

CS544 Final Project  
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Africa Economic, Banking and Systemic Crisis Data

#### - Dataset Details

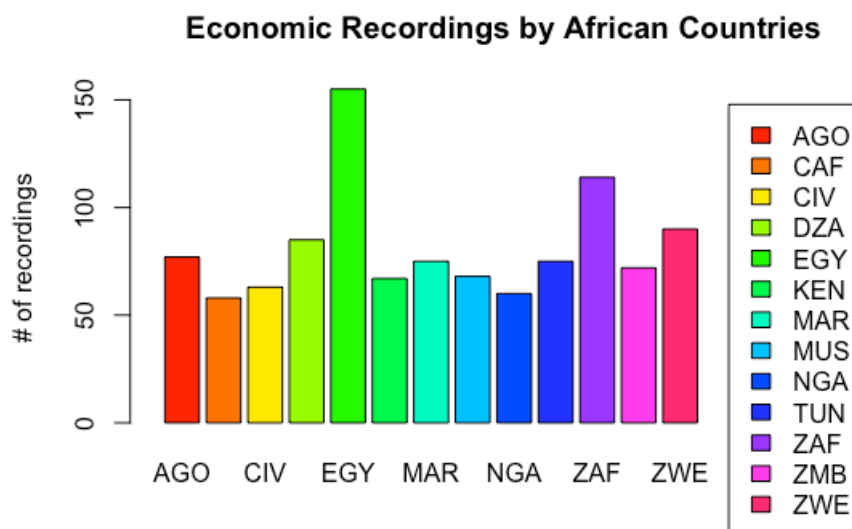
The dataset was populated to specifically focus on the Banking, Debt, Financial, Inflation and Systemic Crises that occurred in African countries from 1860 to 2014. 13 countries from African were researched. Algeria, Angola, Central African Republic, Ivory Coast, Egypt, Kenya, Mauritius, Morocco, Nigeria, South Africa, Tunisia, Zambia, and Zimbabwe. These countries were studied in order to get further look into the economic crisis occurring in Africa.

#### - Objective

The objective of this project was to gain further insight to why bits of the African Economy has been in shambles. I wanted to find hard evidence that would show how certain factors could influence the economy.

#### - Differentiating the Total Population of a Country and its Number of Recordings

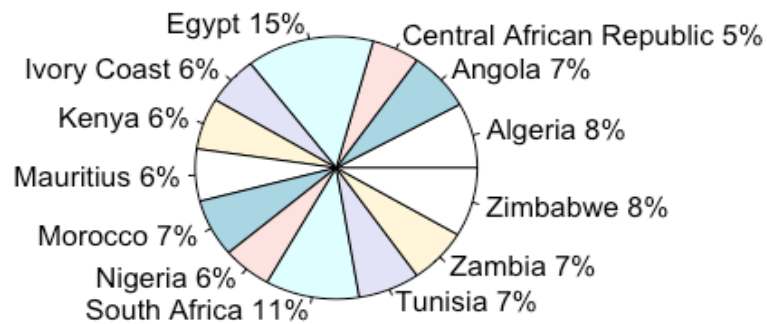
This dataset contains 1059 entries, across 13 different countries. The data that's been collected has been recorded during various years. Hence there is a lot of information to back up an inference. The dataset focuses from 1860 to 2014, but I began noticing that some countries began their recordings during different years. My analysis here shows the of the number of recordings that were done across the 13 countries. You will notice that for the most part each country has an evenly distributed amount of recordings that were done. Egypt is an outlier, leading the pack with the most amount of recordings. Which is why it usually comes in first for the majority of the analysis' that I will do as experiments. The more amount of recordings, the more data that's there to influence an analysis.



### -Examining the Countries with a Crisis

The overall project is meant to back up why, and what is leading African countries to a crisis. Below is a Pie plot that shows the distribution of the countries in this dataset, with an economic crisis. This plot gives a good representation of which countries the crisis has affected the most. As we had mentioned earlier, Egypt has the most recordings, so it follows that Egypt is once again the leader with a bigger slice of the pie.

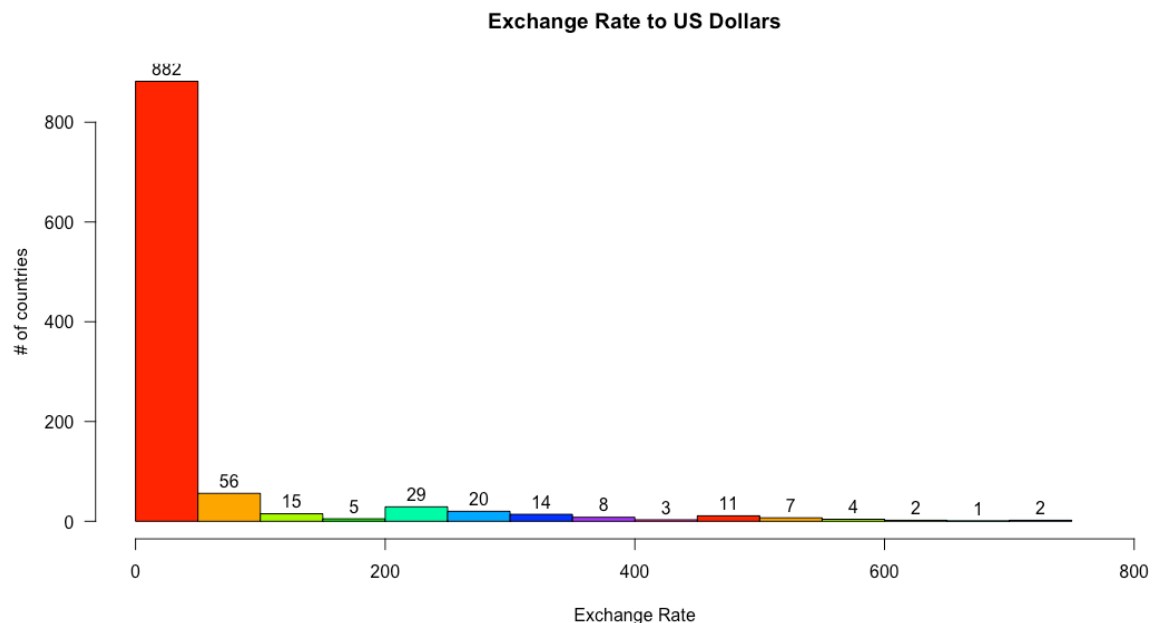
### **African Countries with an Economic Crisis**



### - Understanding the Crisis

To get a better feel of the data, and understand why African countries are in a crisis, we can analyze the other variables within the dataset. The other variables within this dataset will give clues as to why the economic crisis in Africa is well spread out. Before continuing with our research, we can start with making ourselves familiar with the currency system. Each country maintains a different value of what their currency is worth. This will help determine the severity of how much of an impact the currency holds to the economy. Comparing the US currency systems to these countries, by looking at the exchange rates.

Most of the countries will have an exchange rate that is miniscule, ~close to 0. The largest exchange rate is over 700. And as you can see with graph below, there are very few countries with a high exchange rate. This graph is right skewed, with the majority of the data coming from countries with an exchange rate value of less than 200.



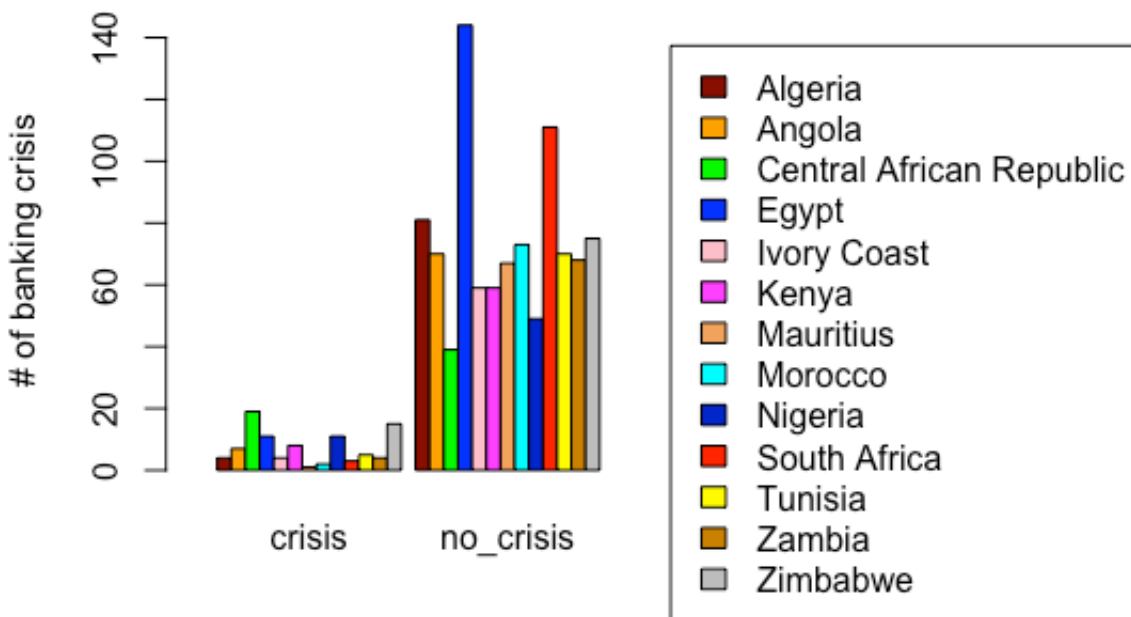
This shows that currency and the exchange rates that are very little, they actual worth of the dollar value is not a big influence to the crisis.

- Which Countries are most problematic with their Economic Issues

In our previous analysis data has been gathered to show recording during various years, and the affect of the currency system each country holds. Its lead to showing factors that influence a crisis. Its time to show which the exact countries are under a crisis.

The more plots and analysis' that's conducted helps with creating future models that can help prevent a crisis from occurring in the future. Banks have a strong command within an economy. They provide specialized financial services, which reduce the cost of obtaining information. In general, they can help make the overall economy more efficient. This dataset holds banking information for each of the countries. This data can help make inferences towards how strong the economy is for that country. Our graph below shows the amount of banking crisis for all 13 countries within this dataset. The majority of the time each of these countries has not had a banking crisis. This is good news, it means the overall economy is not as bad, and not as reliant towards the Bank.

## African Countries w/ a Banking Crisis



Notice, how Egypt is out front with most amount of, 'No banking crisis'.

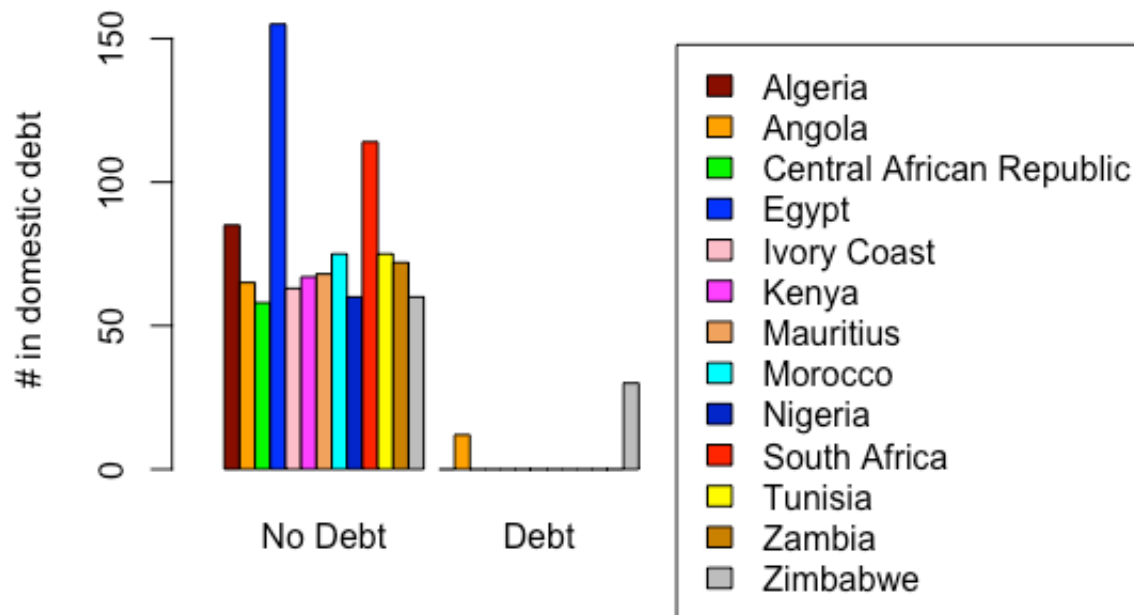
- Further analysis towards the National debt

A lot of the data that's been conducted so far for this project reveals that the crisis', are not as bad. I wanted to really get more out of the data, to see if I was missing anything that could be swaying the information to look like everything was going alright.

There are recordings for the domestic debt for each of the countries within the dataset. This data really helps show the distribution of all the domestic debt spread through the 13 countries within this research. And again the data is shifting more so towards these countries are in the positive, with no debt.

So you begin thinking if its not a banking problem, and not a debt problem, why is the economy in question? What's their to be scared of? Is there even a problem? Or is it a placebo, and hype to keep people on the lookout, and interested about the Economic Crisis? My plots help emphasize that the domestic debt to these countries.

## African Countries in Domestic Debt

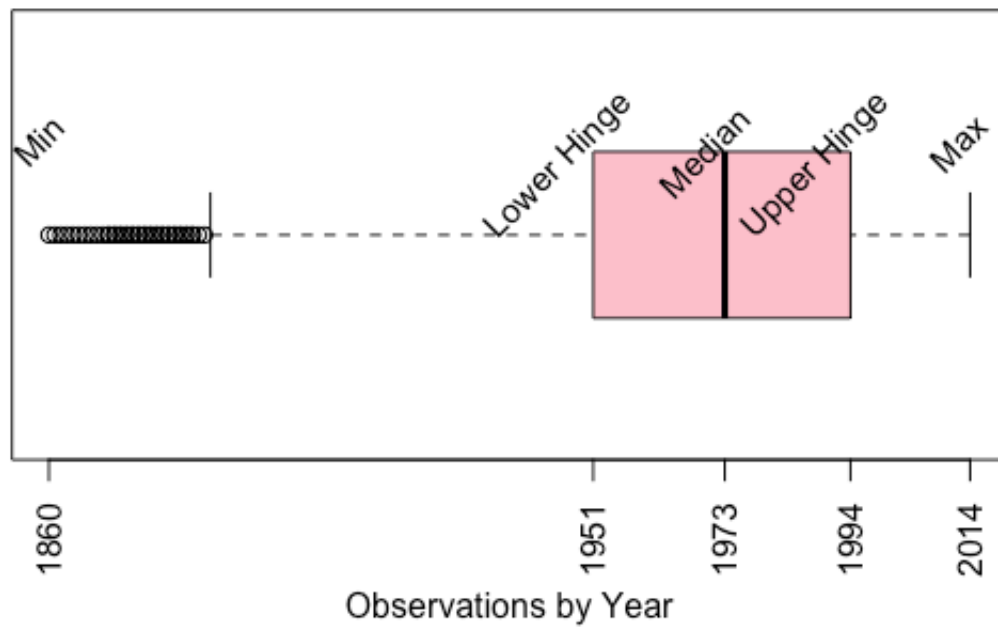


- How important are the Time Intervals?

After questioning the severity of the crisis, I wanted to start observing when the data was actually being recording, and if that had anything to do with some problems with the economy. I used two different plots to show the impact of yearly recordings, and they both gave similar results to when most of the data was being recorded.

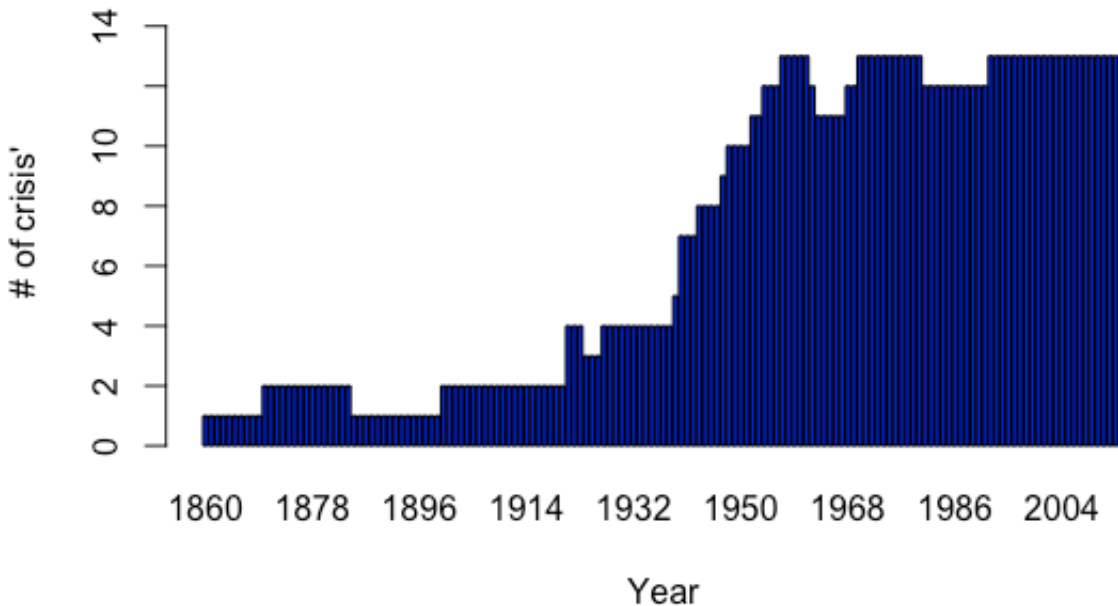
These two graphs show a very good example of a Normal Distribution.

## Crisis Distribution by Year



Most of the data shows the bulk of the distributions being collected after the 1950s.

## Crisis Distribution by Year



This plot follows the plot before it, where the majority of the data, shows a greater distribution after 1950.

### - Central Limit Theorem

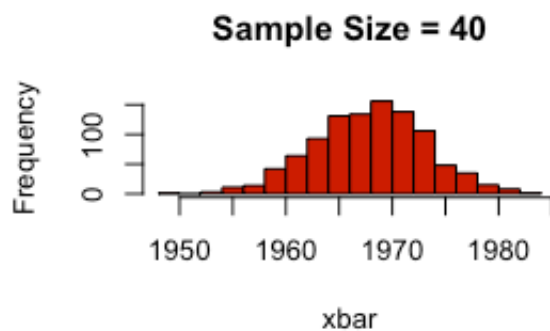
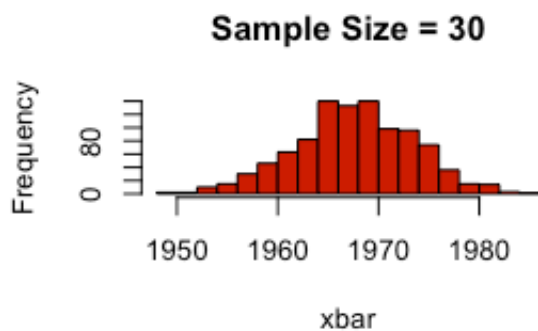
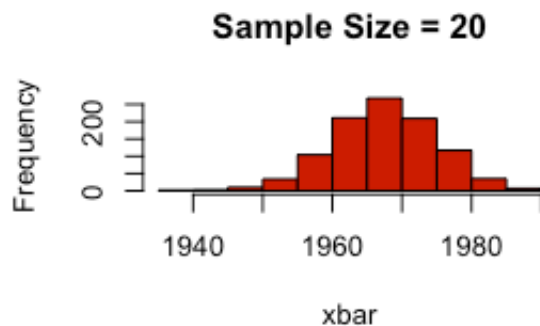
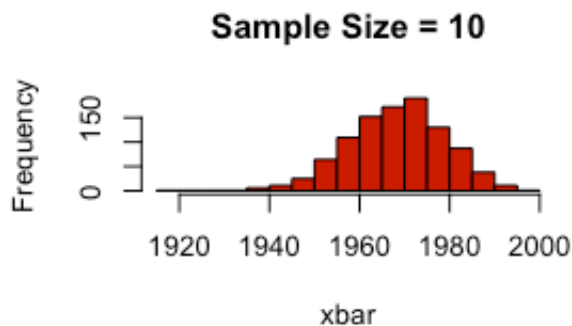
The Central Limit Theorem states that for a random variable  $x$  and a given sample size, the distribution of the variable  $\bar{x}$ , is called the sampling distribution of the sample mean. It's the distribution of all possible sample means of a given sample size. With that, we can apply the statistics to this dataset. The year distribution from above shows a positive distribution of all the possible outcomes and recordings from this data. To demonstrate analysis, I will be using that as an example to show the application of the central limit theorem. I am showing a sample space of 10, 20, 30, and 40 following a normal distribution.

#

# population mean: 1967.768

#

# Sample Size = 10 Mean = 1968.229 SD = 10.79379  
 # Sample Size = 20 Mean = 1967.544 SD = 7.544611  
 # Sample Size = 30 Mean = 1967.628 SD = 5.897729  
 # Sample Size = 40 Mean = 1967.858 SD = 5.191411



- Sampling Cases via Simple Random Sampling Without Replacement, Systematic Sampling, and Stratified Sampling

Sampling is a statistical technique that selects a representative portion of a population. For my project I am going to focus on performing calculations with Simple Random Sampling Without Replacement, Systematics Sampling, and Stratified Sampling. Simple random sampling is a basic sampling technique where individual subjects are selected from a larger group. For my project I took 25 random samples, and applied it to the simple random sampling technique along with the systematic sampling technique.

I applied these techniques on the Cases variable, which depicts the number the cases based off one of the 13 countries. It provides a great distribution to show how many cases were recorded during the number of years that the analysis were being recorded.



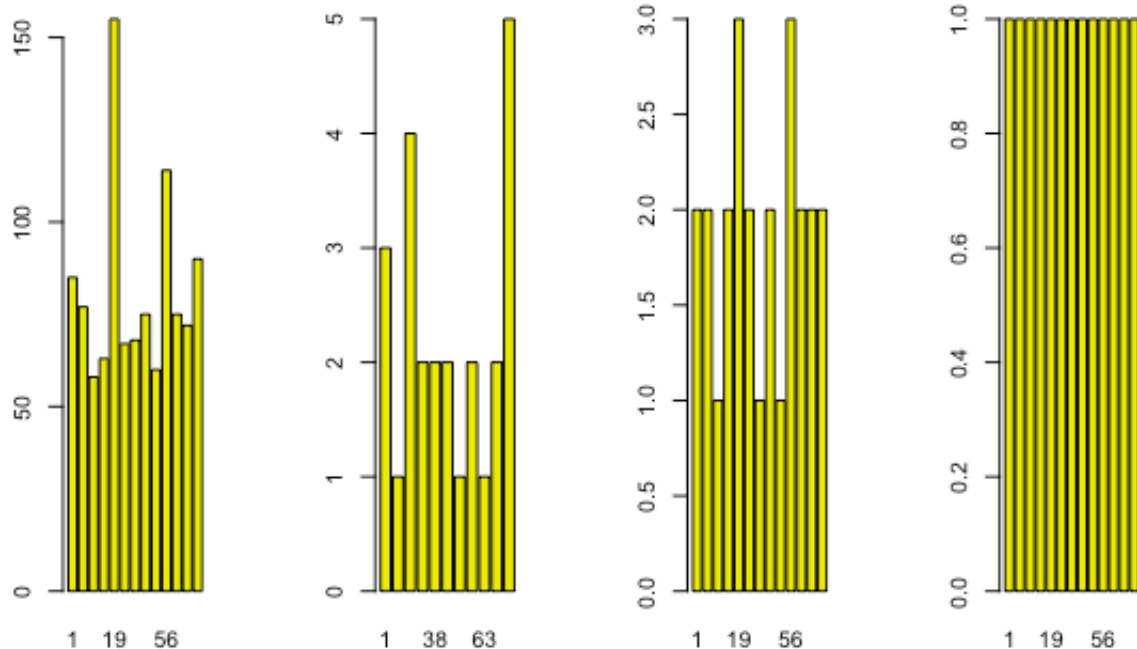
Notice how transitioning from the big population set (1<sup>st</sup> plot), to the other plots (plots 2, 3, &4) really shows how these are just slices of the total population. My conclusions from these samples, are they are a good indicator to understand bits of the information. We can see that most of the data is right around 1 on the number of recordings, for a sample size of 25 countries, because with sampling we are taking a piece of the population.

# Total Population  
 # mean = 35.61379  
 # sd = 23.6924

# sample 2, plot 2  
 # mean = 40.92  
 # sd = 24.58984

# sample 3, plot 3  
 # mean = 36.32  
 # sd = 24.53861

# sample 4, plot 4  
 # mean = 35.61538  
 # sd = 24.59857



#### - Conclusion

To conclude, the Economic crisis in Africa is not as bad, as one would think. The data tells us that although there is hard evidence of some of these countries have small hints of debt its not as widespread and disastrous, to its economy as it appears. These countries can do better, by conducting research similar to this experiment, where they can show analysis on tangible variables that can prevent an economic crisis. Just because this is small case, it does not mean it can not spread into a crisis that get worse, and completely flatten these countries, or even the whole continent.

Going forward to want to do better as an economy, these countries should come together and continue providing data in order to make better decisions. The better decisions that are made, the better the future economy will be. Its not fatal, and the economy isn't completely shut down, but more can be done in order to keep the economy trending positive.