hispanics earn 4% more and blacks earn 7% less than whites in 2010. These findings are consistent with Light and Strayer's results using data for the period 1979-96. Estimating with median regressions conditional on pre-market skills such as the ASVAB scores, McHenry and McInerney (2013) find that Hispanic women earn significantly higher wages than non-Hispanic white women and Hispanic men earn similar wages as non-Hispanic white men. However, they argue that this wage premium disappears after controlling for cost of living (McHenry and McInerney 2015). The Hispanic-white wage gap or premium seems to fluctuate depending on what conditions the regression model controls.

Moreover, the results illustrate that young people's labor market experiences are correlated with their parent's wealth and education level. The higher the household wealth is, the more the person is get paid and the higher the chance of employment is. The father's education has a positive correlation with children's wage and employment but mother's education does not.

4 Conclusion

The respondents in the 1997 National Longitudinal Survey of Youth are categorized into different education groups by college degrees (no degree, associate, bachelor, higher degree) and enrollment types (two-year only, four-year only, both two-year and four-year). I use an OLS regression model to estimate the wage premiums of college education. In addition, a logistic regression model is used to find how the probability of unemployment differ among these different education attainment groups. The key findings include: 1) In terms of average hourly pay and unemployment, college education even without obtaining any degree improves people's performance in the labor market; 2) The only exception to this pattern is the group of workers enrolled in some two-year and four-year colleges but did not receive any degree. Their hourly wage is lower than high school grad-

[5]For monthly unemployment rates by sex, see Bureau of Labor Statistics, U.S. Department of Labor, The Economics Daily, "July unemployment rates: adult men, 7.0 percent; adult women, 6.5 percent; teens, 23.7 percent" at http://www.bls.gov/opub/ted/2013/ted_20130806.htm.

uates without any college education. In other words, switching between two-year and four-year colleges without completing the course actually hurts their jobs after college; 3) Gender disparity in labor market exists. Men on average have a higher payroll but lower odds of employment; 4) Hourly wage and employment rate are lower for blacks but higher for Hispanics; 5) People's standardized test score, household wealth and father's education level have positive correlations with their hourly wage.

These findings can give us some policy implications. For example, President Obama's free community college plan is going to benefit high school graduates since an associate degree is connected with higher wages and a better chance to find a job. However, the benefits would be more substantial if high school students receive some college application consultancy to avoid "undermatches" and make right college decisions.

However, both the wage and unemployment models have not captured variation in the dependent variable well as the low R-squared values show. One possible reason is that the variables I mentioned in the model section are not enough to control the variation in people's decisions to attend college and abilities to complete college education. Factors influencing young people's college decisions and disparities in characteristics of high school graduates who enroll in public versus private colleges, two-year versus four-year colleges can be explored further. In addition, some of the estimation results are not statistically significant because the regression sample is small. As the NLSY-97 program started the interviews when the respondents were between age 12 to 16, a large number of them have only worked for a few years. If this longitudinal dataset has a longer time span with more streams of wage and employment information, we can probably have better estimation. Another route for future research is using other datasets, especially those with a larger sample size, to validate the effectiveness of the model.

Table 2: OLS Estimates of the Wage Effects of College Degrees and School Types

	2006		2008		2010	
	(1)	(2)	(1)	(2)	(1)	(2)
No high school diploma	-0.124*	-0.137*	-0.238***	-0.246***	-0.127*	-0.145*
	(-2.11)	(-2.32)	(-4.33)	(-4.49)	(-2.07)	(-2.37)
GED	-0.114*	-0.129*	-0.230***	-0.239***	-0.0771	-0.0936
	(-1.99)	(-2.25)	(-4.64)	(-4.85)	(-1.44)	(-1.75)
Some college, no degree	0.0717*		0.0769*		0.0581	
	(1.96)		(2.35)		(1.65)	
Two-year college only		0.0774		0.0881*		0.0270
		(1.83)		(2.35)		(0.67)
Four-year college only		0.0521		0.0793		0.0838
		(1.03)		(1.73)		(1.71)
Two-year and four-year college		-0.0321		-0.0373		0.0110
		(-0.51)		(-0.63)		(0.18)
Associate degree	0.197***		0.187***		0.203***	
	(3.51)		(4.10)		(4.49)	
Two-year college only		0.182**		0.184***		0.130*
		(2.60)		(3.32)		(2.41)
Two-year and four-year college		0.146		0.159*		0.295***
		(1.55)		(2.11)		(4.06)
Bachelor's degree	0.200***		0.283***		0.237***	
	(4.41)		(7.63)		(6.20)	
Four-year college only		0.167***		0.268***		0.224***
		(3.55)		(6.91)		(5.62)
Two-year and four-year college		0.151		0.287***		0.214***
		(1.93)		(5.23)		(3.95)
Master's, doctorate or professional degrees	0.511***	0.479***	0.547***	0.530***	0.398***	0.384***
	(5.14)	(4.82)	(8.50)	(8.28)	(7.44)	(7.21)
Adjusted R^2	0.1359	0.1324	0.1929	0.1926	0.1720	0.1705
Observations	1897	1897	2316	2316	2372	2372

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Logistic Regression Results Examining the Effects of College Degrees and School Types on Unemployment

	2006		2008		2010	
	(1)	(2)	(1)	(2)	(1)	(2)
No high school diploma	0.312	0.301	0.00648	0.0162	0.297	0.313
	(1.12)	(1.09)	(0.02)	(0.06)	(1.37)	(1.44)
GED	0.190	0.178	0.156	0.166	0.142	0.157
	(0.61)	(0.58)	(0.61)	(0.65)	(0.63)	(0.70)
Some college, no degree	-0.264		-0.160		-0.188	
	(-1.09)		(-0.79)		(-1.05)	
Two-year college only		-0.368		-0.151		-0.197
		(-1.24)		(-0.63)		(-0.93)
Four-year college only		-0.411		-0.310		-0.156
		(-1.10)		(-1.01)		(-0.60)
Two-year and four-year college		0.107		0.105		-0.116
		(0.28)		(0.32)		(-0.36)
Associate degree	-0.435		-0.933*		-0.239	
	(-0.95)		(-2.25)		(-0.91)	
Two-year college only		-0.414		-2.310*		-0.228
		(-0.76)		(-2.27)		(-0.68)
Two-year and four-year college		0		-0.539		-0.413
		(.)		(-0.87)		(-0.91)
Bachelor's degree	-0.640		-1.030***		-1.441***	
	(-1.72)		(-3.54)		(-5.16)	
Four-year college only		-0.847*		-0.972**		-1.493***
		(-2.02)		(-3.13)		(-4.70)
Two-year and four-year college		0.163		-1.071*		-1.104*
		(0.29)		(-1.98)		(-2.48)
Master's, doctorate or professional degrees	0.346	0.335	-0.420	-0.398	-0.724	-0.699
	(0.51)	(0.50)	(-0.87)	(-0.83)	(-1.92)	(-1.86)
Pseudo R^2	0.1227	0.1251	0.0946	0.0983	0.1317	0.1309
Observations	2831	2782	3233	3233	3457	3457

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: OLS Estimates of the Wage Effects of Background Variables

	2006		2008		2010	
	(1)	(2)	(1)	(2)	(1)	(2)
1 if male	0.136***	0.134***	0.153***	0.152***	0.129***	0.128***
	(5.05)	(4.96)	(6.72)	(6.69)	(5.59)	(5.51)
1 if black	-0.0519	-0.0473	-0.0775*	-0.0741*	-0.0686*	-0.0730*
	(-1.30)	(-1.18)	(-2.28)	(-2.18)	(-1.97)	(-2.09)
1 if Hispanic	-0.000383	0.00178	0.0332	0.0305	0.0388	0.0379
	(-0.01)	(0.04)	(0.98)	(0.90)	(1.10)	(1.07)
1 if Northeast	-0.122**	-0.123**	-0.0289	-0.0298	-0.0362	-0.0375
	(-2.77)	(-2.79)	(-0.75)	(-0.78)	(-0.97)	(-1.00)
1 if North Central	-0.162***	-0.160***	-0.111***	-0.109***	-0.110***	-0.112***
	(-4.25)	(-4.17)	(-3.48)	(-3.43)	(-3.38)	(-3.43)
1 if South	-0.157***	-0.154***	-0.0725*	-0.0716*	-0.0811**	-0.0813**
	(-4.38)	(-4.26)	(-2.45)	(-2.42)	(-2.67)	(-2.67)
Age	0.0556***	0.0563***	0.0418***	0.0420***	0.0329***	0.0330***
	(4.98)	(5.03)	(4.64)	(4.65)	(3.74)	(3.74)
Hours of work before age 20	0.0390	0.0364	0.0574*	0.0549*	0.00849	0.00920
	(1.56)	(1.45)	(2.47)	(2.36)	(0.39)	(0.42)
Hours of work after age 20	-0.0205	-0.0216	-0.0165	-0.0170	0.00751	0.00691
	(-1.17)	(-1.23)	(-1.47)	(-1.51)	(0.89)	(0.82)
Square of hours of work before age 20	-0.00156	-0.00136	-0.00236	-0.00232	0.00284	0.00258
	(-0.33)	(-0.28)	(-0.47)	(-0.47)	(0.63)	(0.57)
Square of hours of work after age 20	0.00329	0.00338	0.00277*	0.00282*	0.000683	0.000727
	(1.57)	(1.61)	(2.46)	(2.50)	(0.99)	(1.05)
Standardized test score percentile	0.00116	0.00142*	0.00159**	0.00170**	0.00273***	0.00265***
	(1.88)	(2.26)	(3.08)	(3.25)	(5.13)	(4.92)
Natural log of wealth	0.0392***	0.0406***	0.0218**	0.0221**	0.0363***	0.0367***
	(4.31)	(4.46)	(2.81)	(2.85)	(4.42)	(4.46)
Father's highest grade completed	0.00790	0.00822	0.00433	0.00409	0.000909	0.000829
	(1.37)	(1.42)	(0.89)	(0.84)	(0.18)	(0.17)
Mother's highest grade completed	-0.00676	-0.00668	-0.00269	-0.00254	0.000418	0.000428
	(-1.09)	(-1.07)	(-0.51)	(-0.48)	(0.08)	(0.08)
Constant	0.631*	0.609*	0.998***	1.000***	1.003***	1.022***
	(2.21)	(2.13)	(3.95)	(3.96)	(3.77)	(3.83)
Adjusted R^2	0.1359	0.1324	0.1929	0.1926	0.1720	0.1705
Observations	1897	1897	2316	2316	2372	2372

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Logistic Regression Results Examining the Effects of Background Variables on Unemployment

	2006		2008		2010	
	(1)	(2)	(1)	(2)	(1)	(2)
1 if male	0.150	0.155	-0.0265	-0.0234	0.355**	0.358**
	(0.82)	(0.85)	(-0.17)	(-0.15)	(2.66)	(2.68)
1 if black	0.721**	0.732**	0.373	0.367	0.340*	0.346*
	(3.11)	(3.15)	(1.87)	(1.83)	(2.03)	(2.05)
1 if Hispanic	-0.0677	-0.0867	-0.161	-0.165	-0.0567	-0.0619
	(-0.23)	(-0.30)	(-0.66)	(-0.68)	(-0.28)	(-0.31)
1 if Northeast	1.040**	1.039**	0.503	0.502	0.679**	0.682**
	(3.07)	(3.06)	(1.83)	(1.82)	(2.93)	(2.94)
1 if North Central	1.194***	1.186***	0.809***	0.805***	0.893***	0.890***
	(4.03)	(4.00)	(3.54)	(3.52)	(4.46)	(4.44)
1 if South	0.978***	0.959***	0.628**	0.623**	0.837***	0.834***
	(3.53)	(3.46)	(2.99)	(2.96)	(4.58)	(4.57)
Age	0.170*	0.170*	0.0958	0.0956	0.0757	0.0740
	(2.47)	(2.46)	(1.67)	(1.66)	(1.54)	(1.50)
Hours of work before age 20	0.295	0.305	-0.0714	-0.0739	0.322	0.321
	(1.56)	(1.60)	(-0.55)	(-0.56)	(1.92)	(1.92)
Hours of work after age 20	-0.192	-0.195	0.295**	0.295**	0.295***	0.294***
	(-1.24)	(-1.26)	(2.92)	(2.93)	(4.53)	(4.52)
Square of hours of work before age 20	-0.0483	-0.0492	0.0233	0.0240	-0.103*	-0.102*
	(-1.15)	(-1.17)	(0.97)	(0.99)	(-2.26)	(-2.25)
Square of hours of work after age 20	-0.0377	-0.0370	-0.0679***	-0.0676***	-0.0399***	-0.0397***
	(-1.33)	(-1.30)	(-4.50)	(-4.50)	(-5.65)	(-5.63)
Standardized test score percentile	-0.00727	-0.00701	-0.00349	-0.00368	-0.00797*	-0.00799*
	(-1.68)	(-1.60)	(-0.97)	(-1.01)	(-2.54)	(-2.52)
Natural log of wealth	-0.0571	-0.0608	-0.0711	-0.0701	-0.104*	-0.106*
	(-0.99)	(-1.05)	(-1.43)	(-1.41)	(-2.47)	(-2.53)
Father's highest grade completed	0.00526	0.00495	-0.00149	-0.00164	-0.0149	-0.0155
	(0.13)	(0.12)	(-0.04)	(-0.05)	(-0.52)	(-0.54)
Mother's highest grade completed	-0.0289	-0.0303	-0.00312	-0.00409	0.00813	0.00776
	(-0.68)	(-0.71)	(-0.08)	(-0.11)	(0.26)	(0.25)
Constant	-6.128***	-6.061***	-4.190*	-4.185*	-3.625*	-3.564*
	(-3.35)	(-3.31)	(-2.57)	(-2.56)	(-2.44)	(-2.39)
Pseudo R^2	0.1227	0.1251	0.0946	0.0983	0.1317	0.1309
Observations	2831	2782	3233	3233	3457	3457

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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