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THE EFFECTS OF CORRUPTION AND EMIGRATION ON EDUCATIONAL OUTCOMES

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ABSTRACT

I will discuss the value of education in terms of the measurable effect that increased investment in education has on economic growth in cross-national data. Existing research claims little or no correlation in such increased "human capital" investments and GDP per capita growth (Easterly 2002). I will offer possible explanations for these curiously uncorrelated variables with a focus on corruption and emigration. I argue that individuals choose a level of educational attainment based on the opportunities that exist domestically and abroad. Furthermore, I argue that the corruption and emigration level in each country is correlated with educational attainment.

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I. Introduction

I wish to find out whether or not the level of corruption in any given country affects the education outcomes of the individuals in the country. Furthermore, I would like to examine how the possibility of emigration of tertiary educated individuals affects educational outcomes. Individuals have choices when it comes to their education. There are choices regarding quantity, quality, and location of education. There are choices about cost one is willing to pay to obtain a certain quantity and quality of education in a certain location. That being said, not everyone has the same choices. The choices that are available to any given individual depend on a variety of factors including initial location, natural ability, ease of learning, available funding, and opportunities for success after the education is obtained.

In this thesis, I wish to address the true value of education, the reasons individuals choose to become educated, and the choices individuals make after they obtain a certain level of education. I will examine the internal and external variables that affect education outcomes, with internal effects being corruption, and external affects being emigration.

Specifically, I will discuss the value of education in terms of economic growth in the first substantive section. The purpose is to understand why some countries invest a high percent of their Gross Domestic Product in education, and do not observe any change in the growth of their economy. Meanwhile, other countries only invest a small portion of their resources into education, and see enormous economic growth. The literature that I examine finds that increased investment in education has no correlation with increase in Gross Domestic Product per capita in any given country.

The reasons for this lack of correlation are unknown. One theory is that education itself has no intrinsic value, and rather than obtaining knowledge, individuals obtain a signal[1]. For the purposes of this paper, I will assume that there is human capital[2] to be gained for attending school. The problem is that other variables, such as corruption and emigration, get in the way of countries receiving full return on investment.

In the subsequent section, I will review the current literature on the effects of corruption on education. These studies have found that beyond a certain level of corruption[3], there is no correlation between increase in output and increase in educational attainment.

Next, I will discuss the emigration rates of tertiary educated individuals. Individuals may either remain in the country from which they obtained their education, or they will choose to emigrate in search of better opportunities.

The final section before the conclusion will review my empirical work for this project. I have conducted regression analysis in order to examine the impact of corruption and emigration decisions on education choices and output. My hypothesis is that education and output would be impacted from increased corruption and emigration.

[1] See Appendix 1 for an explanation of Job Signaling
[2] See Appendix 2 for an explanation of Human Capital
[3] "Beyond a certain level of corruption" refers to high levels of corruption. Up to this certain level, countries are not very corrupt.

II. The Value of Education

There is no doubt that an enormous amount of investment has been filtered into education around the world since 1960. William Easterly recounts the rapid educational increases that the world has experienced in his book *The Elusive Quest for Growth*. He notes that 28 percent of countries had 100 percent primary enrollment in 1960. Only 30 years later, 50 percent of countries reported enrollment of 100 percent. The median rate of secondary education has quadrupled, going from 13 percent to 45 percent worldwide. The median college enrollment rate went from 1 percent to 7.5 percent during the same time period (Easterly, 73, 2002). There is no disputing the extraordinary increase in educational investments around the world. It would appear that countries view this investment in education as an investment in sustained growth for their future.

Despite the valiant efforts for investment in education, several studies (Pritchett 2001, Krueger and Lindahl 1999, Benhabib and Spiegel 1994) have not been able to find a correlation between growth in schooling and growth in GDP when looking at cross-country comparisons (Easterly, 2002, 74). In Lant Pritchett's "Where has all the Education Gone?" he explores the production outcomes for many African countries that experienced rapid growth in education capital from 1960 to 1987. Angola, Mozambique, Ghana, Zambia, Madagascar, Sudan, and Senegal are all examples of countries with vast educational growth, but little or no GDP per capita growth during this time period. On the other hand, many East Asian countries, such as Japan, were enjoying extraordinary GDP per capita growth while educational capital was only modestly growing (Pritchett 1999). Pritchett also finds that Eastern Europe and the former Soviet Union are on par with Western Europe and North America when measuring average years of schooling attained. The former countries, however, have only a fraction of the levels of GDP

per worker of the latter countries. For instance, the 97 percent secondary enrollment ratio of the United States is comparable to the Ukraine's 92 percent ratio. The GDP per capita levels, however, are less than comparable. The United States has a per capita income that is nine times that of the Ukraine. It is clear that the lack of correlation between education growth and GDP per capita growth is not only prevalent in Third World countries.

Government policies have a significant impact on the success or failure of any public program. Easterly argues "in an economy with many government interventions, skilled people opt for activities that redistribute income rather than activities that create growth." He goes so far as to say that "schooling pays off only when government actions create incentives for growth rather than redistribution" (2002, 82). Many times the skills that society members attain will not train them to create and innovate. If this is the case, human capital is clearly being created, and is being used improperly. Similarly to physical capital that is available but remains dormant, human capital that is not harnessed is easily wasted.

In the human capital school of thought, quality of education matters immensely. The number of years students attend low quality schools will not have a dramatic impact on GDP. Educational increases may have the potential to profoundly effect GDP growth, but other variables become roadblocks that diminish gains from additional schooling. These roadblocks are often government policies and institutions that negatively impact the economy. Anything from a country's openness and trade policies to law enforcement capabilities to taxes can undo the successes of a growing educational system. Also, limited access to technology will inhibit growth. These variables must be controlled for in order to make an accurate determination of the real impact of investment in education. In other words, these roadblocks must be removed in order for researchers to observe the true potential for increased quality and quantity of education.

III. Corruption Statistics

In order to determine the validity of either education theory, I will examine other variables that may influence the return to education (if any). The possible positive effects of educational investment are often stifled by the destructive internal forces of corruption in any government. Corruption can be thought of and measured in many different ways. Corruption is the lack of information and transparency (Reinikka and Svensson 2005). It can distort the composition of public spending, favoring certain sectors over others (De la Croix and Delavallade 2006). In their paper "Education, Corruption, and Growth in Developing Countries," Cuong Le Van and Mathilde Maurel attempt to explain the connection between corruption and education. They explain that there are several reasons why political institutions may have a negative effect on the possible productive gains from education. First, individuals residing in corrupt countries may be forced to spend additional resources on bribes instead of increased production. Also, monopolistic structures may be more prevalent in these countries where property rights are low, not allowing for fair competitive practices. Finally, corrupt countries are more likely to have black market, underground economies. Output from these types of transactions is not reported, and therefore, GDP per capita is likely underreported.

In their empirical work, they test for whether or not the "investment in education can be canceled by corruption up to a critical size" (Le Van and Mathilde, 2006, 11). They interact primary school enrolment (p60) and public education spending (geerec1) with corruption (corr96) or other governance indicators. The results in table 3.1 imply that corruption and education are correlated with GDP growth.

Table 9: *Growth, Education, Corruption*

gr6096	Coefficient	Std Err	T-Stat	P> |t|
gr6096	Coefficient	Std Err	T-Stat	P> |t|
iprice1	-0,0000969	0,0000347	-2,79	0,006
p60	0,037631	0,0103372	3,64	0
p60*cor96	0,009314	0,0022544	4,13	0
gdpch60l	-0,0108246	0,0044067	-2,46	0,016
cons	0,0771738	0,0272839	2,83	0,006

Table 3.1: Interacted Variables Tables

(Source: Education, Corruption and Growth in developing countries by Cuuong Le Van and Mathilde Maurel)

This table shows that the interaction term of corruption and primary school enrollment (p60*cor96) is positively correlated with GDP growth from 1960 to 1996 (gr6096) with a p-value of 0.00. The primary school enrollment variable is also positively correlated with GDP growth when taken alone (without interaction of corruption variable). I wish to show similar results for tertiary education outcomes in a later section.

IV. Emigration Statistics

In this section, I will review some of the literature on education levels and migration flows across countries. It is my hypothesis that individuals who obtain a college education in countries that fail to adequately compensate them for their skills will immigrate to countries that will. If my hypothesis is accurate, increased investment in education will not necessarily lead to economic growth. Individuals who choose to obtain a tertiary level of education may be doing so in order to signal their abilities to the country to which they wish to immigrate. If anything, countries may find it more beneficial to outsource education and increase wages in order to provide highly educated citizens with incentives to return to their home country.

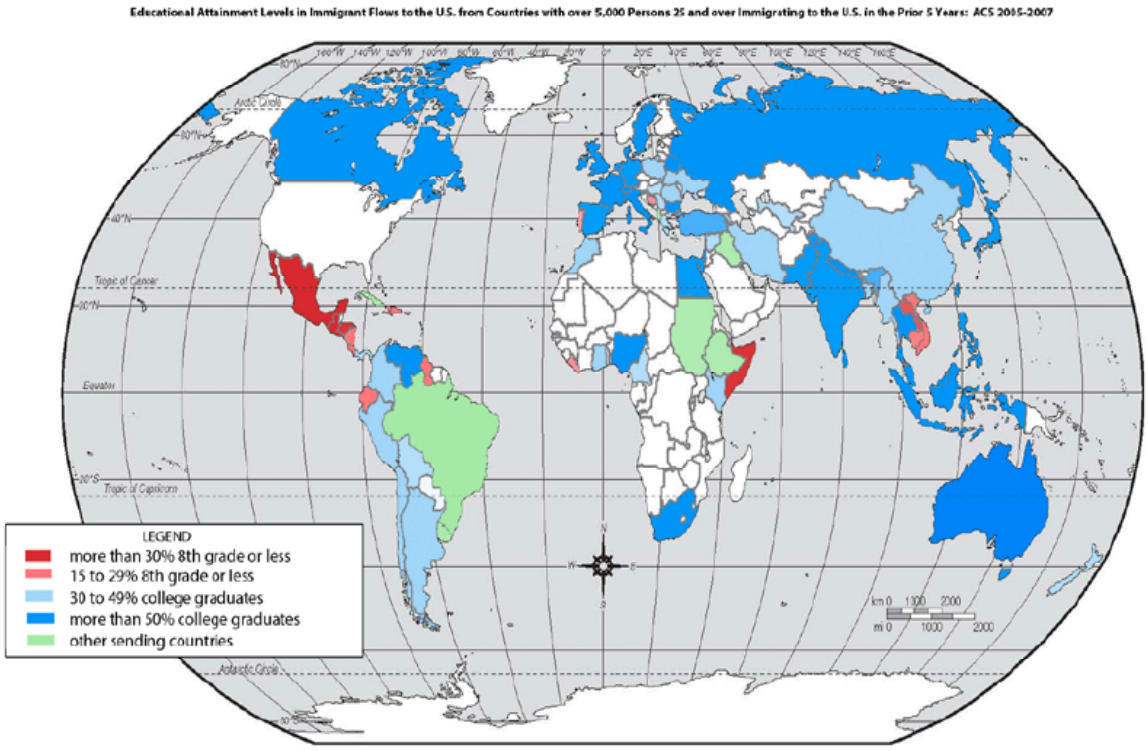


Figure 3.1 – Educational Attainment Levels in Immigrant Flows to the U.S.

(Source: The Dichotomous Nature of U.S. Immigration by John F. Long, 2009)

Figure 3.1 allows us to observe the patterns of educated people over the age of 25 who choose to immigrate to the United States. The red and pink countries represent the least educated migrants and the blue countries have the most educated migrants to the United States. In general, the countries with the least educated migrants are located near the United States. This suggests greater ease of illegal immigration, and a lower cost of immigration. There are some exceptions, including Somalia and Vietnam. The most plausible explanation for this is the high level of refugee populations that are granted access to the United States in order to escape persecution in their homeland.

John Long's study shows that migrant populations from Europe, Asia, South America, selected countries in Africa, Oceania, and Canada have much higher levels of college graduates than the United States population (approximately 30% of Americans have a college degree). Some countries, such as India, Korea, Japan, Germany, the Philippines, and Russia, have significant immigrant streams with more than twice the amount of college graduates than the United States population. Long concludes that one reason for the high levels of highly educated immigrants from most countries is the expansion of visas for skilled technical professionals. Only a certain number of people are able to emigrate from each country, and if most of the visas are only for skilled workers, the average education level of migrants will be very high. This cannot be the entire story, however, because there must be incentives for such highly educated individuals to move.

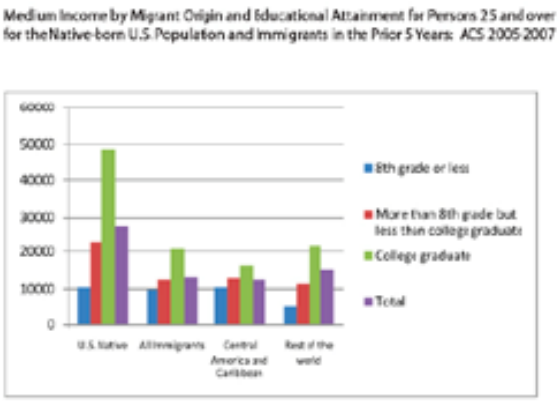


Figure 3.2 –Median Income by Migrant Origin and Educational Attainment for Persons 25 and over for the Native-born U.S. Population and Immigration

(Source: The Dichotomous Nature of U.S. Immigration by John F. Long, 2009)

According to this chart, the U.S. native college graduates are earning twice as much as immigrants with a college degree from anywhere else in the world. It is evident that American employers value graduates from American universities twice as much as those from any other nation. In other words, many employers will not recognize a degree from the most prestigious university in Hong Kong, even if it is comparable to, say, Penn State University. Many immigrants will find that in order to succeed in the United States, they must invest additional time and resources to obtain a degree from an American university, in a subject they have already mastered. Wages in the United States may still be a substantial increase from the wages immigrants were receiving in their homeland. If not, then the reasoning for the migration is due to external variables such as religious persecution, family reunification, corruption, and many others.

Mark R. Rosenzweig reviews the differences in wages[4] paid for the same skills in different countries in his paper "Global Wage Inequality and the International Flow of Migrants" (2010). His theory helps to explain the determinants of immigration that will help to answer my hypothesis: Individuals obtain a college education in order to emigrate.

Rosenzweig estimates that skill pricing is the reason for cross-country variation in schooling levels. This means that wage rates across individuals with the same skills will be extremely different depending on which country they are located in. He makes an important point that Easterly would likely agree with. He says,

> "If the difference in average skill levels is the major reason for global wage or earnings inequality, a focus on upgrading skills might be a suitable remedy for ameliorating global income inequality. If, however, wage inequality is mainly due to the different pricing of skills across countries, the remedies might be quite different" (Rosenzweig, 2010, 3).

If Rosenzweig is correct in determining that wage inequality is, in fact, due to different pricing of skills, then government investment of funds and individual investment of time into education may prove to yield negative returns if wage prices in the country are lower than the global average. In order to obtain world skill prices, Rosenzweig used several datasets including the New Immigrant Survey Pilot (NISP). This survey obtains information from new immigrants regarding earnings from their home country, current earnings, location and years of schooling, and work experience. The one drawback of this data is that the sample size is small and only represents 54 countries. Using this data and two other datasets, the author was able to obtain 139 skill prices, and reject the hypothesis that skill prices were the same across countries. He is also unable to reject the hypothesis that schooling and work experience were identical across

[4] It is worth noting that Rosenzweig does not mention whether his data includes real or nominal wages. The difference in real wages should be equalized in order to reduce cross-country variation in schooling level. Nominal wages do not take into account the variation in inflation rates across nations.

countries, for different skill prices. Table 3.3 demonstrates a visual of these findings by measuring the variance in each variable.

Global Inequality: Comparisons of the Global Variation in Schooling, Schooling Returns, Per Capita GDP, and Skill Prices

	Number of countries	Coefficient of variation	Span (ratio)	Interquartile range (ratio)
Average years of schooling, 15+ population	106	0.474	14.4	2.2
Mincer schooling return	52	0.494	11.7	1.7
GDP per adult equivalent	139	0.948	76.7	4.9
Skill price	130	0.807	108.9	3.6

Sources: Average years of schooling: Barro and Lee 2001; Mincer schooling return: Bils and Klenow 2002; GDP: World Tables 2003; skill price: estimated by the author using the New Immigrant Survey.

Table 3.1 – Global Inequality: Comparisons of the Global Variation in Schooling, Schooling Returns, Per Capita GDP, and Skills Prices

(Source: Global Wage Inequality and the International Flow of Migrants by Mark Rosenzweig, 2010)

The highest global variation is observable in the GDP per adult equivalency and Skill price. Schooling levels and schooling returns had the least variation. The next figure shows this idea in more concrete terms, by comparing the predicted annualized earnings for high school and college graduates in Nigeria, India, Indonesia, Mexico, and Korea. This is based on each country's estimated skill prices and assuming return to schooling is a constant 0.07.

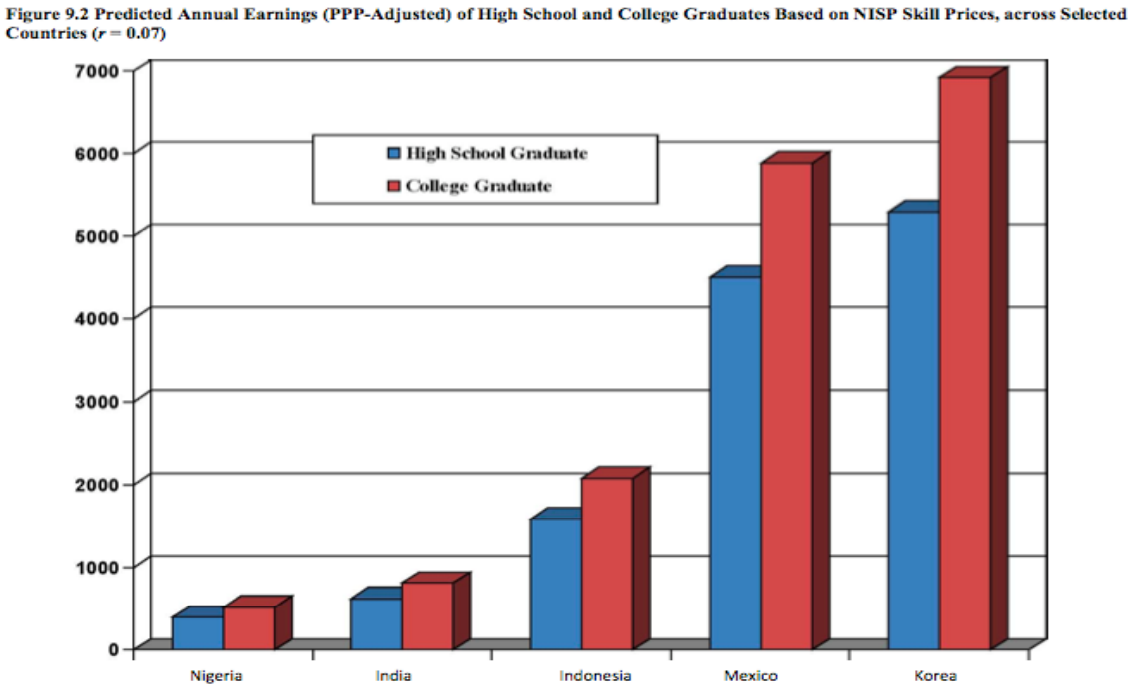


Figure 3.3: Predicted Annual Earnings of High School and College Graduates Based on NISP Skill Prices, across Selected Countries (r=0.07)

(Source: Global Wage Inequality and the International Flow of Migrants by Mark Rosenzweig 2010)

Interpreting the information in figure 4.3, Rosenzweig concludes that a Korean high school graduate is paid 10 times more than a high school graduate in India. Also, a college graduate in Mexico is earning close to three times the amount of a college graduate in Indonesia. The most interesting observation the author makes is the projected expected earnings when high school graduates are provided with a college education. A Nigerian high school graduate can raise his/her earnings by $200 per year by obtaining a college education. If that same student migrates to Indonesia or Mexico, his/her earnings will rise by $1,200 or $5,400 without obtaining any additional education. This assumes that a high school degree from Nigeria will be valued by Indonesian or Mexican employers in the same way that an Indonesian or Mexican high

school degree would be valued. Complete integration will not happen in this way, however, this scenario is much more plausible than the acceptance of a Nigerian college degree by Indonesian or Mexican employers.

> "If everyone in the world obtained a college degree but stayed in place, even ignoring standard within-country general equilibrium effects that would depress the return to schooling, world wage inequality would not be substantially altered. The gaps in wages between persons in poor (low-skill price) countries and rich (high-skill price) countries would not be affected significantly by improvements in schooling attainment in poor countries, unless such improvements affected skill prices positively" (Rosenzweig, 2010, 15-16).

Accordingly, additional investment in education does not, in fact, lead to greater global prosperity. Another notable aspect of figure 4.3 is the differences in the gaps in earnings between high school and college educated individuals in each country. There is a great incentive to obtain four additional years of schooling in Korea and Indonesia, $1,600 a year and $500 a year respectively. In India and Nigeria, however, there is very little difference in annual earnings between high school and college educated individuals.

Rosenzweig uses the following simple model to predict the net gain from migration (G_{ij}),

$$G_{ij} = [w_u - w_j]x_i - C_{ij}.$$

The individual earns $w_j x_i$ at home and can earn $w_u x_i$ in country *u*. The direct cost of migration is C_{ij}. The individual will migrate from *j* to *u* if $G_{ij} > 0$. This ignores any "issues of skill transferability," meaning this assumes an individual will be able to acquire employment at the average wage for his skill level without any additional academic training. In this model, the greater the skill price gap ($w_u - w_j$), the greater the gain from migration. Low skill-price countries will experience the highest emigration rates. Individuals with more skill units (x_i) will experience greater gains from migration, and are thus more likely to migrate. As the wage gaps narrows, only very highly skilled individuals will find it beneficial to migrate. The cost of immigration will also make it so that only highly skilled individuals will be able to afford the trip

from large distances. Migrants from nearby countries have a lower cost of travel which lowers the average skill level of immigrants from these countries. This is exactly the outcome of John Long's study, as seen in figure 4.1.

V. Empirical Evidence

In this section, I will introduce the empirical work that I have done for my thesis. I chose to take the variables that I have described throughout the first few sections of my thesis and attempt to observe how they interact with one another. I will start by addressing the limitations of my findings.

First, I have followed the tradition of many economists who attempt to unearth information in Third-world countries. This means I have come across problems with missing data. Therefore, I am only able to examine relationships of variables in countries with available data. In turn, my sample size is greatly reduced. The other limitation I must point out is my abilities when it comes to regression analysis. The following analysis is extremely simplistic as I am unfamiliar with more advanced manipulation. This section is an overview of the data I used, the correlations that proved to be statistically significant, and those that curiously did not.

I used the following four variables for each country with existing data: percent of the labor force with a tertiary level of education (EDU), gross domestic product per capita (GDP), corruption perception index (CPI), and percent of the tertiary educated labor force that emigrates to a foreign nation (EMG). Data for the EDU and EMG variables comes from The World Bank's World Development Indicators data. The GDP data is from the University of Pennsylvania's Penn World Tables. The CPI variable is measured by Transparency International. Corruption is ranked on a scale (1 through 10) with one being the most corrupt and ten being the least corrupt. These regressions are only a snapshot of a single time period, and do not measure changes over many decades.

Corruption Analysis

The first regression measures the effect of corruption on education in the year 2007. The number of observations (countries) is 54 due to the missing data in the education variable for many developing countries. Using CPI as the independent variable and EDU as the dependent variable, I found a P-Value of .044. This tells us that the results are statistically significant, although the small number of observations is an issue that will be addressed. The estimated equation is

$$EDU = 1.640896\ (CPI) + 16.35425.$$

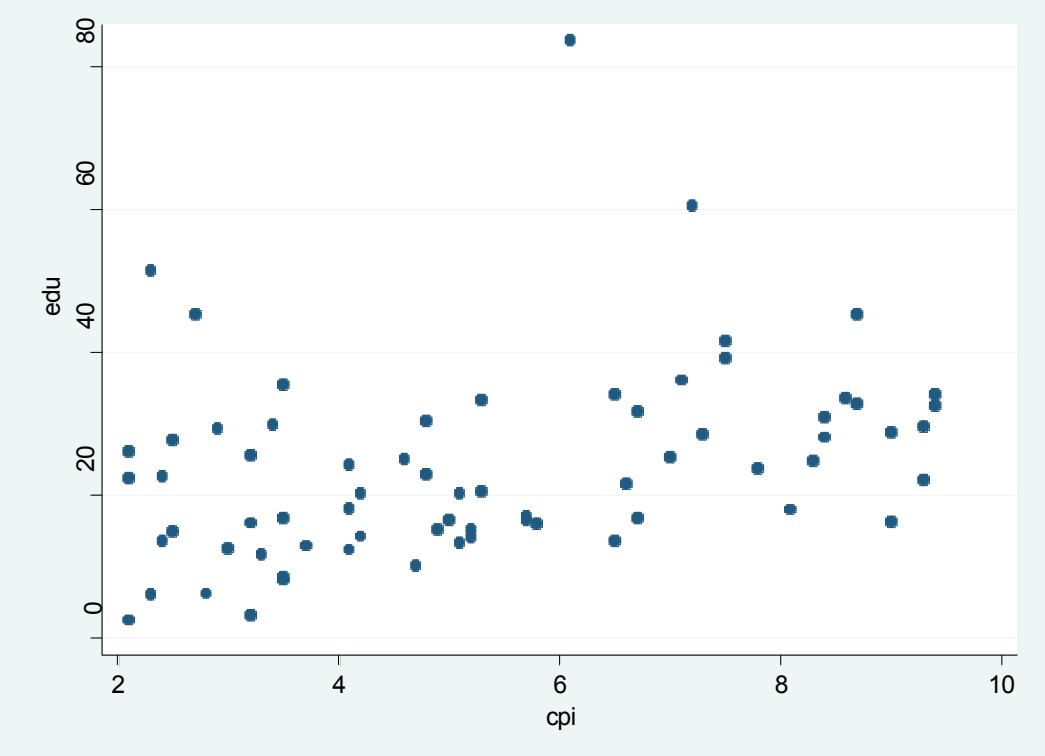
This means for every point the Corruption Perceptions Index increases, the percentage of the labor force with a tertiary level of education increases by 1.640896. Keep in mind that corruption is ranked on a scale (1 through 10) with one being the most corrupt and ten being the least corrupt. So as a country becomes less corrupt, the analysis tells us that the labor force is becoming more educated.

Although this is a statistically significant result, I am unsatisfied with the embarrassingly small number of countries represented given there are about 195 countries in the world. I was able to create the same regression a second time using a broader range of data. Some countries do not report their education data on a yearly basis. Sometimes it is every other year, every five years, sporadically, or not at all. Instead of looking at just 2007, I took data from 2005 and 2006 as well. By doing this I was able to incorporate more countries while maintaining accuracy as education levels do not alter drastically from one year to the next.

Even manipulating the data in this way did not do much to help the issue of missing data. The sample size went from 54 countries to 69 countries. Even the small increase made a

difference in the effect of corruption on education. Again, using CPI as the independent variable and EDU as the dependent variable, I found a P-Value of .004 this time. This suggests that adding more observations yields more significant results. Furthermore, the estimated equation is now

EDU = 2.047374 (CPI) + 13.02678.



The percentage of the labor force with a tertiary level of education is now increasing at a higher rate of 2.047374 for every unit increase of corruption.

In order to verify that the sample size of 69 countries is an accurate portrayal of the world, I will compare the countries that provide education data with those that do not provide education data in the next analysis. Obviously, the EDU variable cannot be used in this comparison. Therefore, I will examine the mean corruption level and mean gross domestic

product per capita in both sets of countries instead. The countries that provide education data have a mean CPI of 5.35 and a mean GDP per capita of 19,339 (USD). The countries that did not provide education data were much more corrupt with mean CPI of 3.08 and much poorer with mean GDP per capita of only 6,959 (USD). I will regress GDP on CPI in order to estimate the effect of corruption on a widely known variable in both developed and developing countries.

In doing this, I found that the effect is statistically significant in countries that report their education data. The estimated equation for these countries is

$$GDP = 4925(CPI) - 6958 \text{ with a P-value of } 0.00.$$

Countries that do not report education data tend to be poorer and more corrupt, and experience a similar correlation between GDP per Capita. In fact, the p-value is still 0.00 and the correlation coefficient is 4624 which is almost identical to that of the wealthier, less corrupt countries. If a country with educational data decreases their ranking of corruption by one unit (becoming more corrupt), it will translate to a 25 percent decrease in GDP per capita on average. If a country that does not report educational data becomes more corrupt by the same amount, it will translate to a 66 percent decrease in GDP. It is clear that the effect of corruption on growth increases as countries become more corrupt.

Just how powerful is this corruption variable? The next series of regressions will attempt to put this question in perspective. The first estimated equation is

$$GDP = 370\ (EDU) + 10{,}600 \text{ with a p-value of } 0.003.$$

This shows a positive correlation between the percent of tertiary educated individuals in the work force and economic growth[5]. When education and corruption are taken as an interaction term, the effect on GDP is more statistically significant, but the regression coefficient decreases. The estimated equation is

$$GDP = 85(EDU\_CPI) + 7579 \text{ with a p-value of } 0.000.$$

The positive effect of education on GDP decreases when education is interacted with corruption. The final estimated equation is

$$GDP = 4931\ (CPI) + 140\ (EDU) - 7\ (EDU\_CPI) - 9268 \text{ with p-value of } 0.000 \text{ for CPI variable.}$$

In this equation, the interaction variable and the education variable are no longer statistically significant with p-values of 0.843 and 0.527 respectively. Once again, corruption is overshadowing any possible gains from education.

Emigration Analysis

The purpose of this thesis is to examine the impact of corruption and emigration on educational attainment decisions. Therefore, I chose to incorporate the emigration variable into the previous equation to examine the impact of corruption and emigration on GDP. Again, there

[5] At first glance, this would appear to contradict the previous mentioned lack of correlation between increased education and increased GDP growth. The difference is that this data shows education and GDP per capita *levels* rather than *growth*.

are 169 observations. The P-value is still 0.000 for CPI and 0.116 for EMG. The estimated equation is

$$GDP = 4973(CPI) - 49(EMG) - 7051.$$

The effect of corruption on output is still highly statistically significant with an R-squared value of .6334. The effect of emigration may be statistically significant with a larger confidence level, but this is not a strong enough correlation to draw any meaningful conclusions. The conclusion I can draw from this is that the corruption variable is highly correlated with GDP per capita, even when other variables are added into the equation.

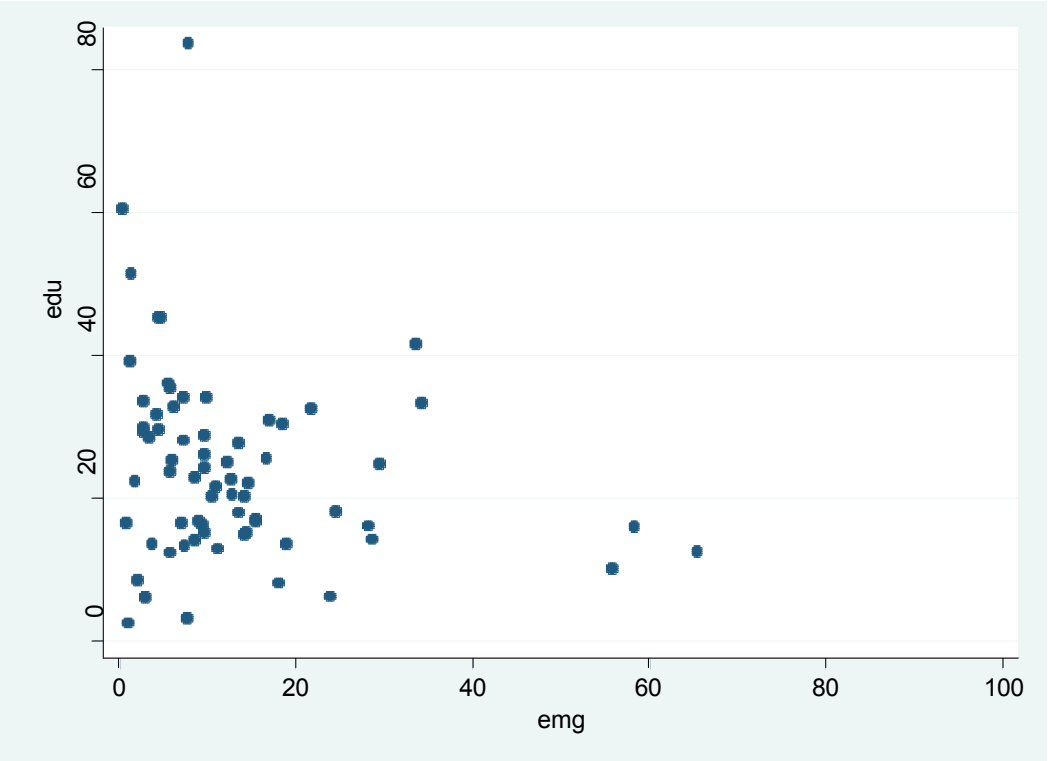
In the year 2000, the following countries experienced the lowest emigration rates of tertiary educated individuals: Oman (0.36%), Turkmenistan (.36%), United States of America (.45%), Bhutan (.55%), Tajikistan (.60%), United Arab Emirates (.73%), Uzbekistan (.83%), Kyrgyz Republix (.91%), and Saudi Arabia (.92%). Most of these are oil-exporting countries in central, southern, and western Asia. The CPI scores of these countries vary from 1.8 in Turkmenistan to 6.5 in the United Arab Emirates, and 7.5 in the United States. The following countries have the highest emigration rates of tertiary educated individuals: Palau (80%), Cape Verde (82%), Haiti (83%), Grenada (84%), St. Vincent (84%), Jamaica (84%), and Guyana (90%). These are all island nations, many of which are located in the Caribbean. The CPI scores range from 1.8 in Jamaica to 6.4 in St. Vincent.

The most peculiar finding in the data is that the range in both low emigration countries and high emigration countries is almost identical. Turkmenistan and Jamaica are among the most corrupt nations in the world. Educated citizens in Turkmenistan hardly ever leave, while educated citizens in Jamaica hardly ever stay. St. Vincent and the United Arab Emirates both

have relatively low corruption levels, but much different emigration rates. These statistics can be attributed to many factors. Job opportunities, religious affiliation, and cultural restraints are just a few possibilities.

By simply regressing the EDU and EMG variables alone, I found a weak negative relationship between the two variables. I can conclude that this is due to emigration being limited to highly educated individuals. Therefore, a country will find itself with a relatively uneducated workforce when educated individuals emigrate elsewhere. These countries may find it more beneficial to invest in increasing their skill prices, than increasing educational attainment.

EDU = -0.23827774(EMG) + 27.26 with a 0.060 p-value.



Regional Analysis

For the next set of regressions, I separated the data that is currently available into regions of the world. There are six regions including: East Asia and the Pacific, Europe and Central Asia, Latin America and the Caribbean, the Middle East and North Africa, Sub-Saharan Africa, and South Asia. I will only discuss the statistics from Sub-Saharan Africa and Europe/Central Asia since these are the two regions from which I found noteworthy results.

There are 48 observations in Europe/Central Asia. Only 36 countries have reported education data, and unfortunately there is no evidence of any correlation between education and any other variable in this region including gross domestic product per capita. The relevant estimated equation for the set of variables is

$$GDP = 4841(CPI) + 162(EDU) + 30(EMG).$$

The corruption variable is once again statistically significant with a P-Value of 0.000. The education variable is not statistically significant with a P-value of 0.280. The emigration variable is also not statistically significant with a P-Value of 0.870. The R-squared value is 0.6433. The corruption variable is correlated with output, while education and emigration are not. This suggests that, once again, the corruption variable is weakening the possible positive correlation between education and Gross Domestic Product per capita.

There are 43 observations in Sub-Saharan Africa. Only 3 countries, however, provide education data, making the results difficult to interpret. Instead, I am able to gather information about the emigration, corruption, and gross domestic product per capita variables. The prediction equation is

$$GDP = 43(EMG) + 2083(CPI) - 3136.$$

Once again, the corruption variable is statistically significant while the emigration variable is not. The P-value is 0.008 for corruption and 0.225 for emigration. Again, the corruption variable is correlated with output while the emigration variable is not. There is not enough available education data in order to properly predict the correlation. The most interesting aspect of these regional regressions is their similarities. Corruption seems to counteract the possible positive effects of education for both regions.

Explanation of Findings

I have found that overall, a country's corruption perception index is correlated with the percentage of the workforce that has obtained a tertiary level of education. Adding more data points seems to make the correlation stronger, yet this is only a prediction since many countries do not report education data on a regular basis. Next, I compared countries that reported their education data to those that did not. I found that countries that reported their education data tended to be wealthier and less corrupt. The correlation between corruption and gross domestic product per capita was highly statistically significant in both countries that reported education data and those that did not.

In order to examine the full effect of corruption on economic growth, I interacted this variable with the education variable. This new variable diminishes some of the positive correlation between education and GDP per capita.

There is a slight negative correlation between the percentage of tertiary educated individuals who choose to emigrate and the percentage of the workforce who obtain a tertiary level of education. This is the case because when highly educated people have better opportunities elsewhere, they will choose immigrate.

Breaking the countries down into regions showed some strikingly similar patterns in some of the world's wealthiest and poorest countries. Corruption in both places counteracted the possible positive effects of increased education. This is inconsistent with the results of section 3, which concluded that corruption is relevant up to a certain threshold.

VII. Conclusion

The results of this study are inconclusive. There is clearly a negative impact of corruption on gross domestic product per capita and education. The empirical work is consistent with the existing literature. The impact of emigration is not as clear. I found no correlation between the percent of tertiary educated individuals who emigrate and GDP per capita. There was a slight negative correlation between emigration and education which implies that highly educated individuals are able to emigrate, lowering the average education level of the country. The emigration outcomes are also dependent on skill pricing and relocation costs. Countries may find it more beneficial to outsource their education, and increase skill prices to encourage educated workers to return.

There is great potential for future research in this subject. The missing data in this project was a major obstacle. The key to more conclusive findings is, of course, more comprehensive data. The education data, in particular, needs to be improved. I fail to understand how governments are able to report their GDP per capita data, but they are unable to report the educational composition of their citizens. In order for meaningful research to be completed in this field, this data is essential. When this data is available, future research may be able to uncover better ways for countries to invest their resources before investing in education.

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Appendix A

Human Capital

Adam Smith speaks of what we now refer to as human capital in *The Wealth of Nations* as "the acquired and useful abilities of all the inhabitants or members of the society" (1775, 2). In modern society, we understand this concept as the benefit individuals attain from a costly formalized education and on-the-job training. The human capital argument is that there is true value to be gained from the transfer of knowledge that will eventually result in a higher level of productivity for those who have obtained it. According to Smith,

> "…the acquisition of such talents, by the maintenance of the acquirer during his education, study, or apprenticeship, always costs a real expense, which is a capital fixed and realized, as it were, in his person. Those talents, as they make a part of his fortune, so do they likewise of that of the society to which he belongs…" (Smith, 1776, 3).

If society benefits from the positive externalities of education, then future investment and government subsidy is justified. Positive externalities of education can be anything from better health outcomes to better creating better citizens and reducing crime rates.

Gary S. Becker was one of the first economists to view education as an actual investment. He linked education and human capital in the same way that individuals purchase physical capital. Becker points out that the "signaling" debate came about due to the 1970's decline of the return to investment in education. This made people question whether or not education and training actually raise productivity. His counterpoint is that "monetary gains from a college education rose sharply again during the 1980s, to the highest level since the 1930s" and that "the earnings advantage of high school graduates over high school dropouts has also greatly increased" (Becker, 2008). While this argument is valid, Becker fails to mention whether the monetary gains equate to any true increase in productivity. Furthermore, this does not rule out the possibility of job signaling.

Appendix B

Job Signaling

The way in which an individual is viewed and treated within a given society partially depends on their level of education. There is a distinct divide between the way society views educated and uneducated people. Those who are educated have a different set of employment opportunities than those who are not. In Michael Spence's paper "Job Market Signaling" he presents a theory that any high school, college, or graduate degree is only as valuable as the signal it sends to a future employer. He notes that employers have little information about the productive capabilities of future employees. A degree from a credible institution sends a signal that the individual has the discipline to complete the program. It has little to do with the skills attained; meaning the quality of course content will be of little importance.

The concept of "signaling" is applied to many different areas of economic theory. In some instances a signal can provide increased information to market participants that increase overall efficiency. For instance, a warranty can act as a signal, guaranteeing the quality of the product for a certain amount of time. A high school, college, or graduate degree can also be a signal in the labor market. It informs the future employer of the educational level of the applicant. The major difference between a warranty and a degree is that employers do not get their money back if it does not work out. They may, in fact, lose money if the employer hires an unqualified person with a high signal. The only guarantee is that the applicant has completed the required courses from a certain institution with a certain Grade Point Average. The name of the institution and GPA will also send a signal about the reputation of the school and the success of the student at that school. For instance, a high GPA from a top tier school will send a strong

signal about the intelligence level of this applicant, and their basic ability to learn. The individual's actually abilities and knowledge base are still unknown.

The simple model is based on the idea that there are two types of workers. We will refer to them as type A and type B. Type A workers are "able" and type B workers are "unable". The type A workers incur a lower cost of learning, while type B workers have a higher cost of learning due to their initially lower abilities. Type A workers are more valuable to companies, and therefore, they are paid a higher wage. Employers need a way to differentiate between type A and type B workers, and this is difficult to evaluate based on an interview or resume alone. An individual can acquire a certain level of education in order to signal to employers that they are, in fact, a type A worker and should be compensated as such. Type B workers will choose not to obtain this level of education because the actual costs plus the opportunity cost is too great to make it worthwhile. Therefore, type B workers will find it optimal to choose a zero educational level.

The most significant idea in this model is that the transfer of knowledge is irrelevant. In other words, the education that type A workers receive does not affect their level of productivity. Employers do not place value on the so-called "human capital" that future employees thought they were going to school to attain. Employers choose to hire educated people because the pool of educated individuals has a higher proportion of workers with high abilities. The reason being that it is less costly for those with high abilities to obtain an education. In order for this theory to work properly, it must be costly enough to obtain an education to separate the low ability workers from the high ability workers.

This type of separation has a private benefit, but is also socially beneficial. The amount produced by a society is the same with the signal as it would be with no signal, however, the

signal allows for the able workers to be placed into employment that requires a certain level of ability. From a social standpoint, the signal is needed to separate out the able from the unable.

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