(SST)
Project Number: 49-SST-GROW

# Growth

An Interactive Qualifying Project Report
submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfillment of the requirements for the
Degree of Bachelor of Science
by

David J. Brown
Jaime S. Shannon
Fernando Perez

Date: March 4, 2011

Approved:
Professor Steven Taylor, Major Advisor

# Table of Contents

# Abstract

The need to grow is something that every American strives for as an individual, a company, and a country. We want bigger cars bigger houses and more space to ourselves. We also strive for growth as a country; in fact that's how most people view the success of our presidents. Continual growth seems to be ideal but the question is whether or not it is even possible and what it may mean to our country.

# Executive Summary

This project revolves around the ideas of economic growth and the endless possibilities that are accompanied with it. We started by introducing the question that drove this project which is, can we continually grow forever? With this introduction to this project came the background which lays out the blueprint for our understanding of our economy. It discusses the past and where we have came from following the great depression. This paper digs down deep to find the true meanings of gross domestic product and what it means to our country. It also tries to develop other possible methods for measuring the economic success of our country. Our background information also discusses the questions and ideas involving continual growth from the affects it has on our natural resources to the impact it will have on our cities development.

Our background information drove us into our methodology section which was shaped by six main questions. The questions are as follows:

- **Question 1: How do we measure growth, and is it the best way for the country?**
- **Question 2: Can we measure success in different ways, even when GDP doesn't increase?**
- **Question 3: Will growth stop? If it does can we avoid a collapse and make the adjustment easier for humanity?**
- **Question 4: Is it possible to not have an increasing GDP but still**

**have a prosperous economy?**

- **Question 5: Does continual growth seem at all possible, and would all negatives multiply for the individual?**
- **Question 6: What happens if natural resources continue to erode? Can we avoid a collapse and make the adjustment easier for humanity?**

These questions also were the foundation of our analysis chapter. In this chapter we answered the questions in our opinions that were developed with our background information combined with the opinions and ideas of experts.

We believe continual growth is possible for a significant period of time. We as a nation will have to adjust to some of the obstacles that come with the idea of continual growth such as the search for more natural resources and considering the gap between the rich and the poor. Our adjustments to growth as we move forward as a country are what will make the growth a successful growth. If we cannot change and coincide with having bigger houses, finding alternative fuels and ideals to replenish natural resources, and close the gap between the rich and the poor our country may be in trouble when it comes to growth.

## Chapter 1

# Introduction

# 1. Introduction

Economic development along with its fortunes and problems is the way a nation's progression is evaluated. Throughout the world every nation is constantly looking for sustained economic growth, but where does it begin to level off or cease? The United States has a projected healthy annual growth of 3.3 percent, factors contributing to this growth come from technology, salaries and size of population but if these factors reach their limits, growth cannot continue at a steady rate. Before coming up with a decisive conclusion we need to be sure growth has limits, in order to do this we need to understand what contributes to growth and whether or not these are sustainable. Three subjects will be thoroughly investigated, and answered in entirety, these are what would happen if we would continue to grow and if it would even be logical, does growth have limits, and where and how does the U.S measure growth? Once these questions are answered, we can try to explain the situation in a way that will be easier for anyone to understand.

Different issues affecting the growth in the economy are more evident in this day and age because of the fact that society has drastically changed, and everything from population to pollution and consumption has risen. Today our national debt is extremely high and only continues to rise; meanwhile we just managed to dig ourselves out of a recession and are still trying to fight a war. These problems are only part of a much larger issue, finding statistics on how this is taking effect in the United States will help bring clarity into our answers.

If the economy's growth were to come to a halt, the changes would be huge, but it's not only important to look at the nation as a whole but also the effects on an average individual family. Comparing and contrasting the difference will give a more in-depth look on how each family could be affected. With this direct connection, smaller more minute problems can be investigated and represent the roots of the economy rather than looking at one big picture. Things such as family income, spending and size will be compared in the past, present and future. Clarifying those three questions is going to take an extensive amount of research along with considerable knowledge of the economy. There are two sub-questions to each section, and they are posed for the simple reason of clarifying our point.

In spite of our economy's efforts to constantly grow, that doesn't seem to be a realistic situation. Even with the recessions and downfalls that our economy has gone through, we're still able to grow, this shows that our measurement of healthy growth isn't correctly measured. This fact brings us to our first question of **how do we measure growth, and is it the best way for the country?** The United States along with many other nations use a measurement of growth know as the GDP. GDP stands for 'Gross Domestic Product'. This is a measurement of how much people are spending nationally, by adding up all revenue in a year. The United States gross domestic product is currently at 14.6 trillion dollars according to google.com and their public data website. The ideal situation would be that the United States continues with its economic growth with all of its perks and developments such as inflation and population growth. However if the United States' economy does continue to grow at the desired rate we could be in a

conflict as a society. This question will be crucial because our project is based around economic growth, and GDP is the measurement of this growth.

The economy will always have negative and positive feedback because of how important a role it plays in our lives. Since there are criticisms of the current system we use, we wanted to give people alternative measures. That brings up the second question to our first section and that is, **can we measure success in different ways, even when GDP doesn't increase?**

Since we are leaning towards the conclusion that the economy cannot continually grow, we had to look at what that would mean for the U.S. This is where our third question is asked**, will growth stop? If it does can we avoid a collapse and make the adjustment easier for humanity?** Everything in our society and our lives eventually stops growing from our population to our income. Can the same be said for our economy? The question is not just if our economy will eventually stop growing, but when it does can we **have a non increasing GDP but still have a prosperous economy?** Everything in our society and our lives eventually stops growing from our population to our income. Can the same be said for our economy? The question is not just if our economy will eventually stop growing, but also when would this occur and how do limitations put a time constraint on this. These two questions are the main concern for the second part, there may be smaller questions to be answered but these two are the root.

If our country's GDP continually grows at the standard rate of 3.3 percent annually, by the time we get to 2085 our gross domestic product would have grown from

roughly the 15 trillion that it is today to above 500 trillion**. Does this seem at all possible?** That seems to be a major increase or our country's gross domestic product, **and if that were to happen would all the negative things related to growth multiply?** Negative situations like the increasing disparities between the wealthy and poor, or the increasing usage of erodible resources. This question is the beginning to our last section; this set the wheels in motion because the possibility of us continually growing at a steady rate seems a little over the top, so naturally we have to investigate what would happen.

Limitations within our economy are so strongly emphasized because of the tangible resources the earth provides. There is only a certain amount of available resources and limited time in which they can be replenished. One example is the rain forest; it is being cut down at a tremendously fast rate and we cannot re-grow it nearly as quickly as we need to. In order to completely comprehend the argument concepts such as sustainability and ecological footprints we will have to further investigate and better understand what this means. These concepts seem to continuously refer back to environmental situations and how they put constraints on growth. The question within this argument is not **what happens if natural resources continue to erode, can we avoid a collapse and make the adjustment easier for humanity?**

Our research will extend, as far in depth as possible, we will be using society as a whole as well as families and individuals. In doing so we will get to the bottom of the issues and nothing will be left out. We will also use different situations as a microcosm of what can happen. One example is the recession, if we were to investigate the effect it had on the economy as well as families, we can try to prolong those effects and see

what would happen, not only if growth stopped but if we were to once again have negative growth in the GDP. We also need to investigate where growth could come from, financing has recently taken over, but can that sector continue to expand? There is a lot to investigate but by looking at the individual as well as the nation, all angles will be covered making it easier to answer all questions.

This project is based on research, data, and evidence that will help us predict the future of our economy, and whether or not it will keep growing at steady rate or cease. This should help clarify the theory that continual growth at 3.3 percent is unrealistic and it needs to, at the least, slow down. Some of the data will be found on government websites, interviews and projections of experts on the situation. All this information is crucial because all of our work is based on future projections. Due to the fact that there is no guarantee on the future, collecting lots of data, then comparing and contrasting is a must in order to make our predictions as accurate as possible.

## Chapter 2

# Background

# 2. Background

This section will be set up in three sections, first we will clarify what the GDP is and whether or not it is a good measurement of economic growth. Since the growth we're referring to is completely within the GDP, this is the most important part to the project. Next we will investigate what would happen if growth in the GDP were to stop, and the effects it would have on wealthy, middle class, and poor individuals, and look for alternatives measures of growth. In doing so we will answer the question of what it means if we continually grow and whether or not this is possible or realistic.

### 2.1.1-GDP

First and foremost, we have to clearly identify GDP and its sectors, as well as why growth is so important within them. Following that step, it is necessary to figure out why it is the measure of a country's success and whether or not it is a good indicator. In addition, we need to find other alternatives to try and measure the economy a better way. Lastly, we have to investigate what accounts for growth and whether or not it can be continued.

GDP is a complicated issue because there are so many aspects within it and opinions about it. Donella Meadow's book *Limits To Growth* is a great source for what we want to accomplish. Not only does it clarify what each sector is and how it contributes to the GDP, but it also shows how much growth has increased within each, this sets the foundation for what we want to accomplish. This is the start to everything

because it includes all things that accounts for GDP and thoroughly explains them. Helping us understand how businesses, government, and families contribute.

Another source we will use for this section is a Harper's Magazine article, Our Phony Economy by Jonathan Rowe. Our Phony Economy gives us a general background of when it was constructed, the reason for it and why it is still used. Next it gives great examples of what GDP actually measures and what it means to the average individual, taking the narrow definition of the GDP that is given to us by economist and government officials and breaks it down into a way the average person can relate to.

## 2.1.2 -What is GDP?

The gross domestic product is divided up in to three different sections: industry, services, and agriculture. Industry is the section of economy concerned with production of goods including fuels. The industry section can be split into many sub sectors: the private sectors, which include the primary sector, secondary sector and quaternary sector; the public sectors; and the tertiary or service sector. The agriculture section is the process of producing food, fiber, and other goods by the systematic raising of plants and animals. The industry sector is the segment of economy concerned with production of goods including fuels. This sector includes mining and extraction sectors. Finally the third and final sector is the service sector; a service is the non-material equivalent of a good

Growth is what most countries look at as evidence for success and comparison against one another. However, does it mean a country has not been successful if they maintain the level of prosperity achieved from a previous year? For some reason, as a

country we rely heavily on the concept of GDP as our principle measure of our country's economic growth. Why the United States continues to use GDP as its principle measure of economic growth is unclear due to the many limitations and boundaries of its components. Our economy is faced with an issue involving the huge disparity between the wealthy and upper class citizens and those in the lower and middle classes. This gap between the rich and the poor has been constantly growing in America. The space between the two classes has grown steadily alongside our economic growth. Does this mean as long as our economy continues to grow so will the disparity between the rich and the poor?

Another limitation to the GDP system is that it excludes actions that are not provided through the market. An example of that would be unpaid work such as community service and volunteer work. If we are not including all services in our GDP can it be considered a fair measurement of our country's growth? Another limitation to GDP is that the gross domestic product concentrates and focuses more on short term economic developments and flaws, instead of focusing more on developments in the assets of natural, economic and social capital. These omitted assets are very important from a long-term sustainable economic development standpoint. If growth is something that develops over time, it is unclear why our country uses a system of measurement that leaves out portions of its structure and only considers short-term success instead of development over time.

Just as demographics changed during industrialization so did our economy. Prior to industrialization the economy was mainly made up of service and agriculture. Capital has both a positive and negative loop; once a machine becomes outdated due to the

new breakthroughs in technology it gets discarded causing a negative depreciative effect. By constantly creating new technology, this process can keep the industry section at a steady growth rate by replacing the depreciated factories and machines with newer improved ones. As the capital growth loop started to manufacture, each sector began to grow. However, the industry sector grew the largest. This positive loop caused the industrial sector to expand much faster than the population. The industrial transitioning began to eventually slow down. This decline occurred because our country had finished going through its industrialization phase. Once the industrial base of our economy was built that section did not grow as rapidly and was not the main percentage of the economy.

By taking a look at the historical overview of the United States GDP growth and the growth of each of the individual section, we can see growth patterns and project where the country's GDP is headed. Our service section has grown incredibly since the start of industrialization, especially once the industrial base of our economy was built. Can the service sector of our economy continue to grow so quickly? If our industrial sector begins to slow down or maybe even decrease, then does that mean our service sector will decrease dramatically? These questions develop the topic of considering what the limits to growth actually are.

## 2.2.1-Stoppage to Growth

For the second section we went back to *Limits To Growth.* *Limits to Growth* does a great job of explaining why our limitations of natural resources will be the reason for a stoppage of growth in GDP. It brings up sustainability and our ecological footprint, giving

alternatives to how we can adjust to a straight-line economy. It touches on things from consumption of the poorest countries to the salaries of the richest countries. The next source we're going to use is the video The Story of Stuff. This gives the cycle of products we use and since the services section is the biggest sector in the GDP, this is perfect at explaining why it is continually growing. It also does a great job of touching upon sustainability within the products we use. The book and video will be great resources because together they cover so many aspects.

## 2.2.2 -Stoppage, Examples and Arguments

By investigating what has currently taken place in our economy we can learn a good amount. The recession that our nation has been dealing with for the last few years, shows the effects of a GDP that is not increasing. Many service driven industries such as schools for example have been making major budget cuts and the laying off of a large amount of highly qualified employees. These types of setbacks can cause a major decrease in our service sector. Also the lack of funding may put a stop on research and developing in most major industries, which means that the current technology is going to have to suffice our society for longer than expected. This raises the question of what would happen in a much larger recession or depression. If the depression continued would that be an accurate measurement of growth stopping?

Growth in the GDP is a measure of how much money we spend, but what if we are spending our money irresponsibly? If you are paying medical bills because you eat unhealthy and have high blood pressure, which will be accounted for as GDP income. If you live a healthy lifestyle and never seek medical care or assistance, you do nothing to

help GDP in terms of medical services. Living a healthy lifestyle is obviously wiser and more beneficial to the individual; however, through the lens of GDP the government does not consider it so. The line between economic growth and economic success is very thin and it must be further investigated to set boundaries.

*Limits to Growth*, a pessimistic view of economic growth is the first book we chose to explore. It makes a concerted effort to inform people on the "reduction of humanity's ecological footprint while trying to help increase the consumption of the world's poor, in order to reach sustainability." It points out the fact that no matter what action we take, growth will eventually stop. The end of growth is inevitable; it is just a matter of how drastic the effects are in the future based on what actions are taken today. Considering the fact that human consumption has grown at a much faster rate than anyone expected, we now have to compensate for that extreme growth. *Limits to Growth* states that if we do not become ecologically conscience, we will eventually reach an end to growth by way of a collapse; this would be considered the worst-case scenario. A collapse means we would need to make a large number of major changes in such a short time, making the transition extremely difficult for anyone residing in the country.

*Limits to Growth* continually mentions and stresses the possibility of a collapse; this is the highly touted because it is the worst possible outcome that can happen to an economy. It is a very realistic situation but what are the factors that might cause it? *Limits to Growth* has three features of the global system that need to be changed. First are the erodible limits, this includes any resource that is being used and cannot be replenished. Eventually the resource will run out and we will not have anything to fall

back on or replace the preexisting resource. One example of this is the South American rainforest. Deforestation is steadily increasing, and within the next two decades, it is expected to be reduced by 40 percent. Second is the “incessant pursuit of growth.” Due to the notion of consistently needing to grow in order to be successful, our resources are wearing thin and desperate attempts at growth, will eventually lead to unwanted results. The last factor is the “delay in society’s response to approaching limits.” *Limits To Growth* was published over thirty years ago; it had the same content and very reasonable predictions of how the earth would fare in the future. Today, over thirty years later, little to no action has been taken place to reduce consumption and the transition into the limits. Becoming conscious of these three things are vital now more than ever because more nations are becoming industrialized, considering industry plays the biggest part in the ecological footprint, LTG pleads with us to take immediate action. Those three factors come together to form what is known as overshoot. Overshoot is expecting more than something can actually provide and go beyond its limits. One example is the “dot.com bubble” that took place in the stock market. Price rose to an unsustainable peak then continually fell for a full three years. Luckily in that situation the only thing that had eroded was investor’s confidence, and the collapse had came in the form of capital something that can be replenished, but what happens if that happens to erodible natural resources? How will that affect society? *Limits to Growth* aims to answer these questions while trying to give an insight into the harsh realities of human ignorance.

### 2.3.1-Continual Growth

The third section will be the most difficult of the three. The resources we would use for this section would need to be one that totally contradicts the argument of growth not being able to continue. We were able to use the book *The Skeptical Environmentalist* by Bjorn Lomborg. This book does a great job of arguing against the opposition by contradicting all of their points and using the fact that everything in society has gotten better over the years.

Growth is often based on aspects such as the stock market, businesses, labor, and population. However, the effects on individuals may be highly researched but it is rarely discussed used for advancement. Because of this, it can be used as a great example of what growth in the GDP means to the population, and not only in regards to the wealthy business owners but also to the middle and lower class lifestyles. It is hard to show growth in individuals, but an easy way to investigate this is by looking at the disparity in lifestyles between the 19th century and the 21st century. The biggest example of growth over this period of time is annual income. Once that is investigated, we can see how annual income influences house size, family size and purchases such as shoes or suits.

In society, there is a lot of confusion in what actually matters when discussing economic issues and our industrial growth. The book *Limits to Growth* identifies these aspects as "money and the real things money stands for." When thinking of the economy and its issues, we should think in terms of natural resources and limits known as the physical economy. We should not be concerned with the money economy, which was created as a social invention that does not take into account the physical characteristics and nature of our planet. A money economy is purely focused on

purchases and payments, instead of on the total revenue in terms of resources. Money is an object of known value that is used as a measuring stick for society. Gross domestic product is expressed through a calculation of various numbers all in terms of money, which are all non-physical aspects of our economy. The capital stocks, resources, goods, and services, among others are what GDP actually represents. It is what permits our economy to function successfully or what some might consider successful. The problem is that a number of these resources are extracted from our planet in a physical way but replaced as waste in one form or another. This being said, we need to determine how that waste will affect our planet and if our resources can be replenished.

## 2.3.2-Can We Continually Grow?

Due to the pessimistic negative approach displayed in *Limits to Growth*, it seems as if they are trying to scare people into taking action, but as it is known there are always two views on a situation. *The Skeptical Environmentalist* takes the approach of optimism, even though both books are aiming for the same result. *The Skeptical Environmentalist* is a good way to even off all the negativity because it has such a calm and relaxed approach to the same situations. Right from the beginning it sets the tone of optimism by showing that humanity should not be in desperation, the first chapter is entitled '*Things are getting better*'. *The Skeptical Environmentalist* is not suggesting things do not need to change, but rather things have gotten better, so humanity needs to continue with this improvement, while making the necessary changes to reach sustainability.

*The Skeptical Environmentalist* immediately gives examples of contradiction, first he uses food, stating that less and less people are starving each year, then moves on to the average living age and the reduction of poverty in every country, these are all results of a prosperous economy, but what about natural resources and environmental problems that LTG so desperately stressed? *The Skeptical Environmentalist* says global warming, doesn't pose a threat to humanity, nor will animal species become extinct at a rate that was once predicted and water and air has become less and less polluted over time. It takes all the positives that are measurable and pits them against the 'exaggerations' of others in order to make a point. It is an interesting concept, but can these exceptions clarify the thought of continual growth?

Since LTG continually 'exaggerates' the effects of our actions, they force us to take more action than normal, which is an effective method to becoming ecologically sustainable faster. It also argues that all actions aren't good actions; instead of scaring people into making changes we should investigate what the biggest and most important problems are, and then find the most efficient plan of attack.

*The Skeptical Environmentalist* provides clarity through comparisons; every example they give is compared to either past experiences or other situations. One example is the starving people of the Sub-Saharan Desert in Africa. This has the highest concentration of starving people, there is an extremely high staving percentage, it was around 38 percent in 1970, and now in 2010 it is estimated to be 30 percent. Another example used that is a huge issue is the price of oil, barrels of oil has steadily decreasing prices and is expected to continually drop. It was at an all time high in the 1980s, and fell over the last twenty years. It was not until recent years that the level

reached the point it was at during the 1980's. *Limits to Growth* justifies the fact that our economy is getting better, but it is necessary to see how all of this correlates to growth.

To examine what will happen if we continue growing, we will look at the past and compare consumption and amount of materials we have. Buying habits are usually good indicators of growth. When it comes to owning "stuff" we as Americans tend to overdo it in some people's minds; whether we have large extravagant houses or gigantic gas guzzling sports utility vehicles, Americans love owning "stuff." The background information for this project has stimulated a number of different research questions in our minds about the possibility of continual economic growth. The research questions are as follows:

- **Question 1: How do we measure growth, and is it the best way for the country?**
- **Question 2: Can we measure success in different ways, even when GDP doesn't increase?**
- **Question 3: Will growth stop? If it does can we avoid a collapse and make the adjustment easier for humanity?**
- **Question 4: Is it possible to not have an increasing GDP but still have a prosperous economy?**
- **Question 5: Does continual growth seem at all possible, and would all negatives multiply for the individual?**
- **Question 6: What happens if natural resources continue to erode? Can we avoid a collapse and make the adjustment easier for humanity?**

## Chapter 3

# Methodology

# 3. Methodology

The mission of this project is to determine and make clear whether or not there is a limit to our country's economic growth. Through research, the collection of data, and our own analysis' we have developed a general idea of this concept. We have discovered the implications of economic growth and what factors add into it. Based on these findings we were able to develop and argument on whether or not there is in fact a limit to economic growth in our country.

## Research

Our project was not a survey-based project; it contained a large amount of research and data collection. Many economists and financial experts have developed theories and arguments about our nation's economic growth and development and the factors that contribute to them. Along with our own research from various websites such as cia.gov and hoover.com we structured our project around two main books. The first book is the *Skeptical Environmentalist* by Bjorn Lomberg this book provided a more optimistic view on our economic issues and its relations to growth. The second book were we shaped most of our project around was *Limits to Growth* by Donella H. Meadows, Jorgen Randers, and Dennis L. Meadows. This book was almost the opposite of the *Skeptical Environmentalist*; it was much more pessimistic about our economic issues in relations to growth. These two books were the backbone of our project and helped develop the argument on the economic and financial growth of our country.

When researching and developing our ideas during this project we encountered many questions that would shape and create an understanding of what we were trying to accomplish. One of the main questions that we continuously ran into was what does GDP actually mean? To develop our understanding of what gross domestic product actually means we decided to look at it from a number of different angles. Researching and reading definitions was not sufficient enough for our understanding of GDP. We had to look up articles and journals describing what GDP measures and what it does not consider in its calculations. By knowing what was considered when looking at our nation's gross domestic product we were able to start to unveil its actual meaning. The book *Limits to Growth* was a large aid in trying to define GDP for ourselves. These are the six questions broken down into three parts that composed our project.

## Question 1: How do we measure growth, and is it the best way for the country?

This was a question that needed to be researched and understood prior to attempting to begin this project. In order to answer this question there was a lot of material we needed to know. We had to understand what we considered as growth. Whether it was the creation of jobs or just the amount of money the United States created each year. Not only did we have to understand what we considered growth but what me were actually measuring. The gross domestic product system seems to be the way the entire world measures its economic growth. However we have reason to believe this form of measuring is flawed. We had to look into and research the pros and cons of GDP and how that effected our measurements of growth.

Understanding was not the only aspect we needed to figure out, we had to figure out how to approach this question as well. Due to the fact that this is a two-part question there were a number of approaches we could have used. One of the most obvious approaches would be through research. Another approach was through readings and lecture given about the ideas of growth. With the approach of understanding what other people believed to be true could help shape our ideas and arguments regarding this question. A sub question rooted from our question would be, if our current measure is not suffice, what type of measurement should we use to calculate our country's growth.

As a group we decided to use the research approach. We decided to use this approach because there was significant data that we needed to collect to help shape our answer to this question. With regards the second part of this question we decided to use other proposals discussing the idea of growth and if our current system is the best way to measure our country's economic growth.

Using our research approach we understood that there were certain ideas, data, and concepts we needed to collect. We needed to know what the measures of growth were, not just in the United States but the other major countries in the world. This information was found through various websites such as cia.gov which supplied us with economic numbers for most countries in the world. Also this information was found in books such as *Limits to Growth*. These books developed ideas on whether or not our system of growth was a good indicator and whether or not it is beneficial to our country.

**Question 2: Can we measure success in different ways, even when GDP doesn't increase?**

When answering this question we had to figure out what other measures existed when describing an economy and how they were used. We had to know what the other forms of measurement were and where they were used. Were they used in large economies similar to the United States, or was it smaller more simple economies. Knowing this information was essential in our attempt to answer this question

When attempting to figure out an answer to this question we felt that one, and only one, approach was necessary and that was through comparison. We had to compare GDP and all of its limitations and benefits to the limitation and benefits of other means of measurement. Using different measures of growth could possibly provide a better way to gauge our economy and possibly improve it. A sub question that began to form here is which new measure do you choose and why? Also does it even make sense to try using a new measure? Will it really make a difference? These were the sub questions that formed when trying to answer this question.

Prior to producing an answer to this question we had to educate ourselves on the different ways to measure economic growth. We had to understand what they actually meant so we could decide whether or not it was usable in our economy. Finding this information required a decent amount of research seeing how most of the larger countries in the world decided to use the GDP system. This information was found through online searches and books that offered alternative ways of measurement. Discovering this data lead us to our conclusion regarding this answer.

## Question 3: Will growth stop? If it does can we avoid a collapse and make the adjustment easier for humanity?

Most of the questions we are trying to answer are related, meaning the information we learn and gather in one question most likely leads to the information needed to answer the next question we must answer. To answer this question we had to understand what it actually meant to stop growing. In terms of economic numbers like GDP and realistically what it would look like in our nation for example the unemployment rate. Also our continuous knowledge of GDP also needed to be expanded. IF the unemployment rate was high what affect would that have on GDP if any? These were the type of sub questions that grew as we were trying to understand this question and what knowledge we needed to obtain in order to answer it.

Approach this question was very difficult for us seeing as how it was more of a "what if" question. We had to form our own prediction and we did so based on the research and data we collected. We used books such as *The Skeptical Environmentalist* who touched upon the idea of growth stopping. Research seemed to be the only approach with regards to this question because it is not one that has really been answered before.

The data needed to answer this question was rather large. We needed to get data from recessions that our economy had gone through and see how the country handled that. We read countless articles discussing the collapse of an economy and how it affects the people in nation. This was the time where the books *Limits To Growth* and *The Skeptical Environmentalist* came into play. These books were our main sources of research for this question. The two books had contrasting ideas and not only explained

the meaning of erodible resources but, gave great arguments on how it directly affects growth, and whether or not each author believes growth can be continual. This gave us a different plan of attack, we were able to see things from two different perspectives and find reasons for a cease in growth.

**Question 4: Is it possible to not have an increasing GDP but still have a prosperous economy?**

In order to answer this question we must know and comprehend a large amount about GDP. We must know what it is measuring and what each sector accounts for. We must also understand what aspects decrease our national GDP. Along with our understanding of GDP knowing what the dynamics of a prosperous economy are is essential to developing an answer for this question. These are the main ideas we must know when trying to answer this question.

When approaching this question there are a few different routes we could have taken, and each of these routes involved research. One direction was to use comparisons. Comparing one GDP from one country to another GDP from another country and see how each grew or declined. Along with comparisons another approach was to read through ideas regarding this question and see economist and experts were saying about GDP and its possibilities and limitations. Discussing and researching for this question created sub questions for our group. These questions included what are a prosperous economy and what does it look like? Also what factors caused a decline in GDP was a question we ran into.

We decided to use the second approach and read and see what experts were saying to help formulate our idea and concept regarding the question. With this came our encounter with data and research that needed to be collected. Understanding what caused a decline in GDP was essential in this question. We also needed to collect data on successful economies and what their GDP was during their successful years.

In order to retrieve this data we used the book *Crunch* and various articles written by economist to view their opinion. Since GDP is questionable in measuring success that brings us to our next question…

**Question 5: Does continual growth seem at all possible, and would all negatives multiply for the individual?**

This question seemed difficult to understand when we first started because it was hard to understand whether the economy could grow continuously and if that meant we were being successful or not. This question was formed through the discussion of other questions such as, what does continuous growth actually mean. We also had to know how this growth affected our nation as a whole and how it affected the individuals. Knowing this information was essential in formulating an answer to this question.

We approached this question in different parts or sections. We started with discussion. We needed to understand each other's opinions on growth along with the economist we were reading about. Discussing what we believed continuous growth was or could be allowed us to create an answer to this question. Along with our discussion there was a large amount of research involved. Seeing as how we were discussing the

negative effects of continuous growth we also wanted to understand what the positive effects would be and how they compared. Although we researched information for this question our educated opinions along with the opinion's of others is what guided us. Researching the effect on individuals put a twist on the research and made it feel a lot more personal. The results were intriguing because of how severely the U.S has changed in such a short amount of time. We had to investigate three statuses in the hierarchy, high class or wealthy, middle class or average, and lower class or poor. We found the data we needed for this question through two main books and while researching other questions. The two main books used in this question were *Limits To Growth* and *The Skeptical Environmentalist*.

These six questions were the foundation for our project, we felt like once we were able to clearly answer these questions, explanations of what the project was and how we went about it would all be answered. Even though we came up with these six questions, that doesn't mean we didn't run into other sub questions within them. With the three books, it was relatively easy to find concrete facts and research, but as soon as we started searching the web is when things began to get a little tricky. In the beginning, there was so much information and since all three of us were researching, we would all turn up with different results on the same topics. We had to sort through and answer what seemed realistic and what were the most consistent, struggles like this defined our project.

**Question 6: What happens if natural resources continue to erode? Can we avoid a collapse and make the adjustment easier for humanity?**

Answer this question raised our knowledge of natural resources and the effect it had on our country. We had to know which natural resources were important to our society and the affect it had in present day. If we knew what affect they had not we could start to see the affect they would have if they began to diminish significantly. We also began to understand how these resources were eroding, if it was through being over used or if they were eroding naturally. This question also sparked other sub question during our project. . These questions are, how much is consumption growing? How much do we have to reduce consumption in order to become sustainable?
As a group we only believed in one possible approach to this question and that was through data collection and research. Retrieving this information did seem to be very difficult. We had to understand what in fact we were looking for. We began searching for natural resources but realized we needed to look for the use of natural resources and what a possible decline of it may do to our society. We found this information through previous data that was collected when our country was struggling to get natural resources like oil. The opinions of other economist proved to be beneficial when providing an answer to this question.

## Chapter 4

# Analysis

# 4. Analysis

Our analysis is taking the questions we learned and developed from the beginning of this project and actually answering them. We will use the information we said we would use in our methodology to help make these question seem much clearer. However many of these questions are not black and white with a right or wrong answer. We will use our opinions with the expert conclusions and the opinions of others to formulate what we would consider a respectable and understandable answer. The questions we used are the same ones in our methodology section and will be answered in the same order.

### Question 1: How do we measure growth, and is it the best way for the country?

The U.S currently measures growth by using the Gross Domestic Product of the nation; this measures the market value of all goods and services produced within a country in a given period. The gross domestic product is divided up in to three different sections: industry, services, and agriculture. Industry is the section of economy concerned with production of goods including fuels. The industry sector can be split into multiple sub sectors: the private sector which consists of the primary sector, secondary sector, and quaternary sector; the public sectors; and the tertiary or service sector. The primary sector consists of changing natural resources into a primary product. The majority of the products in this particular sector are considered raw materials; it is much larger in younger developing countries. The secondary sector embraces the economic factors that create and develop finished usable goods and products. This sector, in

general, takes the output of the primary section and manufactures finished goods that are suitable for use by other businesses and companies, for export to other countries, or sale to consumers. The quaternary sector is a fairly new sector that deals with the type of industry focusing on technology research, design, and development such as computer programming. The tertiary sector is the production of services rather than the production of goods, for example a mechanic fixing your car instead of purchasing a new one. The public sector deals with the delivery and production of goods to the country's citizens. Along with the public sector there is the private sector of industry. This includes private groups and companies run by individuals with the means of enterprising a profit. These sectors create the industry section of our country's gross domestic product. Industry accounts for 21.9 percent of our nation gross domestic product. Up until the end of the 1940's the industry was the primary economic sector for the United States economy.

We rely heavily on the concept of GDP as our principle measure of our country's economic growth. Why the United States continues to use GDP, as its principle measure of economic growth is unclear due to the many limitations and boundaries of its components. One example of this is wealth distribution; the gross domestic product does not take into account the difference in income between the wealthy or rich and the poor citizens in America. GDP emphasizes the average income, and in fact puts more weight on the expenses and spending of the wealthy rather than focusing on similar income development of the poor and less fortunate people in our country. Our economy is faced with an issue involving the huge disparity between the wealthy and upper class citizens and those in the lower and middle classes. This gap between the rich and the

poor has been constantly growing in America. The space between the two classes has grown steadily alongside our economic growth. Does this mean as long as our economy continues to grow so will the disparity between the rich and the poor?

Another limitation to the GDP system is that it excludes actions that are not provided through the market. An example of that would be unpaid work such as community service and volunteer work. If we are not including all services in our GDP can it be considered a fair measurement of our country's growth? Another limitation to GDP is that the gross domestic product concentrates and focuses more on short term economic developments and flaws, instead of focusing more on developments in the assets of natural, economic and social capital. These omitted assets are very important from a long-term sustainable economic development standpoint. If growth is something that develops over time, it is unclear why our country uses a system of measurement that leaves out portions of its structure and only considers short-term success instead of development over time. These are some of the quantitative factors that show the inefficiencies of GDP, this affects the whole country. We were also able to investigate why GDP is a bad measure in relation to everyday life.

Our Phony Economy is an article by Jonathan Rowe, does a great job of relating GDP to everyday life. It gets to the beginnings of GDP and explains why we have begun to use it completely different than originally intended. The part we used is the explanation of selfish tendencies the government possesses in relation to GDP. Since growth in the economy is the based on how much we spend, how we actually spend is irrelevant. One example is how we are born and raised; GDP's most valuable citizen would be someone who was born overweight into a rich family, with a bunch of health

problems. Chances are, this baby is going to be a spoiled child, getting lots of toys, going on vacations, and getting the highest quality 'stuff' contributing a great amount to GDP. If the baby is overweight and eating a tremendous amount of fast food, that is counted in the services sector of GDP along with the amount he is going to rack up in medical bills from being overweight and unhealthy. This is all contribution, and while it benefits the GDP and the country, it couldn't get much worse for the baby living that life. All of these inefficiencies are included in the measurement of our economy, that's why there are so many criticisms when it comes to GDP. It has yet to be changed and doesn't look like there is any urgency to do so mainly because there haven't been many alternatives, which leads us to our next question.

**Question 2: Can we measure success in different ways, even when GDP does not increase?**

Success within the country can be measured by more than GDP, so even if the GDP does not increase we can still have some sort of success. To answer how is the possible we must first define what GDP really means. Gross Domestic Product or better known as GDP is the total value of all final goods and services produced in a country in a given year, equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports this is understood from earlier in the project. However when discuss our successes we found it was more important in look at real GDP rather than nominal GDP. We did this because the nominal GDP may increase either in whole or in parts due the price changes and not the actual output. A

number of other important factors are not measured by the GDP but do affect our economy.

When GDP begins to decrease we assume that our economy may be getting into trouble when in fact it may really not be. GDP is heavily biased towards the increase of consumption and productivity, regardless of the necessity or desirability of such outputs, at the expense of other more holistic criterion. It does not take into the account the use of the product or if it is something that will actually stay on the market. So part of the GDP might be decreasing due to the fact that certain goods are being taken off the market and have not been replaced by a new or better good, or we have found and alternative for that specific good. GDP excludes any unpaid or volunteer work that might benefit not only society but our economy as well. Volunteer work sometimes drives our country. For example the habitat for humanity programs that build houses for those in need after huge disasters are not taking into account. One would think that those houses would be considered part of the output while they are being built but because no one is paying for that service it is not be accounted for.

Many countries have decided to use substitute to GDP, example is Bhutan in Southeast Asia using GNH (Gross National Happiness). This was developed in an attempt to define an indicator that measures quality of life or social progress in more holistic and mental terms than gross domestic product, because GDP is a measurement based more on spending instead of success within the country. If politicians and government officials do their jobs efficiently they must understand the happiness, mental health and stability of the people living there “because it is overall human well-being (not simply a collection of its constituent elements) that is of interest.” Now with that being said it is

not easy the measure the happiness and mental health of a group, town, and even a country. So is it actually possible to capture and measure that happiness as an alternative measure to see if we are being successful? Experts are trying to figure out a way to do so and gross national happiness seems to be the leading way so far. Yes we can measure our country as a success even if our GDP is not increasing.

**Question 3: Will growth stop? If it does can we avoid a collapse and make the adjustment easier for humanity?**

**'**We live on a finite planet with finite resources, and it is obvious that there are limits to growth - limits to the rate at which the global economy can grow, and consume the world's resources.' This is an explanation given by Rob Squires on the blog *Creative Solutions.* This reasoning for why growth cannot continue is a great way to set the president for this question. The only reason economic precedence around the world think we cannot keep growing is natural resources. The bigger the economy comes, the more non-replenish able natural resources we are using and they will eventually come to their limit. Is it possible to grow a as a nation without using up all of our natural resources?

Another limit is the earth's natural reaction to the use of natural resources. The greenhouse effect is a process by which thermal radiation from a planetary surface is absorbed by atmospheric greenhouse gases, and is re-radiated in all directions. Essentially it is causing the earth to heat up, and lots of negative changes are happening in such a short amount of time making it hard adjust or stop. The burning of

fossil fuels –coal and oil—has had the biggest impact on the greenhouse effect. Since growth is measured by having more and more 'stuff', our cars and houses will get bigger and bigger forcing us to consume more fossil fuels. As far as growth is concerned, "to save the Earth, we must stop economic growth." How we put an end to economic growth is the biggest concern because with the adjustment being longer, the transition is only going to get harder.

Since we are leaning towards the assumption that growth can only continue for a certain amount of time, we must investigate how we can make the adjustment. Limits to Growth does a great job of explaining what will happen if we don't become ecologically conscious, and that is a collapse by way of overshoot. This is going into a depression because we over estimated the amount of resources that were available, therefore there will be no more for us to use.

We used the great depression as an example, and adjusted it to fit the situation of overshoot. This was an extreme economic depression in the 1930's. The first effect was a decrease in income, revenue and prices, these three things are all based around industry and services. Without natural resources, we could not produce product to sell, because industry would take a major hit since fossil fuels are the main reliability. We would have to go back to the days of the mills when water and human power were the main source. Another thing related to revenue and income is international trade. A large amount of the products we use and consume are brought into this country through trade. Without fossil fuels most international trade would be completely stopped or drastically slowed down because of the high expenses. Unemployment was around 25% during the great depression, and probably wouldn't be much different in the future.

All three sections of the GDP would suffer tremendously, causing layoffs especially in the industry section because mining and logging would drop tremendously because there would be no more resources to mine or log.

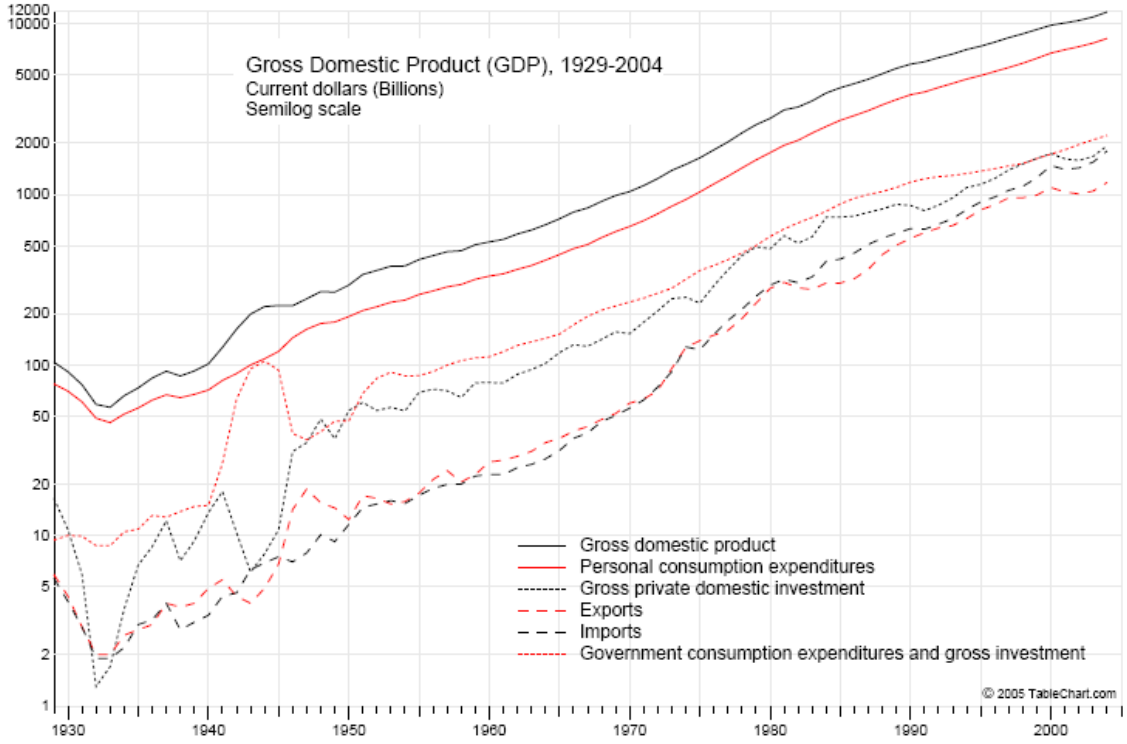
The way to avoid an economic collapse due to overshoot is simple, stop the economy from growing by lowering consumption of natural resources. Population is expected to eventually level off in the near future, and has slowed down as of recently, so there is no need for us to grow when the population isn't. Lowering consumption will also help with our second limiting factor, global warming. Lowering consumption will help with all factors of overshoot, helping the country adjust much easier and avoiding a collapse.

## Question 4: Is it possible to not have an increasing GDP but still have a prosperous economy?

As discussed in the methodology, in order to answer and understand this question we need to understand what causes GDP to increase. As you know from reading this project, GDP has both its positives and its limitations. Part of the positives of GDP is that for the most part it only accounts for goods and services that pass through the market. Knowing this, it seems that if GDP is not increasing this may mean that the market is not doing well, in both the sale of goods and the use of services. This might not allow the GDP to increase, but it does not necessarily hurt the economy because the good and services that are not used normally are not accounted for

anyways. With this concept in mind, it seems as though we may be able to have a prosperous economy even if GDP is not increasing.

With that being said, we have to distinguish what a prosperous economy is. Is it the amounts of goods and services that are being passed through the market, or is it much more than that? A prosperous economy is one that it stable and durable. The United States seems to have created a “prosperous economy” since the Great Depression. While this might not hold true on an individual scale, it seems that over the past three or four decades the economy as a whole has been prosperous meaning growth has continued and remained stable for the majority of this time period. The graph below shows the constant growth in GDP during this time period. This graph shows an example of what we believe is a durable and prosperous economy. If you look at the graph from the start of the 2000’s the rate and which the GDP was growing appears to have slowed down, this does not mean that our country is doing worse than in previous years. There are certain factors that can cause a huge boost in the economy, such as advancements in technology and new products. If there is not a major increase in GDP, it does not mean we are not doing well as a country. If our growth rate becomes less drastic then it could reflect a time when the market was not expanding as rapidly.




Source: Bureau of Economic Analysis

GDP seems to measure "how well off people are in a material sense, it has serious deficiencies as a measure of economic welfare." GDP also does not take into account the underground activity taking place in our country. These are acts or purchases that go undercover in attempts to not be taxed by the government. These limitations to GDP will not cause the GDP to decrease but will result in an inaccurate measure of economic growth. People may have good economic welfare without the continuous purchase of goods or a service, which is considered the largest section of the GDP. Our economy is a reflection of the prosperity of the people, not for the use of the Government. With that being said, we can have a prosperous economy without an

increase in GDP because we understand the limits of GDP, a flawed system of measurement and the factors that stunt its growth.

**Question 5: Does continual growth seem at all possible, and would all negatives multiply for the individual?**

Throughout history it has been a goal of the people in our society to try and predict what will happen next or when an event will happen. That is what we will be doing with this question. Comparing the past to the present to try and develop a reasonable idea for what we believe the future will hold in regards to this question. From how big our homes have grown over the years to the amount of shoes we now own all seem to be relevant when trying to analyze this particular question. The impacts that growth has had over the years make it seem almost certain that it is something that can quite possibly continue forever.

The people of our country thrive on growth in many different aspects, from trying to increase our job salaries to deciding whether or not our President had a successful term based on the growth of the country's economy. None of these desires of growth is more evident than in our need for bigger material items from houses to cars. The average American house has doubled since the 1950's now standing at 2,349 square feet. If it is possible to continue this pattern of growth does it mean that in the next fifty or sixty years the average house size will double again? It seems to be an end to this growth and we believe part of it is space right? Wrong, if you look around you Americans and people all over the world for that matter are not building outwards

anymore we are beginning to build up and as the say in this matter the sky is the limit. We can continue to grow and produce bigger houses because of our ability to build up. . Building upwards is not just for our living arrangement but for our stuff. Americans especially need space to put or stuff, from cars to clothes to miscellaneous materials that for some reason we cannot seem to throw away.

This takes us into our next section of continual growth and regarding our resources. The possibility of continual possible growth means the more uses of our natural renewable and non-renewable resources. We can obviously replenish our renewable resources but we would have to cut back on the amount we use them which seems to be tough but possible. The real question is about nonrenewable resources and how we can make up for them. Some experts think that for some of our nonrenewable resources will be gone in as little as 13 years but these are the less important one such as silver and tin. However our more important ones such as coal are projected to have over a hundred years before we may run out. Now within that time we believe that there will be new ways to find and possibly develop resources. One example could be the mining of the moon and the exploration of the asteroids for possible resources. Now this may be very expensive but it very much possible. It seems that there are ways to take care of our natural resource issues in the future.

What will all this growth mean for the individuals of our nation financially? Since our continual growth over the last fifty years or so the gap between the rich and the poor has steadily increased. Now GDP does not take this gap into account but it is still a rising issue. Following our most previous census in 2010 the gap between the rich and the poor has grown to the largest it's ever been. "The gap between rich and poor has

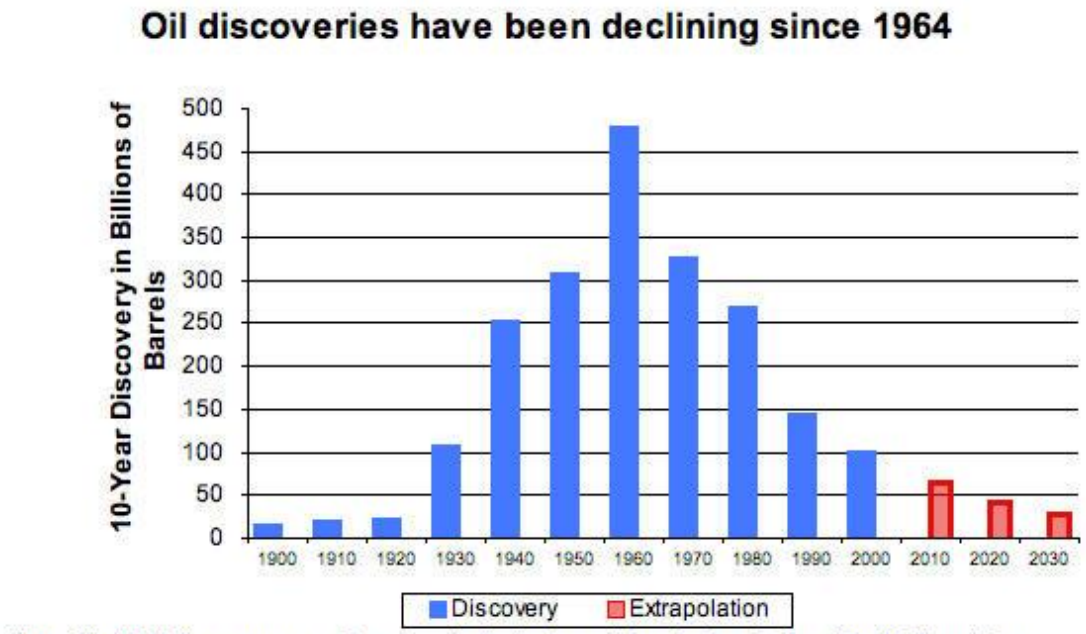
grown to its widest ever." The poorest section of the population dropped to the lowest it has ever been. "Twenty-eight states had increases in the share of people below $10,977 in income, half the poverty line for a family of four." So the question is if we do continually grow forever will this gap just keep widening and actually hinder our economy? Unless we figure out a way to fix this problem it seems like this will be one of the negative effects that continue to multiply as our country and economy grows.

Continual growth is something that does seem to be very possible for a number of different reasons. As mentioned above the amount of space on the earth will not grow, but we do have the ability to grow upwards rather than out. It does not seem that we are running out of space when you think of it in this way. Natural resources both renewable and no renewable seem to have some sort of futuristic plan or goal that can help keep our country growing. Continual growth seems to be an idea that will take some work to achieve but it does seem very much possible.

**Question 6: What happens if natural resources continue to erode? Based on how much we're using how much time do we appear to have?**

We know that a collapse will happen if we don't become ecologically sustainable, and even though immediate action would be the best action, this is not realistic do to the amount of adjustments we would have to make. Three resources we use that run the world are coal, oil and trees. Both are being depleted at a tremendous rate because of the economic need to grow, so we can check how much time we have left until we need to adjust.

Oil is the most important natural resource; it speeds up the process of just about everything we do, as well as giving us tons of energy for heat needed in the winter months. There is an estimated 2 trillion barrels of oil on the earth, and we are consuming about 80 million barrels a day. Based on past consumption we are estimated to run out of oil around the year 2060.



Note: World oil discovery over 10-year periods, by Association for the Study of Peak Oil and Gas.

Above is a graph showing the decrease in discovery of oil, the declining of discovery is parallel with the availability, so as consumption increases but discovery increases we will run into a huge problem.

Another big resource we use is wood, and that contributes to deforestation. The good news is that trees that provide the wood and trees can be replenished. The bad news is that we are using them at a much faster rate than we can actually replenish them so we will eventually run out. An estimated half of the tropical forests have been

depleted. There is an estimated loss of 18 million acres a year and rainforests are projected to be totally gone by the year 2050.

Based on these projections, it looks like a collapse could be coming between the years of 2050-2060 if we do not become ecologically sustainable. If we begin to adjust to the limiting factors of the earth, we could live a lifestyle that is different but not as bad as a depression. Projections say that no matter what happens, we will be in shambles at the earliest 200 years from now, so although an adjustment won't change the inevitable, it will make it easier to live with.

To live comfortably in the future, we have to find energy sources that don't rely on non-renewable resources. If we are able to do that, we can continue to grow our economy because there will be no constraints to what is possible. GDP will continue to grow as long as industry grows; growth within the GDP is dependent on whether or not we can produce more products with the same amount of input and to do this we need energy. The best plan of action would be to move to alternative energy resources as soon as possible, and the more we begin to adjust, the easier it would be for everyone.

As for population, it is predicted to level off within the next century and at that time we could put an end to growth. That will not be enough because of the poverty that has plagued our country. We will have to try to even off income and make life as close to even as possible for everyone. Then we could have a prosperous economy even though GDP isn't increasing. Finding energy alternatives and a way to prosper if we don't grow are the two best ways to avoid an economic collapse, and make things not only easier for the country but the world.

## Chapter 5

# Conclusion

# 5. Conclusion

As we progressed, we saw that even though there was no right or wrong answer, we would eventually have to choose a side and support by showing reasoning for choosing that option. There were two very distinct ideas and we saw that there was no middle ground, it's either you believe that growth will stop or continue to grow. Considering that, we chose to go with the idea that GDP will not continue to grow. We heavily supported this concept because of the non-replenish able natural resources. There is a limit to them and, no matter what, if we continue to grow we will run out of them. Our only hope would be to find energy alternatives, such as solar power to replace the natural resources we use now. Even if we do use things like solar power, we rely so heavily on things like fossil fuels that the adjustment will take centuries to completely change over.

The topic of Gross Domestic Product and just the economy in general is so broad; and do to that fact, we had to sort out exactly what we needed to complete this. The bottom line is that we cannot have unlimited economic growth, when the resources that are a means to growth aren't unlimited. As we use natural resources it's not a question of whether or not we can continue, but a question of how long. The two books that were the bas of our project seemed to have different views on the same issue, but it was really different opinions on different issues. Limits to Growth investigated the growth of the economy, and based the opinions off of the way we are currently living. The Skeptical Environmentalist was based it's opinion on us changing the way we live to find energy alternatives, so there was no right or wrong answer, there were more

suggestions to how to change rather than answers.

We also decided that while GDP is very inefficient, it is the best measure of the economy simply because there aren't many alternatives the can measure our money economy. Maybe the best thing to do would be to have different measures for different issues, one could measure the money economy and another measure the physical economy, and the last one could measure the welfare of individuals. If two outweigh the three then that maybe counted as a successful year, there could be tons of alternatives we just need to be willing to change as a country and fear what will happen if we don't change because a collapse will be absolutely devastating to every living human being not just the United States.

The most important skill that we learned from this project is being able to go out and find a problem, propose the problem and then figure out a way to solve it. All throughout school there is a set, structured problem that we have to solve. That is the easy way of doing a project, but it is not the way things are in the real business world. That is the most valuable skill we had learned from this project and we will be able to use that not only later on in life when we get a job but when we go to do our MQP next year, nothing will seem like to big of a problem.

# Work Cited:


1. http://news.bbc.co.uk
2. http://www.google.com/publicdata?ds=wb-wdi&met=ny_gdp_mktp_cd&idim=country:USA&dl=en&hl=en&q=united+states+gdp
3. http://www.nydailynews.com/money/useconomytimeline/index.html
4. www.CIA.gov
5. http://kclibrary.lonestar.edu/decade30.html
6. http://www.buzzle.com/articles/average-american-income.html
7. http://www.nahb.org/generic.aspx?genericContentID=143996&fromGSA=1
8. http://retrorenovation.com/2010/02/11/why-mid-century-houses-had-small-closets-the-century-in-shoes/
9. http://www.reuters.com/article/idUSN0632859720070910
10. Bjorn Lomborg. The Skeptical Environmentalist
11. Donella Meadows, Jorgen Randers, Dennis Meadows. Limits to Growth
12. http://www.investorwords.com/2240/Gross_Domestic_Product.html
13. 1980, By. "Erodible - Definition of Erodible by the Free Online Dictionary, Thesaurus and Encyclopedia." *Dictionary, Encyclopedia and Thesaurus - The Free Dictionary*. Web. 15 Dec. 2010. <http://www.thefreedictionary.com/erodible>.
14. "Concepts of Leadership." *Collocation | Broadband Wireless | Dedicated Servers | Web Design & Development | DocSTAR | DSL | Web Hosting | Infinity Internet*. Web. 14 Dec. 2010. <http://www.nwlink.com/~donclark/leader/leadcon.html>.
15. Donovan, John. "BEA : Gross Domestic Product (GDP) Graph." *U.S. Bureau of Economic Analysis (BEA) - Bea.gov Home Page*. Web. 15 Dec. 2010. <http://www.bea.gov/newsreleases/national/gdp/gdp_glance.htm>.
16. King, Sam. "Economic Data - FRED: Help - FRED - St. Louis Fed." *St. Louis Fed: Economic Research*. Web. 15 Dec. 2010. <http://research.stlouisfed.org/fred2/help-faq/>.

17. "OVERSHOOT." *BRAIN FOOD TABLE OF CONTENTS*. Web. 15 Dec. 2010. <http://dieoff.org/page15.htm>.
18. "Recession Definition." *InvestorWords.com - Investing Glossary*. Web. 15 Dec. 2010. <http://www.investorwords.com/4086/recession.html>.
19. Rowe, Jonathan. "Our Phony Economy." *Harpers Magazine* June 2008: 1-7. Web.
20. http://www.paecon.net/PAEReview/issue20/Vaury20.htm
21. http://www.time.com/time/business/article/0,8599,1957746,00.html
22. Blanchflower, David G and Oswald, Andrew J; International Happiness: A New View on the Measure of performance
23. http://sunhomedesign.wordpress.com/2009/12/08/avoiding-societal-economic-and-ecological-collapse/
24. Schenk, Robert. http://ingrimayne.com/econ/Measuring/GNP2.html
25. http://www.outsidethebeltway.com/size_of_average_american_house_doubled_since_1950s/
26. http://environmentalthinker.blogspot.com/2009/04/non-renewable-natural-resources-how.html
27. http://www.huffingtonpost.com/2010/09/28/income-gap-widens-census-_n_741386.html
28. http://www.storyofstuff.com/