Mutual Fund Assets in Municipal Bonds Over Time as an Early Indicator of Economic Crisis

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Abstract

In this paper we analyze the relationship between the assets held by municipal bonds by mutual funds over time and market volatility to find any causation between the two variables. We find a visual correlation between the two overtime that suggests a negative relationship between the two where market instability affects mutual fund asset allocation; however, upon application of a linear regression, we found that the connection was too statistically insignificant to suggest a legitimate connection between variables. This suggests that ceteris paribus, these two variables are not connected to each other. This opens the door for further research into the topic, as this implies that there is a third, currently omitted, variable that affects both of the observed variables.

JEL classification: C91, C92, D91, J16.

Keywords: Mutual Funds, Municipal Bonds, Market Volatility, Economic Crisis

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1 Introduction and Motivation

There is a vast amount of literature examining how mutual funds and investors at large act during times of crisis. Specifically evaluating the efficacy of using them to predict business cycles, how well they time their bond assets, etc. The main question that we attempt to answer is this paper is whether the actions of those same funds can be used as indicators of a coming crisis. Specifically, we look at how they use municipal bonds in times leading up to and during crisis. To answer this question we evaluated the effect that market instability, a basic indicator of economic overheat, on the total amount of assets that mutual funds held in municipal bonds. We attempted to find a long-term trend or connection as well as evidence of a direct causation between the two variables

Our focus on municipal bonds and mutual funds is based the long-term stability of the bonds as an investment and the commercial aspect of mutual funds. Mutual funds, we believed, due to their goal of attaining as much gain for investors as possible, would reallocate their funds from municipal bonds once the market began rewarding risky investments during times of high market instability. This would be followed by reinvestment in municipal bonds as markets returned to stability, or gains from risky investments began to fall to a level that was no longer worth the added risk.

In short, this paper seeks to determine if there is any causation between these two variables in order to better understand the behavior of mutual funds in times of economic crisis. This will be evaluated through two ways, a visual comparison and a linear regression of the applicable data.

2 Literature Review

Our study is oriented towards the analysis of mutual fund behavior with regard to municipal bond assets and using these data to find any correlation with the greater economic downturn. Research on this topic is inspired by research using mutual fund activity as an indicator of investor sentiment (Ben-Rephael et al. (2012)), an early indicator of business and credit cycle activities (Ben-Rephael et al. (2020)), and their ability to time their bond assets in relation to market condition (Yin et al. (2024)). This establishes the idea that mutual funds, as investors, are highly aware of the incentives the market puts out towards investing in certain types of assets. This provides a foundation for our research, which examines if stable assets are in fact reallocated towards to volatile investment and whether this change in allocation can serve as a leading indicator of economic crisis. The specific focus on municipal bond assets, instead of other stable investments, is due to prior research linking yield curves, and expected returns of municipal bonds, to economic conditions in local areas (Grigoris (2019)).

These previous research papers help build a basis for what we can expect from mutual fund behavior. We can see that mutual funds behave in accordance with how investors feel about the markets at a given point in time, and that their actions can be used to indicate what portion of a business cycle we're in or entering. This information gives us expectation that mutual funds will move assets around as they perceive market conditions changing. In that same vein the paper by Yin et al. (2024) tells us that funds do attempt to time markets, with more success when in relation to government bonds like Municipal bonds. This provides further proof of an incentive and ability of fund managers to reallocate funds away from and back to municipal bonds as market volatility ebbs and

flows.

These pieces of previous research give us an idea of how these funds function with relation to certain indicators of economic performance, as well as in relation to business cycles. To accurately model our independent variable, market volatility, within our research, we utilized the CBOE volatility index (VIX) Chicago Board Options Exchange (2025). A well-known index dedicated to the evaluation of "fear" in the market, specifically of volatility in the SP 500. By utilizing this data we can accurately compare its movement to our mutual fund assets and observe if those incentives do, in fact, come into play.

3   Empirical Approach

To carry out our investigation, we used data related to mutual fund holdings in municipal bonds Board of Governors of the Federal Reserve System (US) (2025) and compared it to the volatility index of the CBOE VIX Chicago Board Options Exchange (2025) over time, paying special attention to timespans defined as recessions by the Federal Bank of St. Louis. We observed the total amount of their financial assets in municipal bonds, specifically, to get a better idea of the total net change in their holdings in any given year. Our time series includes financial bubbles and events from the dotcom bubble of the 1990s, to the great recession, and the COVID-19 recession. The inclusion of many major financial crashes, bubbles, and economic slowdowns is intended to give us a large enough sample size to draw causality or correlation between our major variables.

We normalized the data collection into quarters to better view the overall relation over specific parts of the year. Every three months of VIX data was averaged into quarterly units in order to match the data from the Mutual fund

Figure 1

TFA and Market Volatility
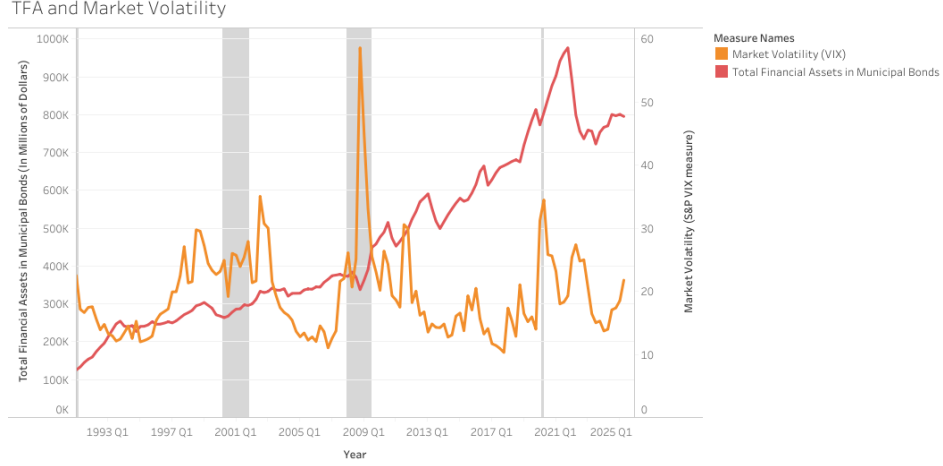
set. Furthermore, we introduced a trend-line to the graphical representation of the data to determine any visual correlation between the two variables. The graph without our trendline is seen here:

To determine the legitimacy of the null hypothesis of a lack of causation between the two variables, we conducted a linear regression using our dataset. We used 'Total Financial Assets in Municipal Bonds' as our dependent variable and measured the effect of Market Stability (VIX) on it to see if there is any direct explanatory power between the two. All numerical results of the regression were also rounded to their 5th decimal place to retain precision and brevity. The linear regression function is seen below:

$$(MunibondAssets)t = \beta0 + \beta1(VIX)t + \epsilon t \tag{1}$$

4 Results

The trend-line, seen above, shows a simple negative relation between the two variables. During different time periods of market instability we can see that

Figure 2
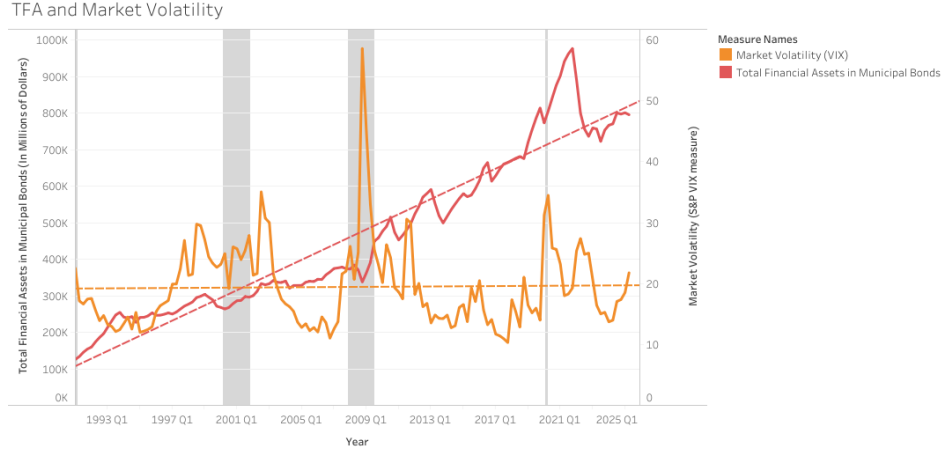
assets held in municipal bonds drops to varying amounts. This shows some level of correlation between the two variables, but no hard evidence of causation.

Term	Estimate	STD Error	Statistic	P Value
(Intercept)	471356.13965	55021.53350	8.56676	2.05172
VIX	-497.27810	2673.14758	-0.18603	0.85270

Our linear regression output, seen above, gave us our data on any possibility of actual causation. The regression yielded an estimate of **-497.27810**, which suggests a negative relation between **VIX** and our fund assets where more market instability leads to fewer assets in municipal bonds. Our yielded P-value was **0.85270**, far higher than the necessary critical value to disqualify our null hypothesis. Our t-statistic value backs this up with an absolute value near 0, further proving the that any relationship is statistically insignificant.

5 Conclusion

The results of this paper point towards the idea that these two variables are connected, but not directly. The linear regression has shown that a change in Market stability has no significant effect on assets held in municipal bonds by

mutual funds, but the visual representation of the data over time shows that there is at least one shared variable between the two that causes their curves to align in a way that can be percieved as having a causative relationship. This opens the floor for further investigation into the topic by introducing a new variable that could act as our connecting variable between the two that have already been measured and conducting .

6 Appendix

Graph With and Without Trend-line
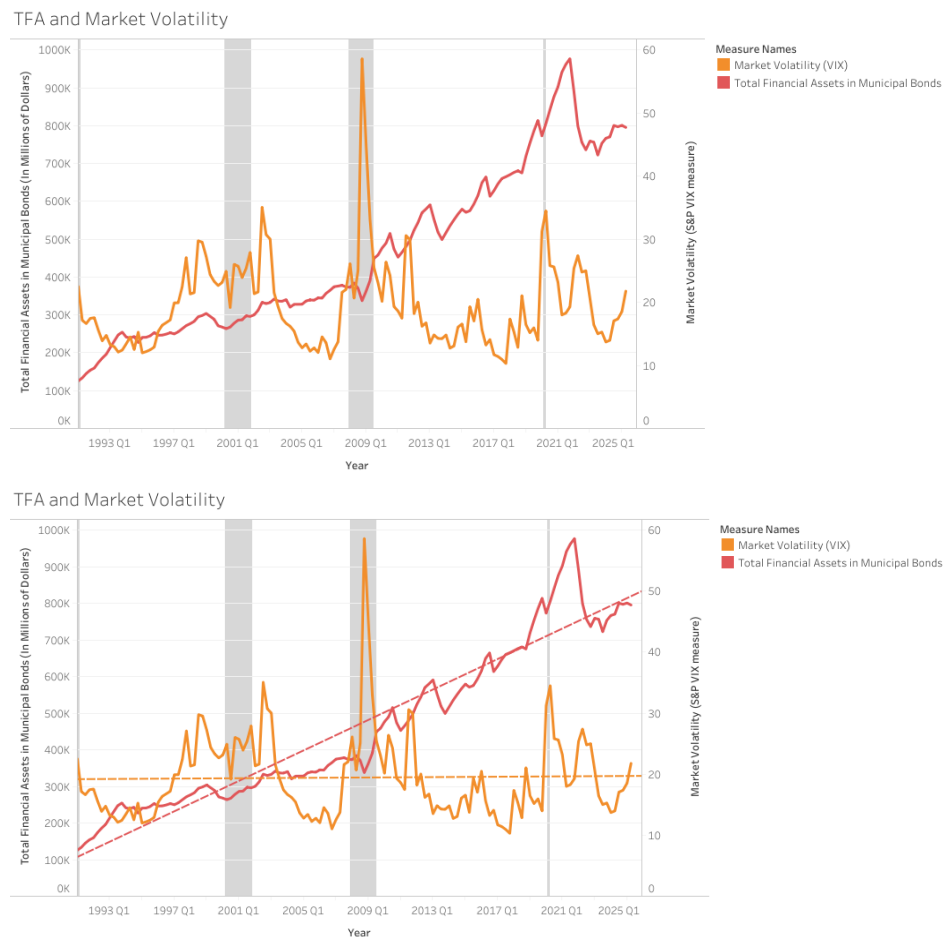
Linear Regression Output & Equation

Term	Estimate	STD Error	Statistic	P Value
(Intercept)	471356.13965	55021.53350	8.56676	2.05172
VIX	-497.27810	2673.14758	-0.18603	0.85270

$$(MunibondAssets)t = \beta 0 + \beta 1(VIX)t + \epsilon t \qquad (2)$$

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