U.S. Treasury Activity and Macroeconomic Analysis

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Introduction

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- We conduct our analysis and build the relevant predictive models in line with the leading literature in the field (Barro, 1979) to provide valuable information to our target audience.

Target Audience

- Although widely relevant - this work is geared towards **Government Policy Makers** including the Federal Reserve and Treasury leadership.
- We believe that these decision makers must have an accurate perception of the myriad of moving parts and the historical impact of monetary policy decisions, particularly in times of recession and economic uncertainty.

Historical Debt Issuance

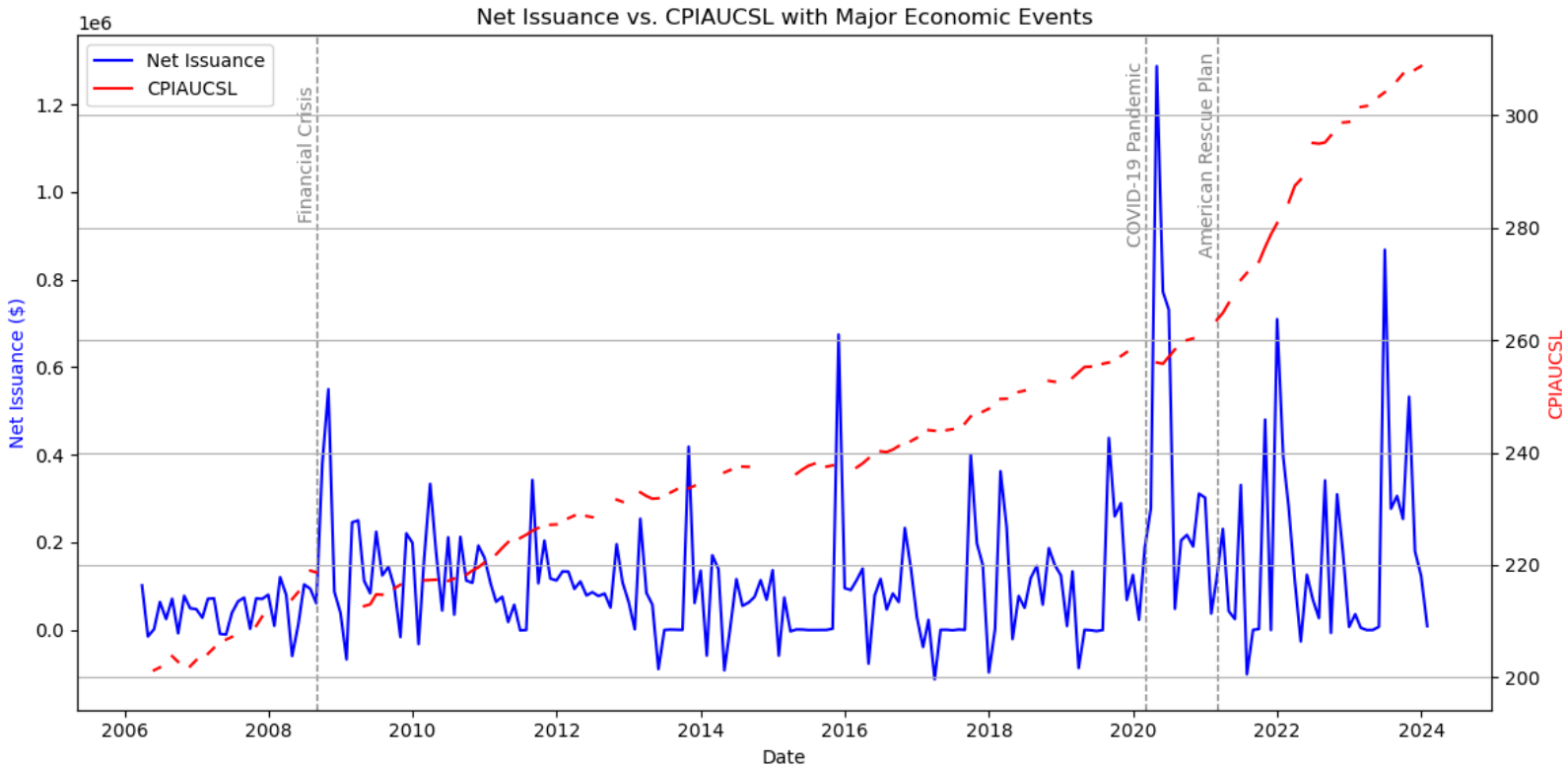

Figure 1: Net Treasury Issuance and Consumer Price Index

Targeted Analysis Using SQL

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- **Questions Like:** What security types account for the most activity? What years have seen increased issuance of certain securities? What about during times of economic downturn?

Security Types With the Most Activity

The following security types account for the majority of treasury activity in the data considered

Security Type	Total Transaction Amount
Government Account Series	2,927,222,994
Bills	334,334,594
Notes	74,399,617
Other	9,538,465
Bonds	5,378,013
State and Local Series	3,556,171

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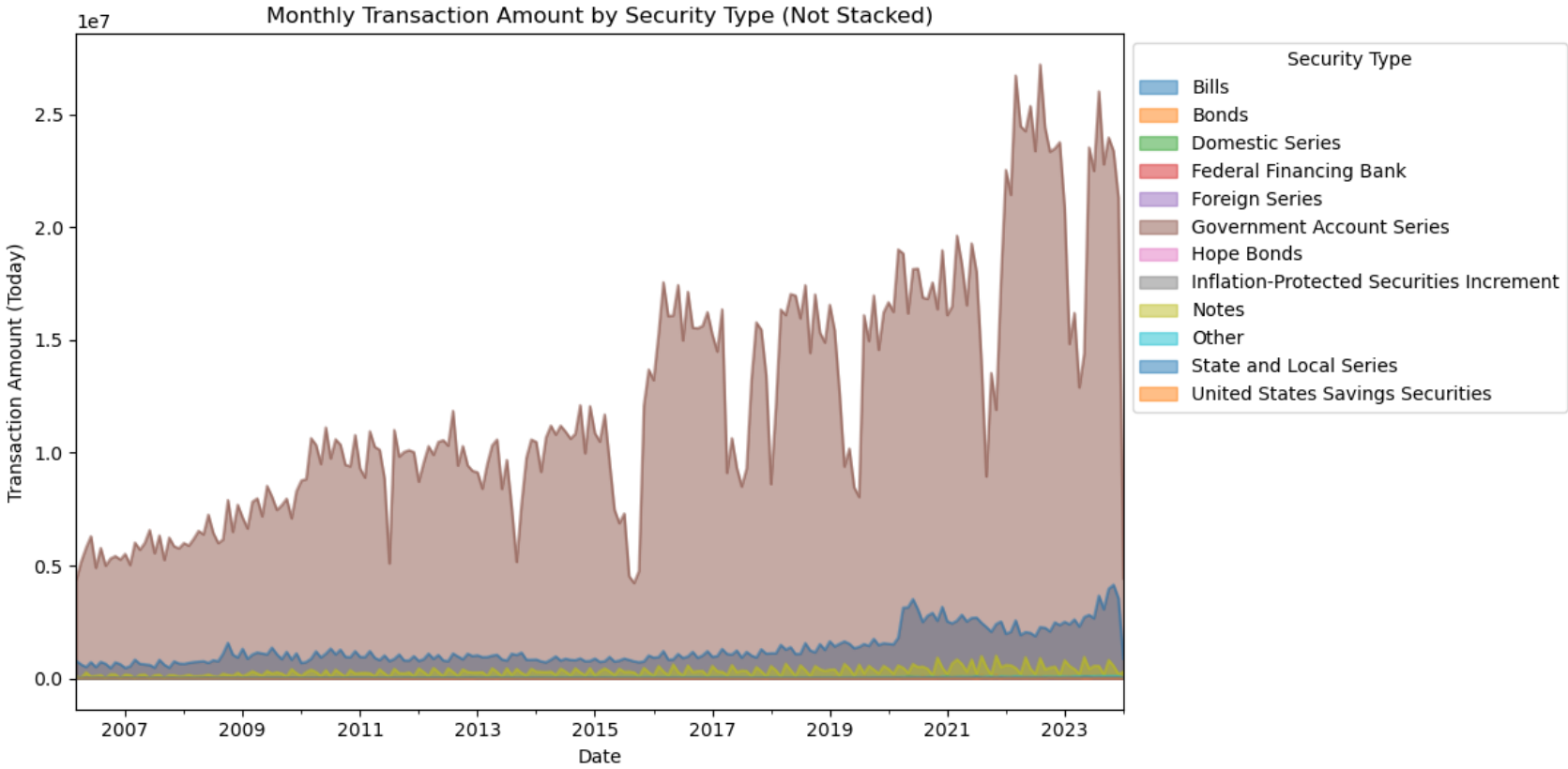

Figure 2: Transaction Amount and Security Type

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Intragovernmental nonmarketable securities remain the most popular transaction by far

Security Type	Total Transaction Amount
Government Account Series	353,533,137
Bills	42,515,798
Notes	12,691,588
Bonds	1,525,305
Other	1,278,431
State and Local Series	510,705

Predicting Increase or Decrease in Debt Issuance

Wanting to understand how debt issuance decision makers react, we build a logistic regression model here to predict whether or not monthly net treasury issuance will increase compared to the previous month. The model can be written as:

$$\log\left(\frac{P(Y=1)}{1-P(Y=1)}\right) = \beta_0 + \beta_1 \text{Inflation} + \beta_2 \text{Unemployment} + \beta_3 \text{Interest Rate} + \beta_4 \text{Lagged Issuance}$$

where:

- $P(\text{Issuance Increase Y/N} = 1)$ is the probability of an issuance increase.
- $\beta_1, \beta_2, \beta_3, \beta_4$ are the coefficients for the independent variables.

Logistic Regression Results

- **Accuracy:** 0.8140
- **Confusion Matrix:**

	Predicted Decrease	**Predicted Increase**
Actual Decrease	20	3
Actual Increase	5	15

Classification Report:

Class	Precision	Recall	F1-score
0	0.87	0.75	0.80
1	0.83	0.79	0.83
Accuracy		0.81	
Macro Avg	0.82	0.82	0.81
Weighted Avg	0.81	0.81	0.81

Logistic Regression Results

Model Feature Coefficients:

- **CPI Percent Change:** 0.1743
- **Net Issuance (1M Ago):** -1.8033
- **Net Issuance (2M Ago):** 0.1893
- **30-Year Mortgage Rate:** -0.1028
- **Unemployment Rate:** 0.1182

Predicting CPI

As we believe the goal of the US Treasury and our decision-making target audience is to maintain and improve the economic well-being of the people of the country - we chose to dig into the way in which debt issuance impacts CPI (our proxy for inflationary measures and consumer well-being).

Predicting CPI

We build a linear model predicting CPI in hopes of parsing out the impact of debt issuance on CPI when controlling for our other economic factors. This model includes the relevant co-variates and can be defined as:

$$\begin{aligned}\text{CPI}_t = \alpha + \beta_1 &\text{Net Issuance}_t + \beta_2 \text{Net Issuance}_{t-1} \\ &+ \beta_3 \text{Net Issuance Percent Change}_{t/t-1} + \boldsymbol{\gamma}\mathbf{X}_t + \varepsilon_t\end{aligned}$$

where:

- CPI_t is the Consumer Price Index at time t.
- $\beta_1, \beta_2, \beta_3$ are coefficients for issuance-related variables.
- $\mathbf{X}_t$ is a vector of other economic indicators, with corresponding coefficient vector $\boldsymbol{\gamma}$.

Linear Regression Results

Model Performance:

- **Mean Squared Error (MSE):** 496.93
- **R-squared (R^2):** 0.3819

Feature Coefficients:

Variable	Coefficient
Net Issuance (1M Ago)	3.7712
Net Issuance (2M Ago)	5.5128
30-Year Mortgage Rate	-4.8845
Unemployment Rate	-16.7588
Net Issuance Percentage Change	0.9284
Net Issuance	6.9647

Conclusion

This analysis yielded many insights that our target audience would value, including:

- The analysis reveals that Treasury debt issuance responds to (and moves with) macroeconomic conditions and fiscal policies, particularly in times of economic uncertainty.
- Government borrowing strategies adapt to inflationary pressures, with key insights provided by the relationship between Treasury issuance and CPI trends - and captured within our models.
- Regression models indicate significant predictive relationships between debt issuance, macroeconomic variables (e.g., CPI, mortgage rates, unemployment), and inflation trends, helping refine fiscal strategies for future economic stability.

Thank You

Data Sources

The following data sources (linked to their names) were used for this project:

- U.S. Treasury Debt Transactions Data
  Data on the issuance and redemption of U.S. Treasury securities. Accessed via API.
- Consumer Price Index (CPI)
  CPI data from the Federal Reserve Economic Data (FRED) for tracking inflation rates over time.
- 30-Year Mortgage Rate
  Data on the U.S. 30-year fixed mortgage rate from FRED, for interest market.
- Unemployment Rate
  The U.S. unemployment rate from FRED.