Decoding US Economy "A 25-Year Economic Journey: Insights from the 2008 Recession to the Global COVID-19 Impact"

### **Introduction:**

Ever wonder how the economy works? Well, imagine it's a giant puzzle, and for the past few hundred years, we've been trying to solve it. As we explore, we'll zoom in on the complex workings of the United States., a highly developed mixed economy that stands as the world's largest by nominal GDP. The United States, like the global economy, has weathered significant storms and triumphs. Picture this journey as a thrilling rollercoaster ride through time, where two major events, the 2008 U.S. recession and the global COVID-19 pandemic, shook things up.

Get ready for a closer look at some key numbers—like how much money is floating around, how many people have jobs, and what's happening in the stock market. Each of these numbers has a story to tell, and we're here to unravel those stories. It's like decoding a mystery, but instead of clues, we have charts and graphs.

Welcome to our exploration of US Economy for the past 25 Years. We're not just looking at numbers; we're trying to understand what they mean for all of us. It's like peeling back layers to see the hidden tales within the data.

just a straightforward exploration of how our money and markets have been dancing over the years. Get ready for a journey where numbers become our storytellers.

# 1. Research Objectives:

Our study is driven by a set of clear objectives aimed at unraveling the complexities of economic indicators and their impact on inflation and stock market performance. The key goals of our research are as follows:

#### • Examine Historical Trends:

Analyze the historical trends of key economic indicators over the past 25 years, providing a comprehensive view of their fluctuations and patterns.

### • Assess Impact during Major Events:

Investigate the specific impact of economic indicators on inflation and stock market performance during two critical events: the 2008 recession and the COVID-19 pandemic.

### • Identify Correlations:

Establish correlations between different economic indicators and assess how changes in one variable may influence others, contributing to a holistic understanding of the economic landscape.

### • Evaluate Long-Term Effects:

Assess the long-term effects of economic events on inflation and stock market performance.

# 2. Scope of the Study:

### • Time Frame:

The analysis covers a span of the past 25 years, from 1998 to 2023.

#### • 2008 Recession:

The study scrutinizes the impact of the 2008 recession, a critical turning point in recent economic history.

### • COVID-19 Pandemic:

A special emphasis is placed on the COVID-19 pandemic, a global crisis with farreaching economic implications.

## 3. Methodology:

Our research leverages advanced analytical tools and programming languages to conduct a thorough examination of economic indicators, inflation, and stock market performance.

### • Data Collection with Python:

Utilized Python programming language to automate the data collection process. Python's rich ecosystem of libraries facilitated seamless extraction and integration of datasets. Which includes information on key economic indicators, inflation rates, stock market indices, and relevant macroeconomic variables.

### • Statistical Analysis with Pandas, Matplotlib and Plotly:

Utilized Pandas, Matplotlib and Plotly libraries for advanced statistical analysis. These tools allowed me to perform *correlation analysis*, *Scatter Plots*, *Trend line and time-series analysis* to capture the nuances of the data.

### • Event-Based Analysis with Jupyter Notebooks:

Utilized Jupyter Notebooks for event-based analysis, allowing for an interactive and iterative exploration of data. Implemented an event-based analysis, focusing on two significant economic events—the 2008 recession and the COVID-19 pandemic.

### • Code Validation and Reproducibility:

Ensured code validation and reproducibility by sharing Jupyter Notebooks containing the entire codebase. This transparent approach allows for the verification of results and encourages reproducibility by other researchers.

### 4. Economic Indicators:

This study scrutinizes a diverse set of economic indicators to unravel the intricate relationships governing inflation and stock market performance.

#### • GDP Growth:

Gross Domestic Product (GDP) growth serves as a fundamental indicator of economic health. The study considers GDP growth rates to identify broader economic trends and their effect on inflation and stock market dynamics.

### • Unemployment Rates:

Unemployment rates offer insights into labor market conditions. Analyzing the relationship between unemployment rates and inflation helps uncover potential trade-offs in economic policy.

#### • Fed Funds Rate:

The Federal Funds Rate is the interest rate at which depository institutions (banks and credit unions) lend reserve balances to each other overnight, typically within the Federal Reserve system. It serves as a crucial tool for the Federal Reserve to influence the overall level of economic activity and control inflation.

### • Inflation Rates:

Inflation rates, measured through consumer price indices (CPI) is pivotal to understanding the purchasing power of currency. The study explores inflation trends over the 25 years to assess their correlation with stock market movements.

### • S&P 500 Market Performance:

The performance of major stock market indices, such as the <u>S&P 500</u>, serves as a pivotal metric. Examining market trends, volatility, and investor sentiment provides insights into the broader economic health.

## • Money Supply (M2):

The study delves into the dynamics of money supply, specifically focusing on M2, which includes cash, checking deposits, and easily convertible near-money. Analyzing changes in money supply aids in understanding liquidity conditions and their impact on inflation and financial markets.

By examining this set of economic indicators, our research aims to establish correlations, identify causations, and unravel the complex interactions that shape the dynamics of inflation and stock market performance.

# **Beginning the Journey**

Our exploration of the U.S. economy kicks off with a glance back in time. Let's start by understanding the historical underpinnings that set the stage for the economic powerhouse we know today.

### **Historical Overview**

The economic story of the United States traces back to its founding years, where an agrarian economy slowly transformed into an industrialized nation. The latter part of the 20th century saw transformative moments—the rise of technology, the information age, and the globalization of trade. These factors propelled the U.S. into a position of economic dominance.

Now that we have a snapshot of the historical landscape, let's delve into the data from the last 25 years to gain a quantitative understanding of how the U.S. economy has evolved during this period. beginning with Gross Domestic Product (GDP), a fundamental measure of economic health.

### **GDP**

Gross domestic product (GDP) is the total monetary or market value of all the finished goods and services produced within a country's borders in a specific time period. GDP can be calculated in three ways, using expenditures, production, or incomes and it can be adjusted for inflation and population to provide deeper insights. GDP measured in expenditure approach can be calculated using the following formula: GDP=C+G+I+NX

#### where:

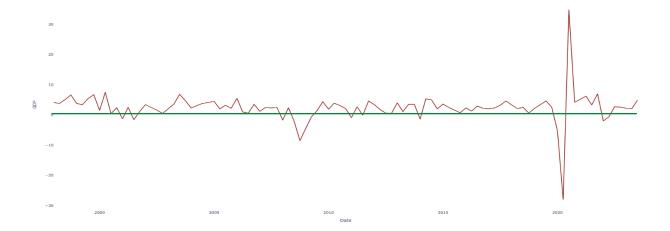
• C = Consumption, G = Government, spending, I = Investment, NX = Net exports

### **GDP Growth Rate**

GDP Growth rates are used to express the annual change in a variable as a percentage. This rate of growth is used to measure an economy's recession or expansion. If the income within a country declines for two consecutive quarters, it is considered to be in a recession.

Economic Growth = (GDP2-GDP1/GDP1) \* 100

#### US GDP Growth rate Over the Past 25 Years



For the Interactive Graph Click on the Link Below:

## https://drive.google.com/file/d/1eT93K79rA-EZLRm\_11QJxft-mtNpZSet/view?usp=drive\_link

As we delve into the economic journey represented by the GDP growth rate graph, it becomes a canvas telling a story of resilience, challenges, and pivotal moments that shaped the United States' economic landscape. Two distinctive periods stand out, marked by negative growth rates—2008, the year of the Great Recession, and 2020, the onset of the global COVID-19 pandemic.

### Quarterly Dip in GDP Growth rate (2008):

A dip in GDP growth rate during 2008 signifies the economic contraction that accompanied the housing market crash and financial instability.

Unemployment rates surged as companies tightened budgets, resulting in job losses and a strained labor market.

### Quarters Reflecting Pandemic Impact (2020):

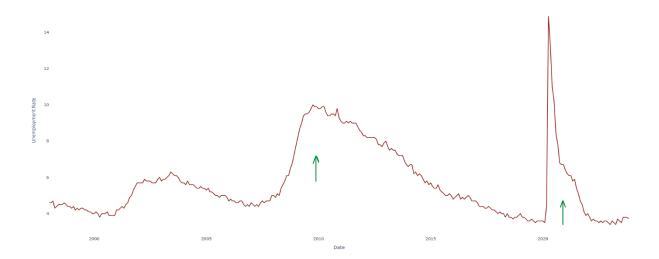
- The negative GDP growth rates in 2020 mirror the economic fallout of the COVID-19 pandemic.
- Unemployment rates, once again, escalated as businesses grappled with closures, travel restrictions, and the overall economic uncertainty induced by the pandemic.

In the evolving narrative of GDP growth and unemployment rates, these negative quarters serve as markers of resilience. Despite the challenges posed by the 2008 recession and the 2020 global pandemic, the subsequent quarters on the graph telling stories of recovery, adaptation, and the indomitable spirit of economic revival.

# **Unemployment Rate**

As we explore the economic indicators, let's turn our attention to a key player. The unemployment rate is the percentage of the labor force without a job. It is a lagging indicator, meaning that it generally rises or falls in the wake of changing economic conditions, rather than anticipating them. The unemployment rate is the proportion of the labor force that is not currently employed but could be.

### **US Unemployment Rate Over the Past 25 Years**



For the Interactive Graph Click on the Link Below:

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We've seen it go up during tough times like the 2008 recession and the 2020 global pandemic. The dips and peaks in this graph like a snapshot telling us about jobs, how people cope with work changes, and how job situations keep changing. It's like a story of jobs, workers, and the ever-changing job scene.

As we peer into the realm of employment dynamics, the natural transition leads us to explore another crucial facet—Inflation Rates. The interplay between unemployment and inflation is a delicate balance, and understanding this relationship is key to unraveling economic cycles. Let's now shift our gaze to the Inflation Rate graph, where each fluctuation is a heartbeat in the pulse of the economy.

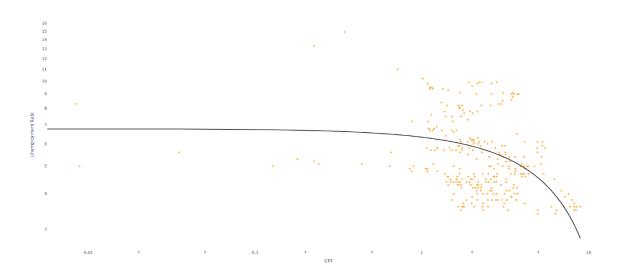
## **Inflation Rate (CPI)**

Now, let's dive into a different aspect of the economy—the Inflation Rate. Think of inflation like the cost of living going up. When it goes up, things become a bit more expensive, and each dollar doesn't buy as much as it used to. This is an important part of our economic story.

Interestingly, inflation and the Unemployment Rate are like dance partners in the economic Context. Imagine a seesaw: when one goes up, the other may go down. Here's how they relate:

- When jobs are plentiful (low unemployment), people have more money to spend. With more spending, demand for goods and services increases, and so do prices—inflation goes up.
- On the flip side, during economic downturns (high unemployment), people might be spending less. With lower demand, prices may not rise as fast—inflation tends to go down.

Now, let's bring this relationship to life with a Scatter Plot graph covering 25 years.



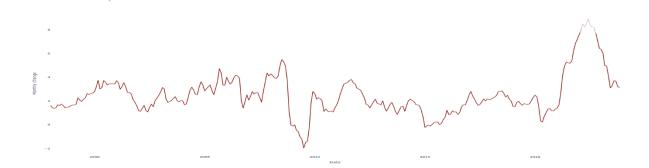
For the Interactive Graph Click on the Link Below:

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This Scatter Plot graph becomes our visual guide to understanding the dynamic relationship between inflation and the job market.

As we conclude our exploration of the Scatter Plot, a dynamic portrayal of the dance between Unemployment and the Consumer Price Index (CPI), our next canvas is the Inflation Rate graph. This graph brings to life the fluctuations in the cost of living over the past 25 years.

### **US Inflation Rate Over the Past 25 Years (CPI)**



For the Interactive Graph Click on the Link Below:

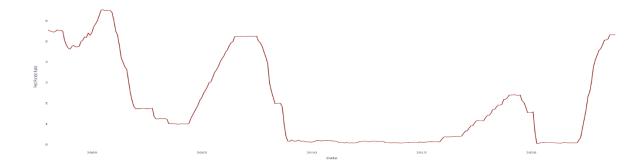
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### **Fed Funds Rate**

As we conclude our exploration of inflation and unemployment, our next stop is the Federal Funds Rate—a tool used by the central bank to influence the economy. Just like a conductor guides an orchestra, the Federal Reserve guides the economy by adjusting this interest rate. Let's smoothly transition to this crucial indicator.

Before we dive into the relationship between the Federal Funds Rate and other economic indicators, let's first unveil the Federal Funds Rate graph. This graph is a visual representation of the interest rate's movements.

#### US Fed Funds Rate Over the Past 25 Years

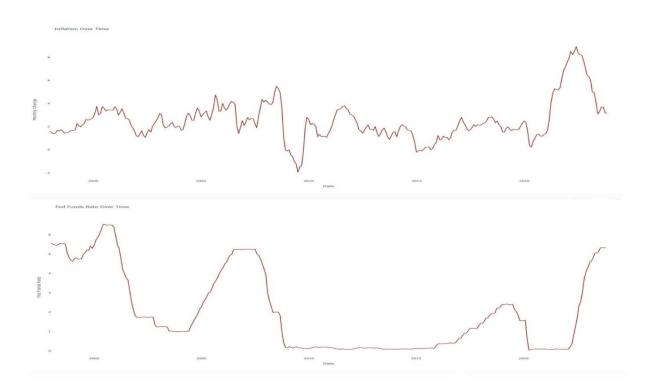


For the Interactive Graph Click on the Link Below:

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To deepen our understanding, let's bring it in a single Frame. This visual representation will highlight the relationship between the

### Federal Funds Rate and the Consumer Price Index (CPI) 25 Years



In 2008, as the economy grappled with the depths of the Great Recession, the Federal Reserve took decisive action. Facing a downturn, they decided to decrease the Federal Funds Rate. This strategic move was a melody designed to stimulate borrowing, investment, and spending.

Fast forward to 2022, and the conductor's baton adopts a different rhythm. The economic stage witnesses a surge in inflation, a consequence of the government injecting funds into the economy to combat the challenges posed by the global pandemic. Now, the Federal Reserve adjusts its score. In a bid to temper inflationary pressures, interest rates ascend—the tempo shifts, the melody adjusts.

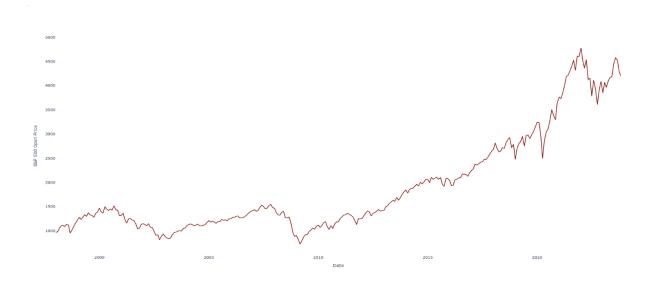
In essence, the Federal Funds Rate becomes a versatile instrument in the hands of the Federal Reserve. In 2008, it was a tool to bring up economy from the depths of recession. In 2022, it was a tool to cool down an overheated economy.

As we decipher the symbiotic relationship between the Federal Funds Rate and CPI, we're well-prepared to transition seamlessly to our next destination—the S&P 500. Here, we'll explore how the market performed over these 25 years.

### US Stock Market (S&P 500)

Now, let's shift our gaze to the S&P 500, a barometer reflecting the heartbeat of the stock market. This graph encapsulates the rise and fall of major U.S. companies and serves as a captivating storybook of market performance.

### **S&P 500 Performance Over the Past 25 Years**



For the Interactive Graph Click on the Link Below:

### https://drive.google.com/file/d/1oWPBfXTnF9RH0tHSpF8SFphoERIZAj87/view?usp=drive\_link

Behold the S&P 500 Performance graph, a visual narrative capturing the market's journey over the past 25 years. As we traverse this financial landscape, three distinct dips catch our attention.

- In 2008, mirrors the economic turbulence of the Great Recession.
- In 2020, This dip underscores the profound impact of the pandemic on market dynamics and investor behavior.
- In 2022, unfolds as the Federal Reserve steers the ship by hiking interest rates to curb inflationary pressures.

### Pandemic Infusion and AI Rally:

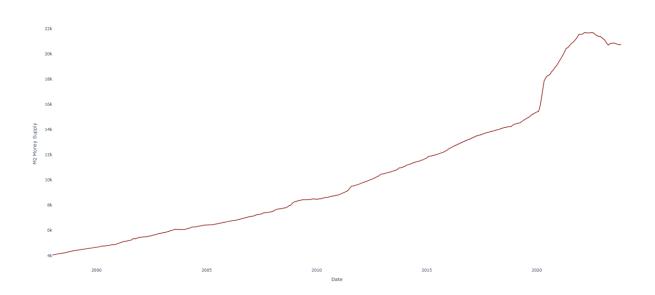
- Zoom in on the remarkable growth after the infusion of funds during the 2020 pandemic. Witness the market's resilience as it rebounds from the crisis.
- Another notable spike in mid-2023, driven by advancements in artificial intelligence, adds a new dimension to the market narrative.

As we decipher the nuances of the S&P 500's performance in the wake of economic events, our spotlight turns to the Money Supply (M2). This vital economic indicator holds the key to understanding the financial pulse, reflecting the amount of money circulating in the economy. Let's seamlessly transition to unravel the intricacies of M2, our final destination in this comprehensive economic analysis.

# Money Supply (M2)

M2 is a measure of the money supply that includes not only all the elements of M1 (cash, demand deposits, and other liquid assets) but also near-money components such as savings accounts, time deposits, and other relatively liquid assets. In simpler terms, M2 represents a broader definition of money, encompassing both immediate spendable assets and those that can be quickly converted to cash.

### **Money Supply Over the Past 25 Years (M2)**



For the Interactive Graph Click on the Link Below:

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### Data Insight 1:

2020 Surge - Government Infusion:

- Witness the notable surge in M2 during 2020—a direct outcome of the government's strategic infusion of funds to combat the economic repercussions of the COVID-19 pandemic.
- This surge in the money supply reflects a concerted effort to stimulate economic activity and cushion the impact of the unprecedented global crisis.

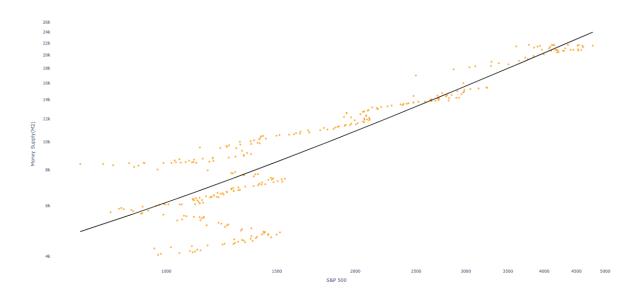
### Data Insight 2:

Later Decrease - Quantitative Tightening:

- Transition to the subsequent trend showcasing a decrease in the money supply. This shift represents the Federal Reserve's implementation of quantitative tightening—an intentional reduction in the money supply to manage economic conditions.
- As the Federal Reserve engages in this controlled tightening, it aims to curb potential inflationary pressures and maintain a balanced financial environment.

Now, let's unveil a Scatter Plot graph that investigates the correlation between the M2 Money Supply and the performance of the S&P 500.

Scatter Plot: M2 vs. S&P 500



For the Interactive Graph Click on the Link Below:

https://drive.google.com/file/d/1GrBeMfz7wwBN\_bkvl\_u8AymLFaWJQ4E7/view?usp=drive\_lin k

The positive relationship signifies a profound interplay between the availability of money in the economy and the movements of the stock market. When the Money Supply experiences an increase—be it through government infusion or other monetary stimuli—investors, armed with liquidity, are more inclined to participate in the financial markets.

Conversely, during periods of controlled tightening, where the Money Supply decreases, investors may navigate with a more cautious approach. So, this connection between how much money is around and how the stock market behaves shows us how closely linked government decisions about money and the stock market's ups and downs really are.

# **Conclusion: A 25-Year Economic Odyssey**

In our exploration of the economic landscape spanning a quarter-century, we've embarked on a compelling journey marked by peaks and valleys, guided by the intricate dance of economic indicators. From the echoes of the 2008 recession to the resilient bounce-back after the global upheaval of COVID-19, our analysis has dived deep into the heartbeat of the economy.

The stock market, embodied by the S&P 500, dynamically responding to the twists and turns of both fiscal and monetary policies. The evident positive correlation between the Money Supply (M2) and the S&P 500 unveiled a fundamental relationship, emphasizing the profound impact of liquidity on market dynamics.

Our exploration of interest rates, inflation, unemployment, and broader economic indicators highlighted the nuanced symphony conducted by central banks and governments. The surge in M2 during the pandemic, the subsequent controlled tightening, and the ensuing rally fueled by artificial intelligence painted a vivid picture of economic adaptability and resilience.

In conclusion, we acknowledge the intrinsic interconnectedness of monetary policy, liquidity, and market outcomes—a dance where each move crafts the economic landscape. The lessons gleaned from the past 25 years provide valuable insights into the delicate balancing act essential for economic stability and growth.

# **Acknowledging Data Sources**

### Data Links

To access the raw data and maintain transparency, reference materials used in this analysis are available through the following links:

https://www.investopedia.com/

https://www.wikipedia.org/

https://fred.stlouisfed.org/

https://www.bls.gov/

https://ca.finance.yahoo.com/

# Python Codes and data files:

https://github.com/bajiojoy/US\_Financial\_Market\_Analysis\_Python

# **Thank You**

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