

Effect of Educational Attainment on Income Per Capita

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Abstract

This study is done to see a relationship between income and educational attainment among all the countries. Using 2015 data from the United Nations Human Development Reports, this research shows that there is a positive correlation between mean years of schooling and income per capita.

I. Introduction

I wish to study the effect of education levels on income. Growing up as an Asian American, I was always expected and had the privilege of pursuing higher education. It was instilled in me as a child by my parents and society that education was the answer to a better standard of living. I didn't know any other way to carry on with my life after high school than to come to University. It made me curious about how the cultures and expectations are in other countries throughout the world. My hypothesis is that a higher average rate of schooling in a country increases income because, because a higher educational attainment opens the door to more opportunities of employment. If a potential worker has achieved higher forms of education, then they would become more marketable and be in more demand for higher paying jobs.

The findings of other research show that primary and secondary level of schooling (elementary to high school) has an important effect on aggregate income in less developed countries while tertiary schooling (college) has an important effect on aggregate income in more developed countries (Akgüç 2010). The same study shows that in an extra year in average years of tertiary education have increased income levels of 6.1-6.8% for all the countries in the dataset. However, it also shows that an additional year of primary and secondary education has insignificant effects using all countries. Another study shows that between 1991 and 2010, the salaries of people without a bachelor's degree have declined in the United States. (Carlson & McChesney 2014). This study also shows that as people achieve professional and doctorate degrees, females tend to have a better salary change than men, but they still have lower salaries per year.

My study would be different in that I'm looking at educational attainment as a whole, rather than just separating it by levels of schooling (primary, secondary, etc.). Also, my paper takes data on the whole world rather than just the United States unlike (Carlson 2014). My study will focus less on the wealth and income gap and more on just the relationship between education and income among different countries.

For this research, I am using data from the United Nations Human Development Reports to get educational attainment measured by average years of schooling per country. From the same source, I am getting gross national income per capita levels per country, prison population (per 100,000 people), and life expectancy index.

I used Microsoft Excel to run the regression model to find the t-statistic, p-values, and coefficient values. My results showed a positive correlation between income per capita and educational attainment. The more average years of schooling a country has, the higher their income is. This paper will go more in depth into the specifics of the model, then I will report my results and draw a conclusion.

II. Model Specification

Human capital theory suggests that investment in into human capital (training and education) results in a higher productivity and output. In this case a rise in education leads to a more skilled worker that adds more value to production. The model used in this paper is to find out if having a variety of high level skills makes the employee rewarded with a higher wage.

My main variable is the average years of schooling for person throughout different countries in the world. I will also apply two control variables that affect educational attainment and income. The first control is prison population for each country. This is an important variable because a high crime rate can greatly reduce the average income per capita as a bigger proportion of the population isn't producing or contributing for the country. A high crime rate might also indicate poor living conditions that force citizens to resort to crime to earn money. The other control variable is the life expectancy index. This is a big control variable because overall health especially among children is a big factor into whether or not they can attend school or be a productive worker to society. A poor life expectancy can be attributed to factors such as disease, infant mortality, violent crime, medical technology, and more. So, when health conditions are poor, my theory is that workers wouldn't be able to work as efficiently, students would have to be pulled out of school, and overall the country wouldn't be able to produce and operate to their fullest potential. These variables will be included in my empirical model to show their effects on a country's income per capita.

This is the regression equation and the data for the model:

$$\text{Income} = B_0 + B_1\text{EducationalAttainment} + B_2\text{PrisonPopulation} + B_3\text{LifeExpectancyIndex}$$

	Income	EducationalAttainment	PrisonPopulation	LifeExpectancyIndex
Average	17550.74054	8.421081081	0.372972973	0.583783784
Max	129916	13.4	1	1
Min	587	1.4	0	0
n	185	185	185	185

Educational Attainment is denoted by the mean years of schooling in each country. The Prison Population is the amount of people in prison per 100,000 people of the country's population and is controlled by whether the prison population is above or below 166 (per 100,000). Life expectancy index is controlled for whether the index created by the United Nations is above or below 0.79.

The null hypothesis is that the mean years of schooling does not have an effect on a country's income which is denoted by $H_0: \beta_1 = 0$. The alternative hypothesis is that there is a correlation between income and mean years of schooling which is denoted by $H_1: \beta_1 \neq 0$. For this model specifically, I believe that there is going to be a positive correlation so that I can conclude that higher educational attainment would lead to better and more opportunities in the job market which improves the chances at a higher income as the country's labor force becomes more valuable and more efficient producers. Therefore, I infer that β_1 will be positive and result in rejecting the null hypothesis. I also predict that β_2 will be negative as a higher prison rate will result in lower income and education among the population. Lastly, I predict β_3 will be positive as better access to good health and medicine and low violent crime will result in more opportunities to work and get educated while growing up.

This data is from the United Nations Development Programme. From the dataset, I omitted a few countries so that every data set can have the same 184 countries to compare. I also assigned a value of 1

and 0 to PrisonPopulation and LifeExpectancyIndex. 1 if the life expectancy index is above 0.79 or 0 if below. 1 If the prison population is above 166 or 0 if below.

III. Empirical Results

I used Microsoft Excel to create a regression model using the data.

<i>Regression Statistics</i>	
Multiple R	0.660654142
R Square	0.436463896
Adjusted R Square	0.427123519
Standard Error	14479.66485
Observations	185

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	3	29391528625	9.8E+09	46.72872162	2.06062E-22
Residual	181	37948585632	2.1E+08		
Total	184	67340114258			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-10813.55194	3186.570087	-3.39348	0.000847802
EducationalAttainment	2994.575873	451.2739528	6.635827	3.62147E-10
PrisonPopulation	-9042.48792	2329.0867	-3.88242	0.000144798
LifeExpectancyIndex	11167.37058	2768.959571	4.033057	8.10746E-05

Using a significance level of $\alpha = 0.05$ and degrees of freedom of $185 - 3 - 1 = 181$, I'll use a critical values of ± 1.973 . β_1 as predicted is shown to be positive, and the t-statistic is also much greater than the positive critical value. The p-value is also extremely low so therefore, I reject the null hypothesis. β_2 is also predicted correctly, but this time to be negative and the t-statistic is low enough to reject the null hypothesis. β_3 is predicted correctly to be positive and the t-statistic is high enough to reject the null hypothesis.

So, it seems that there is a positive correlation between educational attainment and income. An additional mean year of schooling for a given country increases income by almost \$3000 for a person living in said country. The model also implies that an increase in prison population by 1 per 100,000, results in an income loss of \$9000 and an increase in life expectancy by one unit increases income by \$11,000. However, assigning values of 1 and 0 to LifeExpectancy and PrisonPopulation makes the dummy variable more inaccurate when it comes to calculating the t-statistic. Regardless, the controls

have made a significant impact at least in the right direction for calculating the effect of educational attainment.

Without the use of the controls, this is what the summary data looks like:

<i>Regression Statistics</i>					
Multiple R		0.589365137			
R Square		0.347351265			
Adjusted R Square		0.343784879			
Standard Error		15497.12478			
Observations		185			

<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	23390673878	2.34E+10	97.3958549	1.09296E-18
Residual	183	43949440379	2.4E+08		
Total	184	67340114258			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-13282.41047	3325.536064	-3.99407	9.399E-05
EducationalAttainment	3661.424313	371.0050524	9.868934	1.093E-18

The added value of an additional mean year of schooling is \$667. In income terms, that's a lot of money especially for poverty-stricken countries.

IV. Conclusion

The motivation of my research is to find a link between years of schooling and income. While quality of education might possibly be a bigger factor in gaining skills and knowledge, I wanted to see what the true value of just showing up and getting through school is. Through this model, I can't give you an exact value or effect on income that educational attainment has, simply because there are probably much more factors that I didn't control for that affects world education such as quality of education and living conditions within a country. However, I can say that there is a significant positive relationship between income and average years of education.

V. References

Akgüç, Mehtap. *The Effects of Different Stages of Education on Income Across Countries*. 2010, *The Effects of Different Stages of Education on Income Across Countries*.

Becker, Gary S. "Human Capital." *Library of Economics and Liberty*, Liberty Fund Inc.

Carlson, Ronald H., et al. *The Impact of Education on Individual Economic Wellbeing*. 2nd ed., vol. 2, 2013, *The Impact of Education on Individual Economic Wellbeing*.

"Human Development Reports." *Human Development Data (1990-2015) | Human Development Reports*, United Nations Development Programme, hdr.undp.org/en/data#.