Inflation Analysis

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Berkeley MIDS
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Overall Objective and Questions

Our objective is to analyze current market conditions to determine if the official report measures of inflation (CPI and PCE) are accurate. A secondary objective is to attempt to illustrate, inflation and its components utilizing data and data visualization.

Research Questions:

- Are the measures of inflation reported by the Fed accurate measures of real inflation in the economy?
- What is the historic relationship between interest rates and inflation?
- What is the relationship between the money supply M2 and inflation?
- Is inflation likely to be transitory or permanent?
- What is the impact of inflation on the working class and middle class in the United States?

Approach

1. We identified our overall objective and guiding questions for the analysis.

2. We researched and identified data sets and data sources that would inform our analysis.

3. We created a prototype, data extraction, cleaning and plotting framework based on, data source APIs, and libraries covered within w200 course material.

4. We drafted our research paper and its corresponding sections which served as a narrative and guiding document for our data analysis.

5. We further developed our data extraction and plotting framework, and generated required plots with the relevant data series.

6. Incorporated all the data, plots and relevant narrative into a holistic research report.

Assumptions

1. We assumed our data sets were accurate given the official government data source.

2. We assumed the data trends were weighted appropriately across all US regions.

3. Some of the data series have gaps in their recordings, however the trends are apparent for the years that are relevant for inflationary pressure.

Background

- Inflation is an increase in prices and fall in the purchasing value of money. The resulting effect is a decline in the consumer's purchasing power.

- Federal Reserve is responsible for the monetary and economic policy of the US Government. There are 12 regional banks.
    - The Fed is chartered to maximize employment, stabilize prices and moderate long-term interest rates.
    - The Fed uses open market operations, interest rate adjustments and bank deposit reserve requirements to accomplish its objectives.

- Official metrics for measuring inflation are:
    - Consumer Price Index (CPI)
    - Personal Consumption Expenditure (PCE)

- In addition to price and expenditure inflation there exists asset price inflation. This can be measured by indexes such as:

    - Case-Schiller home price index.
    - Dow Jones Industrial Average Index.

Geographic Boundaries
of the Federal Reserve Districts
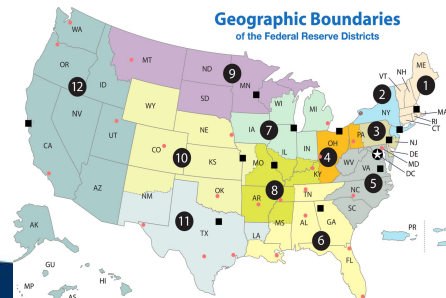
Data Sources and Data Types

Data Types:

1. Commodity Prices, Precious Metals
2. Factory Capacity Utilization
3. Income Indices
4. Inflation Statistics, Interest Rates
5. Unemployment Rate
6. Currency Strength
7. Fed Balance Sheet
8. Worker Share of GDP
9. Money Supply

Data Sources:

1. https://fred.stlouisfed.org/docs/api/fred/
2. https://www.bls.gov/data/tools.htm
3. https://fredhelp.stlouisfed.org/fred/about/about-fred/what-is-fred/

Understanding FRED "Series" Data

FED Series ID	Title	Freq	Obs Start	Obs End	Unit	Seasonal Adjustment
MEHOINUSA672N	Real Median Household Income in the United States	A	1/1/1984	1/1/2019	2019 CPI-U-RS Adjusted Dollars	Not Seasonally Adjusted
CPIAUCSL	Consumer Price Index for All Urban Consumers: All Items in U.S. City Average	M	1/1/1947	6/1/2021	Index 1982-1984=100	Seasonally Adj
MEHOINUSA672N	Real Median Household Income in the United States	A	1/1/1984	1/1/2019	2019 CPI-U-RS Adjusted Dollars	Not Seasonally Adj
PCE	Personal Consumption Expenditures	M	1/1/1959	6/1/2021	Billions of Dollars	Seasonally Adj Annual Rate
WPS0811	Producer Price Index by Commodity: Lumber and Wood Products: Softwood Lumber	M	1/1/1975	6/1/2021	Index 1982=100	Seasonally Adj
PCOPPUSDM	Global price of Copper	M	1/1/1990	6/1/2021	U.S. Dollars per Metric Ton	Not Seasonally Adj
PSAVERT	Personal Saving Rate	M	1/1/1959	6/1/2021	Percent	Seasonally Adj Annual Rate
PCEC96	Real Personal Consumption Expenditures	M	1/1/2002	6/1/2021	Billions of Chained 2012 Dollars	Seasonally Adj Annual Rate
TCU	Capacity Utilization: Total Index	M	1/1/1967			
CPILFESL	Consumer Price Index for All Urban Consumers: All Items Less Food and Energy in U.S. City Average	M	1/1/1957			
CSUSHPINSA	S&P/Case-Shiller U.S. National Home Price Index	M	1/1/1987			
MABMM301USM189S	M3 for the United States	M	1/1/1960			
UNRATE	Unemployment Rate	M	1/1/1948			
FPCPITOTLZGUSA	Inflation consumer prices for the United States	A	1/1/1960			
GOLDAMGBD228NLBM	Gold Price in US Dollars	D	1/1/1958			

"CPIAUCSL" -- Consumer Price Index All Urban Consumers

date	Value
1947-01-01	21.48
1947-02-01	21.62
1947-03-01	22.0
1947-04-01	22.0
1947-05-01	21.95
1947-06-01	22.08
1947-07-01	22.23
1947-08-01	22.4
1947-09-01	22.84
1947-10-01	22.91
1947-11-01	23.06
1947-12-01	23.41
...	...
2020-12-01	261.560
2021-01-01	262.231
2021-02-01	263.161
2021-03-01	264.793
2021-04-01	266.832
2021-05-01	268.551

"MABMM301USM189S" -- FED M3 Money Supply
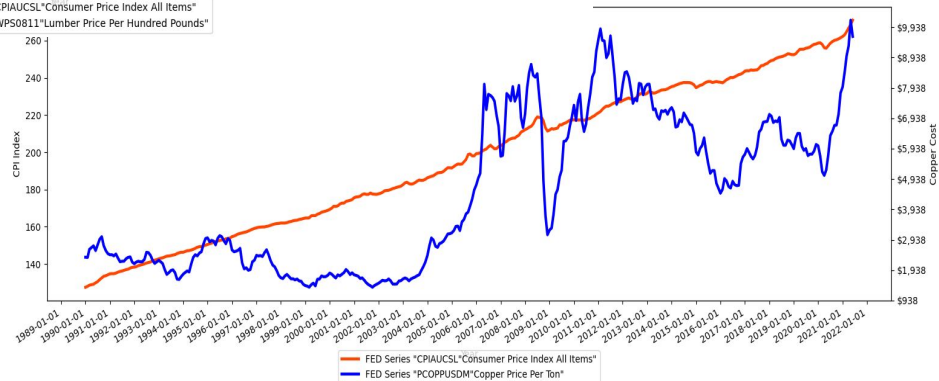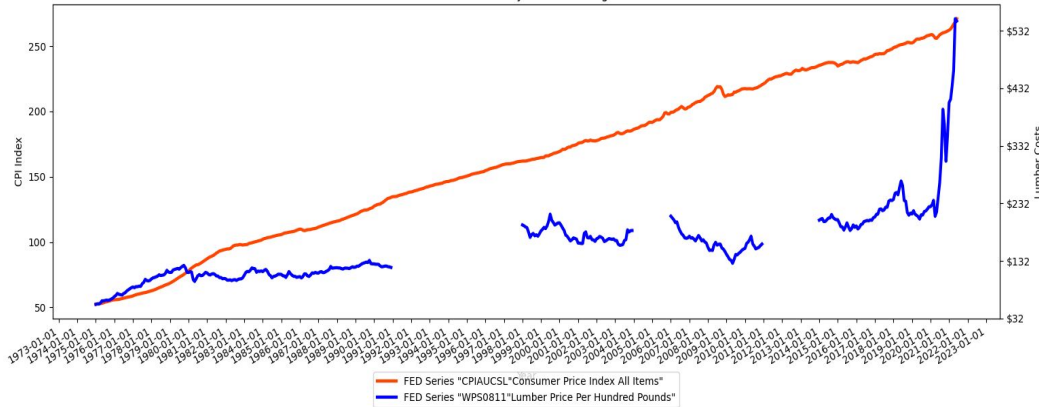
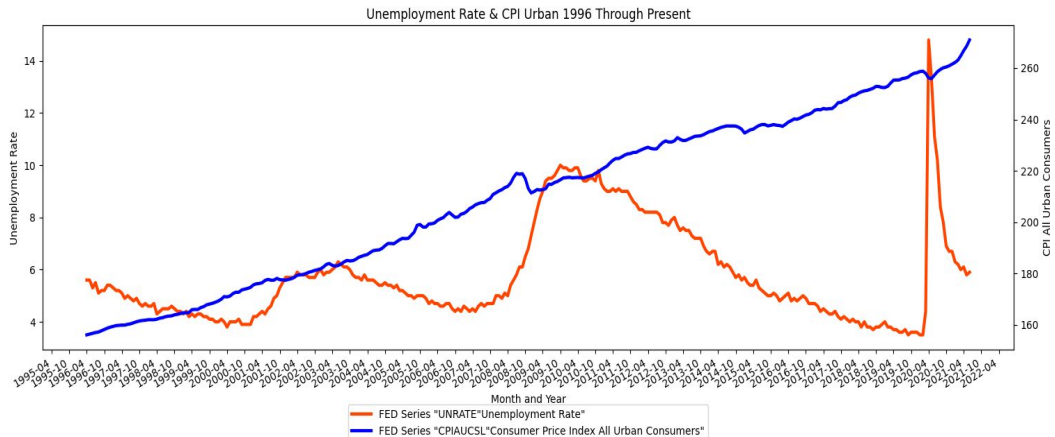| date	value
. ...	. ...
2019-08-01	$ 14,938,800,000,000.00
2019-09-01	$ 15,030,100,000,000.00
2019-10-01	$ 15,156,700,000,000.00
2019-11-01	$ 15,254,400,000,000.00
2019-12-01	$ 15,329,100,000,000.00
2020-01-01	$ 15,410,000,000,000.00
2020-02-01	$ 15,473,400,000,000.00
2020-03-01	$ 16,014,300,000,000.00
2020-04-01	$ 17,042,900,000,000.00
2020-05-01	$ 17,893,000,000,000.00
2020-06-01	$ 18,179,600,000,000.00
2020-07-01	$ 18,320,000,000,000.00
2020-08-01	$ 18,381,800,000,000.00
2020-09-01	$ 18,605,200,000,000.00
2020-10-01	$ 18,751,100,000,000.00
2020-11-01	$ 18,960,200,000,000.00
2020-12-01	$ 19,131,400,000,000.00
2021-01-01	$ 19,395,400,000,000.00

Data Pipeline
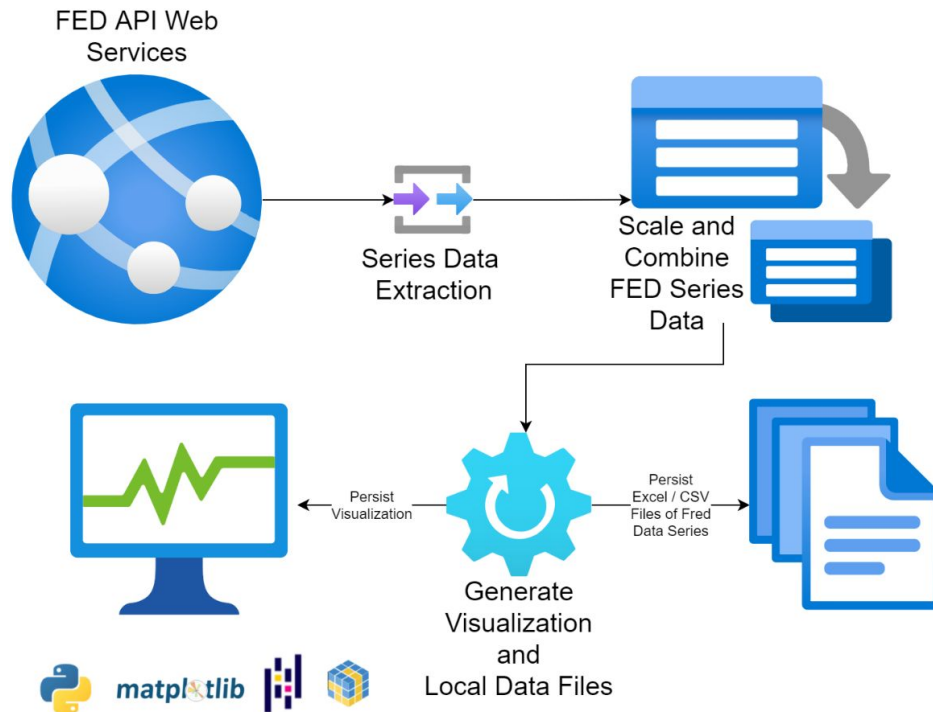
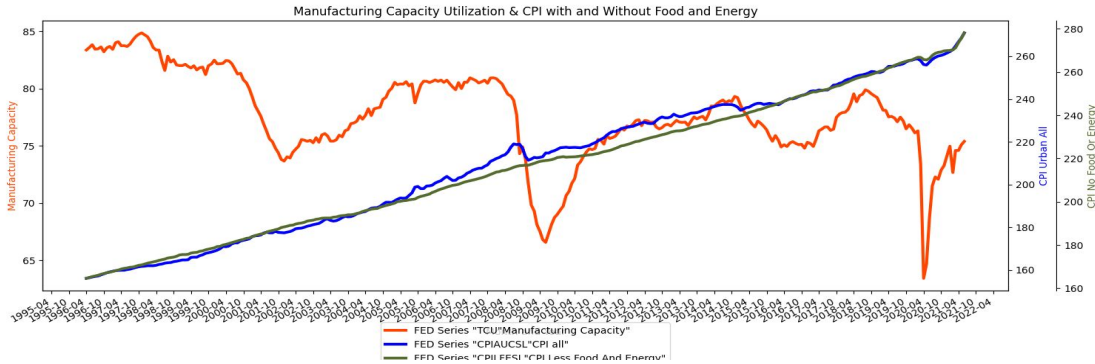# CPI & Supply Costs

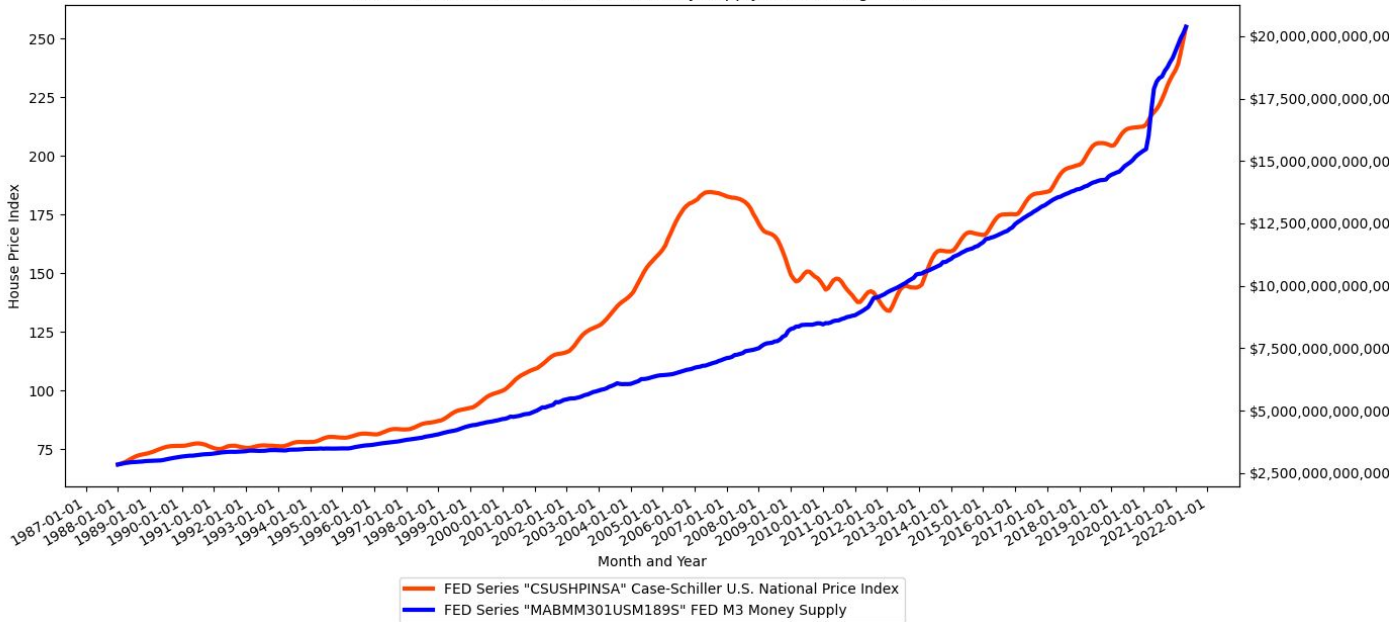CPI and Lumber Costs Jan 1975 through Present

CPI with Unemployment Rate & Manufacturing

Manufacturing Capacity Utilization & CPI with and Without Food and Energy

Unemployment Rate & CPI Urban 1996 Through Present

Asset Inflation Part 1:

Case Schiller Home Index and M3 Money Supply 1988 through Present

FED Series "CSUSHPINSA" Case-Schiller U.S. National Price Index
FED Series "MABMM301USM189S" FED M3 Money Supply

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Asset Inflation Part 2: GDP disconnected from "normal" economic measures.

U.S. Central Bank (FED) Assets, Quant Easing, and Money Supply

FED Series "DDDI06USA156NWDB" FED Bank Assets to GDP
FED Series "WALCL" Total Assets (Less Eliminations from Consolidation) (Quantitative Easing)
FED Series "MABMM301USM189S" FED M3 Money Supply

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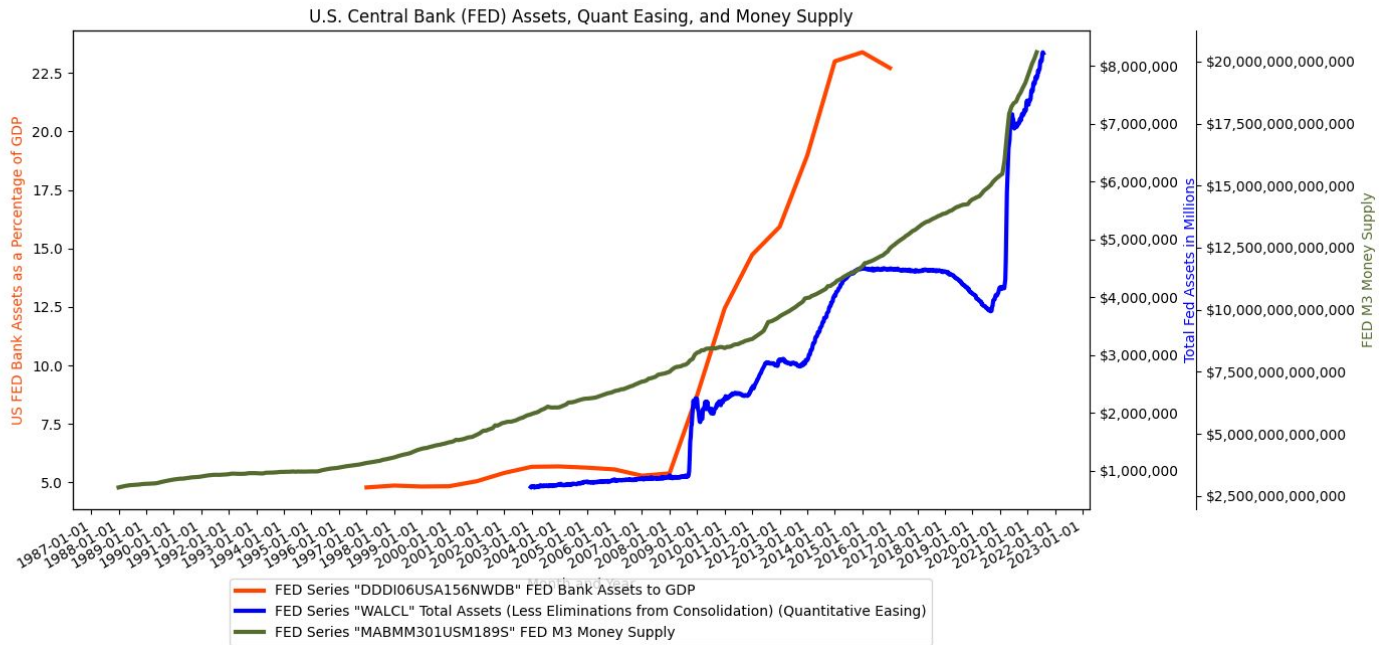
Asset Inflation Part 3: Assets Versus Workers share of GDP

FED Quant Easing Stock Index Gains, Real Wage Gains

Legend:
- FED Series "WALCL" Total Assets (Less Eliminations from Consolidation) (Quantitative Easing)
- FED Series "djia" Dow Jones Industrial Average
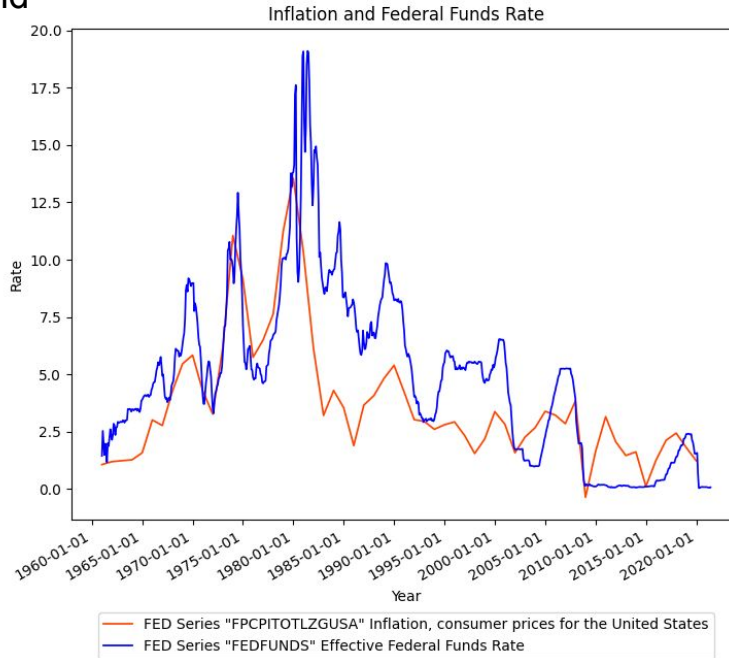- FED Series "W270RE1A156NBEA" Wage Earners Share of GDP
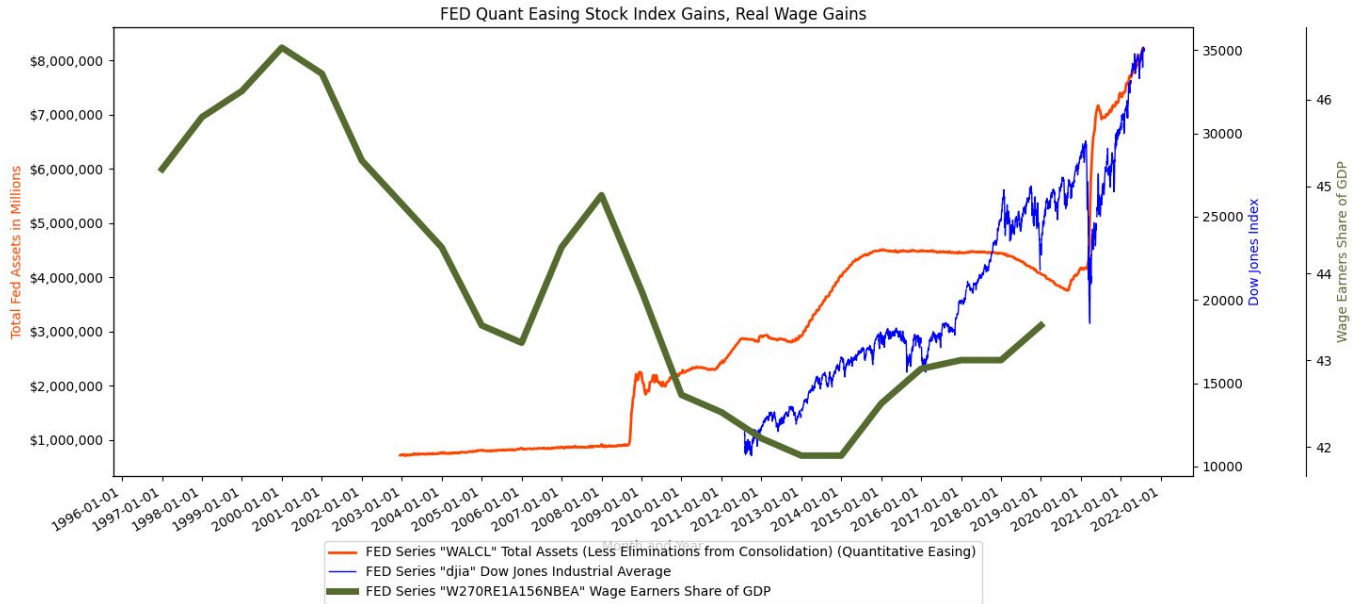
Without Precedent: 10 year T Bill, versus CPI And History.

1.17 %
10 year U.S.
Treasury Bond

4.8 %
CPI Rate

26%
Increase in Energy
Prices last 6
months

Inflation and Federal Funds Rate

FED Series "FPCPITOTLZGUSA" Inflation, consumer prices for the United States
FED Series "FEDFUNDS" Effective Federal Funds Rate

Conclusion

- The official indicators of inflation such as the indexes (CPI and PCE) while inclusive of thousands of variables are not ideal in measuring rapid variations of inflationary pressure. Secondary discrete real-time measures can be used to assess the upward inflationary measures as indicated in our analysis.

- Asset inflation is at an all time high and because of the financialization of the entire economy, asset inflation is being transmitted into cost and price inflation. I.E. If I pay a million dollars for an apartment building, I am going to demand more in rents than if I paid half that.

- Workers' wages as a percentage of GDP has not kept up with asset inflation, creating a situation where the transmission of asset inflation to consumer price inflation is unstable.

- If the FED were to raise interest rates, they could likely control inflation. However, they are unlikely to raise rates because the economy is in a "debt trap", whereby doing so would cause asset prices to crash.

- Follow on research should include a broader selection of secondary data discrete measures and inclusion of geographic regional zones vs a nation wide approach.