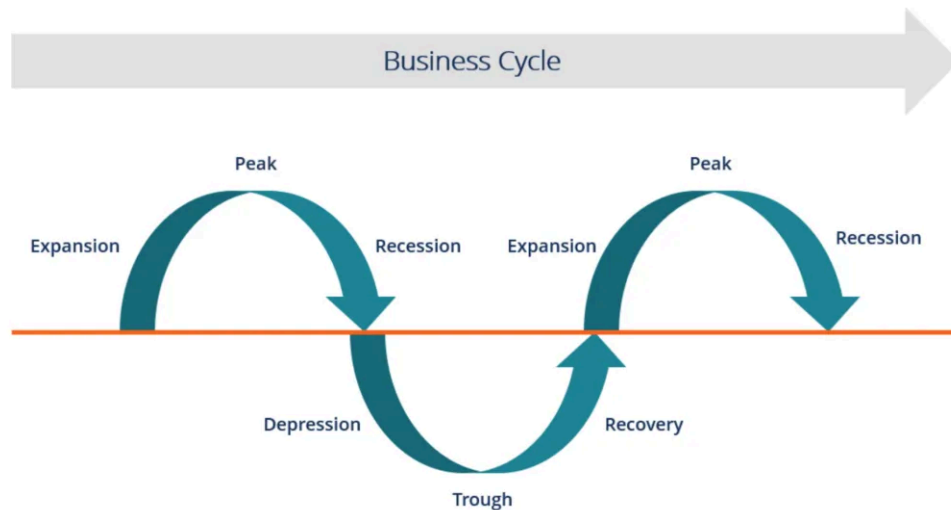


## **ES 2 Final Project Proposal**

### **Plan**

For my final project I would like to visualize, analyze, and discuss macroeconomic activity in the United States over a large period of time. I am planning to discuss the relationship(s) between GDP(Gross Domestic Product), Unemployment Rate, Inflation Rate, CPI, and I am going to include a calculation of the GDP Deflator with the same base year as the CPI data I collected and compare those as well. I want to discuss broader economic implications, historical and economic causes, and patterns in the data. I am going to include much discussion on the impacts different economic time periods have had on people and discuss some of the historical background to those different periods. The primary reason I want to do a macroeconomic market analysis is because I am doing a double economics and finance minor and I find economics incredibly fascinating. I think it is very important for me to try and tie my major (Electrical and Computer Engineering) to my economic and finance minors. I feel that this project proposal gives me the opportunity to connect engineering and data science to economics in an in-depth manner, as well as being able to show my MATLAB abilities in the process.

The primary questions I want to discuss include: What are the human impacts during different economic periods? How do the patterns and trends in the data sets relate? What are the possible historical and political implications and causes? Are any of the patterns predictable? – These are the main questions, but I will certainly be discussing smaller derivatives of these and possibly microeconomic implications as well. I want to include a visual of the business cycle as well in my final report and presentation, which looks like this:



### **The Data**

The first two data sets I have are from the St. Louis Fed website for economic research, or the FRED Economic Data database: <https://fred.stlouisfed.org/> – I will include a complete

bibliography at the end of this proposal, this hyperlink is here in case you want to quickly check out the database site! :)

The first data file from this website I am using is the United States GDP (Gross Domestic Product) since 1947 (). It is a CSV <https://fred.stlouisfed.org/series/GDP> file and it is in a 309 row by 2 column format. It is easily uploadable to MATLAB either using the `readtable('USGDP19482023.csv')`, or the import data function at the top of the home page section. I am going to use the `readtable` function because it has two great headers already, one being "DATE" and the other being "GDP". This makes it super easy to deal with. This file contains data from every third month from January 1, 1947 to October 1, 2023. By this I mean it has data from every year from the months of January(1), April(4), July(7), and October(10) – Essentially the end and beginning of each fiscal quarter.

The second data file from this website I am using is data on the Unemployment Rate since 1948 (<https://fred.stlouisfed.org/series/UNRATE>). It is a CSV file and it is in a 916 row by 2 column format. It is easily uploadable to MATLAB either using the `readtable('UnemploymentRate1948Present.csv')`, or the import data function at the top of the home page section. I am going to use the `readtable` function because it has two great headers already, one being "DATE" and the other being "UNRATE". This makes it super easy to deal with. This CSV file contains data by month (I mean every month) from January 1, 1948 to March 1, 2024.

– I created yearly averages for both of these data sets in MATLAB.

The third data set I will be using is from kaggle.com. The data file I am abstracting from Kaggle is a CSV file containing the monthly CPI(consumer price index) from 1913 to 2013 (<https://www.kaggle.com/datasets/tunguz/us-consumer-price-index-and-inflation-cpi>). It is in a 1213 row by 2 column format. It is easily uploadable to MATLAB using the `readtable` function or the import data header at the top of the homepage. I will use the `readtable` function for this file because it already has great column headers: "Date" and "CPI". Since this file is monthly, I am going to use some MATLAB functions so I get an annual CPI for each year, instead of monthly. This will make it cleaner, and also easier to compare and do computations with.

–Again, I included the hyperlink for your convenience in case you would like to check out the source. Complete bibliography will be at the end in the works cited.

The third data set I am going to use is directly from the Bureau of Labor Statistics (<https://data.bls.gov/pdq/SurveyOutputServlet>) The data file I am abstracting from this site is a file that contains the monthly inflation rate from 1913 to 2021. This file is in a CSV format. This file is a bit different from the others I have used and is in a 110 row by 14 column format. The first column header is the year, and then the next 12 are the months of the year, and then each

box in the table corresponds to the inflation rate of the year and month. Again, I made an annual average for each year instead of monthly for easier comparison.

I am planning to merge data from multiple sources, but I am going to do this after everything is uploaded to MATLAB and in tables. I want to make comparisons between all the data sets individually and all at once to examine trends and economic implications.

### Visualizations

Figure 1: GDP and Unemployment Rate from St. Louis FED database

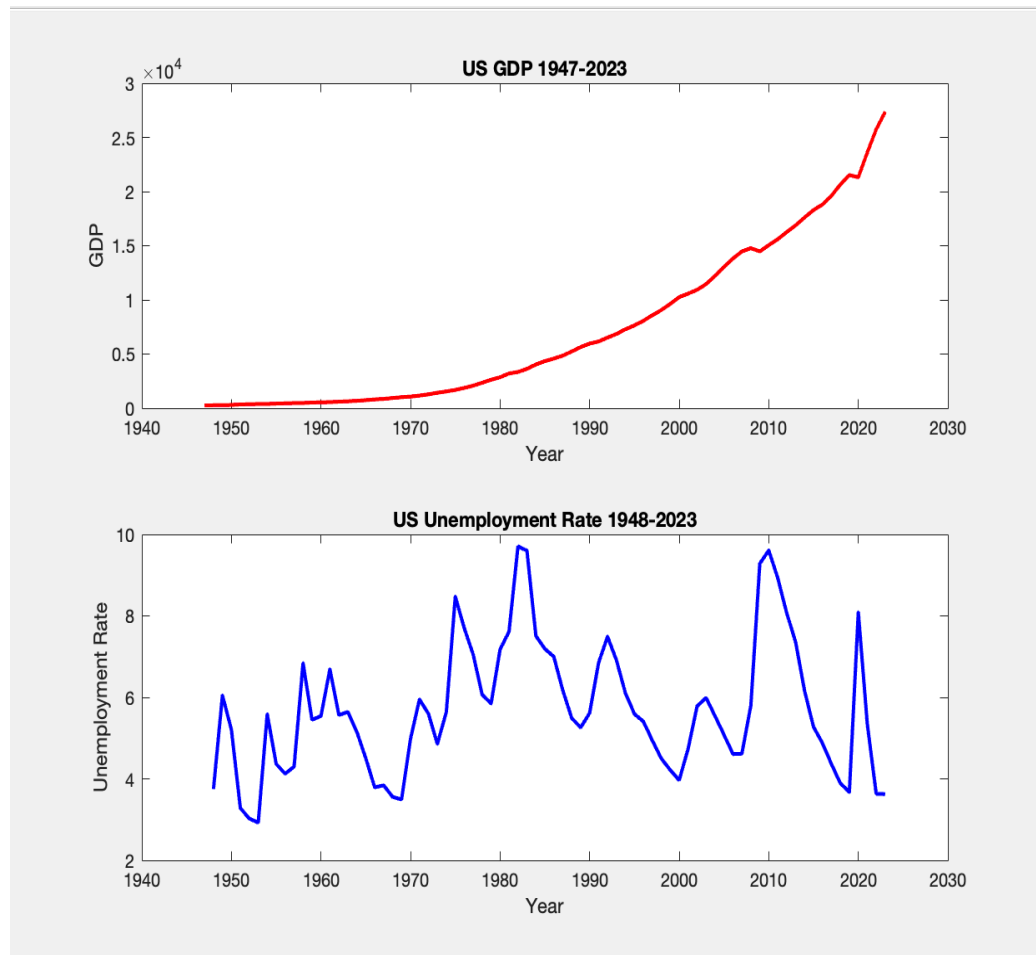


Figure 2: CPI Visual from Kaggle dataset

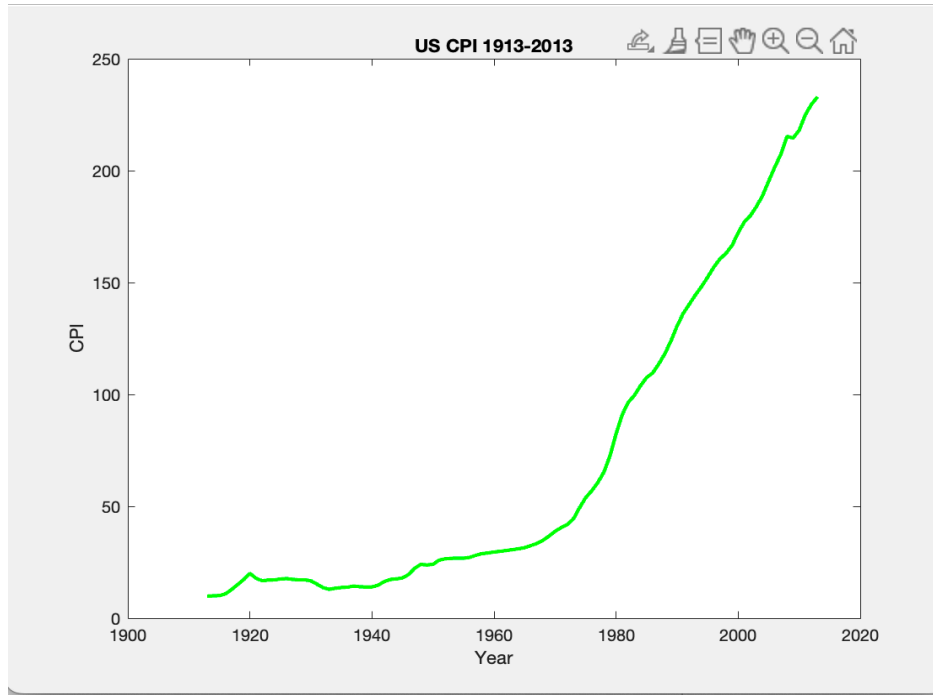
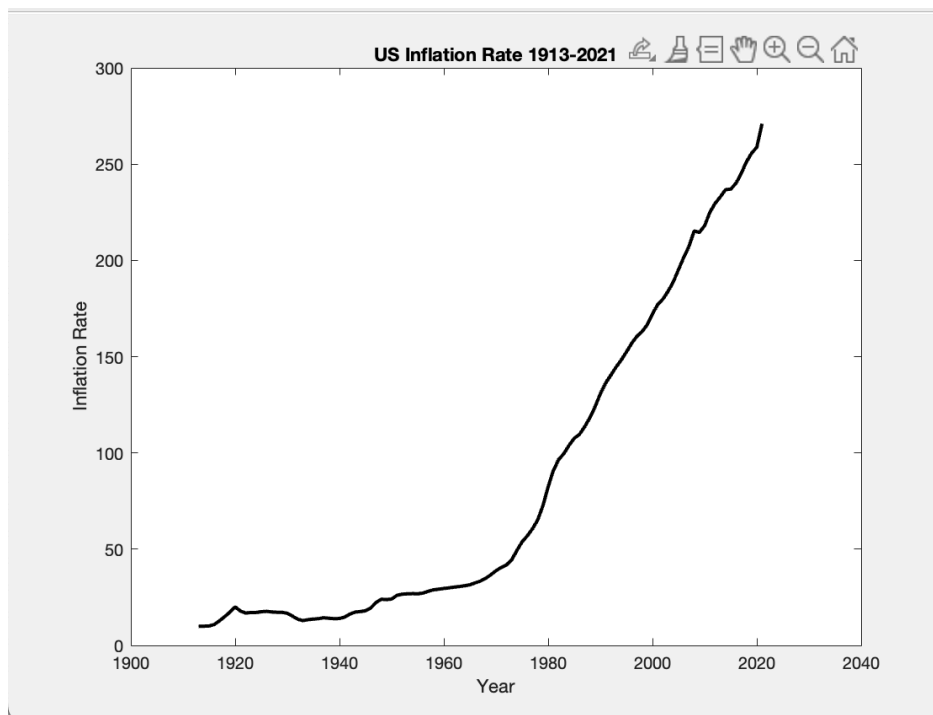


Figure 3: Inflation Rate Visual from US Bureau of Labor Statistics



**Additional Computations**

The only additional computation I want to include is the GDP Deflator. This is a measure of inflation, similar to the CPI, but they can differentiate at some points and that would be cool to analyze.

The general formula is:

$$GDP\ Deflator = Nominal\ GDP / Real\ GDP * 100$$

In this equation nominal GDP is the GDP based on the price of goods at that time, without adjustment for inflation. Real GDP is the measure of GDP based on the price of goods adjusted for a particular base year. In economics, the GDP deflator is a measure of the money price of all new, domestically produced, final goods and services in an economy in a year relative to the real value of them. It can be used as a measure of the value of money. This is important and helpful because I can select the base year I want from the data set I have.

And that is it about it. Currently I do not need any help and I am all set for going with my final report and presentation as long as this is approved. I have already written all my code and have everything set up and ready to go. I do not have any concerns.

- Works Cited below on final page

Works Cited

- CFI Team. "Business Cycle." *Corporate Finance Institute*, 18 Apr. 2023, [corporatefinanceinstitute.com/resources/economics/business-cycle/](https://corporatefinanceinstitute.com/resources/economics/business-cycle/).
- FRED. "Unemployment Rate." *Stlouisfed.org*, 2023, [fred.stlouisfed.org/series/UNRATE](https://fred.stlouisfed.org/series/UNRATE).
- Tunguz, Bojan. "US Consumer Price Index and Inflation (CPI)." *Wwww.kaggle.com*, [www.kaggle.com/datasets/tunguz/us-consumer-price-index-and-inflation-cpi](https://www.kaggle.com/datasets/tunguz/us-consumer-price-index-and-inflation-cpi).
- U.S. Bureau of Economic Analysis. "Gross Domestic Product." *Stlouisfed.org*, 2023, [fred.stlouisfed.org/series/GDP](https://fred.stlouisfed.org/series/GDP).
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