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Defining and Determining National Economic Success

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A Project Presented to  
the Faculty of the Undergraduate  
College of Arts and Letters  
James Madison University

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in Partial Fulfillment of the Requirements  
for the Degree of Bachelor of Arts

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by Nicole Regina Clarke

May 2014

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Accepted by the faculty of the Department of Political Science, James Madison University, in partial fulfillment of the requirements for the Degree of Bachelor of Bachelor of Arts.

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## **Abstract**

Economic success is the goal of many different countries across the world. Yet there is no clear-cut consensus regarding how to accomplish or even measure economic success. This thesis looks at two different measurements of economic success, gross domestic product per capita and resource depletion (as an indicator of sustainable development), along with seven possible causes of economic success in order to find out whether or not there are any clear paths to economic success. Using different data sets, we look at how defining economic success two different ways could help clarify whether possible causes of economic success vary in accord with the nature of the economic success at issue.

These differences in definition resulted in some of the causes of economic success to be significant in some cases and not in others. Some of the relationships materialized as hypothesized others did not appear as expected or no relationship appeared at all. We suggest that to further research in this area many of the more broad causes could be broken down further in order to see whether specific policies have implications for economic success.

## Introduction

Economic success is crucial in that it affects the lives of every single person on the planet. Some people are better off due to economic success while some are worse off due to a lack of it. On a national level, when a country achieves economic success, typically the population of that country is better off (financially at least). That is why many countries strive to achieve economic success for their citizens. Citizens too consider it to be of importance and in democratic countries list the economy as one of the main issues that they consider in elections.

There is a lot of research out there currently on possible causes of economic success. However, all of this research taken together is inconclusive. It is indecisive to the point where the definition of economic success varies from researcher to researcher. Two such measurements of economic success are resource depletion (for the sustainable development view of economic success) and gross domestic product per capita. Gross domestic product per capita is the most commonly used indicator for economic success. The gross domestic product part is defined as the market value of all goods and services produced in a country during a given year (DeLeon). Gross domestic product per capita is simply the gross domestic product of a country divided by that country's population (*GDP Per Capita* 2013). Resource depletion is considered to be one of the indicators of economic success when taking into account the economic success of today along with the economic success of the future. It tracks the amount of resources being depleted (Magdoff 2013) and considers a lower number of depleted resources (and thus more resources conserved) as the goal of economic success.

Defining economic success and determining the causes behind economic success is incredibly important to every country and every citizen in the world. Defining economic success allows countries to better determine which policies to put in place in order to achieve their



greater economic success according to their definition. For example, a country with a sustainable development definition of economic success will want to implement policies that allow the country to better conserve resources for the future. Determining the causes of economic success could allow a country to better formulate policies that would allow them to achieve economic success. For example, if literacy rates were found to have a positive correlation with gross domestic product per capita then it might benefit a government to invest in its' education systems in order to increase economic success.

In order to look at these possible causes with different definitions of economic success a quantitative analysis was run. The first chapter details the theories behind causes of economic success and the pros and cons of using various indicators for economic success. Chapter two provides an overview of the methodology used to run this analysis. The third chapter contains the results of this analysis. Chapter four looks at the problem of endogeneity between health and economic success. The last chapter consists of conclusions from the analysis along with thoughts on where research in this area could be furthered.

## Literature Review

### *Introduction:*

In reviewing the prior research done on what makes a country economically successful there are a multitude of (sometimes contradicting) theories on what spurs and what deters economic growth. These various theories incorporate a number of categories including factors that promote the growth of human capital and thus overall economic growth, factors that promote capital flow into the economy, political factors, cultural factors, and geographical factors. These theories differ in their thoughts on the proponents/detriments of economic growth in addition to how they define and measure economic growth.

One of the first theories behind economic growth was the Harrod-Domar Growth Model (*Harrod*). The Harrod-Domar model suggests that economic growth is positively correlated to the level of savings within a state's economy. In other words, the more savings a country has the more likely it is to be economically well off. The logic behind this theory is that savings within an economy will eventually turn into investment in either the country's capital or its labor. In the model, investment in an economy would lead to a shift outward of the production possibilities frontier which would indicate an increase in the economic growth of that country. The Harrod-Domar model uses gross domestic product per capita as an indicator of the overall growth of an economy.

The later developed Solow Growth Model is an extension of the Harrod-Domar Growth Model (Solow 1956). According to Solow in his *A Contribution to the Theory of Economic Growth*, output or production is a result of three factors which are labor, capital, and technology. Investment is included in this model as a portion of the total output. According to the Solow

Growth Model, the capital within an economy is based on the difference between savings and the rate of depreciation combined with the overall growth in the labor force of a state. This model expands on the Harrod-Domar growth model by suggesting that economic growth is based on more than just the savings level and the amount of investment within an economy.

Over time, the Solow Growth Model further evolved into the Traditional Paradigm Growth Model (Brunton 2013). Economic growth or an increase in productivity, according to the Traditional Paradigm, is a result of an increase in labor, capital, natural resources, entrepreneurial activity, or technology. Savings are still considered to be a portion of outcome and are expected to turn into investment over time. This model is different from the previously mentioned models in that it considers more factors to be causes of economic growth.

These theories are just three of a multitude of theories on economic growth. Theories on economic growth have continued to evolve and differ. The previously mentioned theories bring up some of the possible causes of economic growth that will be further explored throughout this thesis. While many theories measure economic growth using gross domestic product per capita other theories sometimes differ in the means and considerations that they use as a basis for measuring economic growth.

#### *Gross Domestic Product per Capita:*

Throughout all of the three previously mentioned theories on economic growth, gross domestic product per capita was the commonly used indicator for country level economic success (James 2012). Gross domestic product is defined as the market value of all goods and services produced in a country during a given year (De Leon). Furthermore, gross domestic product per capita is the gross domestic product of a country divided by the same country's

population (*GDP Per Capita 2013*). Throughout a lot of the current research on economic growth, gross domestic product per capita is used as a comparison tool for economic performance across countries (*International 2012*).

Gross domestic product per capita is commonly used as an indicator of economic growth because it is a measure of the average standard of living across the population of a state (Madsen 2006). This indicator is also used to study and compare the economic growth of various countries over time. Seeing whether a state's economic growth is consistently growing or receding allows policy makers to get an idea of which policies contribute to economic growth and which policies do not contribute to economic growth. Another advantage of using gross domestic product per capita is that it is widely used as an indicator of economic success in cross-national studies because the population figures in the denominator provide a common baseline for comparing the size of gross domestic product from one country to the next.

Despite its common usage various parties have pointed out some flaws of using gross domestic product per capita as an indicator of economic success. One of the problems with gross domestic product per capita is that calculations of gross domestic product can vary in the way that the indicator is calculated (James 2012). For example, some calculations may take black markets into account (which would be difficult) while others may not. This means that there is some inconsistency in the way that the gross domestic product part of gross domestic product per capita is measured across studies.

Secondly, many have argued that gross domestic product per capita does not take into account some factors that may be a part of economic growth (Harvie 2009). For example, gross domestic product per capita does not take into account the average amount of hours a laborer

works in a week. Some have suggested that economic prosperity might partly be due to the fact that workers in some countries work longer hours than workers in other countries. Those that work longer hours are more likely to produce more output thus causing a country's economic success levels to be higher.

Thirdly, gross domestic product per capita does not take into account the actual income distribution (Madsen 2006). In some cases, a large amount of wealth may be concentrated in the hands of a few. Thus, gross domestic per capita could indicate that the average citizen is doing well even if they actually are impoverished. An impoverished population is unlikely to maximize its production level and thus unlikely to maximize its economic success.

Fourthly, some who favor a more sustainable view of development argue that gross domestic product per capita ignores/does not take into account the destruction of the environment and the depletion of natural resources (De Leon). The idea of a sustainable economy focuses on the effects of the economy on climate change, global warming, resource depletion and other economic environmental issues (McKillop 2013). While those who favor theories on sustainable economies believe that growth is possible, they argue that by ignoring environmental issues one is limiting the possible future growth of the economy. One of the first people to express such a view was Thomas Malthus. Malthus believed that overpopulation would put pressure on global resources and would consequently result in a decrease of economic growth and an increase in famine, plague, etc. Today, while overpopulation is still considered a threat to environmental/economic stability, followers of sustainable development tend to focus on more environmentally related issues. Their criticism of gross domestic product per capita is that it does not take into account these environmental problems and thus they consider it to not be a good measure of growth between countries.

Finally, some believe that gross domestic product per capita should not be equated with the overall well-being of a country (Harvie 2009). Gross domestic product does not take into account factors like economic security, personal safety, the health of the population, etc. (De Leon). Therefore, while the people might have a high gross domestic product per capita they still might have a low lifespan, poor health, or a lack of security. Despite these criticisms gross domestic product per capita has remained the most widely used indicator of economic success.

*Human Development Index:*

One proposed alternative indicator of economic success is the Human Development Index (Dipietrom 2006). The Human Development Index seeks to include some of the factors that gross domestic product per capita has been criticized for not including. One of the factors that the Human Development Index incorporates is the education level of a country's population (*Human* 2011). The Human Development Index incorporates education by taking the mean average years of schooling that an adult at age 25 is expected to have received and combining that with the expected average years of schooling for children entering school. The measurement of expected years of schooling is taken by estimating the enrollment at all levels of education combined with the number of children at each level of education. The expected years of schooling is capped at 18 years of schooling.

Another measurement that the Human Development Index uses is the current average life expectancy at birth for each state. The life expectancy value has a minimum of 20 years and a maximum of 83.57 years. Life expectancy at birth is used as an indicator of the health of a population.

Finally, the human development index has a national wealth component reflecting gross domestic product per capita. The goalpost for the minimum income is \$100.00 (incorporating purchasing power parity<sup>1</sup>) and the maximum is \$87,478.00 (incorporating purchasing power parity). However, like gross domestic product per capita the Human Development Index also has a variety of limitations. For example, the Human Development Index does not take into account factors like the overall safety of a population. While the Index's use has become more popular, gross domestic product per capita has remained the most commonly used indicator to measure economic prosperity.

### *Sustainable Development:*

Recently, a lot of attention has been placed on sustainable development theories of economic growth. These theories look at the harm that some of the current economic growth policies have done to the environment and have decided that the definition and the goal of economic growth should be reformed to reflect the welfare of future generations (Trica 2013). Followers of this theory believe that economic growth is worth pursuing in cohesion with environmental protection. They focus on a lot of current possible detriments to future economic growth. Such detriments include a lack of or loss of biodiversity and the shrinking amount of fresh water resources.

In *How Much Real Cost Has China Paid for Its Economic Growth* the authors look at potential detriments on future economic growth in China due to China's current insufficient

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<sup>1</sup>Purchasing power parity is a ratio that allows different currencies to be expressed in the same unit of currency (*International*). The numerator is the number of country A's national currency units needed to purchase a basket of goods and services in country A and the denominator is the number of country B's currency units needed to purchase the same basket of goods and services in country B. Country B's currency is the base currency in which country A's currency value will be expressed.

environmental protection policies (Minjun 2011). China currently faces a number of environmentally related problems including resource depletion, pollution, and ecological decay. In 2005, the authors found that the environmental costs of these problems were equal to 13.5% of China's gross domestic product. 13.5 percentage points constitute a figure that was higher than the rate of gross domestic product growth. They also found that the amount of costs has been increasing over time. As a result they predicted that these costs are a drag on the Chinese economy currently and will continue to be so in the future.

Natural resource depletion is one issue that followers of sustainable development focus on (Mudakkar 1995). They argue that by measuring natural resource depletion one can track the progress made in moving towards a more environmentally friendly economic growth. The fewer resources being depleted the more environmentally friendly economic growth is considered to be. One such resource is phosphate which is commonly used as a fertilizer (Magdoff 2013). Experts predict that if current usage rates of phosphate remain constant than the world's phosphate deposits will be used up by the end of the century. This is troubling because as a fertilizer, phosphate is critical in food production. While most resources do not face immediate exhaustion, the rates of resource usage continue to increase and thus cause concern.

Those who favor sustainable development theories favor moving towards a more "green" economy as a means of accomplishing economic growth (Trica 2013). However, it is difficult to limit these environmental issues in both developing and developed countries. This is due to the cost associated with these changes. The cost represents money that could have been spent elsewhere in the private or public sectors. Those who favor sustainable development argue that gross domestic product alone does not accurately represent economic growth because it does not consider the implication of environmental issues on future growth. However, others criticize this



view because they claim that the indicators of sustainable development often do not take into account factors like education and health which can affect future economic success.

### ***Causes of Economic Success:***

While there are a multitude of theories on what exactly economic success encompasses there are also a multitude of theories on what can cause or harm economic success. There is a wide variety of factors thought to cause economic success in current literature and there is not much agreement on these factors. The factors that are thought to be possible causes of economic growth are divided up into the following categories; human capital factors, economic factors, government policy factors, cultural factors, and geographic factors.

### **Human Capital:**

#### ***Education:***

H1: Countries with better education systems are more likely to have greater economic success

According to the Oxford Dictionary, education is, “the process of receiving or giving systematic instruction, especially at a school or university (*Education* 2013).” One previously studied theory is that an increase in the education of a population will lead to a greater amount of economic success (Baker 2011). This theory assumes that better schools or more schooling will lead to a greater gross domestic product per capita. One way in which education can assist economic growth is through the creation of a better-educated labor force (Orszag 2013). Better-educated workers tend to be more knowledgeable and thus an increase in education can increase human capital. This increase in human capital (all else held constant) can result in an increase in gross domestic product per capita and thus economic success overall.

One can measure improvements in education and thus improvements in human capital by looking at the overall test scores of a school (Baker 2013). Test scores can also allow researchers to make comparisons between schools and even education systems. On the flip side, previous studies have found a number of flaws in the ability of test scores to predict the overall quality of an education system and thus the ability to predict the overall level of national academic success. A number of reasons can explain this finding. One of these reasons is that schools teach students skills that often do not test well. For example, it is difficult to measure qualities like leadership, entrepreneurship, innovation, etc. through a test. So if students are learning these skills, which might increase economic productivity and thus economic success, they might not necessarily show through test scores. This indicates that test scores might not be the best indicator for education. Another reason that test scores are not necessarily the best indicator for economic success is that test scores are not standardized across the world. Students take different tests with different questions which are scored using different methods. When using test scores researchers must account for these differences and this may often lead to errors that could alter the relationship between test scores, education, and economic success.

Another indicator of the quality of an education system and thus possibly the economic welfare of a country is the literacy rate of a country (Baker). In prior research, a strong correlation has been found between literacy rates and economic success. Literacy rates indicate the overall ability of a population to read thus indicating how much of the population has received a basic education. A more educated population indicates a more educated labor force. Thus if the labor force increases in the amount that it is educated the overall productivity of the labor force should increase. As productivity increases, as long as everything else is held constant, the overall gross domestic product per capita of the state should increase as well. One of the

flaws with using literacy rates is that they do not necessarily indicate the level of the proficiency of reading that the individual has actually obtained. A population with a higher level of reading should have more human capital than a population with a lower level of reading and thus should have greater productivity and a greater level of economic success.

It is this argument that an increase in education causes an increase in human capital and thus an increase in economic success that is the foundation for those that who believe that economic success is at least partially caused by education. However, this argument is often subject to problems of reverse causality because many others look at increases in economic success as causes of increases in education. This problem of reverse causality will be examined later on in this thesis.

### *Health:*

H2: Countries with healthier populations are more likely to have greater economic success

According to the World Health Organization, health is defined as, “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (*WHO* 1948).” Research studies have also found a connection between the overall health level of a country and its gross domestic product per capita (Swift 2011). Both the World Health Organization and the European Commission have produced reports that argue that greater spending on health will increase overall health levels and thus will promote gross domestic product per capita growth. The basic idea behind health as a cause for economic success is that a healthier labor force will increase human capital and thus increase gross domestic product per capita.

A healthier population can affect gross domestic product per capita in a multitude of ways (Swift 2011). One way that an increase in overall population health can affect gross domestic product per capita is by making the labor supply of workers healthier. Healthier workers would be able to use their time and resources more effectively thus influencing and increasing productivity. Secondly, if overall life expectancy increases due to a better health system than the labor supply would be able to work longer thus producing more and increasing gross domestic product per capita. Life expectancy is often used as an indicator of health due to the fact that it measures the overall quality of life across the population of a country (Central Intelligence Agency, 2013). However, it is criticized as an indicator due to the fact that it only incorporates the lifespan of the population and not the overall well-being of the population as a whole. Health, like education, also faces the reverse causality problems. This is because many think that an increase in the economic success of a country will cause an increase in the overall health of that country. Despite this issue, health is still one of the main suspected causes behind increases in economic success.

#### *Economic Factors:*

##### *Trade Barriers:*

H3: Countries with a greater amount of trade freedom are more likely to have economic success

It has been suggested that barriers to trade can hinder a country's economic success (Pal 2012). Followers of this theory believe that opening a state's economy to the international market will help create competition and thus increase productivity (Fosu 2013). Researchers in this area think that countries should encourage foreign direct investment as a means of obtaining further economic growth. They believe that countries need to court foreign

direct investment through the building of domestic institutions, the strengthening of institutions already in place, and the improving of macroeconomic stability. Followers of this theory cite examples like Switzerland and India as having economic success due to the opening of their economies to international businesses.

A case study by Pal looked at the relationship between trade barriers and economic success in India. Until 1991, India has a closed economy. India had promoted an extensive public sector. It had attempted to discourage international investment through the use of tight regulations in the private sector. Additionally, India had extremely high taxes to discourage international businesses. A tax is, “an involuntary fee levied on corporations or individuals that is enforced by a level of government in order to finance government activities (*Definition* 2013).” The top marginal income tax rate at this time in India was 97.50% (Pal 2012). During this time period, India’s tax rates on imported goods were among the highest in the world.

However, since India opened its economy starting in 1991, a new picture has emerged (Pal 2012). Currently, different varieties of multinational corporations are investing in and have invested in India. India has reduced its income taxes to make foreign investment more appealing to foreign entities. Additionally, India has lowered the top marginal income tax rate from 97.5% to 30%. According to Pal, India’s more open markets have encouraged economic growth in India.

Another theory is that, opening up an economy to trade can increase production if there is a greater demand for a good (*Mexico* 2013). For example, China, which has recently become the country that has the second greatest gross domestic product, has continually run trade surpluses (Jacques 2013). These surpluses have increased domestic productivity and allowed China to

experience a great surge of economic growth. Despite these surpluses that occur from opening up to trade, some argue that greater trade freedom can be a detriment to economic growth. They state that it can hurt domestic producers and that people can become corrupt and take advantage of more liberal trade systems. Despite these arguments, many point to greater trade freedom as a cause for economic success.

### Government Policy

#### *Spending*

H4: Countries with a less government spending are more likely to have economic success

There are a multitude of views on whether government spending affects economic growth in a positive or negative manner or whether it affects economic growth at all (Chang 2011). In his article *Regime-Switching Effects on Debt on Real GDP per Capita the Case of Latin America and the Caribbean Countries*, Chang cites a number of factors that might determine whether or not government growth has a positive, negative, or any effect on gross domestic product per capita. One factor might be how severely the government is in debt due to overspending. Furthermore, he states that government spending might be negative if there are few incentives for the private sector to make investments. However, it might be a positive factor if the government is pursuing a fiscal policy with the purpose of stimulating the economy. These factors combined with many others are expected to determine what kind of effect government spending has (if any) on economic growth.

Additionally, there are a couple of different major viewpoints on the effects of government spending on economic growth (Chang 2011). The first is the Keynesian stimulus view. It states that higher spending will help to stimulate employment due to the fact that the

government is spending money on projects that require workers. Secondly, higher spending will stimulate consumption because people who now have jobs (as a result of increased government employment) will now have a greater amount of money to spend. Thirdly, these same workers will also have money to invest in the economy thus hopefully stimulating economic growth in the future.

Another view is the more classical view that government spending and government debt due to spending will actually reduce long-term economic growth (Chang 2011). The Index of Economic Freedom states that, “excessive government spending that causes budget deficits and the accumulation of sovereign debt is one of the most serious drags on economic dynamism (Government Spending 2013).” This view predicts that government debt as a consequence of government spending will cause interest rates to rise thus causing a decrease in loans. A decrease in loans can mean that entrepreneurial activities like starting a business will decrease because people will be unable to easily obtain credit and pay back the interest on this credit. Furthermore, this means that there could be less money to hire people thus reducing the people who are employed and lowering economic productivity and thus gross domestic product per capita. This view states that increasing spending will not result in an increase in the level of employment (Swan 1956).

Additionally, government debt as a consequence of government spending could cause wage growth to decrease (Furth 2013). This is thought to be because private business owners will not have as much money to pay their employees thus decreasing the wage growth of these employees. This means that the employees do not have as much money to spend and stimulate markets. Finally, a decrease in job creation means that consumption will not be as high as it could be thus decreasing the demand for certain products and causing a lack of capital flow into

the economy (Chang 2011). As debt increases people with this view argue that the debt drag (the effects of debt) will only continue to get worse further slowing the economy (Furth 2013).

Lastly, there is the Ricardian view that high government spending will have no impact on economic growth (Chang 2011). The Ricardian view states that a decrease in future income and consumption would be due to tax burdens (not the debt).

When talking about government spending as a possible cause for economic success there is no concurrent theory. The three main theories are that government spending can spur economic success, that government spending can hinder economic success, and that government spending does not affect economic success but rather other economic policies affect economic success.

#### *Market Failures:*

H5: Counties with less government regulation are more likely to have economic success

There are a variety of views on how far the government should go in correcting market failures (Fosu 2013). There is no concurrent view on what exactly is the appropriate balance between market forces and government spending on infrastructure and social sectors in order to cover up market failures or whether such spending is appropriate at all.

On one side, people argue that the government should play a minimalistic role in the economy, leaving most dilemmas to market forces (Fosu 2013). They believe that a government that plays a larger role in the economy will hinder economic growth. Some who have this view argue that the taxes that are often associated with government spending which can have serious consequences on growth. They argue that when the government uses this money it takes it away



from consumers and private investors who could use the money more effectively. What's more, they state that government social programs can actually be a disincentive for people working in the labor force and be a cause of what is known as the free-rider problem.

On the opposite end, people argue that government needs to play a more expansive role through the funding of social programs, subsidies, etc. in order to make up for market failures (Fosu). People with this view often argue that the government is responsible to a certain degree for funding factors like education, health, public transportation, etc. They state that these factors will be conducive to forming a better labor force and providing the proper infrastructures and legal requirements that will allow economic growth to flourish.

Similar to government spending, there is no concurrent view on what type of role the government should play in the economy. Some believe that more expansive role will increase economic success while others think a more limited role will cause economic success.

#### Cultural Factors:

##### *Institutions:*

H6: Countries with less government corruption are more likely to have economic success

H7: Countries with more property rights are more likely to have economic success

Cultural aspects are often cited as being correlated with economic growth (Hjort 2010). In his article, *Pre-Colonial Culture, Post-Colonial Economic Success? The Tswana and the African Economic Miracle*, Hjort states that culture is a, "system of shared beliefs, values, customs, behaviors, and artifacts that the members of society use to cope with their world and with one another, and that are transmitted from generation to generation through learning."

Hjort accredits economic growth to cultural aspects like pre-colonial institutions. He believes that the country of Botswana, which has had one of the fastest growing economies in the last 40 years, can accredit its current success to the political and social institutions that it has had put in place. Botswana had a gradual shift to independence. However, some of the institutions that it has in place have been around for centuries. Botswana has had a right to appeal in place since the nineteenth century. This right has transitioned into an adequate and effective legal system. Legal systems can help foreign investors, domestic business owners, consumers, etc. dispute claims, thus giving them confidence in their rights.

Additionally, the recognition of private property and wealth has been around in Botswana since the mid-nineteenth century. Even women were allowed to own their own land. Recognition of ownership means that people do not have to fear losing their property and thus are more willing to invest in it which can promote economic growth. According to some, institutional differences across states reflect initial differences in geographical factors and historical incidents (Galor 2005). While there is not common a thesis on what institution play a role in creating/increasing economic success it is commonly thought that some sort of combination of them do contribute to economic success. Specifically, it is thought that those that limit government corruption can help to increase economic success. This is due to the fact countries with such institutions in place limit/punish officials who would attempt to steal from the country's success.

#### *Entrepreneurship:*

Entrepreneurship is another factor thought to determine economic success (Pinillos 2009). Researchers have previously stated that an orientation towards achievement and a pursuit

towards personal objectives are determinants of entrepreneurial activity. Entrepreneurship or innovation can help fuel economic growth (Bussey 2013). It encourages the advancement of ideas or technologies which can make production more effective and thus hopefully spur an increase in production. This increase in production should cause gross domestic product per capita to increase.

Using various sources like the Global Entrepreneurship Monitor, previous research has supported the theory that there are differences in the levels of entrepreneurial activity across states (Pinillos 2009). In her article, *Relationships between Individualist-Collectivist Culture and Entrepreneurial Activity: Evidence from Global Entrepreneurship Monitor Data*, Pinillos states that the reason that entrepreneurship varies across states is due to differences in culture across states. She argues that different cultures encourage or discourage the development of certain personality traits and behaviors. In her article, she explores the connection between individualism and entrepreneurship. Pinillos came to the conclusion that, an individualist culture would encourage self-sufficiency and self-control. The opposite of an individualist culture is a collectivist culture in which one would put the interests of the group above their own individual interests. Through her research she found a strong relationship between individualist cultures and entrepreneurial activity. This indicates that a country that scores higher in individualism would thus be more likely to score higher in entrepreneurial activity and thus have a higher gross domestic product per capita. It is for this reason that some believe that entrepreneurship can act as a cause for greater economic success.

## **Geography:**

### *Transportation*

Distance plays a role in determining the gross domestic product per capita of a country (Boulhol 2008). People can overcome distances through the use of transportation thus hopefully encouraging economic growth (Dobrowolski 2013). Thus, one theory states that an improvement in transportation can cause an increase in gross domestic product per capita.

Businesses with better access to larger markets will have lower transportation costs (Boulhol 2008). This means that they will have more money to invest in their business which should hopefully increase productivity thus increasing gross domestic product per capita.

Transportation also allows workers to have better access to their jobs (Dobrowolski 2013). This can allow more people to obtain jobs and thus can increase the overall labor supply. More workers allow for more productivity.

Furthermore, transportation allows people to have better access to education. More education usually leads to better-educated workers thus leading to an increase their overall productivity. Finally, transportation allows more people access to doctors thus likely increasing their overall health levels. A healthier person is more likely to be a more productive worker. The theory that transportation can allow workers to have better access to their jobs, health resources, and education resources and thus increase economic success does not have a lot of research done on it yet. However, current research indicates that it does have validity to it and should be further explored.

***Conclusion:***

Currently there is a variety of disagreement on what exactly causes one country to be economically successful and another not to be economically successful. Through the rest of this thesis, some of these possible causes will be further looked at in order to establish correlation and possible causation.

## **Methodology**

### ***Introduction:***

In the current amount of literature available on economic success, there are a variety of theories on what factors could possibly hinder or help a country's economic success. While differing in possible factors, these theories commonly attempt to provide data on a national/country level. This providing data on a country level can be difficult for a number of reasons. In certain cases for specific countries the country may not provide information on demographics for whatever reason. When this occurs different averages are used in order to make estimates for the country or the countries that are excluded from the data set(s). Despite this, sometimes researchers are unable to come up with a reliable estimate. For this reason, several countries are excluded from the following data sets.

While there is currently a lot of research that uses gross domestic product per capita as an indicator of economic success there has not been as much research into measuring and attempting to explain theories focused on sustainable development. This thesis attempts to expand on research done in this area. Additionally, this thesis will attempt to look at possible causes of economic success overall using two dependent variables; gross domestic product per capita and resource depletion (a lack of resource depletion being an indicator of economic success for sustainable development). It will use both these variables to compare and contrast possible causes of economic success using two different definitions of economic success.

### ***Dependent Variables:***

#### ***Gross Domestic Product per Capita (GDP per Capita):***

Gross domestic product per capita is used throughout this thesis as one indicator of national level economic success. The data set that is used to compile data on gross domestic

product per capita is created by the World Bank. The World Bank gathers its data from a variety different of international resources. When calculating the gross domestic product portion of gross domestic product per capita, the World Bank uses the least squares method and constant price data in the local currencies of countries (*Methodologies* 2013). In order to calculate gross domestic product per capita, the local currency is converted into the United States' dollar. The least squares growth rate is used whenever there is a significantly long time series from which a reliable calculation can be formulated. If more than half of the observations are missing from a time series then the growth rate is not calculated. When this occurs, the country whose data is missing has an unknown gross domestic product per capita.

Gross domestic product per capita has been criticized for its use as an indicator of the population's well-being and for a population's overall economic success. This is because it does not incorporate other factors considered necessary by some researchers, for a human being to be well off (health levels, education level, shelter availability, etc.). Despite these criticisms, gross domestic product per capita is still one of the most frequently used indicators of economic success. In this thesis we consider economic success strictly to be a matter of how well off the state is financially. Factors like health levels and education levels are considered to be possible causes of economic success but are not considered to be part of the definition of economic success.

### *Sustainable Development:*

Those that follow theories of sustainable development are concerned with how the economic policies of yesterday affect the economic policies of today and how the economic policies of today will affect economic success in the future. In this thesis, sustainable

development is considered to be a measurement of economic success through one significant part of sustainable development, resource conservation. Resource conservation allows resources to be utilized by future generations for economic success. This definition for economic success is criticized in the fact that it does not take into account factors like poverty reduction and climate change which could also influence future economic success.

The World Bank data set that is used in this thesis for the dependent variable representing sustainable development is on resource depletion. This resource depletion variable measures the depletion of energy, forest, and minerals within countries. Energy resources, forest resources, and minerals are all considered to be natural resources. Energy depletion is the ratio “of the stock of energy resources to the remaining reserve lifetime.” Energy depletion includes resources used in the production of energy like coal, crude oil, and natural gas. Mineral depletion is considered to be “the ratio of the value of the stock of mineral resources to the remaining reserve lifetime.” The indicator for this trio of factors is expressed as the combined ratio of adjusted savings to natural resource depletion (as a percentage of gross national income). One thing that should be taken into consideration with this variable is that should more of a natural resource be found this would cause the ratio to decrease or increase (depending on how this new supply of the resource is used).

While using the World Bank’s resource depletion variable a higher percentage means that the country has a greater depletion of resources and thus a lower economic success. A lower percentage of natural resource depletion indicates a higher amount of economic success. This is because sustainable development defines economic success through the preservation of natural resources. These resources will provide for future economic success.



## ***Independent Variables:***

### **Literacy Rate:**

Throughout this thesis, the literacy rate of a population is the independent variable used to represent the overall educational level of the population of a country. The data set that is used for this literacy rate indicator comes from research done by the United Nations Education, Scientific, and Cultural Organization's (UNESCO) Institute for Statistics (*UNESCO 2013*). UNESCO defines literacy as "the ability to both read and write, with understanding, a simple statement related to one's everyday life." UNESCO collects this data on literacy rates in association with partner agencies. These groups use population censuses, country reports, and sample surveys to gather information. Once the information is gathered then the country's population is divided into two groups: those who are literate and those who are illiterate. This data is only published for a country if information is available at the national level for at least 33% of the population of that country.

Two of the representative surveys that are used in gathering information are the Demographic and Health Surveys and the Multiple Indicator Cluster Surveys (*UNESCO 2013*). One problem with using these surveys to gather data is that the respondents to these surveys often record or "self-report" their own information. This can lead to an overestimation (or an underestimation) of literacy rates for both the individuals doing the self-reporting and their families. This is because individuals can report on behalf of their families. To combat this problem some of the surveys now incorporate simple reading tests. These tests have only been given to respondents who have not had any secondary or higher education. These tests consist of simple sentences like "The child is reading a book." Only people who can read the entire sample sentence are defined as being literate.

Another possible issue lies in the fact that the surveyors may have slightly different interpretations of exactly what is the definition of literacy. For example one surveyor may consider a person who stumbles over the words of a sentence but can still read that sentence to be literate. Another, surveyor may consider this person not to be literate due to the issues that the individual faced while reading the sentence. There is also an issue in the fact that different sentences were used in these studies. One person may be able to read one sentence based on their education and not another (even if both of the sentences are considered to be simple). In this case, literacy would be based on whether they could read the sentence they were given (even if they were able or unable to read a different sentence which other people were given). Finally, there is always a concern of possible translational mistakes or errors in translating sentences. Translational issues can change the level of simplicity of the sentence. These concerns may all lead to slight errors in the reporting of the data and thus may lead to slight differences between the reported literacy rate of a country and the actual literacy rate of a country.

#### *Life Expectancy at Birth:*

For this thesis life expectancy at birth is the independent variable that serves as the indicator for the overall health of a population of a country. The information used for this variable comes from the Central Intelligence Agency's World Factbook. The Central Intelligence Agency's World Factbook has updated its life expectancy at birth data set up to the year of 2013 and has data for 223 cases (at the national level). The World Factbook defines life expectancy at birth as, "the average number of years to be lived by a group of people born in the same year, if mortality at each age remains constant in the future."

The World Factbook gathers data and formulates projections based on a variety of censuses, surveys, and registration systems. This information is gathered from a variety of

American departments and agencies. Due to the way that information is obtained there are a number of possible problems with this data set. One of these issues is that researchers may have to obtain data at different times. This means that the data might be slightly off as life expectancy varies across time. Additionally, different researchers can differ in their estimates and projections based on the researchers' individual biases and backgrounds.

Despite these limitations the life expectancy at birth variable is still a good indicator for overall health because it represents the average life span of the population. A population that tends to have more health problems will probably have a lower life span. On the other hand, a population with less health issues is more likely to have a higher lifespan.

#### Trade Freedom:

The trade freedom indicator comes from the Heritage Foundation's Index of Economic Freedom's data set on trade freedom. This measurement is comprised of two factors; tariffs and non-tariff barriers. The first factor, the trade weighted average tariff rate, is a quantitative measurement. The weighting of this measurement is based on the share of total imports for each good that the tariff was placed (or not placed) on. The second factor, non-tariff barriers, consists of both qualitative and quantitative information. Non-tariff barriers included quantity restrictions, price restrictions, regulatory restrictions, investment restrictions, customs restrictions, and direct government intervention. These non-tariff barriers were measured on a scale of 20 to 0. A score of 20 indicates that non-tariff barriers are used "extensively across many goods and services and/or effectively impede a significant amount of international trade (Trade Freedom, 2013)." A median score of 10 means that a country's non-tariff barriers are "used to protect certain goods

and services and impede some international trade.” A score of 0 signals that non-tariff barriers are “not used to limit international trade.”

The overall trade freedom score is then based on a scale of 0 to 100. A score of with 100 indicates absolute trade freedom and a score of 0 represents no trade freedom. The overall trade freedom score is calculated using the following equation:  $\text{Trade Freedom}_i = (((\text{Tariff}_{\max} - \text{Tariff}_i) / (\text{Tariff}_{\max} - \text{Tariff}_{\min})) * 100) - \text{NTB}_i$ .<sup>2</sup>

This trade freedom indicator incorporates data from the second half of 2011 through the first half of 2012. This means that all of the data is not from the exact same time (although it is relatively close in time). These time differences could mean that some of the measurements used to calculate the indicator are slightly incorrect. Additionally, countries do not report their weighted average tax rate every year. When this figure is not reported an average of the most favored nation tariff rate is used to calculate this figure. This means that some of the measurements are different and as such might lead to a country having a higher or lower trade freedom indicator than it would if the weighted average tax rate was available.

The trade freedom indicator uses information from a variety of different sources<sup>3</sup>. This means that there might be variations in the way in which this data was collected. Different researchers and/or institutions might have slightly different definitions of tariffs and non-tariff barriers which may lead to differences across the measurement of the variable. Despite its

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<sup>2</sup>In this equation trade freedom<sub>i</sub> represents trade freedom in county i; Tariff<sub>max</sub> and Tariff<sub>min</sub> are the upper (50) and lower (0) bounds for tariff rates as a percentage; Tariff<sub>i</sub> is the weighted average tariff rate as a percentage in country i.

<sup>3</sup>The World Bank, the World Trade Organization, the Office of the U.S. Trade Representative, the U.S. Department of Commerce, and the Economist Intelligence Unit.

limitations the trade freedom variable is a useful indicator for trade freedom because it measures how much control governments assert over trade.

### Government Spending:

The government spending value from the Index of Economic Freedom is the variable that is used as an indicator of government spending for this thesis. The Index of Economic Freedom measures government spending as a percentage of a country's gross domestic product. This variable treats zero government spending as the benchmark or ideal level of public-sector spending. Consequently, countries that are under-developed and have less government spending as a result of being underdeveloped may receive a higher score than they should have. This is because these countries' governments do not have the money to spend if they should want to.

In the majority of cases measured, the data includes all levels of government. However, in cases where information on local or state level funding is not available data from only the central government is used. This means that due to a lack of information, spending levels might be slightly off for certain countries that are unable to or chose not to provide this information.

The equation used to determine government expenditures for the Index of Economic Freedom is  $GE_i = 100 - \alpha(\text{Expenditures}_i)^{2(4)}$ . The Index of Economic Freedom used a variety of sources in order to gather data<sup>5</sup>. This means there might be variations across the data in the way in which it was gathered. This means that some of the data might have been collected in different

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<sup>4</sup>In the government expenditures equation  $GE_i$  is the government expenditures in country  $i$ ;  $\text{Expenditures}_i$  is the total amount of government spending at all levels of government compared to the country's gross domestic product per capita;  $\alpha$  is the coefficient used to control for variation among scores (.03).

<sup>5</sup>Organization for Economic Co-operation and Development, Eurostat, African Development Bank and Organization for Economic Co-operation and Development, International Monetary Fund, Asian Development Bank, African Development Bank, official government publications of each country, and the Economic Commission for Latin America

ways thus leading to different estimates. These different estimates could mean that as a result some of the data is not as precise as it could be. These discrepancies are common across many different measurements of government spending.

### Government Regulation:

The indicator that is used to measure government regulation is a combination of three different variables, business freedom, labor freedom, and monetary freedom. All three of these variables come from the Index of Economic Freedom. For each case (country), the scores of each factor will be added up together and then divided by three (finding the mean score). This mean score will be the number that is put into the data set as the dependent variable for government regulation.

The business freedom indicator is a measurement of the efficiency of a country's regulation of businesses. The score is a number at or between 0 and 100. A score of 0 means that the country's government totally regulates every business. A score of 100 means that businesses are completely free to operate in the manner in which they choose. This score is based on ten different factors which are all weighted equally<sup>6</sup>. Each of these factors is converted to a value on a scale of 0 to 100 using the equation  $\text{Factor Score}_i = 50 \frac{\text{factor}_{\text{average}}}{\text{factor}_i}$ <sup>7</sup>. Much of the data used for these factor scores was found in the World Bank's *Doing Business* report. However, six

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<sup>6</sup>These ten factors (all for the same country) are the number of procedures it takes to start a business, the number of days it takes to start a business, the cost to start a business as a percentage of income per capita, the minimal capital as a percentage of income per capita needed to start a business, the number of procedures needed to obtain a business license, the days it takes to obtain a business license, the cost as a percentage of income per capita it takes to obtain a business license, the time in years it takes to close a business, the cost as a percentage of estate it takes to close a business the recovery rate as cents on the dollar it takes to close a business

<sup>7</sup>This equation bases the ratio of country data for each factor to the world average

countries<sup>8</sup> did not have data on them available in these reports. This means that the scores for these countries were gathered differently and might not be the same as they would have been had their information been available in the *Doing Business* report. Instead the information for these six countries was gathered from other internationally recognized sources. Consequently, a variety of sources were used to calculate the business freedom indicator<sup>9</sup>.

The labor indicator takes into account the legality and the regulation of a country's labor market (Labor Freedom 2013). This indicator is made up of six factors which are all weighted equally<sup>10</sup>. Each of these six factors are converted to quantitative measurements on a scale of 0 to 100. The equation used to do this conversion is  $\text{Factor Score}_i = 50 * \text{factor}_{\text{average}} / \text{factor}_i$ . The six factors are then averaged for each country thus obtaining the labor indicator for that country. However, some countries do not have the information readily available in certain reports that are used for most cases. Hence, these countries were scored by looking into "labor market flexibility" based on information from other sources (Labor Freedom). In determining these scores for this indicator a multitude of resources<sup>11</sup> were used by the Index of Economic Freedom.

The last indicator that is used in the average for government regulation is the monetary freedom indicator (Monetary Freedom 2013). This measurement combines the weighted average inflation rate for the past three years (during which information is available for) along with price controls. The weighted average inflation rate is determined by using this equation Weighted

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<sup>8</sup>These countries are Burma, Cuba, North Korea, Libya, Macau, and Turkmenistan

<sup>9</sup>These sources include the World Bank, the Economist Intelligence Unit, the U.S. Department of Commerce, and official government publications of each country.

<sup>10</sup>These factors include the ratio of minimum wage to the average value added per worker, the hindrance to hiring additional workers, the rigidity of hours, the difficulty of firing redundant employees, the legally mandated notice period, and the mandatory severance pay

<sup>11</sup>These sources include the World Bank, the Economist Intelligence Unit, the U.S. Department of Commerce, and official government publications for each country

Avg. Inflation<sub>i</sub> =  $\theta_1$ Inflation<sub>it</sub> +  $\theta_2$ Inflation<sub>it-1</sub> +  $\theta_3$  Inflation<sub>it-2</sub><sup>(12)</sup>. The weighted average inflation rate is then used to determine monetary inflation in the equation Monetary Freedom<sub>i</sub> = 100 -  $\alpha$ weighted avg. inflation<sub>i</sub>-PC penalty<sub>i</sub><sup>(13)</sup>. The monetary freedom value is a number between a scale of 0 and 100. A value of 0 indicates no monetary freedom and a value of 100 indicates total monetary freedom. The Index of Economic Freedom used a variety of sources when calculating and gathering the information need to calculate this indicator<sup>14</sup>. This means there might be slight variations based on researchers' biases and the differences in which the information was gathered. Despite these variations the indicator for government regulation is useful for this thesis because it incorporates monetary freedom, labor freedom, and business freedom.

#### Government Corruption:

The indicator that is used for the measurement of government corruption comes from the freedom from corruption index published out by the Index of Economic Freedom. Their measurement is primarily derived from Transparency International's Corruption Perceptions Index but also relies on other sources<sup>15</sup>. The Corruption Perceptions Index uses a scale of 0 to 10. On this scale a score of 10 indicates very little corruption within the government and a score of 0 indicates a highly corrupted government. The Index of Economic Freedom multiplies the score from the Corruption Perceptions Index by ten in order to put the score on a scale of 0 to 100. On this scale a score of zero still indicates a very corrupt government and a score of 100 indicates a

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<sup>12</sup> $\theta_1$  is equal to .665;  $\theta_2$  is equal to .245;  $\theta_3$  is equal to .090; and Inflation<sub>it</sub> is the absolute value of the annual inflation rate in Country i during year t as measured by the consumer price index

<sup>13</sup> $\alpha$  is equal to 6.333; and the price control (PC) penalty is assigned a point value of 0 to 20 based on the extent of price controls.

<sup>14</sup>These sources include the International Monetary Fund, the Economist Intelligence Unit, and official government publications of each country

<sup>15</sup>These other sources include the U.S. Department of Commerce, the Economist Intelligence Unit, the Office of the U.S. Trade Representative, and official government publications of each country



government free of corruption. For countries that are not covered by the Corruption Perceptions Index, other sources were used to gather data on the extent of corruption within the country. This means that these countries vary from the other countries in the way that their score was obtained. Despite these limitations, the freedom from corruption index is still the indicator in this thesis used to represent government corruption.

### Property Rights:

For the property rights indicator, the data set from the Index of Economic of Freedom for their property rights measurement is used. They measure the “ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state,” along with the government’s ability to enforce those laws, and the ability of the judiciary to protect those laws (*Property Rights* 2013). The property rights indicator is measured on a scale of 0 to 100. A score of 100 indicates that the government guarantees property rights, the judiciary branch has the ability to punish those who violate these rights, and there is no corruption within these systems. A median score of 50 indicates that the judiciary system is often delayed and inefficient, corruption is possibly present, the judiciary branch may be subject to or influenced by other sectors of the government, and expropriation is a rare possibility. Finally, a score of 0 means that private property is totally outlawed and that the state owns all property, people do not have the right to sue other people or do not have access to the courts, and corruption is widespread. For this measurement a variety of sources<sup>16</sup> were used indicating that there could be some discrepancy in the ways that the measurements were determined (due to researcher misinterpretations, misunderstandings, and biases). Despite these limitations, the property rights

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<sup>16</sup>The Economist Intelligence Unit, the U.S. Department of Commerce, the U.S. Department of State, and various news and magazine articles were used as sources

indicator put out by the Index of Economic Freedom is still used to represent property rights throughout this thesis.

## Statistical Analysis

For this study, multiple linear analyses were run. In the process of running the first regression analysis, three outliers were found. Three different cases were each found to have a high z-score. The country of Switzerland had a z-score of 3.58567, Norway had a z-score of 4.39187, and Luxembourg had a z-score of 5.15990. Due to their high z-scores these three countries were eliminated from the analysis. Additionally, a number of countries did not have complete information and thus also had to be eliminated.

When the first regression analysis had been run, it was found that in both sets of analysis two variables had tested positive for multicollinearity (results for this regression can be seen in figures 1.1, 1.2, 1.5 and 1.6). These two variables were the freedom from corruption variable and the property rights variable. In order to deal with this issue of multicollinearity it was decided that each variable would be run in a separate data set in the analysis. This meant that when the analysis was run one data set contained the freedom from corruption variable and another data set had the property rights variable. Other than these two independent variables in the data sets the rest of the independent variables were identical. Due to these independent variables and the two dependent variables each analysis consists of four different parts; gross domestic product per capita with freedom from corruption, gross domestic product per capita with property rights, resource depletion with freedom from corruption, and resource depletion with property rights.

After running the regression analysis it was found that some of the relationships between the independent variables and the two dependent variables (gross domestic product per capita and resource depletion) representing economic success had materialized as they had been predicted to materialize. On the other hand, other relationships did not emerge as they had been expected to emerge. Despite the fact that not all of the relationships between variables were as

hypothesized these relationships can still help further research in the area of economic success. The results are presented and compared and contrasted along with what was hypothesized. Within this thesis in order to distinguish between the different data sets run using the regression analysis the gross domestic product per capita and freedom from corruption data set will be known as model one, the gross domestic product per capita and property rights data set will be known as model two, the resource depletion and freedom from corruption data set will be known as model three, and the resource depletion and property rights data set will be known as model four.

**Hypothesis One: Countries with better education systems are more likely to have greater economic success**

*Model One:*

In this regression analysis gross domestic product per capita served as one of the dependent variables representing the economic success of a country. Literacy rate served as the independent variable representing the overall education level of a country. With a p-value of 0.883, the literacy rate of a population indicator was not found to have either a significant effect on economic success (as measured by gross domestic product per capita) (figure 1.3). Due to that lack of statistical significance, the null hypothesis cannot be rejected. A possible explanation for this is that literacy rates do not include every aspect of countries' education systems. It is possible that many people in a country may be able to read, but may lack math and/or science skills. Literacy rates also do not measure skills like innovation which can be crucial to the formation of new ideas and possibly economic success. One way to see if there is any statistically significant relationship between education and economic success would be to use a

different indicator of the education level of a country. This indicator could incorporate more or different aspects of countries' education systems to see if the relationship might be significant.

Model Two:

In the second part of this analysis the indicator for the education level of a population, literacy rate, and gross domestic product per capita were found to have a p-value of 0.819 (figure 1.4). This means that the null hypothesis cannot be rejected. As previously mentioned literacy rates might not be the best indicator for education. Thus they might not have a statistically significant relationship with gross domestic product per capita because they only measure one aspect of the overall education experience. It is possible that literacy rates do not have any effect on economic success whatsoever. This could be because unskilled workers in some countries do not need to be able to read in order to do their jobs correctly. Thus more workers becoming able to read or less workers being able to read would have no effect on their overall productivity and thus on the economic success level of that country. Perhaps an indicator of what portion of the population receives a higher education might be a more useful indicator and have some sort of correlation with economic success.

Model Three:

When using resource depletion as the dependent variable a higher amount of resource depletion indicates that there is less economic success (according to theories on sustainable development). When resource depletion was used as the dependent variable representing economic success (according to sustainable development) in combination with literacy rates the results were found to be statistically significant (figure 1.7). The p-value was 0.073 which would be unlikely if the null hypothesis were to be true. This relationship is statistically significant

between the 90% and the 95% confidence levels. However, with a positive B value of .117 these findings go against what was hypothesized. In using resource depletion as the indicator for economic success it appears that as literacy rates increase the amount of resources being used up also increases. This would indicate a decrease in the country's economic success.

#### Model Four:

In the fourth part of this analysis the literacy rate variable was found to have a significant correlation with resource depletion. This section has a p-value of 0.089 and a B value of 0.11 (figure 1.8). This means that once again when literacy rates increase resource depletion rates are also likely to increase and thus economic success decreases. This result is not what was hypothesized. It is interesting to note that when gross domestic product per capita served as the indicator for economic success there were no statistically significant correlations. However, when resource depletion was used as the indicator for economic success (according to sustainable development) both of the relationships were significant. Perhaps other definitions of economic success could be used in order to grasp exactly whether there is an overall statistically significant or insignificant correlation between economic success and literacy rates.

#### **Hypothesis Two: Countries with healthier populations are more likely to have greater economic success**

#### Model One:

In this analysis, life expectancy at birth was used as the indicator for the health of the overall population of a country. The relationship between life expectancy at birth and gross domestic product per capita was found to be statistically significant with a p-value of .028 (figure 1.3). This result would be highly unlikely under the null hypothesis. This means that the

relationship between the two variables is close to being significant at the 99% confidence level. Additionally, the analysis showed that these two variables have a positive relationship due to the fact that the B measurement was 211.947. This means that generally when life expectancy at birth increased gross domestic product per capita increased too. One reason for this significant relationship could be that when people start to live longer they start to work longer. The fact that they now work longer could cause productivity to increase thus increasing gross domestic product per capita and economic success.

#### Model Two:

With a p-value of .012 the relationship between economic success and life expectancy at birth was also found to be significant during the second part of this analysis (figure 1.4). This relationship is significant almost at the 99% confidence level. As this part of the analysis had a B value of 289.857 the relationship was also found to be a positive relationship. This means that as the lifespan at birth of a population increases so does gross domestic product per capita and thus economic success of that population. This coincides with the hypothesis that healthier populations are more likely to have economic success.

#### Model Three:

Using resource depletion as the dependent variable materialized similar findings to the first two parts of the analysis (between gross domestic product per capita and life expectancy at birth). With a p-value of .015 the relationship was found to be significant almost at the 99% confidence level (figure 1.7). In addition, due to the -.325 B variable measurement the relationship indicates that a greater lifespan is correlated with less resource depletion and thus greater economic success. This means that as a population's average lifespan increases the

amount of resources that they are conserving increases and thus the population's economic success increases.

Model Four:

The fourth part of the analysis also indicated that there is a significant relationship between resource depletion and life expectancy at birth. This relationship had a p-value of 0.023 (figure 1.8). As it also has a B value of -0.299 there is a negative correlation between the two variables. All of the relationships between lifespan at birth and the two dependent variables indicate that the null hypothesis should be rejected. Additionally, they all indicate that economic success and a greater lifespan (health of a population) are positively correlated. This is supported by the idea that healthier people who live longer can work more hours and be more productive thus generating more economic success. In order to establish causation more research should be done in this area.

**Hypothesis Three: Countries with a greater amount of trade freedom are more likely to have economic success**

Model One:

Economic freedom, one of the independent variables, was measured using the trade freedom variable from the Heritage Foundation's Index of Economic Freedom. The relationship between trade freedom and gross domestic product per capita was not found to be statistically significant as it had a p-value of 0.219 (figure 1.3). Consequently the null hypothesis should not be rejected. A possible explanation for this might be that some trade barriers matter to economic success while others do not matter to economic success. To further this research one could look at whether different types of trade barriers impact or do not impact economic success. This



would help policy-makers see whether enacting or not enacting certain trade policies helps or hinders their country's economic success.

Model Two:

In the second part of the analysis the relationship between trade freedom and gross domestic product per capita was found to be close to significant at the 90% confidence level with a p-value of .121 (figure 1.4). With a B value of 126.813 this indicates that the correlation is positive so as trade freedom increases so does gross domestic product per capita and thus economic success. Due to the fact that this relationship is only close to being significant the null hypothesis should not be rejected. However, further research could be done in this area to see whether or not the relationship actually is significant.

Model Three:

When resource depletion is used as the dependent variable for economic success, the relationship between the two variables is not considered to be statistically significant. The relationship has a p-value of 0.28 (figure 1.7). This means that the null hypothesis should not be rejected. Once again looking at the types of trade barriers might be more useful in determining whether or not they actually impact economic success.

Model Four:

The fourth part of this analysis indicated that the relationship between resource depletion and trade freedom was not statistically significant (figure 1.8). It had a p-value of 0.341. Three of the four parts of this analysis indicated that the relationship between trade freedom and economic success was not statistically significant. However, one part indicated that it was close to being

statistically significant. As previously suggested it could be useful to look at different trade policy relationships with economic success to see if any of those relationships are significant. This would be useful for countries who have decided that economic success is their ultimate goal and want to enact the best policies to achieve this goal.

**Hypothesis Four: Countries with less government spending are more likely to have economic success**

Model One:

The government spending variable from the Heritage Foundation's Index of Economic Freedom was used as the independent variable for government spending in this analysis. With this variable a lesser amount of spending was considered ideal and would earn a score of 100 on a scale of 0 to 100. With a p-value of .000 this relationship was found to be significant at the 99% confidence level (figure 1.3). Prior research had indicated that both a lesser amount of government spending and a greater amount of government could cause greater economic success. The B variable of -121.385 indicates a negative correlation between the two variables. Consequently according to this data set, a greater amount of government spending is related to greater economic success which is the opposite of what was hypothesized. However, this could be due to the fact that many underdeveloped countries do not spend a lot and also do not have economic success. Such countries could alter the results of this analysis. Further research should explore this area to see if there actually is an ideal level of government spending for economic success. In addition, government spending could be broken down into different sectors (defense, health care, etc.) to see if certain kinds of spending help or hinder economic success.

Model Two:

In the second part of the analysis the p-value was also .000 thus indicating a 99% confidence level (figure 1.4). This indicates that the null hypothesis can be rejected. With a B value of -158.37 these two variables have a negative correlation. This means that as government spending increases so does gross domestic product per capita and thus economic success. This is the opposite of what was hypothesized.

Model Three:

In the third part of the analysis the relationship between the dependent and independent variable was found to be insignificant (p-value of 0.813) (figure 1.7). This means that the null hypothesis cannot be rejected. This means that government spending does not appear to have any effect on resource depletion. Perhaps if government spending was broken down into different types of spending then some kind of significant correlation would occur.

Model Four:

With a p-value of 0.66, this analysis did not find a significant correlation between government spending and resource depletion (figure 1.8). It is interesting to note that in both cases where economic success was defined as gross domestic product per capita the relationship was strongly significant. However, when economic success was defined as resource depletion the correlation was determined to be insignificant.

**Hypothesis Five: Countries with less government regulation are more likely to have economic success**

Model One:

When using gross domestic product per capita as the dependent variable, the relationship between economic success and government regulation was not significant (p-value of 0.835) (figure 1.3). This means that the null hypothesis should not be rejected. Perhaps if government regulation was broken down further into different types of regulation then a possible significant correlation would happen. Research should be done in this area to discover whether or not certain types of government regulation help or hinder economic success.

Model Two:

As this portion of the analysis came up with a p-value of 0.601 there was no significant correlation found between government regulation and gross domestic product per capita (figure 14). Thus the null hypothesis cannot be rejected.

Model Three:

Like the first two parts of the analysis, during the third part the relationship between the dependent economic success variable (resource depletion) and the independent variable was not found to have any statistical significance (p-value of 0.916) (figure 1.7). This indicates that no matter how heavily a government regulates the country the regulation has no significant effect on resource conservation and thus economic success. It would be interesting to see whether or not environment or resource development regulation would correlate with resource depletion.

Further research could be done to see if there is a relationship between resource depletion and certain areas of regulation.

Model Four:

With a p-value of .601 the regulatory efficiency variable was not found to have a significant relationship with resource depletion (figure 1.8). This means that in all four portions of the analysis none of the correlations were found to be significant. This could be because government regulation has no effect on increasing or decreasing the overall production of countries. More research should be done in this area to see if this holds in all areas of government regulation.

**Hypothesis Six: Countries with less government corruption are more likely to have economic success**

Model One:

The relationship between freedom from corruption and gross domestic product per capita was found to be very statistically significant with a p-value of 0 (figure 1.3). Each measurement of freedom from corruption had a value on a scale of 0 to 100. A higher value indicated less government corruption. Because the relationship has a positive B value less government corruption indicates a greater gross domestic product per capita and thus a greater amount of economic success.

Model Three:

When using resource depletion as a measurement for economic success, the relationship was not found to be statistically significant (p-value of .114) (figure 11.7). This means that the

null hypothesis cannot be rejected. For the government corruption variable the definition of economic success effected whether or not the variable had a significant relationship with economic success.

**Hypothesis Seven: Countries with more property rights are more likely to have economic success**

*Model Two:*

The relationship between property rights and economic success (using gross domestic product per capita as the dependent variable) was statistically significant with a p-value of 0 (figure 1.4). With a positive B value of 386.111 this means that as property rights increase so does economic success. This could be because as business owners feel more secure in their property rights they decide to expand more thus increasing production and thus gross domestic product per capita.

*Model Four:*

With a p-value of .013, this relationship was found to be close to statistically significant at the 90% confidence level (figure 18). Due to the negative B variable, the relationship indicates that a decrease in property rights is correlated with an increase in resource depletion and thus a decrease in economic success. Using both definitions of economic success the relationships were found to be at least close to statistically significant.

## **Case Study: Health and Economic Success**

### **The Turkish Case**

#### ***The Reverse Causality Problem:***

Some scholars criticize the usage of life expectancy at birth in its usage as an overall indicator of the health of a population (Odrakiewicz 2012). They state that it is an incomplete measure of health. This is due to the fact that it does not take into consideration factors like nutrition. A population with better nutrition will be able to be more productive than a population with a lower overall average of nutrition. It also does not reflect whether the majority of the population is younger or older (Aisa 2013). An older population will not be part of the labor force and will thus be less productive. A younger population will have greater productivity due to the fact that they have more years left in the labor force. As a result of these criticisms authors sometimes use a variety of other indicators for the overall health of a population including the number of physicians per capita, the number of hospital beds, overall medical consumption, the quality of and access to health care services, infant mortality rates, general death rates, and average life expectancies (Buker 2004).

During the statistical analysis portion of this thesis, it was found that life expectancy at birth was statistically significant in its relationship with both gross domestic product per capita and resource depletion. Life expectancy was used as an indicator for the overall health of a nation. Resource depletion and gross domestic product per capita represented the overall economic success of a country. In the current research on the connection between the economic success of a state and the health of a nation there are concerns of endogeneity. Scholars are split on whether an increase in economic success causes an increase in the overall health of nation or

if an increase in the overall health of a nation causes an increase in economic success or whether both situations occur (Aisa 2013).

Many scholars believe that an increase in economic success in a state causes an increase of the overall health of that state (Aisa 2013). This is because that as income rises typically so does overall health care expenditures (Odrakiewicz 2012). According to a multitude of studies, wealthier individuals tend to spend larger portions of their income on things like nutrition. These items then benefit their overall health. So as the population gets wealthier they spend more on health care thus likely causing an increase in the overall health of a population.

Additionally, as a country grows economically it has more money to invest in technology (Odrakiewicz 2012). An increase in technology means that new medicines, treatments, etc. can be developed and invented. These new technologies can lead to better health within the population of a country thus indicating an increase in overall health. This is one way that some scholars in this field suspect that an increase in economic growth can spur an increase in the overall health of a state.

A different indicator of the health of a population, infant mortality rates, has also been used to show that economic improvements can cause an increase in the overall health of a population (Odrakiewicz 2012). Studies have found that, up to 40% of a state's improvements in its infant mortality rate can be explained by increases in the same country's economic growth improvements. This is due to the fact that people with more income tend to have better living standards, improvements in nutrition, and states are able to spend more in the public health sector. With better living standards infants are better sheltered and mothers are less likely to have birthing complications. Improvements in nutrition increase the overall health of both the mother



and the child. Finally a larger health sector means that women have greater access to health services during pregnancy and the birthing process. This study also shows that as a country's growth increases disease and mortality rates tend to decrease. This means that more people are living longer thus indicating an increase in the overall health of a population.

There have been studies that have found no statistically significant impact of life expectancy on gross domestic product (Odrakiewicz 2012). However, these studies have noted small but positive increases when comparing the overall effect of a change in the health of a population on economic success. Those who support the view that an increase in health increases economic success argue that the effects of changes in the overall health of a population slowly affect the economic success of a state. They argue that these effects can be seen more in the longer run because the effects are not immediate.

Some scholars argue that a state's overall health has a role in affecting economic success due to its status as an input into both human capital and labor productivity (Odrakiewicz 2012). Many consider the two most important indicators of human capital to be health and education (Kesikoglu 2013). Followers of this opinion, point toward studies that say spending in health should be looked at as an investment that could result in greater income (Odrakiewicz 2012). Both human capital and labor productivity are considered to be inputs into economic growth. A greater health status could spur greater human capital due to the fact that healthier individuals generally tend to live longer. People who live longer have a greater interest in investing in their abilities through education. Those who have a higher education are thought to be more productive. More productivity indicates economic growth. One study found that a 10% jump in life expectancy has a causal relationship with a .4% jump in economic growth.

Some also point to studies indicating that a population with a longer lifespan tends to save more (Aisa 2013). These saving will be reinvested into the economy and thus can promote economic growth. Savings also allow consumers to keep on consuming and if consumers are consuming longer it can help to spur economic growth.

While there are studies supporting the idea that an increase in economic growth causes an increase in the country's overall health, there are also studies providing support for the idea that an increase in a country's health can cause an increase in the country's economic growth (Odrakiewicz 2012). One study found that 30% of economic growth experienced by the British within the past 200 years is related to improvements in nutrition (an indicator of overall health). This could be due to nutrition's positive influence on labor participation. Healthier workers tend to have less sick days. This means that they are able to produce more thus increasing overall productivity. Healthier workers also tend to produce better quality work. Finally, healthier workers tend to be more mentally and physically prepared for their jobs thus likely increasing their production. These factors increase productivity and thus can increase (all other factors held constant) a country's economic growth.

Another factor is that healthier people tend to have fewer children (Odrakiewicz 2012). One of the reasons for this is that children tend to be healthier and thus child mortality rates tend to be lower. This means that the parents of these children spend less time raising and having children and are able to spend more time in the work force. With extra time in the work force their productivity rises thus (everything else held constant) increasing a country's economic growth.

Another study looked at Russia during the first half of the 1990s (Odrakiewicz 2012). The authors found that a fall in life expectancy from 70 to 65 years led to a lowering of Russia's gross domestic product from 1.8% to 2.7%. One other study looked at OECD countries from 1960 to 1990 and found that countries that typically have higher health expenditures have higher gross domestic products.

Studies also point to the fact that poor health can have significant impacts on the economic welfare of households as proof that health impacts economic growth (Thoa 2013). Medical bills and costs coming from poor health can cause a family to become indebted and thus not contribute as much to production. These bills can also cause a family to lower their consumption. The lowering of production and consumption are especially true in cases in which people have to pay out of pocket for their health expenses. In lower and middle income countries, out of pocket expenses are the primary form of financing health expenses. The lack of production along with the lowering of consumption can cause economic growth to decrease.

One criticism of this view that an increase in the overall health of a population causes an increase in economic growth is that it is difficult to tell whether the increase of health is spread evenly across the population (Odrakiewicz 2012). It is possible that just a portion of the population experienced an increase in their health care experience. In order to better explore the relationship between the overall health levels of a population and economic success the country of Turkey will be examined to see if there is a connection between the two.

### ***Turkey's Health Care History:***

The Republic of Turkey was created in 1923 although it has historical roots within the Ottoman Empire (Atun 2013). Currently it is considered to be an upper-middle income country.

Located between Europe and Asia, Turkey has 81 provinces. Having a population of 75.6 million people, Turkey's population is considered to be young and is growing. Some people point to this young population as a source of its rapid economic growth within the past ten years. Providing that these people have jobs Turkey should have more years or productivity ahead of it. Shortly after its founding as a republic, the Turkish government created the Ministry of Health (Seren 2013). The job of the Ministry of Health was to oversee Turkey's health care policies.

In 1945 Turkey expanded its insurance outreach by establishing the Social Insurance Organization (Atun 2013). The Social Insurance Organization helped blue collar workers obtain insurance. Turkey continued on its path of expanding insurance when in 1949 it created the General Employees Retirement Fund which was used to support retired civil servants and their families. This meant that less people had to pay totally out of pocket for health services thus making them more likely to seek health services overall. This seeking health services meant that they were more likely to be healthy and able to work. Being able to work would have allowed them to keep being productive. As they were healthier they would have had to take less sick days. Less sick days means they were at work more being productive. This increase in productivity could have contributed to Turkey's economic growth.

During the 1960s, in a move toward a more socialist society Turkey developed 5 year state plans for health coverage (Atun). In 1961 Turkey attempted to better condense its public health services system through the Law on the Socialization of Health. This law attempted to create a health system with three levels; health houses, health centers, and district hospitals. From 1960 to 1969 we can see that life expectancy at birth rose from 45.38 years to 51.65 years. This could be due to the fact that health coverage was more readily available to the public. While Turkey's gross domestic product per capita grew from 507.92 dollars to 573.06 dollars during

this time Turkey also experienced some economic trouble during this time period. In 1961, Turkey's gross domestic product per capita dipped to 284.01 dollars. Despite this Turkey's life expectancy at birth grew consistently. This seems to indicate that this economic dip did not have much if any impact on life expectancy. However, because life expectancy at birth continued to grow it could be that this overall health level increase helped increase Turkey's economic success level after it suffered the dip in 1961.

In 1987, Turkey began to focus on the government having a narrower role in the health field with the Basic Health Law (Atun 2013). This law recommended a narrower role for the Ministry of Health saying that the Ministry of Health should be solely concentrated on regulation. However, due to political splits this law was never fully implemented.

During the 1990s, many public health indicators in Turkey were on a positive trajectory (Atun 2013). Between 1990 and 2009, the average life expectancy increased by 15.4% from 65 years to 75 years. During this period Turkey continued passing legislation on dealing with the health industry. The 1993 Law of Health Law restructured the Ministry of Health and gave it new responsibilities. It also developed Provincial Health Administrations for each province. However, during the 1990s Turkey was also struggling economically. This was due to factions and political instability within the government. So while legislation on health was still being passes it became less of a priority.

As of 2001, Turkey was not doing well economically (An Executive). The country was nearing three digit inflation and was supporting a massive debt. It's gross domestic product per capita went from 4,219.54 dollars in 2000 to 3,057.79 dollars in 2001. However, it was able to recover and get back on track economically. One of the reasons that it was able to recover

according to “An Executive Country Review on Turkey” was the pharmaceutical industry. Between 2001 to 2007 the industry grew from having a value of 3.7 billion American dollars to 9 billion American dollars. It is now about 300 companies large and sells on aver 1.8 billion units of pharmaceutical products per year. The fact that the pharmaceutical industry has grown so much shows an increase in the population’s demand for pharmaceutical drugs. This could be due to the fact that Turkish people are living longer. In 2001 the average life expectancy at birth was 70.55 years. In 2007 the average life expectancy at birth had risen to 73.18 years. Despite the fact that government inconsistency and political instability were rampant the economy of Turkey was able to recover. One of the reasons that it was able to recover was the health industry.

During 2003, Turkey implemented their Health Transformation Program (Atun 2013). This program expanded health care coverage and access in the goal of making it available to all citizens. It also unified Turkey’s various insurance programs into one program. As a consequence of this program insurance coverage increased from 2.4 million people in 2003 to 10.2 million people in 2011. This means that the number of people insured in Turkey quadrupled within a span of eight years. In addition the gross domestic product per capita in Turkey went from 4,595.28 dollars in 2003 to 10,604.84 in 2011. While gross domestic product per capita had a setback in 2009 life expectancy at birth did not. If gross domestic product per capita affected life expectancy at birth then it would have been likely to see some sort of pullback in life expectancy at birth. Instead life expectancy at birth continued to increase.

While Turkey has made enormous progress within its health system it also still suffers from its share of difficulties (Atun 2013). There is sometimes not enough financing for its public system which can lead to a shortage of health resources. Additionally, an individual’s access and ability to get health care depends on where they live due to inequalities in service and access.

There have been quite a few studies done that have looked at the relationship between economic success and health in Turkey (Tatoglu 2012). One study which looked at 20 OECD countries between 1975 and 2005 found that the overall relationship between health and income changed based on the time and the country. However, when the same study looked strictly at Turkey it found a long term relationship that existed between health and income.

Additionally, when looking at the patterns of a variety of health indicators trends show improvements in overall population health between Turkey's founding and 1999 (Buken 2004). The annual birth rate has decreased from 48.2 per 1,000 to 20.8 per 1,000. This indicates that Turkish adults have more time to spend working and producing. The estimated annual death rate has decreased from 23.5 per 1,000 to 6.3 per 1,000. This means that less people are dying and thus more people are available to the work force. Finally, life expectancy at birth has increased from 43 to 69 years. Thus people are living longer lives and thus spending more time in the work force. All of these indicators correspond with the overall upward economic trend. While one can see that both trends are upward generally. Life experience at birth, unlike gross domestic product per capita has experience no pullbacks. For the reasons indicated above this makes it a more likely cause of economic success. The following analysis looks at the results of a regression analysis between Turkey's life expectancy at birth and gross domestic product per capita data.

***Analysis:***

When a regression analysis was run between Turkey's gross domestic product per capita and life expectancy at birth the relationship was found to be statistically significant. With a p-value of 0.00 life expectancy at birth was found to be significant at the 99% confidence level. The B value of 270.183 indicates that the relationship was positive. This means that as life

expectancy at birth increases by a year gross domestic product per capita increases by 270.183 dollars. These results indicate that in Turkey life expectancy at birth over the past fifty years life expectancy at birth has been positively correlated with gross domestic product per capita. These results are concurrent with the hypothesis. Using this data indicates that gross domestic product per capita and life expectancy are certainly correlated when life expectancy at birth is used as the independent variable and gross domestic product per capita is used as the dependent variable. It should be noted that this was only data for one country, Turkey. Data for other countries may indicate different trends.

Looking at scatter plot 4.1 one can definitely see an upward trend between life expectancy at birth and gross domestic product per capita. Looking at the trend over time one can see that both gross domestic product per capita and life expectancy both gradually increase over time.

However, one must also keep cultural factors in mind while studying Turkey. The majority of the population of Turkey practices Islam. According to Islamic customs, it is traditional for women to stay home and take care of their families rather than be participants in the work force. The lack of women in the work force means that Turkey has a good percentage of their possible labor force that that is not directly in the labor force. This is not to say that no women work. Some might have home businesses and some work in the labor force. However, a decent amount of women are staying at home. Should these women decide to start working (and if jobs are available for them) gross domestic product per capita would likely see an increase that is unrelated to health care (although some women might have better access to health care if they are working). This cultural difference points to the idea that it is likely not one factor alone that is responsible for economic success but rather a combination of factors. Despite this, a positive



statistically significant correlation still appeared between the gross domestic product per capita of Turkey and its life expectancy at birth. Thus, the null hypothesis for this case can be rejected.

## Conclusion

In order to better examine the relationship between economic success defined by gross domestic product per capita and resource depletion (as an indicator of a lack of sustainable development), three scatter plots were created (figures 5.1, 5.2, and 5.3.). Each scatter plot has gross domestic product per capita on the x-axis and resource depletion as a percentage on the y-axis. The first plot consisted of 25 different countries that were chosen using a random number generator. The countries were listed alphabetically and, for example, if the random number generator chose 131 the country of Tanzania would be used in the scatter plot. No country was repeated in the data set. The second plot consisted of the first 25 countries within the alphabetical list and the third plot consisted of the last 25 countries within the alphabetical list. Each of these plots is similar in the pattern that it presents. Countries with less gross domestic product per capita tend to be a lot more erratic in the amount that they deplete their resources. This could be explained by the fact that they either did not have the means (financially) to exploit these resources or did have the means and consequently were using up a decent amount of them (perhaps because they could not import those resources or were exporting resources to other countries). However, countries with higher gross domestic product per capita tended to be depleting a lower amount of their resources. Now this could be because they were exporting them from other countries or it could be because they had more sustainable development friendly policies in place or it could be a combination of the two. In order to truly see if there is a relationship between the gross domestic product per capita and sustainable development more research should be done to see why these high-income countries have lower rates of resource depletion and why the lower-income countries tend to be more all over the board with the percentage of resources they deplete.

Additionally, in order to see if gross domestic product per capita was an explanatory variable for the sustainable development indicator of resource depletion another analysis was run with resource depletion as the dependent variable and gross domestic product per capita as one of the independent variables. The results for this analysis can be seen in figures 5.4, 5.5, 5.6, and 5.7. It did not appear that gross domestic product was an explanatory variable. If it had been then the positive relationships would have become negative and the negative relationships would have become positive. This occurred only for the independent variable or government spending (which did not have statistically significant results). Additionally, when gross domestic product per capita was run as an independent variable in the freedom from corruption set both freedom from corruption and gross domestic product per capita had results indicating that the two could be possibly multicollinear.

After running the linear analysis there were a variety of results. Some of the relationships appeared as they had been predicted to appear. Other relationships were the opposite of what had been hypothesized. Finally between some variables there were simply no statistically significant relationships.

When looking at the first independent variable, literacy rates, three out of four parts of the analysis indicated that there was no statistically significant relationship between literacy rates and economic success. The one that did show a statistically significant relationship used resource depletion as the indicator for economic success and contained freedom from corruption within the data set. However, the relationship was a negative one indicating that as a greater percentage of the population became literate the number of resources being depleted increased and thus economic success decreased. This is the opposite of what has been found in prior research and

what was hypothesized. Due to the discrepancy in the results perhaps another indicator for education should be used to see if there is actually any statistically significant relationship.

In all four parts of the analysis between life expectancy at birth and economic success it was found that life expectancy at birth and economic successes were positively correlated. This means that as life expectancy at birth increased so did economic success (no matter how it was defined). This went along with what was hypothesized and what was found in prior research. In order to address the possibility of endogeneity, a case study on Turkey was done. This study found a significant relationship when life expectancy at birth was the independent variable and gross domestic product per capita was the dependent variable. Further research could look at whether certain areas of health are more useful to address when seeking economic success than others. This would help policymakers better target various of areas of health when looking towards making a country economically successful.

When looking at trade freedom only 1 out of 4 parts of the analysis found a close to statistically significant relationship. This occurred when gross domestic product per capita was used to define economic success and the property rights variable was used in the data set. Trade freedom could be further broken down into different trade freedoms to see if any of those produce a statistically significant relationship with economic success. It could be that some have an effect on economic success while others do not.

In the government spending portion of the analysis when gross domestic product per capita was used to define economic success the relationship was found to be statistically significant. However, it was significant in a manner that was not hypothesized. It was found that more government spending correlated with greater economic success. This is what some of the

prior research on economic success has found. However, this result could be due to the fact that lower income countries (which were included in the data set) do not have as much to spend. Research in this area is pretty split and it might be useful to split countries into income ranges and see if any statistically significant relationships emerge.

When looking at government regulation, none of the portions of the analysis emerged as having statistically significant relationships. It might be useful to identify different types of regulation and see if any sort of statistically significant relationship emerges.

Freedom from government corruption was found to be statistically significant when economic success was defined by gross domestic product per capita but not when it was defined by resource depletion. This could be due to the fact that both highly corrupt and non-corrupt governments deplete resources equally. Perhaps, another sustainable development indicator for economic success could be used to see if there was any statistically significant relationship between the two variables.

Having more property rights was found to have a statistically significant relationship when economic success was defined both ways. It appears that a sense of ownership is important to a population having economic success. It would be interesting to see if certain property rights like the right to buy and sell goods, affect economic success more than others do.

In conclusion, there is no clear cut path to economic success currently. In addition, it is likely a variety of factors that influence economic success and not just one factor alone. A lot more research could be done in this area and could further explore the relationships between the independent variables. Further research could involve breaking these possible causes down so that policy suggestions could be made.

## Appendix

Figure 1.1 Gross Domestic Product Per Capita with Freedom From Corruption and Property

Rights

R	R Squared			
0.895	0.801			
Variable	B	Standard Error	t	Significance
Literacy Rate	5.38	47.024	0.114	0.909
Life Expectancy at Birth	216.616	95.464	2.269	0.025
Trade Freedom	88.324	68.121	1.267	0.207
Government Spending	-122.684	30.326	-4.044	0
Regulator Efficiency	-16.919	80.869	-0.209	0.835
Freedom from Corruption	596.788	75.493	7.905	0
Property Rights	-62.845	68.336	-0.92	0.359

Figure 1.2 Gross Domestic Product Per Capita with Freedom From Corruption and Property

Rights Multicollinearity Test

Variable	Tolerance	VIF	Multicollinear
Literacy Rate	0.447	2.238	No
Life Expectancy at Birth	0.42	2.383	No
Trade Freedom	0.615	1.627	No
Government Spending	0.729	1.373	No
Regulator Efficiency	0.451	2.218	No
Freedom from Corruption	0.146	6.85	Possibly
Property Rights	0.132	7.585	Possibly

Figure 1.3

Gross Domestic Product Per Capita with Freedom from Corruption

R	R Squared			
0.894	0.8			
Variable	B	Standard Error	t	Significance
Literacy Rate	6.9	46.969	0.147	0.883
Life Expectancy at Birth	211.947	95.277	2.225	0.028
Trade Freedom	83.971	68.036	1.234	0.219
Government Spending	-121.385	30.278	-4.009	0
Regulator Efficiency	-40.371	76.701	-0.526	0.599
Freedom from Corruption	539.089	41.963	12.847	0

Figure 1.4

Gross Domestic Product Per Capita with Property Rights

R	R Squared			
0.844	0.713			
Variable	B	Standard Error	t	Significance
Literacy Rate	-12.895	56.224	-0.229	0.819
Life Expectancy at Birth	289.857	113.741	2.548	0.012
Trade Freedom	126.813	81.317	1.559	0.121
Government Spending	-158.37	35.898	-4.412	0
Regulator Efficiency	-50.635	96.673	-0.524	0.601
Property Rights	386.111	45.497	8.487	0

Figure 1.5: Resource Depletion with Freedom from Corruption and Property Rights

R	R Squared			
0.415	0.172			
Variable	B	Standard Error	t	Significance
Literacy Rate	0.113	0.064	1.753	0.082
Life Expectancy at Birth	-0.31	0.13	-2.375	0.019
Trade Freedom	-0.095	0.093	-1.018	0.31
Government Spending	-0.012	0.042	-0.278	0.782
Regulator Efficiency	0.064	0.111	0.582	0.561
Freedom From Corruption	0.095	0.106	0.895	0.372
Property Rights	-0.201	0.095	-2.12	0.036

Figure 1.6: Resource Depletion with Freedom from Corruption and Property Rights

Multicollinearity Test

Variable	Tolerance	VIF	Multicollinear
Literacy Rate	0.447	2.236	No
Life Expectancy at Birth	0.421	2.374	No
Trade Freedom	0.617	1.621	No
Government Spending	0.719	1.39	No
Regulator Efficiency	0.452	2.21	No
Freedom From Corruption	0.141	7.102	Possibly
Property Rights	0.128	7.843	Possibly



Figure 1.7: Resource Depletion with Freedom from Corruption

R	R Squared			
0.381	0.145			
Variable	B	Standard Error	t	Significance
Literacy Rate	0.117	0.065	1.805	0.073
Life Expectancy at Birth	-0.325	0.132	2.466	0.015
Trade Freedom	-0.102	0.094	1.084	0.28
Government Spending	-0.01	0.042	0.237	0.813
Regulator Efficiency	-0.011	0.106	0.106	0.916
Freedom From Corruption	-0.093	0.058	1.591	0.114

Figure 1.8: Resource Depletion with Property Rights

R	R Squared			
0.11	0.013			
Variable	B	Standard Error	t	Significance
Literacy Rate	0.11	0.064	1.713	0.089
Life Expectancy at Birth	-0.299	0.13	2.305	0.023
Trade Freedom	-0.089	0.093	0.956	0.341
Government Spending	-0.018	0.041	0.441	0.66
Regulator Efficiency	0.058	0.11	0.523	0.601
Property Rights	-0.13	0.052	2.509	0.013

Figure 4.1: GDP per Capita versus Life Expectancy at Birth for Turkey Graph

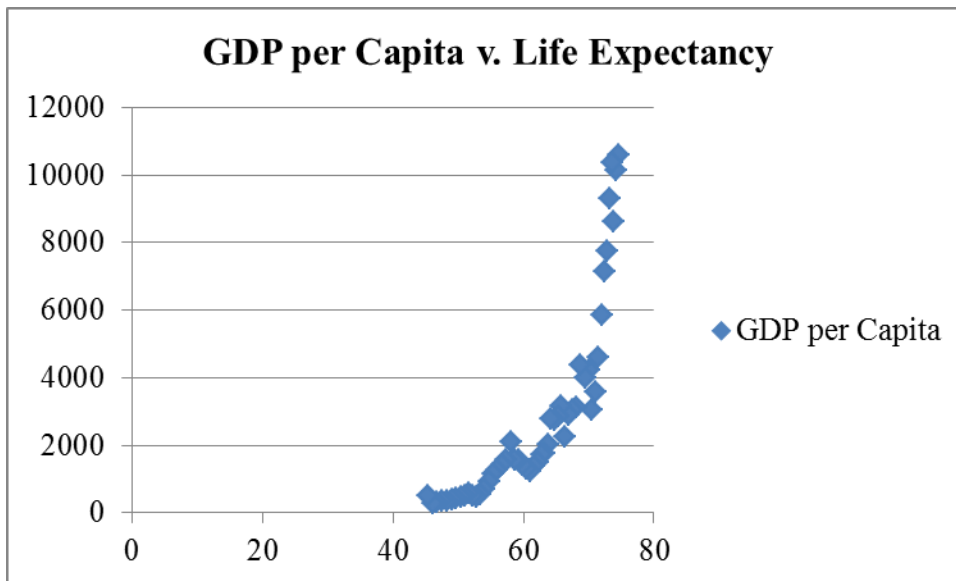


Figure 4.2: GDP per Capita and Life Expectancy at Birth for Turkey

R	R Squared	B	Standard Error	T	Significance
0.831	0.691	270.183	25.561	10.57	0

Figure 5.1: GDP per Capita versus Resource Depletion (Randomly Chosen)

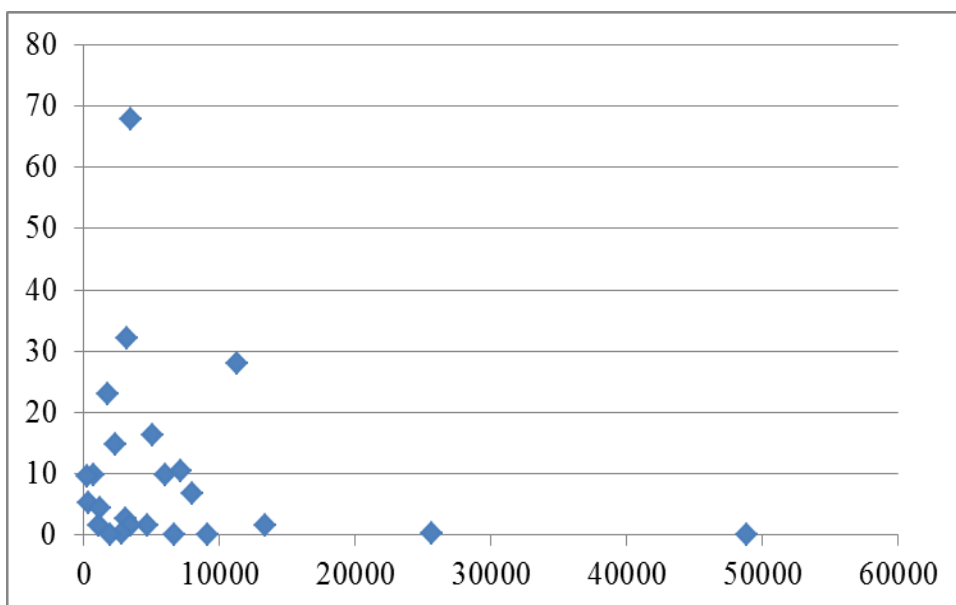


Figure 5.2: GDP per Capita versus Resource Depletion (First 25 Alphabetically)

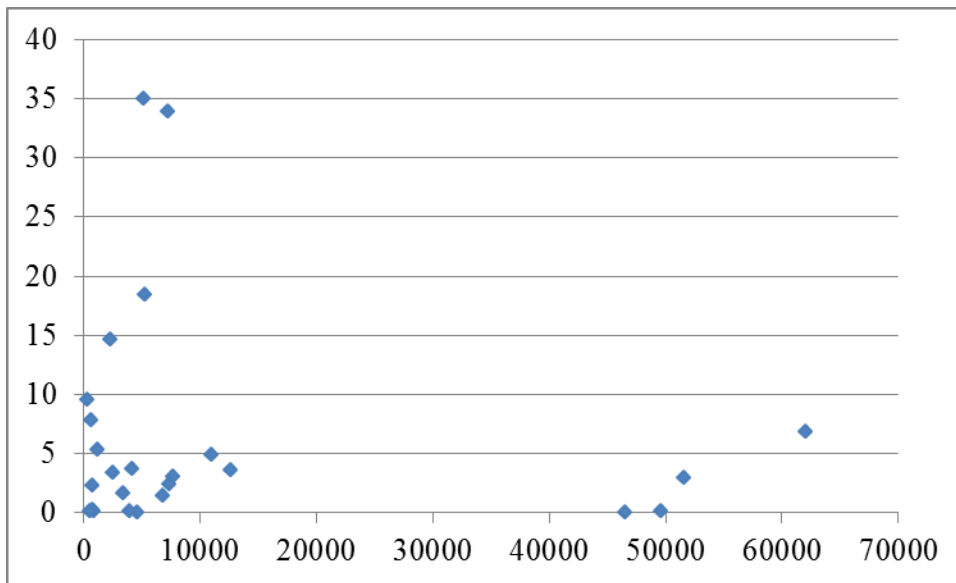


Figure 5.3: GDP per Capita versus Resource Depletion (Last 25 Alphabetically)

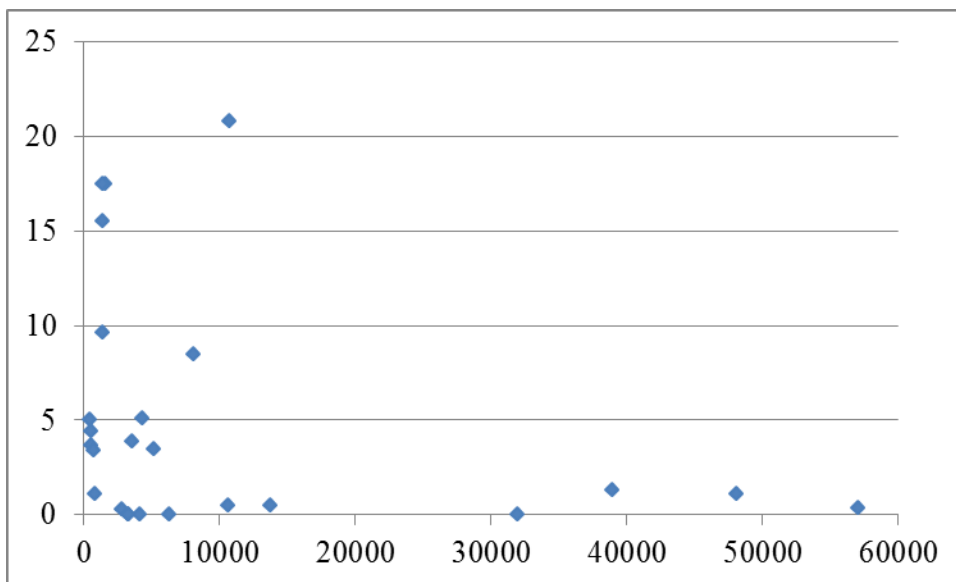


Figure 5.4: Resource Depletion with Freedom from Corruption and GDP per Capita as an Explanatory Variable

R		R Squared		
0.46		0.212		
	B	Standard Error	t	Significance
Literacy Rates	0.115	0.063	1.833	0.069
Life Expectancy at birth	-0.407	0.129	-3.147	0.002
Trade Freedom	-0.135	0.091	-1.479	0.141
Government Spending	0.04	0.043	0.931	0.354
Regulatory Efficiency	0.005	0.102	0.051	0.959
Freedom from Corruption	-0.299	0.082	-3.627	0
GDP per Capita	0	0	3.426	0.001

Figure 5.5: Resource Depletion with Freedom from Corruption and GDP per Capita as an Explanatory Variable Multicollinearity Results

	Tolerance	VIF	Multicollinear
Literacy Rates	0.448	2.23	No
Life Expectancy at birth	0.408	2.45	No
Trade Freedom	0.611	1.64	No
Government Spending	0.637	1.57	No
Regulatory Efficiency	0.504	1.99	No
Freedom from Corruption	0.221	4.52	possibly
GDP per Capita	0.22	5.01	possibly

Figure 5.6: Resource Depletion with Property Rights and GDP per Capita as an Explanatory Variable

R		R Squared		
0.478		0.229		
	B	Standard Error	t	Significance
Literacy Rates	0.113	0.062	1.831	0.069
Life Expectancy at birth	-0.387	0.128	-3.026	0.003
Trade Freedom	-0.128	0.09	-1.413	0.16
Government Spending	0.036	0.043	0.833	0.406
Regulatory Efficiency	0.079	0.107	0.742	0.459
Property Rights	-0.253	0.062	-4.073	0
GDP per Capita	0	0	3.343	0.001

Figure 5.7: Resource Depletion with Property Rights and GDP per Capita as an Explanatory Variable Multicollinearity Results

	Tolerance	VIF	Multicollinear
Literacy Rates	0.448	2.23	No
Life Expectancy at birth	0.407	2.46	No
Trade Freedom	0.61	1.64	No
Government Spending	0.637	1.57	No
Regulatory Efficiency	0.453	2.21	No
Property Rights	0.277	3.6	No
GDP per Capita	0.277	3.62	No

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