INCOME INEQUALITY AND WELFARE EFFECTS

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ABSTRACT

This paper examines the definition and history of income inequality and it's observable effects on public health with an emphasis on life expectancy. We will also examine the relationship between income inequality and various measures of standard of living. By looking at income distribution using different measures over time, an examination can be made of the effects on well-being as measured by consumption, life expectancy and other measures of public health.

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INTRODUCTION

Income inequality is defined as the extent to which income is distributed in an uneven manner among a population, or between countries, and is generally considered to be the earnings gap between the rich and the poor. Recently, the subject of growing income inequality has been one discussed in many different contexts, ranging from it's effect on economic conditions, life satisfaction, an aging population, equality of opportunity, equality of outcomes and even the effects on health.(Stiglitz, 2013) After the Great Recession of 2008, there has been a great deal of unhappiness aimed at the political systems in Western democracies that seem to implicitly support the growing inequality, as expressed through movements such as Occupy Wall Street and the Los Indignados movements that have arisen throughout the world.Stiglitz (2013) As the discussion has grown, a great deal of attention is being paid to the projected effects as a perceived gap between the well-educated and well off and the unskilled poor grows in the United States as well as globally.(Noah, 2012) Worldwide, the benefits of the rapid pace of recent innovations have accrued to the educated, allowing them to have a labor force participation rate far higher than the less skilled. As a result, the incomes of the more educated workers are rising at a disproportionately high rate, while the wages of the less skilled are shrinking, along with the duration of their work lives.(Firebaugh & Goesling, 2004) Today's income gap is far more systemic than simply a gap between young and old, it demonstrates that there is a very real gap in the skills that workers bring to the workforce, with employment rates falling among the younger and less skilled, while older workers with greater skills are working longer, increasing the inequality in the distribution of income.(Michel, 1991) As the growth of income inequality disproportionately favors the middle and upper income earners and undermines the lower skilled and lower wage workers, the deepening divide in earning capacity and income distribution lays the foundation for individuals and society to experience profound effects well into the future.(Stiglitz, 2013)

The global increase in inequality demonstrates the importance of continued observation and measurement of income inequality, as the effects of inequality leave millions of people worldwide at risk of poverty, shorter life expectancy, less satisfaction, lower consumption and shrinking economic growth which reinforces the cycle.(OXFAM, 2014) While inequality has risen among most developed countries, and especially English-speaking ones, the recent rate of growth in inequality is highest in the United States, where well-educated baby boomers are delaying retirement and working longer at peak earning capacity, while many younger and less-skilled people have simply dropped out of the workforce.(Economist, 2014) In recent years, the labor force participation rate has dropped to 62.8%, the lowest it has been since World War II, at least in part due to recent discouragement of young, less-skilled workers giving up the search for jobs.(Deaton, 2013) In spite of clear evidence of the growing disparity in the US, only 42% of Americans believe that inequality has increased in the past decade when in fact the gap between the richest and poorest Americans is the widest it's been since the 1920s.(Noah, 2012) This lack in public understanding of the true nature of the problem of inequality inhibits the ability of policymakers to counteract the negative economic and social impacts of this growing phenomenon.(Krugman, 2007)

HISTORY OF INEQUALITY

In the United States, the gap between the richest 1% and the remaining 99% has been growing by every statistical measure for about 30 years following a significant period of time during which inequality was stable or decreased consistently.(Firebaugh & Goesling, 2004) Empirical evidence demonstrates that from 1980 to 2010, income inequality in the U.S. increased as evidenced by the fact that the top 20% of earners in the U.S. in 2010 earned nearly half of the total income while the bottom 15% earned less than 4% of total income.(Wiseman, 2013) Some economists point to evidence that inequality is diminishing by some measures, particularly in the area of consumption.(Krueger & Perri, 2005) However, a great deal of evidence suggests that inequality in the United States has been steadily growing since the early 1970's, creating undesirable side effects in a number of areas of economic life.(Stiglitz, 2013)

Economists and policy makers have different views as to the causes, solutions, and the significance of the trend of increasing inequality, which in 2011 helped ignite those feeling left out of the economic growth of the recovery to create the "Occupy" protest movement which was centered around the basic premise of income inequality and it's negative effects on the poor and disadvantaged.(Meyer & Sullivan, 2013a) Education and increased demand for skilled labor are often identified as causes for inequality, although many believe that the causes of inequality's rise are not clear, but that it is essential that contributing factors be identified and appropriate policies implemented to stop the growth and make efforts to reduce income disparities.(Krugman, 2001) Not all economists view income inequality as a looming threat to happiness, health and economic opportunity. Inequality has been described as irrelevant in the face of the social mobility that is unique in the U.S. as people face growing economic opportunities since Americans tend to assume that equality as a core value is always improving.(Deaton, 2013) Some research points to a lack of clarity on the issue of inequality that demonstrates a rush to judge inequality as a social ill, without taking care to really understand the causes and potential

problems that arise from such a condition.(Wilkinson, 2009) Some social scientists even suggest that inequality itself has a positive effect on society, by providing incentives for people to specialize, cooperate and trade.(Welch, 1999) They point out that upward mobility makes inequality a condition that can galvanize action by those seeking to make themselves better off, and that without this incentive, skill, effort and risk-taking would have no effect on wage levels, leaving people without incentives to accrue financial rewards that come through education (Wilkinson, 2009)

As an economic and political phenomenon, income inequality has wide ranging effects on many areas of human happiness, and is often identified as the underlying cause of many negative effects on the economy. Some researchers go so far as to link income inequality to major economic events such as the Great Depression.(Stiglitz, 2013) Views on inequality have been expressed by many public figures, such as Nobel Prize winning economist Robert Shiller who identified rising income inequality as the most important problem faced by the world today, and President Barack Obama who in 2013 identified the widening income gap the "defining challenge of our time".(Economist, 2014) In a recent apostolic exhortation Pope Francis suggested that the solutions to the problems of the poor could not be achieved without rejecting the absolute autonomy of the free markets, implying that only government interference into markets through redistribution of wealth would accomplish the long term goal of reducing poverty and achieving greater income equality.(Francis, 2013) Some social scientists view this growing inequality as a crisis that requires policy solutions, although politicians are divided on what type of policy prescriptions will be most effective.(Noah, 2012) Significant support exists for redistribution of income and wealth, intended to reduce the gap between income levels, while others prefer policies directed at economic growth that will benefit all, although there are some who believe that the wealthy benefit disproportionately from such policies.(Noah, 2012) Regardless of the policy solutions put forward, it is an empirical fact that income inequality has become a focus of those who make economic and political

decisions as a way to seek greater equality in income distribution and as a result achieve policy goals that will benefit those in their respective countries.(McCall & Percheski, 2010)

While income inequality itself does not seem to follow an established pattern of growth or decline, interest in studying income distribution appears to be the highest during times of economic difficulty, when economists and policy makers seek to find answers to difficult policy questions and satisfy people in economic and social distress.(Michel, 1991) For many, it is an automatic assumption that the United States is a place where equality has grown over time, and in many ways that is the case. Equality of human beings has been a clear political goal of United States citizens, as we have seen greater equality as legal barriers to citizenship, voting, and social issues such as marriage and adoption have been removed and more groups than ever experience new levels of equality.(Deaton, 2013) It seems logical to assume that a country that had transformed from an agrarian economy to an industrial economy would be able to maintain the level of income equality that was enjoyed in the early twentieth century, however unlike equality in other areas of American life, income inequality would not follow the same trajectory.(Stiglitz, 2013)

The Gilded Age

The first comprehensive inquiry into income inequality took place in 1915, when Willford I. King, a statistician at the University of Wisconsin published "The Wealth and Income of the People of the United States."(Noah, 2012) At the time, the United States was in the process of displacing Great Britain as the world's economic superpower, and since the U.S. government would not start gathering systematic data until the 1930's, this early study was in part an effort to reassure people that this growing wealth was being distributed equitably among the population.(Stiglitz, 2013) What King actually discovered was that the benefits of economic growth had disproportionately benefited the wealthiest Americans at the time, with the richest 1% in possession of about 18% of the nation's

income.(King, 1915)

The first noteworthy period of measured inequality refers to the time period following the Civil War until the end of the 1930's, when inequality measures showed that the income gap remained fairly stable.(Tregarthen & Rittenberg, 1999) This time period has been referred to satirically as "The Gilded Age," a term coined by Mark Twain to mock the fact that what he viewed as serious social problems were treated as if they were disguised by a thin gold gilding.(Twain & Warner, 1873) The Gilded Age was an era of rapid economic growth that followed the increase in industrialization, and it saw a sharp increase in wages, especially for skilled workers. Despite the increase in the size of the U.S. labor force, real wages grew 60% from 1860 to 1890, and continued to rise in the years following.(Tregarthen & Rittenberg, 1999) As a result, higher wages in America attracted millions of European immigrants seeking higher wages, leading to an era of great wage disparity between skilled and unskilled workers as very poor and relatively unskilled European immigrants came to America seeking better opportunities. Additionally, the Panic of 1873 and the Panic of 1893 interrupted growth as the U.S. experienced the political and economic changes that preceded the Great Depression, which would bring about policies to ease the rather sudden skills and income gap.(Stiglitz, 2013)

The Great Compression

The Great Depression brought about significant changes in the level of income inequality as policies to transfer wealth and protect the income of workers were implemented through the New Deal programs.(Noah, 2012) After incomes started to become more equal in the mid to late 1930's the U.S. experienced a decade of extraordinary compression in the wage structure. The wage structure narrowed by education level, job experience, region, and occupation, and compression occurred within these areas as well as overall.(Stiglitz, 2013) This era of steeply falling inequality became known as the "Great Compression" during which inequality fell as a result of New Deal

taxation and wealth transfers, the strengthening of unions, and new labor regulations which led to a more equal distribution of income.(Goldin & Margo, 1992) This time of adjustment lasted until about 1947, and then as the policy effect leveled off, a period of relative stability followed, which lasted for approximately 30 years.(Goldin & Margo, 1992) During this time, wages in the U.S. remained high due to a number of factors such as the lack of foreign competition, lack of available immigrant labor and strong trade unions. By 1947 more than a third of non-farm workers were unionized, which led to an increase in wages for not only union workers but all workers.(Noah, 2012) Some of the Great Compression can be explained by the effects of World War II and legal changes in labor oversight, but much of the credit belongs to a rapid increase in the demand for unskilled labor at the same time that the amount of educated labor was increasing tremendously. These same factors explain the continued compression until the time of expansion that began in the most recent three decades. The period from 1937 to 1947 was also a time that has been called "the recession within the depression" which may also explain the compression of the wage structure.(Card & DiNardo, 2002) This time period also coincides with the seminal work on inequality in 1955 by Samuel Kuznets, which found that inequality measures demonstrated the same compression pattern and the decrease in inequality that was part of that period of time (Kuznets, 1955)

The Great Divergence

During the 1970's wages stagnated, inflation increased dramatically, and by the end of the decade income inequality had started to rise. Income inequality grew through the 1980's, dipped slightly at the end of the 1990's, and then increased sharply in the early 2000's. This period of time from 1979 to the present day, during which income inequality has steadily increased was labeled by Paul Krugman as the "Great Divergence," a time in which the gap between rich and poor has increased markedly.(Krugman, 2007) From the Kennedy years and into the recession of the early 1980's, it was commonly believed

among policy makers and politicians that the solution to growing inequality was to see economic improvement, following the adage “a rising tide lifts all boats”.(Stiglitz, 2013) However, the rising tide during that time didn’t lift all boats equally, as the late 1980’s and the late 1990’s, saw prolonged periods of economic expansion that led to a disproportionate increase in income for the highest earning Americans. In fact, it was found that from 1980 to 2005, more than 80% of the total increase in American’s income went to the top 1 percent of earners.(Piketty, 2014) Following this increase in income disparity, the early 2000’s experienced slower economic growth than other periods, while the decade saw a 20 percent increase in productivity, with virtually none of the increase in productivity translating into wage growth at middle and lower incomes.(Panousi, Vidangos, Ramnath, DeBacker, & Heim, 2013)

In recent years, research has clearly shown that the evolution of the wage structure has been shaped by technological development and educational advances, particularly those related to the invention of the computer microprocessor and the technology boom of the 1980’s.(Card & DiNardo, 2002) A connection has clearly been established between rising income inequality and increases in demand for high-skilled workers driven by the computer revolution.(Bound & Johnson, 1992) This understanding suggests that the appropriate policy solutions should consist of improvements to access to post-secondary schooling and improved skills training in order for the productivity benefits of a digital economy to be more widely shared.(Bound & Johnson, 1992)

Up until 1979, it appeared that incomes in any industrially advanced country would inevitably become more equal or at least remain stable, a view supported by history up until that point. However, the United States is not the only advanced industrialized democracy where incomes have become more disparate recently. The trend toward inequality is a global one.(Noah, 2012) Globally, income disparity has followed an historical arc similar to that of the United States, with similar periods of expansion and compression of the wage structure, and the sharp increase in inequality that appeared after

1979.(Krugman, 2007) Although the U.S. has had a recent increase in inequality for a variety of reasons, some countries are experiencing some success in reducing inequality.(Stiglitz, 2013)

Income Concentration

The level of concentration of income in America has fluctuated in the same pattern as inequality throughout its history, from high inequality, and therefore high concentration of income in the early 20th Century, to a time of greater relative equality and more disparate incomes, and then moving toward higher levels of inequality in recent years as incomes again become more concentrated.(Krugman, 2007) Since the time that inequality data has been gathered, the U.S. has come full circle. In 1915, the time of economic domination by wealthy industrialists such as the Rockefellers and Carnegies, the richest 1% of Americans earned approximately 18% of all income. By 2007, the earning of the richest 1 percent accounted for nearly 24% of all income.(Noah, 2012) From 1980 to 2007, the top 5 percent of families in the U.S. experienced income gains of 72.7 percent, while the lowest-earning 20% experienced a decrease in real income of 7.4 percent. This contrasts sharply with the 1947-79 period, when all income groups saw similar income gains, with the lowest income group actually seeing the largest gains.(Piketty & Saez, 2007)

The American economy has been distributing increases in GDP per capita disproportionately to the top earners. The share of total income in America going to the top 1% of U.S. households increased from 11.3% in 1979 to 20.9% in 2007, creating a significant concentration of income at higher levels which has an effect on the fundamental inequality among all income groups.(Piketty & Saez, 2007) Recent studies have noted that while current corporate profits are at their highest levels in years, the wage and benefit growth of a vast majority has stagnated as the benefits of economic recovery from the recession of 2007 accrue disproportionately to the top 1%, a group composed

primarily of managers, physicians, administrators, lawyers and financial specialists.(Alvaredo, Atkinson, Piketty, & Saez, 2013)

Global Perspective

Globally, disparities of income and wealth follow a pattern similar to that of the United States, although with different levels of inequality depending on government policies and economic conditions. It is estimated that seven of every ten people on earth today live in nations where inequality has jumped since the 1980s.(Deaton, 2002) Tracking global inequality poses significant challenges for researchers since different nations have different methods of aggregating information about income and wealth, while some nations barely keep any records of such things.(Krugman, 2001)

Research by the Organisation for Economic Co-operation and Development (OECD) has found in 2010 that the richest 10 percent of society in OECD countries received 9.5 times as much market income as the poorest 10 percent, showing an increasing trend from previous years. Among the 34 OECD countries studied, the widest gap between rich and poor within that country was found in Chile, Mexico, Turkey and the United States. In sharp relief to this, Iceland, Slovenia, Norway and Denmark were the most egalitarian in terms of income distribution.(OECD, 2011)

To put global inequality in stark relief, just 85 of the world's billionaires hold as much wealth as the entire bottom half of the world's population, 3.5 billion people in all. From another perspective, the richest global 1 percent currently own 46 percent of the world's wealth. (OXFAM, 2014)

INCOME INEQUALITY AND STANDARD OF LIVING

With the divergence of income undisputed and a majority of the wealth held by the top tier earners, one of the welfare effects to be examined is the impact that inequality has on the standard of living, particularly for those in the lower income brackets. Are those at the top happier or does more income bring with it more stress and greater responsibility? Does a widening income inequality gap signal deeper economic and social issues? These are the salient points driving the discussion of income inequality today. These are the questions this section will seek to find answers to.

The Happiness Index

A common misconception surrounding the overall happiness of a person or nation is the belief that those people or countries with greater wealth have greater happiness. As increasing numbers of studies measuring happiness emerge, it is becoming clear that wealth is by no means an isolated determining factor when measuring happiness.(Oishi, Kesebir, & Diener, 2011) The Organization for Economic Co-operation and Development (OECD)conducts an annual survey that measures a nations happiness using 11 categories. Historically, within the 11 categories the United States has consistently ranked first in the category of income where household net adjusted income and household financial wealth is measured.(OECD, 2011) Health as measured by life expectancy and an overall feeling of wellness is also a strong category for the United States, with a reported 90% of Americans reporting they feel healthy.(OECD, 2011) Among the nine remaining categories, as of 2014, the ranking of the United States is not as strong. As unemployment rates soar to new levels, the overall happiness of the United States declines.(OECD, 2011) Since increasing education leads to lower levels of unemployment, those who join the ranks of the unemployed are often encouraged to stay connected to those within their community and continue to build their skills.(Schneider, 2012) Around 67% of working age US citizens are currently employed, leaving approximately 33% in pursuit of work. In

addition, there have been significant declines in the labor force participation rate, which is at it's lowest level since the mid-20th century.(Milanovic, 2012) Education is integral to happiness by way of its impact on the ten other measurements of happiness. Lower rates of unemployment increase the potential for housing which leads to the formation of communities.(Schneider, 2012) Countries with higher rates of education experience higher rates of civic engagement and greater community strength as citizens feel a greater sense of confidence in their leaders and a greater sense of connection with those in their community. These connections lead to safer neighborhoods since those who feel a connection are less likely to commit crimes.(OECD, 2011) Even the environment is improved through education as those who work seek respite in places with clean air and water. Life satisfaction rounds out the final indicator of a nations happiness with US citizens ranking themselves 7 out of 10 in overall satisfaction.(OECD, 2011)

Effects on Status Seeking Behavior

Part of life satisfaction lies in ones perception of their perceived status within society. To a certain extent, our perception of our worth is tied to our social status at an early age.(Kawamoto, 2009) Enter any Kindergarten classroom and you will witness children vying for a prized toy or calling for a particular tricycle on the playground. These prized possessions may seem trivial to an adult who knows that the tricycles vary only by color, but to a child the social stigma attached with riding the red one as opposed to the green can bring them to tears. As we grow, our desire to consume based on improving our social status grows with us. When the income inequality gap widens, it becomes increasingly difficult for those with lower incomes to consume at a level that allows them to either maintain or gain social status.(Schneider, 2012) When the income inequality gap is reduced or closed altogether as is seen in some undeveloped countries, the need to consume for social gain is reduced and in some cases eliminated altogether.(Ordabayeva & Chandon, 2011)

Consumption Effects of Inequality

The link between consumption and economic growth has been well established with an increase in the rate of consumption indicating an increase in economic progress.(Hoselitz, 1959) Without the ability to pay for consumer goods, demand for such goods will decrease. To maintain stability, most industrialized countries redistribute income through a system of taxation and social spending programs designed to minimize inequality. Less developed countries tend to have greater gaps in income equality since spending in poorer nations centers around non-durable goods such as food.(Hoselitz, 1959) It would seem that by increasing income re-distribution consumption would increase and consequently economic growth would occur. This is not the case as the ability to save, even when income is augmented, is limited in situations where poverty is present.(Krueger & Perri, 2005) In highly developed countries like those found in the United States and Europe, consumption has changed over time. Another example of the ambiguity associated with the income inequality debate is that even as income inequality has increased, the consumption of goods that were once reserved for the wealthy are accessible to consumers in the middle and lower income brackets.(Tuttle, 1960)

Trends in Inequality and Consumption

Whether good or bad, as income inequality has continued to increase since the mid eighties, consumption inequality has also increased.(Meyer & Sullivan, 2013a) While the magnitude of inequality is still debated, recent studies have shown that consumption inequality has risen slightly less than income inequality.(Krueger & Perri, 2005) Trends in income inequality and consumption also vary depending on income levels. Among the lowest income levels, consumption surpassed income as low income earners found ways to earn unreported income. Higher income earners experienced stable income and consumption rates until around 2005 when income inequality began to decrease even while consumption inequality continued to increase.(Meyer & Sullivan, 2013a)

MEASUREMENT AND DETERMINANTS OF INEQUALITY

When the topic of income inequality comes up in conversation within the general public, there is no shortage of opinion as to the cause and cure. Even within academia, scholars disagree about what causes income inequality and what can be done to increase equality. There are also those that disagree as to whether the current perceived trend toward greater inequality is a relevant issue given the economic opportunities present in the majority of developed countries.(Spiegel, 2008) To better understand the controversy surrounding income inequality, it is important to take a closer look at how it is measured before proceeding on to a discussion of causes and cures. Growth in income inequality within developed countries has been the focus of a number of studies conducted in recent years. Emerging from these studies are two main models used in determining changes in income inequality, the Gini coefficient and the Kuznet's curve.(Krueger & Perri, 2005)

Introduction to the models: The Gini coefficient

The Gini coefficient, a measurement of income distribution was developed by Corrado Gini, an Italian statistician in the early 1900's. The Gini coefficient is a range from 0 to 1 where values closer to 0 represent greater equality and values closer to 1 represent greater inequality. The data used to calculate the coefficient comes from a combination of pre-tax income and disposable income after taxes. Using the pre-tax measurement of income inequality leaves out the impact of a regions tax structure on income distribution and leaves only the raw income data.(Fisher, Johnson, & Smeeding, 2012) The second measure, disposable income, measures income inequality in a country after the impact of the tax structure has been felt. The accuracy of the coefficient is dependent on the accuracy of the GDP and income data gathered within the region of study. Since it is often difficult to gather accurate economic data in underdeveloped regions, more information is available for developed countries. When economic data is incomplete or is deemed to be less than accurate, an estimate can still be calculated and

used as a baseline measure for future estimates.(OECD, 2011)

When using the Gini coefficient, there is an expectation of negative correlation due in large part to poorer, less developed nations having fewer economically diverse citizens resulting in a higher index. Critics of the Gini coefficient cite interpretation issues stemming from differences in distribution curves. In nations with a disproportionate number of elderly citizens, or one where the infant mortality rate is low and the birth rate is high, the coefficient must be adjusted in order to reflect the real income distribution for that region. As research in the area of income inequality grows, several variations of the Gini coefficient have emerged to increase the accuracy of the coefficient and reflect demographic extremes.(Meyer & Sullivan, 2013b) Caution must be exercised and accuracy sought when determining a nation's Gini coefficient due to its use in public policy decisions. A country may, for example decide to revisit its tax structure based on results where a lower disposable income coefficient is present to ensure there is not a disproportionate tax burden on a particular demographic. This decision, when based on incomplete or inaccurate information can have a negative impact on individuals within the country or, for that matter the country as a whole.(OECD, 2011)

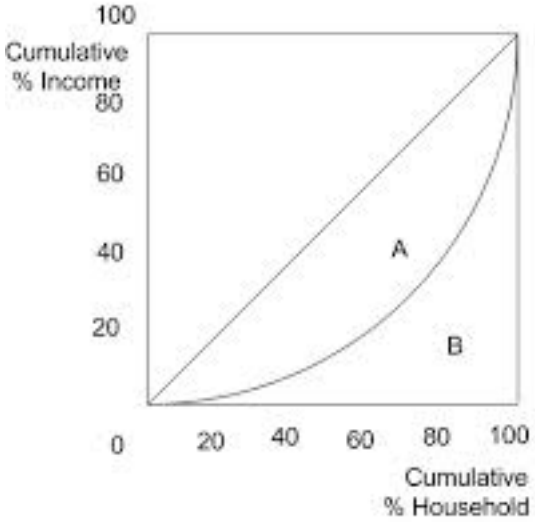

Figure 1. Gini Coefficient

Introduction to the models: Kuznets Curve

As the 1950's turned in to the 1960's, a new hypothesis emerged to explain changes in income inequality. Developed by Simon Kuznets as a graphical representation of his theory, the Kuznets Curve is an inverted u-shaped curve reflecting the theory that within a country, as an economy develops there is a natural cycle of inequality.(Kuznets, 1955) The beginning of the cycle reveals an increase in income inequality however, as the economy continues to develop and incomes plateau, income inequality decreases. Kuznets theorized that in the early stages of economic development, citizens who have money have a greater opportunity to invest, thus increasing their capital and subsequent wealth at a greater rate than those without. At the same time investment opportunities are opening up for those with money, inexpensive labor stemming from an increase in immigration keeps wages low. As a nations economy grows, its citizens begin to develop their human capital, which in turn leads to higher wages and greater opportunity for increased wealth through investment.(Galbraith, 2007) Kuznets believed that this increase in human capital would lead to a period of industrialization. As newer and more efficient ways of production are introduced, labor is driven out of rural industries like ranching and farming as workers go in search of increased wages found in industrialized city centers. This rural exodus then leads to a temporary increase in the average per capita income as population sizes in rural areas decrease while urban areas experience a boom. Increased per capita income then gets distributed through a number of public policy programs and income inequality is reduced. Kuznets believed the process would follow a natural cycle of peaks and troughs as a country experienced periods of economic growth. As time passes, the theory continues to be tested with several scholars emerging with the thought that public policy can influence both the frequency and duration of these periods of income inequality.(Galbraith, 2007)

Causes of Inequality

Although measures of income inequality are continuously scrutinized and improved upon as more data is collected, the causes and, by extension potential cures for income inequality remain topics of heated debates. Of particular interest currently is the widening gap within OECD (Organization for Economic Co-operation and Development) countries like the United States, Canada and parts of Europe.(OECD, 2011) In these economically developed nations where one might expect the income distribution to be relatively equal, the current trend reveals inequality is on the rise. Although some would argue that income inequality is not an issue in countries like the United States with seemingly unlimited opportunities, the causes of a trend still bear a closer look. A factor often thought of when discussing changes in income inequality is education since on average, highly educated or highly skilled populations experience lower levels of income inequality.(Rehme, 2007) Following Kuznets theory, as workers develop their human capital through the accumulation of education or a particular set of skills, they move to higher paying jobs.(Kuznets, 1955) Education can also widen the income gap through the development of new technology.(Gordon & Dew-Becker, 2008) An example of this occurred in the eighties with the invention of the microprocessor. Initially, this new technology was used strictly in highly skilled industries where highly educated workers were needed.(Katz, 1999) While computers are now common place in the work force, their introduction brought with it a rise in income inequality, as the new skills required to work with the new technology separated those with the relevant skills from those without them.(Katz, 1999)

Technology innovation leads us to a second cause of increasing income inequality, changes in labor's share of income.(Gordon & Dew-Becker, 2008) There are several market driven factors associated with the decline in labor's share of income. Globalization continues to increase, causing trade barriers to fall. With this openness, countries that are highly developed with higher labor costs are able to outsource to countries with lower labor costs.(Jacobson & Ochino, 2012) In addition to outsourcing, changes in labor

intensive sectors have led to a decrease in the bargaining power of unions.(Jacobson & Ochino, 2012) Changes in technology have, in many cases maintained if not increased productivity while decreasing the costs associated with labor. With no workers to unionize, the overall bargaining power of unions has declined.(Jacobson & Ochino, 2012) Instability can also lead to a increase in income inequality. Workers earning relatively high wages who have developed a skill have less mobility than those who are unskilled or in the process of developing a skill. When those skilled workers are no longer needed, the income gap widens as they must now develop a new set of skills to match labor demand in another industry.(Gordon & Dew-Becker, 2008) There is perhaps no better example of this than the auto industry which saw workers laid off en masse after technological advances rendered their skills all but useless. With an increase in unemployment, there is an expectation that migration will increase as workers travel in search of increased employment opportunities. In the United States that was true through the 1970's when 3.5% of the population moved from one state to another.(Noah, 2012) Despite increasing unemployment rates, by 2012 migration between states fell to 1.7%. Households no longer went in search of economic opportunity, opting instead to stay where they were.(Noah, 2012) Geographic stagnation exacerbated income inequality as the newly unemployed pulled down the average income.

Although not listed as a cause of income inequality, consumption inequality is often studied in tandem with income inequality. The goal of such studies is to determine whether consumption inequality rises at a similar rate to income inequality when measured within differing income levels.(Lepetyuk & Stoltenberg, 2013) By looking at consumption inequality, the effects of income inequality on the welfare of the average household becomes clearer.(Krueger & Perri, 2005) If an increase in income inequality does not reveal an increase in consumption inequality, an explanation may be found in expectations of future income.(Krueger & Perri, 2005) A final cause of increasing income inequality comes from the source for such dramatic growth amongst the top earners.

Approximately half of the income increase for those at the top came not from salary but from the increase in benefits associated with their employment. These benefits include stock options, healthcare packages and performance based bonus options.(Gordon & Dew-Becker, 2008) This may be one reason why those in the top earning tier have a life expectancy almost double that of those in the lowest tier.(Gordon & Dew-Becker, 2008) Increased income allows for greater access to environmental and lifestyle choices that contribute to longer lives.

INCOME INEQUALITY AND LIFE EXPECTANCY AT BIRTH

Shrinking income and declining living standards are often accompanied by many other social problems such as homelessness, malnutrition, drug abuse, deterioration of family life, and other situations which can harm public health and life expectancy.(Stiglitz, 2013) In the decades since "The Great Divergence", there has been a great deal of inquiry into the relationship of income inequality and various issues surrounding population health.(Rodgers, 1979) For many years it was believed that public health was primarily determined by economic growth and it's positive effects on sanitation, technology and other factors. However, more recently there has been an interest in identifying the effects on income inequality and the effects that it has on population well-being, including life expectancy and other measures of public health.(Shmueli, 2004) Interest in measuring public health is growing, and with it the impact of conditions such as income, education, and technology.This new interest is generally a search for policy solutions to problems in the area of public health, but the search for empirical data to determine the specific effects of variable change can provide valuable insight into which factors most heavily influence outcomes such as mortality.(Rodgers, 1979) Some evidence of the correlation between life expectancy changes and inequality can be seen in U.S. statistics today. American women today have the lowest life expectancy of women from any of the advanced nations, a statistic that corresponds with the sharp increase in inequality that began with the Great Divergence and spiked in 2008 during the Great Recession.(Stiglitz, 2013) An apparent parallel occurred in Russia after the fall of communism, when incomes fell dramatically and data showed an equally dramatic fall in life expectancy. Some researchers see a strong parallel between the five year decline for life expectancy for white women in the U.S. and the seven year drop for Russian men in the years after the collapse of the Soviet Union.(Tavernese, 2012)

Model design

This paper follows a study conducted by researchers who challenged the idea that the relation between income inequality and life expectancy had disappeared since the 1980's.(DeVogli, Mistry, Gnesotto, & Cornia, 2005) The study examines cross sectional data from 20 regions of Italy to consider the research question, and then generalizes the results to 21 other industrialized countries. In order to evaluate the same research question in the United States, time series data was used, and a linear model was developed to evaluate the relationship between the independent variables of inequality (as measured by the Gini Coefficient), Educational attainment, and Per Capita Income, against the dependent variable of life expectancy at birth. Rather than generalizing to other countries, as DeVogli did, we will evaluate the data for the United States only. Because many researchers believe that the effect that income inequality has on life expectancy can be explained by the other variables of educational attainment and GDP per capita, several regression models will be evaluated. The expectation is that the results will mirror those of the Italian study, that income inequality is negatively correlated with life expectancy at birth, and that educational attainment and per capita income are both positively correlated with life expectancy at birth, however the analysis method varies and the sample size is slightly larger.(DeVogli et al., 2005)

A linear regression model will be used, examining the relationships between dependent and independent variables both individually and jointly. The specific model used will be:

$$y_t = \beta_0 + \beta_1(Gini) + \beta_2(PerCapitaIncome) + \beta_3(EducationalAttainment) + \varepsilon_t$$

Where y_t is Life expectancy at birth, measured in years, Gini is the calculated Gini index, Per Capita Income is actual income levels calculated, and Educational Attainment is percentage of Americans over age 25% who have received some tertiary schooling.

Since the DeVogli study predicts that 43% of the change in Life Expectancy at Birth can be predicted by the Gini coefficient alone, a simplified model will be used to evaluate

the effects of just the Gini coefficient on life expectancy:

$$y_t = \beta_0 + \beta_1(Gini) + \varepsilon_t$$

Analyzing the results of these regression models is expected to yield results comparable to those of the DeVogli study, although the fact that it is time series analysis rather than cross sectional analysis may yield some different results.

Variables

The variables chosen will be examined in a variety of interactions, and are expected to demonstrate the previously established relationship between life expectancy at birth and various measures of income inequality. The time period of 1990 to 2013 will be examined, with annual data being evaluated.

Life Expectancy at Birth. Life expectancy at birth compares the average number of years to be lived by a group of people born in the same year. Life expectancy at birth is also a measure of overall quality of life and summarizes the mortality at all ages.(CIA, 2014) For the U.S., life expectancy is expressed numerically, with a figure gathered as an average for each year from 1990 to 2013. An Augmented Dickey Fuller test reveals that the variable of Life Expectancy at Birth is non-stationary at level, and stationary at first-difference.

The Gini Coefficient. The Gini coefficient measures the inequality among values of a frequency distribution, specifically the distribution of income. A Gini coefficient of zero expresses perfect equality, where all values are the same indicating that everyone receives the same income. A Gini coefficient of one expresses maximum income inequality which would be a situation where one individual receives all of the income for a nation. A value greater than one may occur if some people contribute negative income or wealth. For large groups, values close to or above 1 are highly unlikely.(Gini, 1936) An Augmented Dickey Fuller test reveals that the variable of Gini Coefficient is non-stationary at level, and stationary at first-difference.

Per Capita Income. Per capita income is a measure of average income, a measure of wealth of the population of a nation, and is often used to measure a country's standard of living. In the United States it is expressed in terms of the dollar, and it is a useful measure because it is widely recognized, easily calculated from available data, and produces a useful statistic that helps a country to track growth and know their development status.(Tregarthen & Rittenberg, 1999) An Augmented Dickey Fuller test reveals that the variable of Per Capita Income is non-stationary at level, and stationary at first-difference.

Educational Attainment. Educational attainment for this study is measured as the percentage of Americans that have achieved any tertiary education. Tertiary education broadly refers to all post-secondary education, which includes a variety of training that includes public and private universities, colleges, technical training institutions, community colleges, vocational education institutions, nursing schools, research laboratories, distance learning centers, and many more institutions that support the production of the higher-order capacity necessary for economic development and growth. Changes in educational attainment have been shown to have a direct relationship with life expectancy.(DeVogli et al., 2005) An Augmented Dickey Fuller test reveals that the variable of Educational Attainment is non-stationary at level, and stationary at first-difference.

Results

The results from the first model which includes all independent variables of Gini Coefficient, Per Capita Income and Educational Attainment yielded the results found in Figure 2.

Dependent Variable: LEAB
Method: Least Squares

Sample: 1 24
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	74.57854	5.184020	14.38624	0.0000
GINI	2.397691	11.51239	0.208270	0.8371
PCI	0.000183	3.21E-05	5.699242	0.0000
EDUC	-0.088708	0.063120	-1.405380	0.1753

R-squared	0.925669	Mean dependent var	77.04167
Adjusted R-squared	0.914520	S.D. dependent var	1.267629
S.E. of regression	0.370617	Akaike info criterion	1.003718
Sum squared resid	2.747144	Schwarz criterion	1.200061
Log likelihood	-8.044620	Hannan-Quinn criter.	1.055808
F-statistic	83.02244	Durbin-Watson stat	1.911419
Prob(F-statistic)	0.000000		

Figure 2. Regression Output - All Variables

The regression results in Figure 2 show that income inequality as expressed by the Gini coefficient has a positive correlation with life expectancy, although the independent variable of the Gini coefficient is not significant, which is inconsistent with the expected outcome. In general, it is believed that inequality will have a strong negative correlation with life expectancy, which is not the result of this regression. This could possibly be explained by the different method of analyzing the data, using time series data rather than cross-sectional data, as well as the specific type of data gathered. The positive correlation between the Gini coefficient and life expectancy could be explained by the fact that as the Gini coefficient increases, as it has in the U.S. during the time period of 1990 to 2013, there was also an increase in the average life expectancy for U.S. residents. The increase in the Gini coefficient indicates that income inequality in the U.S. was getting closer to 1, which is a state of total inequality. The DeVogli results indicate a strong negative correlation between income equality and life expectancy.

The relationship between per capita income and life expectancy is a positive one, with the t-statistic indicating that the relationship is significant. This is an expected

outcome, as previous studies have found strong positive relationships between individual income levels and life expectancy.(DeVogli et al., 2005) The expected positive relationship between educational attainment and life expectancy was not found in this regression. Educational attainment was measured as the percentage of the population who had achieved any tertiary education, whether completed or not. This may explain the difference, as in previous studies education was usually measured as the percentage of people who had received a high school diploma.(DeVogli et al., 2005) In this regression, educational attainment had an inverse relationship with life expectancy, but the relationship was not significant. These incongruous results could be a result of the different methods and types of data used for the regression. Additionally, the adjusted R^2value of .9256 shows that nearly all of the changes in life expectancy can be explained by the combination of the three variables examined. The highly significant F statistic of 83.022, with a probability of 0.0000 also indicates that the model fits the data well, corroborating the R^2value.

Checking the stationarity of the residual it is clear that the error term of the multiple variable regression is stationary, so the regression can be run without first-differencing the non-stationary variables with valid results.

The data for the simple regression shows that the Gini coefficient by itself was highly significant in it's relationship to life expectancy, and changes in the Gini coefficient explained 70.4% of the variation in life expectancy at birth, as seen in Figure 3. The predictive value is significantly greater than the 43% predicted by the study followed, but can probably be understood by the difference in methods and data used. When per capita income and education were introduced to the model, the fit of the regression model improved, as shown by the increase in the adjusted R^2 from 70.4% (Gini coefficient only) to 92.5% (all variables). When all three explanatory factors were included in the multiple regression analysis the β coefficient for per capita income was not significant while the coefficient for income inequality remained strongly associated with life expectancy, These

results clearly demonstrate, as in the original study, that education plays a significant part in explaining the relation between income inequality and life expectancy.(DeVogli et al., 2005) The residual term for the single regression model was found to be stationary, eliminating the need to first-difference the non-stationary variables of Gini coefficient and Life Expectancy at Birth.

Dependent Variable: LEAB
Method: Least Squares

Sample: 1 24
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	41.36728	4.935455	8.381656	0.0000
GINI	77.59519	10.73051	7.231264	0.0000

R-squared	0.703868	Mean dependent var	77.04167
Adjusted R-squared	0.690407	S.D. dependent var	1.267629
S.E. of regression	0.705322	Akaike info criterion	2.219331
Sum squared resid	10.94455	Schwarz criterion	2.317502
Log likelihood	-24.63198	Hannan-Quinn criter.	2.245376
F-statistic	52.29118	Durbin-Watson stat	1.177368
Prob(F-statistic)	0.000000		

Figure 3. Regression Output - Gini Only

Generally, the U.S. results, while in some ways consistent with the results obtained by DeVogli, show only some of the expected relationships between the explanatory variables and the explained variable of life expectancy at birth. The primary factor that explains the difference in the U.S. results from the results of the original Italian study is the fact that in Italy, health care and education are publicly funded, with practically free access to both services for all citizens, so the association between income inequality and health in such a country will naturally be stronger than that of the United States.(DeVogli et al., 2005)

CONCLUSION

After examining the historical trajectory of income inequality in the United States, patterns emerge that make it clear that inequality is connected to a variety of social and economic conditions. It is clear to see that there was a significant change in inequality that arose in the 1980's with the advent of the computer age, and that inequality has a great deal to do with the skills required to be effective in a new technological age. Income inequality has a variety of effects on how individuals view their ability to be happy and feel satisfied with the consumption that their income affords them. Data gathered in many categories assesses the life satisfaction of individuals which in turn has an effect on many aspects of community life. Inequality has an impact on the consumption patterns of nations, with patterns of consumption that favor non-durable goods in poorer (and therefore more unequal) countries, while richer countries tend to produce and consume more durable goods which leads to greater economic growth and well-being.

The measurement of inequality consists of fairly objective measures, primarily the Gini coefficient, which assigns an index value from 0 to 1 indicating the overall level of income inequality within a nation. The Gini coefficient provides an effective way to compare income distribution among countries, as well as a way to observe changes and trends in income equality.

Identifying causes of inequality is an important goal of many nations, as efforts to find political remedies to resolve issues of inequality are sought. Understanding the conditions and policies that can have an effect on inequality provides nations with valuable policy tools to effect a more equitable distribution of income through political intervention.

Making the connection between income inequality and public health, particularly the measure of life expectancy at birth allows an objective measure of the effects that various factors have on income inequality. The policy implications of the study of income inequality, education, per capita income and life expectancy make it clear that efforts to

promote public health will require policies that promote economic development and increase education attainment, both policies that will serve to reduce economic inequality.(DeVogli et al., 2005)

A better understanding of the history, causes and policy implications of various issues surrounding income inequality can provide a valuable road map for policy makers to find solutions that can allow for greater economic growth, better public health, and a more egalitarian distribution of national income.

References

Alvaredo, F., Atkinson, A. B., Piketty, T., & Saez, E. (2013). The top 1 percent in international and historical perspective. *Journal of Economic Perspectives*, *27*(3), 3-20.

Bound, J., & Johnson, G. (1992, June). Change in the structure of wages in the 1980's: An evaluation of alternative explanations. *The American Economic Review*, *82*(3), 371-392.

Card, D., & DiNardo, J. E. (2002). Skill-biased technological change and rising wage inequality: Some problems and puzzles. *Journal of Labor Economics*, *20*(4).

CIA. (2014, May). *Country comparison: Life expectancy at birth.* The World Factbook. Retrieved from `https://www.cia.gov/library/publications/the-world-factbook`

Deaton, A. (2002). Commentary: The convoluted story of international studies of inequality and health. *International Journal of Epidemiology*, *31*, 546-549.

Deaton, A. (2013). *The great escape: Health,wealth, and the origins of inequality*. New Jersey: Princeton University Press.

DeVogli, R., Mistry, R., Gnesotto, R., & Cornia, G. A. (2005, February). Has the relation between income inequality and life expectancy disappeared? evidence from italy and top industrialised countries. *Journal of Epidemiology and Community Health*, *59*(2), 158-162.

Economist. (2014, May). *A billion shades of gray.* The Economist.

Firebaugh, G., & Goesling, B. (2004, September). Accounting for the recent decline in global income inequality. *American Journal of Sociology*, *110*(2), 283-312.

Fisher, J. D., Johnson, D. S., & Smeeding, T. M. (2012, December). Measuring the trends in inequality of individuals and families: Income and consumption. *American Economic Review*.

Francis. (2013, November). Evangelii gaudium: Apostolic exhortation on the

proclamation of the gospel in today's world. *Apolstolic Exhortations*.

Galbraith, J. (2007, May). Global inequality and global macroeconomics. *Journal of Policy Modeling*, *29*(4), 587-607.

Gini, C. (1936). On the measure of concentration with special reference to income and statistics. *Colorado College Publication*(208).

Goldin, C., & Margo, R. A. (1992, February). The great compression: The wage structure in the united states at mid-century. *Quarterly Journal of Economics*, *107*(1), 1-34.

Gordon, R. J., & Dew-Becker, I. (2008, May). Controversies about the rise of american inequality: A survey. *National Bureau of Economic Research Working Paper*(13982).

Hoselitz, B. F. (1959, December). Does income equality affect growth? *Challenge*, *8*(3), 53-57.

Jacobson, M., & Ochino, F. (2012, February). *Behindthe decline in labor's share of income.* Federal Reserve Bank of Cleveland. Retrieved from `www.clevelandfed.org/research/trends/2012/0212/01gropro.cfm`

Katz, L. (1999, May). *Technological change, computerization,and the wage structure.* Harvard University and the National Bureau of Economic Research.

Kawamoto, K. (2009, May). Status-seeking behavior, the evolution of income inequality, and growth. *Economic Theory*, *39*(2), 269-289.

King, W. I. (1915). *The wealth and income of the people of the united states*. New York: The Macmillan Company.

Krueger, D., & Perri, F. (2005). Does income inequality lead to consumption inequality? evidence and theory. *Center for Financial Studies Working Paper*(2005/15), 1-52.

Krugman, P. (2001, December). *The rich, the right, and the facts: Deconstructing the income distribution debate.* The American Prospect. Retrieved from `www.prospect.org`

Krugman, P. (2007). *The conscience of a liberal*. New York, NY: WW Norton and Co.

Kuznets, S. (1955, March). Economic growth and income inequality. *The American Economic Review*, *45*(1), 1-28.

Lepetyuk, V., & Stoltenberg, C. A. (2013, April). Reconciling consumptkion inequality with income inequality. *Federal Reserve Bank of Minneapolis Working Paper*(705).

McCall, L., & Percheski, C. (2010). Income inequality: New trends and research directions. *Annual Review of Sociology*, *36*, 3299-347.

Meyer, B. D., & Sullivan, J. X. (2013a, May). Consumption and income inequality and the great recession. *The American Economic Review*, *103*(3), 178-183.

Meyer, B. D., & Sullivan, J. X. (2013b, April). Consumption and income inequality in the u.s. since the 1960's. *The American Economic Review*.

Michel, R. C. (1991). Economic growth and income inequality since the 1982 recession. *Journal of Policy Analysis and Management*, *10*(2), 181-203.

Milanovic, B. (2012). *The haves and the have-nots: A brief and idiosyncratic history of global inequality*. Basic Books.

Noah, T. (2012). *The great divergence*. New York: Bloomsbury Press.

OECD. (2011). An overview of growing income ineinequality in oecd countries: Main findings. *Divided We Stand: Why Inequality Keeps Rising*, 21-45.

Oishi, S., Kesebir, S., & Diener, E. (2011, September). Income inequality and happiness. *Psychological Science*, *22*(9), 1095-1100.

Ordabayeva, N., & Chandon, P. (2011, June). Getting ahead of the joneses: When equality increases conspicuous consumption among bottom-tier consumers. *Journal of Consumer Research*, *38*(1).

OXFAM. (2014, January). *Working for the few: Political capture and economic inequality.* Oxfam Briefing Paper. Retrieved from `www.oxfam.org`

Panousi, V., Vidangos, I., Ramnath, S., DeBacker, J., & Heim, B. (2013, March). Inequality rising and permanent over past two decades. *Brookings Papers on Economic Activity*.

Piketty, T. (2014). *Capital in the twenty-first century*. Cambridge, MA: Belknap Press.

Piketty, T., & Saez, E. (2007). How progressive is the u.s. federal tax system? a historical and international perspective. *Journal of Economic Perspectives*, *21*(1), 3-24.

Rehme, G. (2007, August). Education, economic growth and measured income inequality. *Economica*, *74*(295), 493-514.

Rodgers, G. B. (1979, July). Income and inequality as determinants of mortality: An international cross-section analysis. *Population Studies*, *33*(2), 343-351.

Schneider, S. M. (2012, May). Income inequality and its consequences for life satisfaction: What role do social cognitions play? *Social Indicators Research*, *106*(3), 419-438.

Shmueli, A. (2004). Population health and income inequality: new evidence from israeli time-series analysis. *International Journal of Epidemiology*, *33*(2), 311-317.

Spiegel, U. (2008). Income inequality vs. standard of living inequality. *The American Economist*, *52*(1), 49-57.

Stiglitz, J. E. (2013). *The price of inequality*. New York, NY: W.W. Norton & Company.

Tavernese, S. (2012, September). *Life spans shrink for least-educated whites in the u.s.* The New York Times. Retrieved from `http://www.nytimes.com/2012/09/21/us/life-expectancy-for-less-educated-whites-in-us-is-shrinking.html`

Tregarthen, T., & Rittenberg, L. (1999). *Macroeconomics* (2nd ed.). New York, NY: Worth Publishers.

Tuttle, F. W. (1960, June). Standard of living. *Social Science*, *35*(3), 184-189.

Twain, M., & Warner, C. D. (1873). *Gilded age: A tale of today*. www.almostsunday.org: Almost Sunday Publishing.

Welch, F. (1999, May). In defense of inequality. *The American Economic Review*, *89*(2), 1-17.

Wilkinson, W. (2009). Thinking clearly about economic inequality. *Cato Institute Policy*

Analysis(640).

Wiseman, P. (2013, September). *Richest 1 percent earn biggest share since '20s.* AP News. Retrieved from http://bigstory.ap.org/article/top-1-percent-took-record-share-2012-us-income (Wiseman)

Appendix: Data Sources

Life Expectancy at Birth

Databank.worldbank.org/data/views/reports/tableview.aspx
World development indicators
Life expectancy at birth; total (years)
Annual data 1990-2013

The Gini Coefficient

U.S. Census Bureau - Historical Data
Income tables: Income inequality Before Tax and Transfers
Table F4 (Total)
https://www.census.gov/hhes/www/income/data/historical/inequality/

Per Capita Income

FRED - Personal income per capita
U.S. Department of commerce; Bureau of Economic Analysis
Annual data 1990-2013
Not seasonally adjusted

Educational Attainment

FRED - Barro-Lee: Population age 25+ with Tertiary Schooling
World Bank Data
Total (Incomplete and completed tertiary) for the United States
Annual data 1990-2013
Not Seasonally adjusted; Expressed as a percent of the total population