**Why should anyone care about this question?**

**Markets, market indicators and the economy are crucial to everyone’s well being. Understanding and predicting the path of economy and global market indicators can be extremely valuable in making better life choices as well as offer an opportunity to systematically profit (and avoid losses) by making accurate prediction of market indicators.**

**What are you trying to answer?**

Is there a consistent actionable relationship between macroeconomic data of US to predict real GDP, mortgage rates and other market indicators? If yes, how might macroeconomic data influence asset allocation decisions for portfolio management?

**What data will you use to answer you question?**

* St. Louis Fed (FRED) - [Federal Reserve Economic Data | FRED | St. Louis Fed (stlouisfed.org)Links to an external site.](https://fred.stlouisfed.org/)
* Yahoo Finance: [Yahoo Finance - Stock Market Live, Quotes, Business & Finance NewsLinks to an external site.](https://finance.yahoo.com/)
* Nasdaq Data Link: [Retail Trading Activity Tracker: Keep track of retail sentiment (nasdaq.com)Links to an external site.](https://data.nasdaq.com/institutional-investors)

**What methods are you using to answer the question?**

* The techniques you expect to use in your analysis:
* Visualization of data using various types of plots
* ARIMA Models: I expect to use ARIMA models to evaluate stationarity and cointegration among macroeconomic data vectors.
* Regression: I expect to use various linear, non-linear regression methods to further assess macroeconomic data cross-relationships

**The expected results**

* Quantitative description of relationships between macroeconomic variables such as PPI, CPI, M1, M2, Unemployment, Wages, GDP, ISM, PMI.
* Quantitative description of relationships between above mentioned macroeconomic variables and economic regimes, market regimes and various market indicators such as interest rates, yield curve levels, stock index measures, commodity prices and foreign exchange levels.
* Actionable recommendations for portfolio allocation and recommendation on trading decisions based on this analysis.

**Why this question is important?**

* This question bridges a gap in my understanding of what's happening in the economy and what's happening in the market. If answered, it would connect the two in logical ways that can help me in making more educated and informed portfolio and trading decisions.

**What did your research find?**

There is clearly a quantifiable relationship between various macroeconomic indicators:

* Difference between CPI and PPI % change quarter over quarter tend to show stationarity – I have witnessed it practically in markets where – if CPI data is high, eventually the PPI data catches up to it and vice-versa. As a result, when CPI data is released or PPI data is released, having an educated sense of which way the data may lean can guide positioning of a portfolio. Specifically, if PPI is strong, it would make sense to have low exposure to the market and it may be followed by a selloff in equity markets and a rise in interest rates.
* Difference between Personal income and savings change quarter over quarter shows stationarity.
* Difference between Retail Sales and LMV sales quarter over quarter shows stationarity.
* Difference between wages and CPI change quarter over quarter shows stationarity.
* Various macroeconomic data show cointegration.

These all facilitate a better understanding of macroeconomic trends and knowing one data can help guide judgement about the other data release. In turn, one is better able to assess the impact on the market due to the new data release.

I also found a quantifiable relationship between GDP and various macroeconomic variables such as industrial production, retail sales, real private investment.. As such, one can use the release of data on these variables to guide one’s judgement of economy which in turn can guide one’s judgement of how the markets would behave.

Similarly, I found a quantifiable relationship between mortgage rates and wages, Industrial production, consumer credit, US Govt. 10y bond yields and other macroeconomic variables. Specifically, one may be able to better guide the home purchase decisions or buying or selling of mortgage bonds based on an assessment of where the mortgage rates in the economy are.

**What suggestions do you have for next steps?**

**There is a lot of scope to do more work. I would like to expand this work by adding**

* Classification methods: I expect to use various classification methods such as logistic regression, KNN, SVM, decision trees to classify data into categories such as 'recessionary indicators', 'inflationary regime', 'deflationary regime', 'stagflation' and so on.
* Advanced methods: I believe advanced methods such as random forest, and neural networks may be particularly useful towards the end of this exercise to identify the relationships with high degree of confidence.

**Then, I would like to test how markets behave following data releases and see if there’s a way to systematically position a portfolio so as to benefit from these predictions.**