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Recommended Citation

Lewis, Jennifer (2015) "By How Much Does a College Degree Affect Earnings?," *Major Themes in Economics, 17,* 55-63.
Available at: https://scholarworks.uni.edu/mtie/vol17/iss1/6

By How Much Does a College Degree Affect Earnings?

Jennifer Lewis*

ABSTRACT. The purpose of this research is to understand how a college degree will affect an individual's earnings. I use data from the American Community Survey and a human capital model to investigate the question. Earnings increase around 60 percent when an individual earns any form of college degree. There are other factors that influence both income and an individual's decision to continue education after high school, but this model suggests that furthering education should lead to higher earnings.

I. Introduction

All high school graduates must decide whether to continue education or go straight to the work force. The cost of a college education is high and people are wondering if obtaining a college degree will pay off in the long run. Leonhardt (2014) found that in 2013, people who had a four-year college degree earned 98 percent more per hour than those without a degree. Even though college tuition has increased 439 percent since 1982, a person's net earnings with a college degree are still greater than that of a person without a degree (Wang 2009). This is because the demand for skilled workers is high, which causes the earnings of a college graduate to be generally larger than that of a high school graduate.

There are other costs and benefits from obtaining a college degree that I will discuss in this paper. But my main research question is "By how much does a college degree affect earnings?" The monetary returns to some form of higher education are greater than no higher education. Returns for people with some higher education are, on average, greater for women than for men (Jepsen, Troske, and Coomes 2012, 3-5). People with higher education are generally better prepared for the job market, are more satisfied with their type of work, and perform better in the work place than those with only a high school diploma.

In order to understand how earnings change with more education, we will look at the difference in earnings between high school graduates,

individuals with some college but no degree, and individuals who have a college degree. From the results of this paper, one will be able to make a better decision about whether obtaining a college degree will yield greater earnings.

II. Previous Work

Much research has been done exploring the relationship between education and earnings.   Jepsen, Troske, and Coomes (2012) analyzed the differences in earnings among individuals who obtain an associate's degree, a diploma, or a certificate against high school graduates. Through analyzing census data, they found that individuals with higher education levels have greater earnings. Earning any degree appears to be more beneficial than achieving the same number of years of education without obtaining a degree. (Jepsen, Troske, and Coomes 2012, 4). Women's earnings tend to increase more than men's as they gain higher education. Women's earnings with an associate's degree increase around 31 percent where men's earnings only increase around 24 percent. This percentage nearly doubles when achieving a bachelor's degree. In general, men tend to earn more because they typically get degrees in higher-earning fields.

Pascarella and Terenzini (2005), like Jepsen, Toske, and Coomes, discuss the returns from achieving a college degree compared to a high school diploma. Pascarella and Terenzini's findings are very similar to that of Jepsen, Toske, and Coomes, but go beyond the monetary returns and discuss other benefits and costs of obtaining higher education. During college, an individual gains useful knowledge, and not just about what they are studying. Students become more mature and focused on achieving goals. Throughout college, students become better aware of what the labor market is like and are more prepared for the workplace than people who have no form of higher education. Employers sometimes believe the opposite. They feel individuals hired straight out of college have a greater knowledge of concepts in their area of study, but lack skills needed to perform their jobs such as interpersonal skills and setting priorities. Employers may believe that individuals hired straight out of high school are eager to work and are better able to set priorities and manage their time. Individuals who go to college after high school start to adapt to an abnormal schedule and have a hard time managing time. Yet Pascarella and Terenzini found a college graduate performs better in

the same job as a high school graduate (Pascarella and Terenzini 2005, 534-535).

Thomas (2000) discusses the importance of looking at the returns from different areas of study when deciding whether college is a good investment. The evidence shows that college major is an important factor in earnings after college. Thomas found that the highest earnings are from people in health-related fields and the lowest earnings are in the education field. Although the samples of men and women are unequal, women are about twice as likely as men to earn degrees in a health-related field, but are approximately three times as likely to get a degree in education. Still, average earnings in each area are greater for men than for women. In general, a man's starting salary is 6.6 percent greater than that of a woman and men tend to have smaller debt ratios (Thomas 2000, 295). The debt ratio is an individual's total debt divided by her total assets. The higher the debt ratio, the worse off an individual is. Women earning less may be a result of their field of study and the job they take after graduation.

As Thomas discussed in his paper, college major is a very important factor in the determinants of earnings after college. Arcidiacono (2003) examines this factor in greater depth. He found that college major could have a larger effect on an individual's earnings than the quality of the college. He also found that certain majors have a higher difference in earnings across GPA. For example, Arcidiacono found that increasing GPA from a 2.5 to a 3.0 in a business-related field yields a 13 percent increase in earnings after college. He found that individuals who major in natural sciences or business majors had the greatest earnings after college (Arcidiacono 2003, 29). Arcidiacono's findings are similar to Thomas's results.

After looking at past research, it is expected that individuals who obtain a college degree will generally earn more than a person with no degree. Earnings with a college degree vary with the different types of degrees, but overall earnings in any field of study tend to be greater for college graduates. Another factor that is important to look at is the difference in earnings between men and women. It is expected that men will have great earnings than women, but women's percentage increase in income after obtaining a college degree will be greater. By using a linear regression model, we will be able to look at these factors and determine the effects they have on earnings.

III. Data

The data used in this study are from the American Community Survey, which was obtained from Ipums-USA. Ipums-USA is a site that collects and distributes census data. The American Community Survey that collects information each year from people in the United States and is used to determine the distribution of federal and state funding (Ruggles et al. 2010). The original data set that was downloaded had 60 million entries from years 2001 through 2013. This cross-sectional study only uses data from 2012. The year 2013 was not used because the data were not complete for that year. The data only includes individuals aged 22 through 70. The age range 22 through 70 was a common age range across the other studies that I found.

IV. Model

$$\text{LINCTOT} = \alpha_0 + \alpha_1 \text{ (AGE)} + \alpha_2 \text{ (AGESQ)} + \alpha_3 \text{ (MALE)}$$
$$+ \alpha_4 \text{ (NODEGREE)} + \alpha_5 \text{ (DEGREE)} + \alpha_6 \text{ (MARSABS)}$$
$$+ \alpha_7 \text{ (MARSPRES)} + \alpha_8 \text{ (SEPERATED)} + \alpha_9 \text{ (DIVORCED)}$$
$$+ \alpha_{10} \text{ (WIDOWED)} + \alpha_{11} \text{ (UNEMPLOYED)} + \alpha_{12} \text{ (NOTINLF)}$$
$$+ \alpha_{13} \text{ (BLACK)} + \alpha_{14} \text{ (ROTHER)} + \alpha_{15} \text{ (ASIAN)}$$

The dependent variable in this human capital model is the logarithm of total personal income (LINCTOT). Total personal income is an individual's total income before taxes. The logarithm of total personal income was used because income tends to be highly skewed. In addition, using the logarithm allows the regression results to be interpreted as percentages. It also controls for heteroskedasticity. With total personal income as the dependent variable, the objective is to determine what factors affect an individual's earnings.

The independent variables chosen for the human capital model in this study are those that other researchers have found to be important. Two different variables have been included for age, age (AGE) and age squared (AGESQ). Age has a non-linear relationship with income. An individual's income tends to rise as she gets older, but at a diminishing rate. Dummy variables were created for sex and for race (WHITE, BLACK, ASIAN, and OTHER).

Another important factor in the model is an individual's marital status. Six dummy variables were created in order to capture all the different marital statuses (MARSABS, MARSPRES, SEPARATED, DIVORCED, WIDOWED, and SINGLE). MARSABS means the individual is married and the spouse is absent. MARSPRES means the individual is married and the spouse is present. Also included in the model is the individual's employment status, which was captured through three different dummy variables (EMPLOYED, UNEMPLOYED, and NOTINLF). NOTINLF means the individual is not in the labor force.

The variable of interest in this study is the individual's level of education. Three different dummy variables were created to express an individual's amount of education (HIGHSCHOOL, NODEGREE, and DEGREE). HIGHSCHOOL includes the individuals who have graduated high school but have no education beyond high school. NODEGREE includes the individuals who have participated in some form of higher education beyond high school but have not received a degree. DEGREE captures all the individuals who have obtained any form of degree beyond high school level. Included in table 1 is a complete list of the dependent variables included in the model, their meanings, and how they are used in the model.

V. Results

All the variables in the model are significant at the 1% level except SEPARATED and ASIAN, which are significant at the 5% level. The R-squared and adjusted R-squared values for this model are very low at 0.2412. Even though the R-squared and adjusted R-squared are low, the p-value of the F statistic is 0.000, which means that this model is statistically significant.

The variables of interest are NODEGREE and DEGREE. From looking at the coefficient on NODEGREE we can conclude that a person who has participated in some form of higher education but has not obtained a degree generally earns 19.5 percent more than a high school graduate with no higher education. The coefficient on DEGREE shows that a person who has obtained any form of degree from higher education generally earns approximately 60 percent more than a high school graduate. From these results we conclude that continuing education after high school will yield greater earnings.

TABLE 1–Descriptive Statistic

Variable (Abbreviation)	Meaning	Model	Expected Sign
Age (AGE)	Individual's age	Range 22 through 70	+
Age Squared (AGESQ)	Individual's age squared	Squared due to age not being a linear relationship with earnings	-
Sex (MALE)	Individual's sex	Dummy variable; 1 if male and 0 if female	+
High School Graduate (HIGHSCHOOL)	High school graduate with no form of higher education	Omitted dummy variable	Omitted
Some College, No Degree (NODEGREE)	Individuals who have participated in some form of higher education but have not received a degree	Dummy variable; 1 if some college with no degree and 0 if other	+
College Degree (DEGREE)	Individuals who have obtained any form of degree after high school	Dummy variable; 1 if college degree and 0 if other	+
Married, Spouse Absent (MARSABS)	Individuals who are married and their spouse is absent	Dummy variable; 1 if spouse is absent and 0 if other	+
Married, Spouse Present (MARSPRES)	Individuals who are married and their spouse is present	Dummy Variable; 1 if spouse is present and 0 if other	+
Separated (SEPARATED)	Individuals who are separated	Dummy Variable; 1 if separated and 0 if other	+

Variable	Meaning	Model	Expected Sign
(Abbreviation)			
Divorced (DIVORCED)	Individuals who are divorced	Dummy Variable; 1 if divorced and 0 if other	+
Widowed (WIDOWED)	Individuals who are widowed	Dummy Variable; 1 if widowed and 0 if other	+
Single (SINGLE)	Individuals who are single	Omitted dummy variable	Omitted
Employed (EMPLOYED)	Individuals who are classified as employed	Omitted dummy variable	Omitted
Unemployed (UNEMPLOYED)	Individuals who are classified as unemployed	Dummy Variable; 1 if unemployed and 0 if other	-
Not in the labor force (NOTINLF)	Individuals who are not in the labor force	Dummy Variable; 1 if not in the labor force and 0 if other	-
Race, White (WHITE)	Individuals whose race is White	Omitted dummy variable	+
Race, Black (BLACK)	Individuals whose race is Black	Dummy Variable; 1 if black and 0 if other	-
Race, Asian (ASIAN)	Individuals who race is Asian	Dummy Variable; 1 if Asian and 0 if other	+
Race, Other (ROTHER)	Individuals whose race is something other than White, Black, or Asian or whose race is a combination of any of the races listed above.	Dummy Variable; 1 if Other and 0 if not	-

An interesting variable to discuss in this model is MALE. From this model we can conclude that a male typically earns 46.3 percent more than a female. The percentage is a general overview of the population and does not account for many factors. This coefficient tends to be a lot smaller when comparing male and female earnings in the same job or across the same area of study. Even then, on average, men tend to earn slightly more than women. (Thomas 2000, 295)

For marital status, individuals who are married and their spouse is present tend to earn 17 percent more than a single individual. A divorced individual makes approximately 13.8 percent more and a widowed individual makes 22.2 percent more on average than a single individual. Individuals who are separated and individuals who are married but their spouse is absent also earn slightly more than a single individual.

The model shows that black individuals earn 11.6 percent less and other races earn 16 percent less than white individuals. An unexpected finding from this model is that Asian individuals also tend to earn less than white individuals but only around 0.4 percent.

The results suggest that obtaining any form of degree after high school will yield significantly greater earnings. Based on earnings alone, it is concluded that an individual is better off obtaining a college degree. However, there are many other factors in the decision process to continue education that are not shown in this model that could be significant to the outcome.

Source	SS	df	MS		Number of obs	=	967271
					F(15,967255)	=	20499.80
Model	234810.202	15	15654.0135		Prob > F	=	0.0000
Residual	738613.241967255		.76361791		R-squared	=	0.2412
					Adj R-squared	=	0.2412
Total	973423.443967270		1.00636166		Root MSE	=	.87385

LINCTOT	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
AGE	.0591282	.000561	105.40	0.000	.0580287	.0602276
AGESQ	−.0005082	6.12e−06	−83.04	0.000	−.0005202	−.0004962
MALE	.4632515	.0017982	257.62	0.000	.4597271	.4667759
NODEGREE	.1952697	.0026585	73.45	0.000	.1900591	.2004802
DEGREE	.5996503	.0020843	287.70	0.000	.5955651	.6037354
MARSABS	.0349527	.0072313	4.83	0.000	.0207796	.0491259
MARSPRES	.1708716	.0025726	66.42	0.000	.1658293	.1759138
SEPERATED	.0174536	.0068764	2.54	0.011	.003976	.0309312
DIVORCED	.138098	.0035047	39.40	0.000	.1312288	.1449671
WIDOWED	.2224067	.0070391	31.60	0.000	.2086103	.2362032
UNEMPLOYED	−.9322029	.005044	−184.81	0.000	−.9420891	−.9223168
NOTINLF	−.9525879	.0046096	−206.65	0.000	−.9616227	−.9435532
BLACK	−.1169047	.0031811	−36.75	0.000	−.1231395	−.1106698
ROTHER	−.1605113	.0059139	−27.14	0.000	−.1721024	−.1489202
ASIAN	−.0043904	.0039511	−1.11	0.266	−.0121344	.0033535
_cons	8.299795	.0118545	700.14	0.000	8.27656	8.323029

VI. Conclusion

The Cost of obtaining a college degree is high and knowing what factors will affect an individual's earnings are very important when deciding if college would be a good investment. Research has shown that college may not only increase one's earnings but it leaves college graduates better prepared for the labor market (Pascarella and Terenzini 2005, 534). Both Thomas and Arcidiacono found that college major is a very important factor in an individual's earnings after college. Although it was not used in the model for this paper, it is a factor worth noting and would likely improve the model.

In order to understand how college affects an individual's earnings, I have created a linear regression model that compares earnings of individuals with a degree and individuals with some college but no degree against a high school graduate with no form of higher education. I have found that obtaining a college degree increases an individual's earnings after college by close to 60 percent. The model also shows that even attending college without obtaining a degree increases earnings by around 20 percent. Compared to a high school graduate's earnings, continuing education after high school yields greater earnings. From the model one can conclude investing in college is a good option and should eventually pay off.

References

Arcidiacono, Peter. 2004. "Ability sorting and the returns to college major." *Journal of Econometrics* 121, 1-2: 343-375.

Jepsen, Christopher, Kenneth Troske, and Paul Coomes. 2014. "The labor-market returns to community college degrees, diplomas, and certificates." *Journal of Labor Economics* 32, 1: 95-121.

Leonhardt, David. 2014. "Is college worth it? Clearly, new data say." *The New York Times*. Accessed February 10, 2015. http://nyti.ms/1jUkmgC

Pascarella, Ernest T., and Patrick T. Terenzini. (2005). *How college affects students: A Third Decade of Research*. San Francisco: Jossey Bass.

Ruggles, Steven, Trent Alexander, Katie Genadek, Ronald Goeken, Matthew B. Schroeder, and Matthew Sobek. *Integrated Public Use Microdata Series: Version 5.0* [Machine-readable database]. Minneapolis: University of Minnesota, 2010.

Thomas, Scott. 2000. "Deferred costs and economic returns to college major, quality, and performance." *Research in Higher Education* 41, 3: 281-313.

Wang, Penelope. 2009. "Is College still worth the price?" *Money Magazine*. Accessed February 15, 2015. http://www.educate4less.com/files/The%20real%20return%20on%20your%20college%20investment%20-%20Aug.%2020,%202008.pdf