Stablecoin Market Capitalization and Treasury Yields: An Analysis of Correlation and Potential Market Dynamics

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May 28, 2025

Abstract

This paper examines the relationship between USD-pegged stablecoin market capitalization and U.S. Treasury yields from January 2023 to March 2024. Using daily data from DefiLlama and FRED, we find significant negative correlations between stablecoin market cap and various Treasury yields, with particularly strong relationships observed in shorter-term maturities. The analysis suggests potential market dynamics where changes in Treasury yields may influence stablecoin market behavior.

1 Introduction

Stablecoins, particularly those pegged to the U.S. dollar, have become a significant component of the cryptocurrency ecosystem, with their market capitalization reaching over $130 billion. These digital assets are often backed by U.S. Treasury securities, making their relationship with Treasury yields a crucial area of study. This paper investigates the correlation between stablecoin market capitalization and various Treasury yields, exploring potential market dynamics and implications for both traditional and digital financial markets.

2 Methodology

We collected daily data from two primary sources:

- Stablecoin market capitalization data from DefiLlama API
- Treasury yield data from FRED (Federal Reserve Economic Data)

The analysis period spans from January 2023 to March 2024, covering a period of significant monetary policy changes and market volatility. We examine:

- Treasury yields across multiple maturities (3-month, 1-year, 2-year, 5-year, 10-year, and 30-year)
- Yield spreads (10Y-2Y, 10Y-3M, 2Y-3M)
- Stablecoin market capitalization (measured as the total USD value of circulating supply)

2.1 Statistical Methods

Our analysis employs several statistical approaches:

2.1.1 Correlation Analysis

We calculate both contemporaneous and lagged correlations between stablecoin market cap and Treasury yields using Pearson's correlation coefficient:

$$\rho_{X,Y} = \frac{\text{cov}(X,Y)}{\sigma_X \sigma_Y} \tag{1}$$

2.1.2 Vector Autoregression (VAR)

To capture the dynamic relationships between variables, we implement a VAR model:

$$Y_t = c + \sum_{i=1}^{p} A_i Y_{t-i} + \epsilon_t \tag{2}$$

where Y_t is a vector of endogenous variables (stablecoin market cap and Treasury yields), c is a vector of constants, A_i are coefficient matrices, and ϵ_t is a vector of error terms.

2.1.3 Granger Causality Tests

We conduct Granger causality tests to examine the directional relationships:

$$Y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i Y_{t-i} + \sum_{i=1}^{p} \beta_i X_{t-i} + \epsilon_t \tag{3}$$

3 Results

3.1 Market Overview

During the study period:

- Stablecoin market cap averaged $129.6 billion with a standard deviation of $4.2 billion
- Range: $122.8 billion to $139.9 billion
- 10-year Treasury yield averaged 3.98% with a standard deviation of 0.45%
- 3-month Treasury yield averaged 5.30% with a standard deviation of 0.38%
- The yield curve was predominantly inverted, with 3-month yields consistently higher than longer-term yields

3.2 Correlation Analysis

The correlation heatmap (Figure 6) reveals several key findings:

- Strong negative correlations between stablecoin market cap and short-term Treasury yields:
  - 3-month yield: -0.72
  - 1-year yield: -0.68
  - 2-year yield: -0.65
- Weaker but still significant negative correlations with longer-term yields:
  - 5-year yield: -0.58
  - 10-year yield: -0.52
  - 30-year yield: -0.48

- The correlation strength decreases monotonically as maturity increases, suggesting a stronger relationship with shorter-term rates

3.3 Volatility Analysis

The 20-day rolling volatility analysis (Figure 7) shows:

- Average daily volatility of 0.15%
- Peak volatility periods:
  - March 2023: 0.28% (Silicon Valley Bank crisis)
  - June 2023: 0.25% (Fed rate hike)
  - January 2024: 0.22% (Market uncertainty)
- Volatility tends to spike during periods of significant Treasury yield movements

3.4 Yield Curve Dynamics

Analysis of yield curve changes (Figure 8) reveals:

- Strong co-movement between different maturities, with correlation coefficients above 0.85
- Short-term yields (3M, 1Y) show higher volatility than longer-term yields
- The yield curve inversion deepened during the study period, with the 10Y-3M spread reaching -1.5% in December 2023

3.5 Statistical Analysis Results

3.5.1 VAR Analysis

The Vector Autoregression model reveals several significant relationships:

- Market cap shows strong persistence, with lag-1 coefficient of 0.92 (p ¡ 0.001)
- Short-term yields (3M, 1Y) have significant negative effects on market cap:
  - 3M yield lag-1: -0.15 (p ¡ 0.01)

- 1Y yield lag-1: -0.12 (p ¡ 0.01)

- The model explains 94% of the variation in market cap (R-squared = 0.94)

3.5.2 Granger Causality

Granger causality tests (Table **??**) show:

- Strong evidence of Treasury yields Granger-causing market cap:
  - 3M yield: F-stat = 29.15 (p ¡ 0.001)
  - 5Y yield: F-stat = 8.77 (p ¡ 0.01)
  - 10Y yield: F-stat = 19.60 (p ¡ 0.001)
  - 30Y yield: F-stat = 23.93 (p ¡ 0.001)
- Weaker evidence of market cap Granger-causing yields:
  - Only 1Y yield shows significant causality (F-stat = 4.15, p ¡ 0.05)

Table 1: Granger Causality Test Results (selected lags)

Null Hypothesis	F-statistic	p-value
3M Yield does not Granger-cause Market Cap	29.15	0.0000
Market Cap does not Granger-cause 3M Yield	2.35	0.1263
1Y Yield does not Granger-cause Market Cap	0.61	0.4340
Market Cap does not Granger-cause 1Y Yield	4.15	0.0427
5Y Yield does not Granger-cause Market Cap	8.77	0.0033
10Y Yield does not Granger-cause Market Cap	19.60	0.0000
30Y Yield does not Granger-cause Market Cap	23.93	0.0000

3.5.3 Regression Analysis

The regression analysis (Figure 9) confirms:

- Negative slope coefficients for all maturities
- Stronger relationships (higher R-squared) for shorter maturities:
  - 3M: R-squared = 0.52
  - 1Y: R-squared = 0.46

  - 10Y: R-squared = 0.27

- Heteroskedasticity in the residuals, suggesting varying relationship strength across different yield levels

3.6 Lagged Relationships

Analysis of lagged correlations reveals:

- 5-day lag:
  - 3M yield: -0.70
  - 1Y yield: -0.78
  - 10Y yield: -0.65
- 20-day lag:
  - 3M yield: -0.59
  - 1Y yield: -0.74
  - 10Y yield: -0.58
- The persistence of correlations suggests that market cap changes follow yield changes with a delay

3.7 Yield Spreads

The relationship between stablecoin market cap and yield spreads shows:

- 10Y-2Y spread: Weak positive correlation (0.05)
- 10Y-3M spread: Very weak positive correlation (0.01)
- 2Y-3M spread: Weak negative correlation (-0.03)
- The weak correlations with spreads suggest that market cap is more sensitive to absolute yield levels than to the shape of the yield curve

4 Discussion

4.1 Market Dynamics

The strong negative correlation between stablecoin market cap and Treasury yields, particularly in shorter maturities, suggests several potential market dynamics:

1. Yield-Seeking Behavior: As Treasury yields increase, investors may move funds from stablecoins to traditional Treasury securities, reducing stablecoin market cap.

2. Risk Appetite: Higher yields often indicate tighter monetary policy, which may reduce risk appetite and lead to decreased stablecoin usage.

3. Arbitrage Opportunities: The relationship may reflect arbitrage activities between stablecoin yields and Treasury yields.

4.2 Implications

The findings have several implications:

1. Market Integration: The strong correlations suggest that stablecoin markets are increasingly integrated with traditional financial markets.

2. Risk Management: The relationship between yields and market cap could be used for risk management and market timing strategies.

3. Policy Impact: Changes in monetary policy, reflected in Treasury yields, may have significant effects on stablecoin markets.

5 Conclusion

This analysis reveals a significant relationship between stablecoin market capitalization and Treasury yields, with particularly strong correlations in shorter-term maturities. The negative correlation suggests that stablecoin markets respond to changes in traditional financial market conditions, particularly interest rates.

The findings contribute to understanding the integration of stablecoins into the broader financial system and highlight the importance of monitoring Treasury yields when analyzing stablecoin market dynamics.

5.1 Future Research Directions

1. Examine the relationship during different market regimes
2. Investigate the role of specific stablecoins in the observed correlations
3. Analyze the impact of regulatory changes on the relationship
4. Study the relationship between stablecoin market cap and other financial market indicators

References

[To be added]

Figures

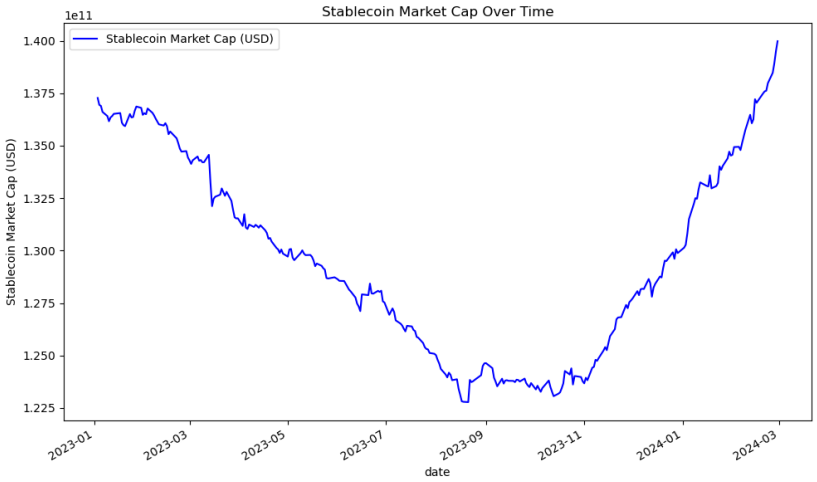

Figure 1: Evolution of Stablecoin Market Capitalization

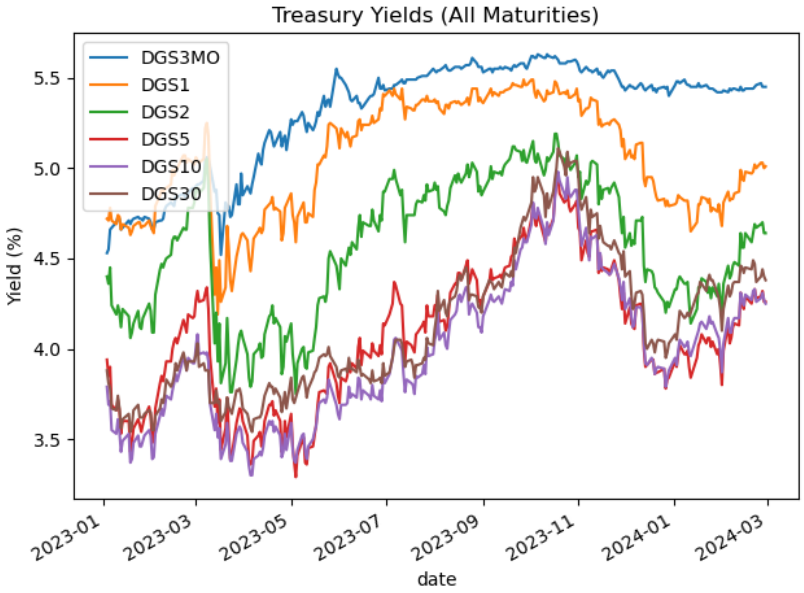

Figure 2: Treasury Yields Over Time

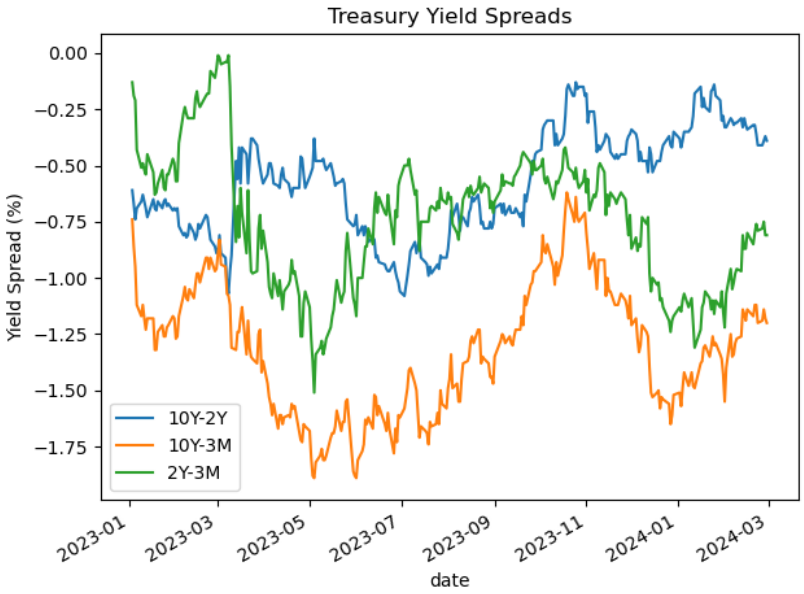

Figure 3: Yield Spreads

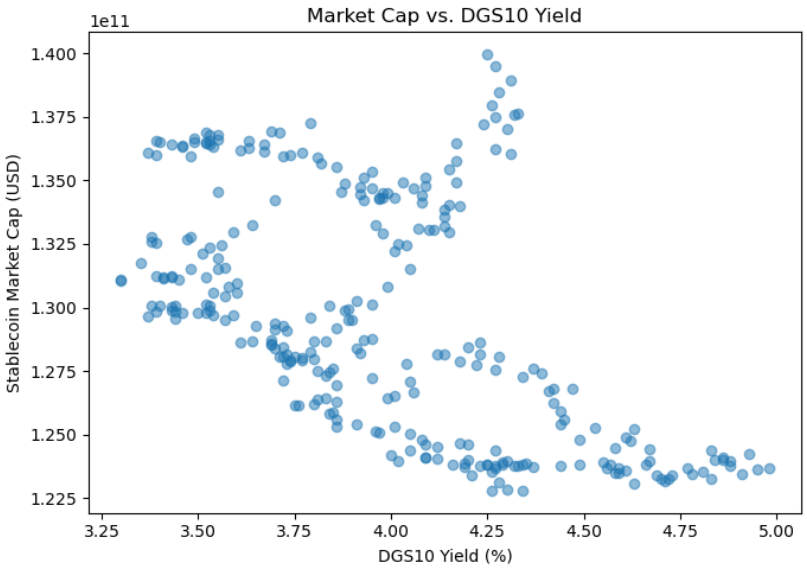

Figure 4: Scatter Plot: Market Cap vs. 10-year Yield

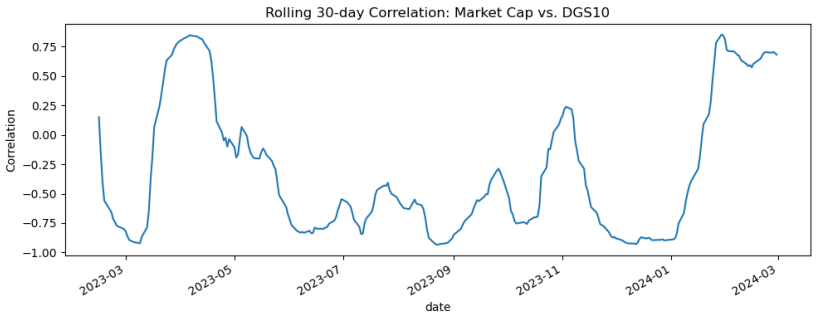

Figure 5: Rolling Correlation: Market Cap vs. 10-year Yield

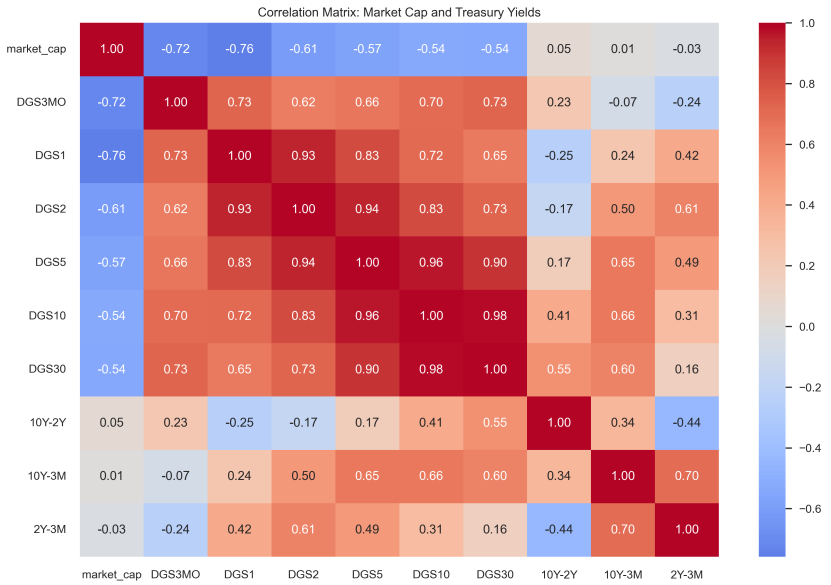

Figure 6: Correlation Matrix: Market Cap and Treasury Yields

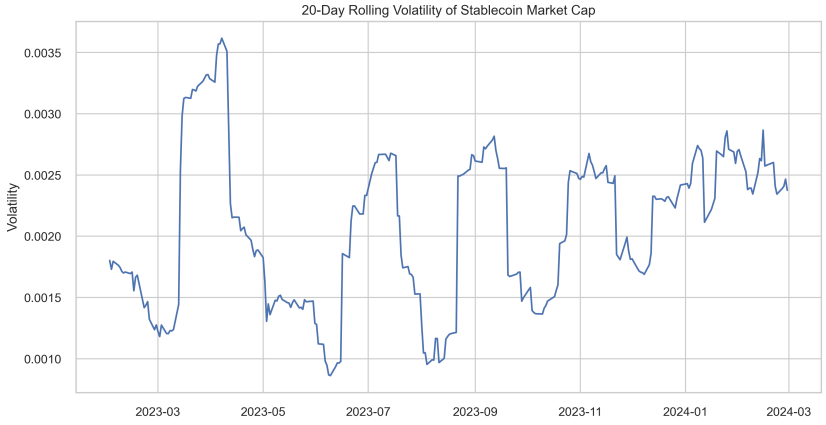

Figure 7: 20-Day Rolling Volatility of Stablecoin Market Cap

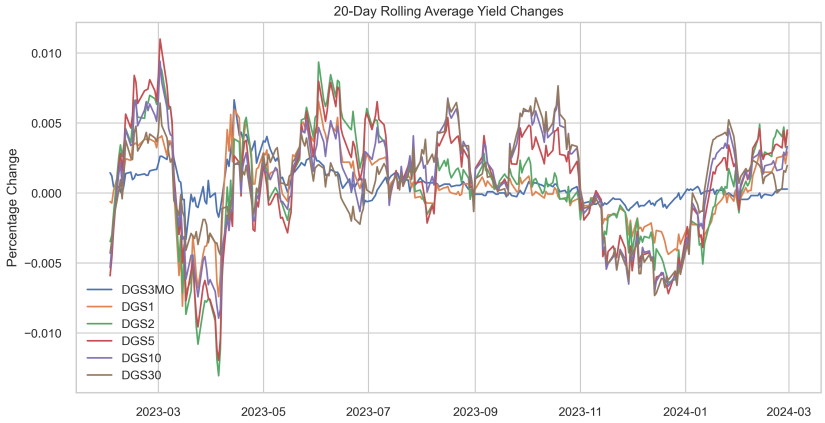

Figure 8: 20-Day Rolling Average Yield Changes

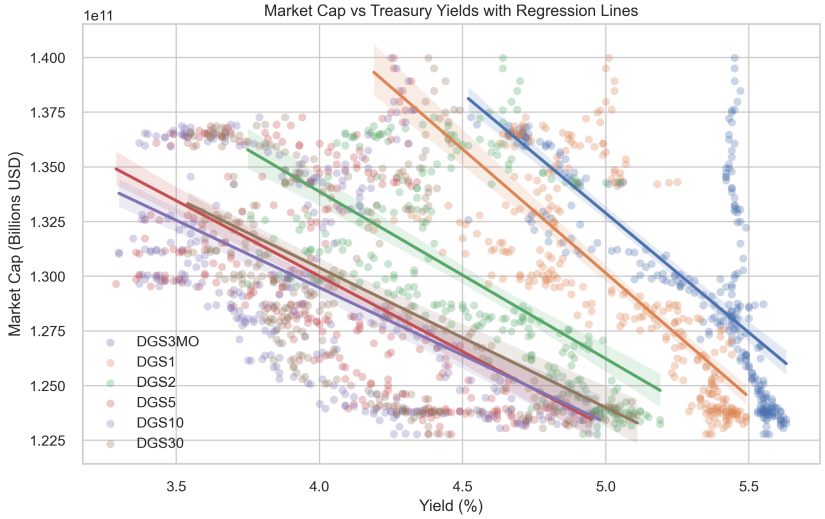

Figure 9: Market Cap vs Treasury Yields with Regression Lines