

THE INFLUENCE OF EDUCATION ON ECONOMIC DEVELOPMENT

An Undergraduate Research Scholars Thesis

by

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ABSTRACT

The Influence of Education on Economic Development. (May 2013)

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The purpose of this research is to measure the effect of education on economic development. Economists use education to explain growth unexplained by capital, and argue that it is a fundamental determinant of technological change. Sociologists have tended to endorse this view arguing by either invoking human capital theory, technological growth, or arguing from a modernization perspective, that education increases entrepreneurialism and Western pro-capitalist values. Using an ordinary least squares regression we analyze the comparative differences in growth in GDP/capita as measured by Angus Maddison's historical GDP dataset among the nations of the world between 1870 and 1950. Education data comes from the recently published educational attainment dataset by Christian Morrison and Fabrice Murtin. The results show that education effects are weak – nearly zero. Education in 1870 predicts growth for the 1870-1950 period. However, shorter lags show almost no effect. Primary education has substantially greater effects than university education. Education/modernization produced very slow effects that cumulated over the long term. However, most of the significant fluctuations can be attributed to other more conflict-oriented variables.

DEDICATION

We dedicate this thesis to our friends and family for their endless support and to our advisor, Dr. Samuel Cohn for making this possible.

CHAPTER I

INTRODUCTION

The question we aim to answer is “Does educational attainment contribute to economic growth?” Because literacy, primary education, secondary education, and tertiary education have been consistently shown to have different sized effects on development – and to relate to different causal mechanisms, primary and secondary education having a larger effect on basic worker productivity while higher education has a larger effect on technological innovation (Cole 2009) – the effects of each different level of education on development need to be considered separately. No one disputes that education and its external effects matter. Economists including Abramovitz, Solow and Denison claim education to be a cause of an increasingly high labor quality (Abramovitz 1956; Denison 1962; 1967; Kendrick 1961; Solow 1957). This inclusion of human capital, or the stock of skills and attributes an individual uses to perform labor so as to produce economic value which is acquired through schooling, accounts for the unexplained residual in growth (Maddison 1987; Pilat 1994; Timmer 2000). In recent years, Paul specifically emphasizes the importance of education in fostering ‘new ideas’ that are, as he argues, the key to long-term economic growth.

However, there are other hidden factors affecting growth, whether directly or indirectly, which eventually leads to another question: whether education itself is indeed the most important factor in generating economic growth. These factors will be taken into consideration and controlled when we evaluate the effects of education. Finding out the effects of education and other factors on economic growth, then, has a broad social impact as it will assist government leaders in

creating and establishing social and economic policies which aim to reduce global poverty and increase global rates of economic development. These findings will allow for a better design of repayment plans for nations under conditions of extreme indebtedness, improve the efficiency of investment in public education, improve American policies concerning land tenure in underdeveloped nations, suggest guidelines for assisting very poor nations with petroleum or valuable mineral endowments, and provide guidance in how nations that have experienced devastating wars and conflicts can recover and return to sustainable economic growth.

Educational development promotes the formation of human capital and long-term productivity. The one thing economists and sociologists can agree on is the importance of human capital, whether it be through formal or informal education, or simply experience in the workplace. The quality of education combined with a high level of enrollment in the primary stages of schooling (the base for developing human capital) is an essential factor in a nation's future development (Haring 2007). Human capital is necessary for the research sector, thereby allowing a country to generate new products and ideas for technological innovations (Barro 1991; Krueger and Lindahl 2001). The Human Capital Theory advocates the support of national development by means of providing higher education. Proponents of this method argue that an investment in human capital or higher education promotes productivity and technological advancement, benefitting the whole of society as opposed to the individual (Szirmai 2005).

In the analysis of Imperial Germany and Japan in 1966 by Barrington Moore, along with James O'Connors' theory of reproduction of capitalism within the state and Greg Hook's (1990) sociological study of the military, military expenditure is claimed to be a key component of

capitalist growth. The two main arguments are that government military expenditures stimulate demand, ultimately bolstering the nation's economic growth. The military is particularly active in creating a core infrastructure through the development of domestic transportation and communications, which serve as public goods utilized by the private sector. War itself can be very destructive to economic growth, although David Harvey in *Limits to Capital* (1999) opposes the view as he states that military destruction stimulates superior growth after the war, since replacing infrastructure and productive facilities stimulates demand.

On the other hand, world systems theorists, dependency theorists and writers on the recent debt crisis in the Third World noted that debt repayment plans have adverse effects on both short and long term growth (Frank 1967, Furtado 1983, Chossudovsky 2003, Cardoso 2009). Subsequently, demographers highlight a correlation between an increase in population and economic development as high growth rates are achieved when both the ratio of children and the elderly relative to the population of working age adults is low (Crenshaw et. al. 1997, Bloom et. al. 2003, Adioetomo 2005). Dependency theorists, world systems theorists, and institutional economic historians see that barriers to land ownership inhibit economic development and that latifundism reduces growth. Of more relevance to the modern global economy are factors such as access to petroleum, exposure to the world economy, and terms of trade that affect economic growth. The presence of petroleum, "a resource curse," is said to adversely affect development by encouraging corruption, short-term investment policies, and underinvestment in education (Auty 1993; Humphreys et. al. 2007), though recent cross-national analyses cast doubt on this claim (Brunnschweiler 2008). Furthermore, the dependency of early world systems theory explicated through Samir Amin's unequal terms of trade poses a second problem unrelated to oil: that

peripheral nations whose export prices are low relative to the price of manufactured goods in core nations will lag behind their competitors. On top of this, the benefits of free trade are still questionable, and its substantial skepticism has taken the form of an extended, ongoing critique of globalization in sociology (Schaeffer 1997, Robinson 2004, Sklair 1991).

We will be analyzing the educational attainment dataset and the comparative difference in growth in GDP per capita among the nations of the world between 1870 and 1950. Christian Morrison and Fabrice Murtin calculated our independent variable. The dependent variable comes from Angus Maddison's dataset on economic growth that provides yearly estimates of GDP per capita for most of the countries in the world during this period. Because correlated errors lead to biased estimates of coefficients if multiple variables are run simultaneously, the use of control variables was minimized to a one essential control variable: log GDP per capita. We control for the variability in growth rates for smaller economies that have a greater variability in growth rate. Controlling for Log GDP per capita eliminates outliers that are due to random fluctuations in the economy. Focused readings on the historical context of each specific nation will help us indicate "period-specific" or "region-specific" errors and consequently validate our analyses. We will be searching more specifically for unmeasured factors associated with particular nations that could account for their superior or inferior economic performance. For example, specific dates in a country's history could produce false positives or negatives in critical high leverage case-years. Throughout these analyses, an iterative process should emerge between statistical and qualitative analyses that will continue until a robust set of conclusions can be drawn. We hope to prove that implementing a stable education system in developing countries will have a greater effect on a nations global economic status.

We will be screening for the strongest impact among educational attainment measures and which one is the most responsible for the biggest difference in changing the world in the years ranging from 1870-1950. In addition to the two-equation model we ran, we search for other influencing factors. What worked then may not work now or in the future, but at the very least these findings could give us a better understanding of the factors necessary for increasing economic growth now and in the future. Identifying these key factors will prove essential in highlighting those areas, which should be invested in, may it be education, population growth, or other controlling factors.

CHAPTER II

METHODS

Data

The study considers two populations of nations. The first consist the set of nations whom data is available for 1870 and 1950 only. The second population considers those nations that have complete data for all decadal years. There are more countries included in the larger sample since less information is needed. The decadal sample has a slight bias towards wealthy nations because they keep better data, and they have more information available for use. The larger sample will be used to measure the long-term effect of education on economic growth. The smaller sample is used to measure the short-term effect of education on economic growth. An 1870-1950 regression will also be done on the smaller sample in order to demonstrate comparability of results between both small and large samples.

Variables

Dependent Variable: The Dependent variable is the annual growth rate that is calculated as (Barro 1991):

$$\left[\left(\frac{\text{GDPpercapita of later year}}{\text{GDPpercapita of earlier year}} \right)^{\frac{1}{\text{number of years of the time period}}} - 1 \right]$$

This GDP per capita data comes from Angus Maddison dataset on world economic growth. Maddison's team calculated historical GDP and population figures for most of the nations in the world in the 1870-1950. The data are adjusted both for inflation and for international differences in the values of currency; this removes the greatest obstacle to use historical GNP data, the

noncomparability of national monetary units from year to year and from country to country. The Maddison team was able to construct viable estimates for most non-African nations for all decades between 1870-1950, that is 1870, 1880, 1890, 1900 and so on. They also made complete GDP and population data on an annual basis for the 1870-1950 period for most European, North American, Oceanic nations as well as for the more developed Latin American and East Asian nations with available records. By 1920, there is an annual data for the Middle Eastern and smaller Latin American nations; only Sub-Saharan Africa is missing. Thus for most of the world, three panels – 1870, 1914, and 1950 – are completed as continuous time-series of varying lengths that end at 1950.

Independent Variable: The independent variable is educational attainment. For the 1870-1950 period, dataset consisting of data enrollments in primary, secondary, and tertiary schooling and literacy scores is nearly universally available on an annual basis. However, economic development is affected by educational attainment and not by enrollment. It is because educated workers tend to be more productive and innovative than uneducated workers, and just by having children enrolled in school produces no immediate effect on productivity or innovation. This educational attainment data is available for most nations only around 1950. Recently, new figures for educational attainment database calculated by Christian Morrison and Fabrice Murtin came out, but their effect on economic development is not yet studied. This database focuses on the average years of primary, secondary, and tertiary schooling, and its accuracy has been cross-validated with literacy scores. We use four measures of this:

- Education 15-64: The average number of years of education attained by people between ages 15 and 64.

- Primary 15+: The average number of years of primary education attained by people over age of 15.
- High School 15+: The average number of years of secondary education attained by people over age of 15.
- College 15+: The average number of years of college education attained by people over age of 15.

To ensure the modest differences in age composition between the measures do not change results we will do some analysis on educational attainment for all people ages 15 and over.

Control Variable: We include the log of GDP per capita as a control variable. Barro (1991) uses GDP as a control variable including such practices become standard in literature and now GDP is a scale variable that measures the greater variability in growth rates in smaller economies. Not including GDP often causes the effect of legitimate predictors to be drowned in noise from random fluctuations in the smaller cases.

Methods: We will run ordinary least square regressions analyzing each independent variable not including the other variables in the equation. Although more elaborate estimation procedures are available, recent econometric work is caused many of these corrections into question (Durlauf 2004). The simple tri-variate analysis minimizes the distortions that come from misconceived corrections for time or region's specific error.

CHAPTER III

RESULTS

Educational attainment overall has long-term impact. Table 1 shows results from regressions of economic growth on education where the dependent variable is the annualized rate of change in GDP Per Capita. When we include all cases the mean educational attainment for people between the ages 15 and 64 between 1870-1950 has a weak but positive effect on economic growth. At 0.0418 the P-value is significant and barely less than .05. For the same time period, 1870-1950, but with a smaller sample, the decadal sample, educational attainment had zero effect on economic growth - the P-value is 0.1034 and insignificant.

Decadal regressions indicate what kind of effect educational attainment had on growth for a shorter time period. From 1870-1880 educational attainment had approximately zero effect on development, the P-value is large (0.4322). The following decade, 1880-1890, education had a positive effect on economic growth as the p-value is small (0.0227) and less than .05. The educational attainment effect goes back to zero from 1890-1900, which is indicated by the large p-value (0.194) for that time period. The effect of education on growth in 1900-1910 is actually negative, but weak, the p-value is greater than 0.1 at (0.1322). From 1910-1920 the effect of educational attainment on economic growth is insignificant as the P-value is large at 0.864. The following decade, 1920-1930, educational attainment had a significant positive effect on growth; the P-value is small at 0.0249. The same is true for the following decade, 1930-1940 where the P-value is close to zero (0.0227), indicating a positive impact on growth as a result of overall educational

attainment. From 1940-1950 educational attainment had no significant effect on growth, the P-value is large (0.3995) and insignificant to development.

Mean primary educational attainment for people above the age of 15 for all cases during the 1870-1950 time period indicates a strong, positive effect on development; the P-value is 0.0103. For the same period, 1870-1950, but using the decadal sample instead, primary education indicates a weak, but positive effect on development with a P-value slightly larger than .05 (.0633). From 1870-1880 the effect of primary education is not significant, the P-value is large (.9196). For the following decade, 1880-1890, the P-value (.0685) indicates that primary educational attainment had a weak, positive effect on growth. From 1890-1900 primary educational attainment had zero effect on economic development; the P-value (.5142) is large and insignificant. From 1900-1910, the same is true, primary education has no effect on growth indicated by a large P-value (.2328). For the following decade, 1910-1920, the P-value is large (.8277) and the effect of primary education on growth is insignificant. The 1920-1930 time period indicates that primary educational attainment had a strong positive effect on growth; the P-value is very small (.009). The following decade, 1930-1940, the P-value goes back up to an insignificant .3704 and primary education had zero effect on development. The last decade, 1940-1950 also indicates no effect of primary educational attainment on growth; the P-value is large at .8681.

Mean secondary educational attainment for people above the age of 15 shows an effect of zero when we include all cases between our long-term time period, 1870-1950; the P-value is large (.5754). Using the decadal sample, secondary education for the 1870-1950 time

period also had an effect of zero on economic development; the P-value is large at .739. From 1870-1880 the same is true, the P-value is insignificant at .7747 and secondary education had no effect on growth. From 1880-1890 secondary education has a weak, positive effect on growth; the P-value is .0569. The following decade, 1890-1900, the P-value is large (.503) and indicates that secondary education had zero effect on growth. From 1900-1910 the P-value, again, is large and indicates that secondary education had no effect on development during this time period. From 1910-1920 the P-value is large and insignificant at .9989; secondary education had no effect on growth. For the following decade, 1920-1930, secondary education had an effect of zero on development; the P-value is large (.2284). The 1930-1940 decade breaks this trend with a small P-value (.005) that is close to zero and indicates that secondary education had a positive effect on growth. The final decade of our time period, 1940-1950, shows secondary education having an effect of zero on development, the P-value is large at .1832.

Mean university educational attainment for people above the age of 15 shows an overall effect of zero on economic growth when we include all cases during the 1870-1950 time period; the P-value is large and insignificant at .6665. Using the decadal sample, the same is true, the P-value is large (.7112) and indicates that university educational attainment had an effect of zero on economic growth. The same is true for the 1870-1880 decade, the P-value is large and insignificant at .7112; university education had no effect on growth during this time. The following decade, 1880-1890, shows similar results, the P-value is large (.5547) and indicates university education having zero effect on economic development. For the 1890-1900 decade the P-value is .9444 and indicates that university education had zero effect on growth during this time. From 1900-1910, again, the P-value

is large (.4861) and shows the effect of university education on growth to be zero. The 1910-1920 decade indicates similar results, the P-value is large (.6154) and university education has zero effect on growth. From 1920-1930 university education has a weak, but positive effect on growth indicated by a P-value slightly above .05 (.0774). The last two decades of our time period, 1930-1940 and 1940-1950 continue to indicate the insignificance of university education on economic growth with P-values of .1325 and .4871 respectively.

Tables 2-6 illustrate the effect of education on economic growth by using a plus minus system where a plus sign indicates a positive effect, a negative sign indicates a negative effect and a zero indicates no effect. In Table 2, primary education having a positive effect during a short-term period is rare, although we do see this happening from 1880-1890 and 1920 to 1930. Moreover, it is clear that primary education has a significant effect on growth over the long term (1870-1950) for both the large and decadal samples. Table 3 shows that secondary education has an overall effect of zero on economic development except for two decades, where education had a positive impact on growth – 1880-1890 and 1930-1940. Table 4 indicates the same minimal effect that university education had on growth for each time period, but introduces a weak positive for the decade 1930-1940. Educational attainment for people between the age of 15 and 64 had a positive effect on growth from 1880-1890 and a weak negative effect on growth from 1900-1910. From 1920-1930 and 1930-1940 educational attainment for this age group had a positive effect on growth. When we use the large sample for the 1870-1950 or long-term time period we see education having a weak, but positive effect on growth. With the decadal sample, the effect on development is a positive for the 1870-1950 time period.

Table 1. Regressions of Economic Growth on Education
Dependent Variable: Annualized Rate of Change in GDP Per Capita

| | Education Measures | | | |
|---|-----------------------------------|---|---|--|
| | Mean Educational Attainment 15-64 | Mean Primary Educational Attainment 15+ | Mean Secondary Educational Attainment 15+ | Mean University Educational Attainment 15+ |
| | <i>B</i> | <i>B</i> | <i>B</i> | <i>B</i> |
| 1870-1950 (All Cases) | | | | |
| Education | .0013764102 | .0021844686 | .0011275499 | .0143923545 |
| Std. Error | 6.537877E-4 | 8.1042957E-4 | .00199599 | .03314686 |
| P-Value | .0418* | .0103* | .5754 ns | .6665 ns |
| LnGDP | -.004678196 | -.0058881254 | .0022009206 | .003083981 |
| Std. Error | .005097279 | .004682364 | .0042934516 | .003586618 |
| P-Value | .3644 | .216 | .6111 | .3951 |
| R ² (adjusted) | .0853 | .1406 | -.0103 | -.0146 |
| 1870-1950 (Decadal Sample) | | | | |
| Education | 9.2277257E-4 | .0014250851 | 5.724235E-4 | .010451223 |
| Std. Error | 5.4599624E-4 | 7.332017E-4 | .0016993529 | .027913151 |
| P-Value | .1034 ns | .0633 ¢ | .739 ns | .7112 ns |
| LnGDP | 2.3818808E-4 | -.0026940443 | .0048047043 | .002341918 |
| Std. Error | .0046098824 | .004155294 | .0042375787 | .0034446088 |
| P-Value | .9592 | .5227 | .2676 | .5028 |
| R ² (adjusted) | .1192 | .0862 | .023 | -.0461 |
| 1870-1880 | | | | |
| Education | -.0016447416 | -2.8092615E-4 | -.0017880765 | .010451223 |
| Std. Error | .0020603836 | 0.0027549267 | .0061788075 | .027913151 |
| P-Value | .4322 ns | .9196 ns | .7747 ns | .7112 ns |
| LnGDP | -.008659768 | -.015646487 | -.014341858 | .002341918 |
| Std. Error | .0152695 | .015613072 | .014190379 | .0034446088 |
| P-Value | .5757 | .3259 | .3219 | .5028 |
| R ² (adjusted) | .0275 | .0031 | .006 | -.0461 |
| *p < .05, ¢ p < .10, ns (not significant) | | | | |

| Table 1. Continued | | | | |
|--|--|--|--|---|
| | Education Measures | | | |
| | Mean Educational Attainment 15-64 | Mean Primary Educational Attainment 15+ | Mean Secondary Educational Attainment 15+ | Mean University Educational Attainment 15+ |
| | <i>B</i> | <i>B</i> | <i>B</i> | <i>B</i> |
| 1880-1890 | | | | |
| Education | .002353736 | .0025561727 | .0055368086 | .028803324 |
| Std. Error | 9.627077E-4 | .0013424295 | .002773852 | .048107207 |
| P-Value | .0227* | .0685¢ | .0569¢ | .5547 ns |
| LnGDP | -.016585939 | -.012695206 | -.01039368 | -.002809509 |
| Std. Error | .008409154 | .008321827 | .0073529542 | .006629357 |
| P-Value | .0597 | .1397 | .1698 | .6753 |
| R² (adjusted) | .128 | .0589 | .0705 | -.0624 |
| 1890-1900 | | | | |
| Education | .0019014628 | .0012416755 | .0030068064 | .0046736604 |
| Std. Error | .0014245977 | .0020043876 | .0036152727 | .064873606 |
| P-Value | .194 ns | .5142 ns | .4135 ns | .9444 ns |
| LnGDP | -.00936376 | -.0030427359 | -.0029037378 | .0030924205 |
| Std. Error | .012277396 | .012993759 | .01090506 | .008572841 |
| P-Value | .4528 | .8168 | .7922 | .7213 |
| R² (adjusted) | -.0015 | -.0566 | -.0439 | -.0726 |
| 1900-1910 | | | | |
| Education | -.002102727 | -.0022551783 | -.0021262004 | -.036861494 |
| Std. Error | .012294029 | .0018441034 | .0031288844 | .052132547 |
| P-Value | .1322 ns | .2328 ns | .503 ns | .4861 ns |
| LnGDP | .021311691 | .017404934 | .010484828 | .007929586 |
| Std. Error | .012294029 | .011998256 | .010203809 | .008014143 |
| P-Value | .0953 | .1593 | .314 | .3319 |
| R² (adjusted) | .0379 | .0043 | -.0362 | -.0346 |
| *p < .05, ¢ p < .10, ns (not significant) | | | | |

| Table 1. Continued | | | | |
|---|--|--|--|---|
| | Education Measures | | | |
| | Mean Educational Attainment 15-64 | Mean Primary Educational Attainment 15+ | Mean Secondary Educational Attainment 15+ | Mean University Educational Attainment 15+ |
| | <i>B</i> | <i>B</i> | <i>B</i> | <i>B</i> |
| 1910 - 1920 | | | | |
| Education | .0011316546 | .002055224 | 2.3170744E-5 | -.122100234 |
| Std. Error | .006540642 | .009342363 | .01602747 | .2400238 |
| P-Value | .864 ns | .8277 ns | .9989 ns | .6154 ns |
| LnGDP | -.06460831 | -.06656579 | -.056370538 | -.04726032 |
| Std. Error | .060700968 | .05965037 | .050214928 | .041177697 |
| P-Value | .864 | .2751 | .2723 | .262 |
| R² (adjusted) | .0114 | .0121 | .0102 | .0203 |
| 1920-1930 | | | | |
| Education | .009586923 | .01755985 | .012625681 | .33326167 |
| Std. Error | .004015854 | .006204732 | .010224885 | .18092825 |
| P-Value | .0249* | .009* | .2284 ns | .0774 ¢ |
| LnGDP | -.08673551 | -.09848383 | -.05130191 | -.049806885 |
| Std. Error | .03758347 | .037050813 | .035819206 | .032003365 |
| P-Value | .0296 | .0135 | .1645 | .1322 |
| R² (adjusted) | .1489 | .2085 | .015 | .0798 |
| 1930-1940 | | | | |
| Education | .0047347317 | .0033243985 | .010508414 | .0847513 |
| Std. Error | .0019504343 | .00364421 | .003412754 | .054495085 |
| P-Value | .0227* | .3704 ns | .005* | .1325 ns |
| LnGDP | -.04368403 | -.022810612 | -.030849904 | -.016609138 |
| Std. Error | .019176643 | .022518462 | .013222652 | .013636616 |
| P-Value | .0315 | .3208 | .028 | .2346 |
| R² (adjusted) | .1329 | -.037 | .2231 | .023 |
| * p < .05, ¢ p < .10, ns (not significant) | | | | |

| Table 1. Continued | | | | |
|---|--|--|--|---|
| | Education Measures | | | |
| | Mean Educational Attainment 15-64 | Mean Primary Educational Attainment 15+ | Mean Secondary Educational Attainment 15+ | Mean University Educational Attainment 15+ |
| | <i>B</i> | <i>B</i> | <i>B</i> | <i>B</i> |
| 1940-1950 | | | | |
| Education | .002990313 | .0010035526 | -.0077232593 | .05112249 |
| Std. Error | .0034883353 | .0059822896 | .0056419238 | .07247897 |
| P-Value | .3995 ns | .8681 ns | .1832 ns | .4871 ns |
| LnGDP | .055653717 | .025378754 | .052985862 | .02124174 |
| Std. Error | .033346843 | .034036934 | .022519821 | .020441722 |
| P-Value | .1076 | .4628 | .0268 | .3087 |
| R² (adjusted) | .0847 | .0588 | .1235 | .0762 |
| * p < .05, c p < .10, ns (not significant) | | | | |

Table 2. Summary of Findings Concerning Primary Education

| | |
|-------------------------------|----------|
| 1870-1880 | 0 |
| 1880-1890 | + |
| 1890-1900 | 0 |
| 1900-1910 | 0 |
| 1910-1920 | 0 |
| 1920-1930 | + |
| 1930-1940 | 0 |
| 1940-1950 | 0 |
| 1870-1950 Small Sample | + |
| 1870-1950-Large Sample | + |

+ Indicates a significant positive finding. 0 indicates no significant relationship. - represents a significant negative finding.

Table 3. Summary of Findings Concerning Secondary Education

| | |
|-------------------------------|----------|
| 1870-1880 | 0 |
| 1880-1890 | + |
| 1890-1900 | 0 |
| 1900-1910 | 0 |
| 1910-1920 | 0 |
| 1920-1930 | 0 |
| 1930-1940 | + |
| 1940-1950 | 0 |
| 1870-1950 Small Sample | 0 |
| 1870-1950-Large Sample | 0 |

+ Indicates a significant positive finding. 0 indicates no significant relationship - represents a significant negative finding.

Table 4. Summary of Findings Concerning University Education

| | |
|-------------------------------|---------------|
| 1870-1880 | 0 |
| 1880-1890 | 0 |
| 1890-1900 | 0 |
| 1900-1910 | 0 |
| 1910-1920 | 0 |
| 1920-1930 | + |
| 1930-1940 | Weak + |
| 1940-1950 | 0 |
| 1870-1950 Small Sample | 0 |
| 1870-1950-Large Sample | 0 |

+ Indicates a significant positive finding. 0 indicates no significant relationship - represents a significant negative finding.

Table 5. Summary of Findings Concerning Overall Educational Attainment

| | |
|-------------------------------|---------------|
| 1870-1880 | 0 |
| 1880-1890 | + |
| 1890-1900 | 0 |
| 1900-1910 | Weak - |
| 1910-1920 | 0 |
| 1920-1930 | + |
| 1930-1940 | + |
| 1940-1950 | 0 |
| 1870-1950 Small Sample | Weak + |
| 1870-1950-Large Sample | + |

+ Indicates a significant positive finding. 0 indicates no significant relationship - represents a significant negative finding.

CHAPTER IV

CONCLUSION

In response to the question “Does educational attainment contribute to economic growth” we conclude that the answer is both yes and no. Primary educational attainment had a strong, positive effect on economic growth over the long-term, but its influence fluctuated for multiple decades. University educational attainment, despite its world-class reputation, had an overall effect of zero on economic development. Surprisingly, primary education outweighs university education in its impact on economic growth. The degree to which these findings waver is heavily dependent on factors outside of education.

High levels of GDP per capita are associated with high levels of educational attainment eight decades earlier. For both primary educational attainment and overall educational attainment, positive long-term effects were more common than short term. In fact, education had nearly no effect on economic development in the short term. The positive long-term effect can be accounted for by the lag education has on economic development. Investment in education is an investment in human capital. Human capital advocates argue that education is significant because it cultivates knowledge and life skills alongside making workers more productive. It is necessary for the research sector, thereby allowing a country to generate new products and ideas for technological innovations. Cross-national studies of development in the late 20th century have also shown a strong positive relationship with education (Barro, 1991, Krueger and Lindahl, 2001). This effect, however, takes time to set in. The economy will not see returns from investment in education for decades, because it takes time for multiple generations of students to transform an economy. Educated workers are likely more productive and earning more than their uneducated counterparts.

Educational attainment did not dish out the same positive-results over the short-term. Only in the decade 1920-1930 did primary education positively influence economic growth. Education alone cannot stimulate growth in the short-term. Factors like war or poor trade agreements between nations can offset the effect of education on development. For the opposite of why education worked for the long-term, it does not work in the short-term. Any investment in human capital or education needs time to turn out results. Even if we are just talking primary education, learning to read and write is a long process along with building your vocabulary and applying these skills to other subjects. Within the short term, the effect of education on development is near zero due to other factors with a more immediate impact. War, for example and the presence of petroleum in a nation is going to affect the growth of any given economy much quicker than an investment in education at the same time.

There are numerous factors that affect the development of a nations economy. Some specific cases may explain why educational attainment's effect on growth fluctuates according to global social trends and not just investment in education. Despite its high level of educational attainment, Germany had a negative economic growth rate in 1910-1920 period. Germany experienced economic growth in 1910 due to successes in manufacturing, engineering, chemicals and booming auto industry until 1913. In 1914, there was World War I, which used up much of German resources. The German economy had to finance these resources needed through bonds. From 1940-1950 WWII occurred. After losing the war (WWI), the country was left in ruins and cities had to be rebuilt. This period was known as "Zero Hour." The Nazis demonstrated poor leadership. Moreover, they failed to develop a long-

term economic plan. For instance, Hitler refused the decision regarding “rearmament in depth,” which would create a large base of factories and bolster development (Boldorf 2012).

Australia is another case where in 1920-1930, after World War I, Britain’s savings and terms of trade were hurt badly. British demand for imports from Australia decreased throughout the 1920s and affected Australia’s balance of payments. Unemployment rate in Australia remained at 6-11% in the 1920s. The British government, moreover, decided to put pound sterling back onto the Gold Standard, which made British exports less competitive in international markets. Australian pound was pegged to British, and as a result, this decision affected Australian terms of trade as well. Subsequently, in 1929, the Wall Street Crash took place and hit the Australian economy hard. This Great Depression led to an increase in unemployment and falling prices of commodity. In 1930-1940, Spain experienced negative growth rate due to the Global Depression and the Spanish Civil War (1936-1939). During the Spanish Civil War, Spain focused on its war industry was divided into two centralized economies. According to a recent research, “growth was harmed during civil wars due to the huge contraction on private investment, and such was the case with the Spanish divided economy” (Weinstein, J and Imai, K. Measuring the Economic Impact of Civil Wars).

The world depression impacted Denmark with a time lag; its terms of trade declined by 24% from 1930-1932. In 1933 and 1934, Denmark was forced by Britain and Germany to agree on bilateral trade agreements and adopted exchange control to restrict the outflow of foreign exchange of the country and imports, which helped protect some of its domestic industries. Nevertheless, its unemployment reached 13-15% of the workforce (Henricksen 2010).

In 1940-1950, there was the World War II that again shattered Austrian economy. Austria's industrial and transportation centers were attacked regularly. Austria depended on foreign financial aid for its postwar reconstruction. Belgium required military resistance while Germany continued to invade the nation. Because Belgium resisted this, the Germans responded by destroying bridges and burning down buildings. The Great Depression took place during this time period as well. The crisis affected Belgium in the late 1930s (Witte 2000).

The Netherlands was weak militarily in the 1930's. Adolf Hitler sent an Austrian known as Arthur Seyess-Inquart to govern the Netherlands. This led up to resistance and had a negative impact on the economy. A large number of Dutch-Jews were murdered and killed (Brok 2012)

In the United Kingdom the exercise of constitutional government was weakened and nation fought numerous battles. Approximately three-quarters were left dead and the nation was left with large debt (Terrain 2008). After World War I, Austria-Hungary broke, and Austria's economy was badly affected. Austria was left with a territory with an inadequate agricultural and mineral base. It also did not have enough food supplies for its population and coal for its industries. Without basic industries functioning properly, any aims at increasing educational attainment are weakened.

Primary education, more than secondary and university had a positive effect on growth. The skills picked up in primary school – literacy and numeracy – are fundamental to most employment opportunities. Reading and writing are tasks used on a daily basis and allow further training to occur on the job. Alison Wolf (2002) highlights the importance of literacy and numeracy –especially the latter – as a foundation for growth as well. The quality of primary education institutions must be invested in and upheld before pouring

extra resources into higher education, which contributes to degree inflation and a higher number of workers than there are jobs to fill. We see this sort of thing in the United States where more and more students are cautioned with pursuing a degree in liberal arts. With more and more technological innovations, there is a higher demand for people carrying a STEM (Science Technology Engineering Mathematics) degree (Wolf 2002).

Economic value and productivity are measured by individual wages, but wages do not reflect productivity or contribution in a given workplace. Natural ability, type of education (and institution), IQ, work ethic, family education, health, and social background are all factors that distort this method of measurement (Krueger and Lindahl). Those with an education in liberal arts are likely to benefit their society more than an individual who specializes in math or engineering, so there is a disconnect where those making more money act according to their own self-interest, while low income earners are more willing to make social contributions (Wolf 2002). This does not mean a liberal arts education is not valuable, but the measure of value has shifted. University education (in the form of any degree) does not stimulate growth unless investments in both human and physical capital are taking place. Before states decide they need more universities so they can catch up to the technological innovations of powerhouse nations, a stable primary education system must set in.

Secondary education is largely an extension of principles gathered in primary school and has no significant effect on growth and development. Regarding the overall educational attainment, however, completing primary and secondary school as opposed to the former points to the positive effect as a result of completing more school years.

We know that educational attainment cannot contribute to growth in the short-term and that positive and significant results appear most in the long term. There is a lag on the returns realized from high government expenditures in education. It takes decades for this human capital to turn out higher productivity in the work place. Students must retain what they are being taught and learn to balance the sort of lifestyle necessary to get large quantities of work done within a small amount time, and graduate with qualifications that a prospect employer will find appealing. The process is long and arduous, but necessary to increase national economic growth. This is of course, at the university level. Primary education has a larger and more immediate effect on labour productivity. Primary education effects economic development more consistently and positively than university education. Literacy is important to finding work and contributing, however little, to the work force.

Apart from the obvious upside of being able to practice reading, writing, and arithmetic, literacy is seen as one of the instruments for achieving wider developmental initiatives. Apart from literacy increasing productivity and economic growth it also encourages social participation, cultural awareness, and personal awareness especially for those without the sort of high-level university system enjoyed by many western nations. First, primary education must be made available to all. The overarching purpose of this research is to identify and question the ways in which education can eradicate poverty. The answer is not simple, and it is not certain, but we are hopeful that with an increasing investment in a strong universal primary education system, the nations of the world will see change in growth. From this model, further investment in university education can be made.

The historical tradition of universities is a western tradition and has little to do with the third-world. The poor will, in general, remain poor without the resources and investments necessary to break through any structural barriers within the higher education system. The development of an academic institution is expensive, but not in comparison to defense spending or industrialization. Education makes a difference and with this proof, its time the expectation of education as a determining factor in economic growth is realized.

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