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When Investing in Stocks, Is Boring Better? Introducing the "High Volatility Anomaly" in a Post-Meme Stock World

Anthony C. Bozza

Greenwich High School, Greenwich, CT, USA
Email: anthonybozza07@gmail.com

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Abstract

This paper explores the concept of risk and return in the context of the 2021 "meme stock" phenomenon, where retail investors utilizing social media drove up the prices of highly volatile stocks. Using historical data from 1994 to 2024, this study analyzes the performance of U.S. publicly traded stocks sorted by volatility decile. While the relationship between risk and return has been studied extensively through the years, little research exists on the performance of high-volatility stocks since the "meme stock" phenomenon. The empirical results indicate a stark contradiction to traditional theories: high-volatility portfolios significantly underperformed low-volatility ones, exhibiting far lower cumulative returns, lower alpha and worse Sharpe Ratios. These findings align with the "low beta anomaly" and suggest a new perspective on high volatility as a predictor of poor performance, challenging the higher risk, higher return paradigm.

Keywords

Return, Risk, CAPM, Market Efficiency, Volatility, Beta, Alpha, Sharpe Ratio

1. Introduction

The question that this paper attempts to answer is if the logic which many traders have adopted in recent years is true: does investing in higher risk, higher volatility stocks really yield higher returns as modern finance theory suggests? This question has been debated long before 2021. However, this topic has not been widely explored since, and in light of the "meme stock" craze of 2021 where retail investors used social media and the subreddit "WallStreetBets" to drive up the share prices of some of the market's most volatile stocks, this paper will provide an updated view on the relationship between stock volatility and return.

During the first quarter of 2021, several companies in which institutional investors held large short positions experienced significant increases in their share prices after retail investors targeted these companies on social media. Some of the most notable examples include GameStop (GME), AMC Entertainment Holdings (AMC) and Blackberry (BB), each of which was facing considerable business challenges at the time. For example, in the 2021 fiscal year, GameStop had revenue of $5.1 billion in earnings before interest, taxes, depreciation and amortization (EBITDA) of $126 million, a decrease from peak revenue of $9.6 billion and EBITDA of $850 million in the 2011 fiscal year [1]. On January 15, 2021, GameStop's short interest was 122.7% as a percent of the equity float, AMC's short interest was 27.7%, and BB's short interest was 8.7% [2]. By comparison, three of the largest publicly traded companies at the time, Apple, Amazon and Microsoft, had short interests of 0.63%, 0.73% and 0.56%, respectively. Amid this frenzy, an online group of retail traders that belonged to a subreddit called r/WallStreetBets fueled a massive rally buying up the most volatile and highly shorted stocks, triggering a series of short squeezes. GME shares increased by 1915% from January 4th to January 27th, while AMC and BB shares saw increases in that same period at 890% and 281%, respectively [3].

The events of the first quarter of 2021 left a lasting effect on the mindset of retail traders across the United States. These anomalies helped create a perception that high-risk, high-volatility securities were preferable because of their immense upside potential. Other highly volatile securities such as cryptocurrencies have also become popular to some investors in recent years simply due to the possibility that they can increase quickly in price. However, by the end of April 2024, many of these highly volatile investments had collapsed in price: the share prices of GME, AMC and BB were down 74.5%, 95.3% and 68.4%, respectively, while the S&P 500 Index was up 26.1%, raising questions about this logic.

Modern finance theory suggests a positive correlation between higher risk and higher return. William Sharpe (1964) and John Lintner (1965) developed the Capital Asset Pricing Model (CAPM) to attempt to predict the performance of a portfolio based on its total risk [4] [5]. The CAPM states that an investor should receive higher expected returns for higher levels of risk and has become a cornerstone of finance. The CAPM built on the work of Markowitz (1952), which established optimal portfolios offering the highest returns for a given level of risk [6]. Research by Fama (1965) on the Efficient Market Hypothesis also established that because markets are efficient, investors must take on higher risk to achieve higher expected returns [7]. Underpinning this research has been the notion that higher risk is consistent with higher stock and portfolio volatility, and therefore, higher volatility securities ought to have higher expected returns. Traditionally, risk as measured by volatility is calculated by dispersion of price data from its mean (*i.e.*, the standard deviation of the price data).

While empirical data on the real-world validity of the CAPM and relationship between stock volatility and return has been studied extensively, little research has been done on this topic following "meme stock" phenomenon of 2021, a period during which a "get rich quick" mindset drove some of the most volatile stocks in the market to experience dramatic surges in their share prices, only to later collapse. Baker, Bradley and Wurgler (2011) wrote about the "low beta anomaly" where they found that low beta stocks actually tend to outperform high beta stocks, contradicting modern finance theory [8]. Baker, Bradley and Taliaferro studied this anomaly further in 2018 [9].

Using historical data from 1994 to 2024, this study analyzes the performance of U.S. publicly traded stocks sorted by volatility decile to provide an updated view on stock risk and return.

2. Literature Review

The study of stock volatility versus return has its roots in Modern Portfolio Theory. Modern Portfolio Theory was based on the work of Markowitz who explored optimal portfolios that offer the highest expected return for a given level of risk [6]. Markowitz studied the idea that risk is calculated by a stock's volatility or standard deviation. Further, Fama emphasized the role of market efficiency in explaining stock volatility and returns and concluded investors must take on higher risk to achieve higher expected returns [7].

Volatility of a security or portfolio can be represented by the standard deviation of its returns as calculated by formula:

$$\sigma = \sqrt{\frac{1}{n-1} - \sum_{t=1}^{n} \left(R_t - \bar{R}\right)^2} \quad (1)$$

where n is the number of return periods, R_t is the return at time t and the average return over the period. $\bar{R}$ is defined as follows:

$$\bar{R} = \frac{1}{n} \sum_{t=1}^{n} R_t \quad (2)$$

Building on Markowitz's work, Sharpe and Lintner developed the CAPM to provide a framework for understanding the relationship between risk and expected return. Both Sharpe and Markowitz were awarded the Nobel Prize for Economic Sciences in 1990 for their contributions to finance [4] [5].

The CAPM can be represented by the following formula:

$$R_i = R_f + \beta\left(R_m - R_f\right) \quad (3)$$

where R_i is the expected investment return, R_f is the risk-free rate, β is beta and R_m is the expected market return.

The independent variable in the equation, beta, was first introduced by Jack Treynor in 1961 [10]. Beta measures the sensitivity of a stock's returns in relation to the market. A higher beta is an indication of higher market sensitivity and therefore, higher risk. As indicated by the CAPM formula, a higher beta (which implies a higher degree of investment risk) should drive a higher expected return.

Beta is calculated as the covariance between the return on the investment, R_i, and the market return, R_m, over the variance of the market return as shown by the following formula:

$$\beta = \frac{\text{Cov}(R_i, R_m)}{\text{Var}(R_m)} \tag{4}$$

In 1966, Sharpe introduced the Sharpe Ratio as a measure of risk-adjusted performance to account for varying levels of expected return based on varying levels of risk [11]. Sharpe argued that evaluating returns alone was insufficient and developed the Sharpe Ratio as a standardized metric to look at the excess return an investor is receiving for the extra volatility endured for holding the riskier investment.

The Sharpe Ratio of a portfolio is calculated as follows:

$$\text{Sharpe Ratio} = \frac{\bar{R} - R_f}{\sigma} \tag{5}$$

where $\bar{R}$ is the average return, R_f is the risk-free return and σ is the standard deviation of the portfolio's returns. A higher Sharpe Ratio indicates an investment is providing a higher return per unit of risk and is therefore preferable.

In 1968, Jensen built upon the prior work of risk and return by introducing a performance measure known as alpha to evaluate risk-adjusted returns of a portfolio [12]. Jensen's alpha measures the excess return generated by a portfolio above its expected return based on its beta and the CAPM.

Alpha is calculated as follows:

$$\alpha = R_i - \left[R_f + \beta\left(R_m - R_f\right)\right] \tag{6}$$

where R_i is the stock or portfolio return, R_f is the risk-free rate of return, β is the beta of the stock or portfolio and R_m is the market return. A higher alpha indicates a portfolio is performing better than expected given its level of risk.

In 2011, Baker, Bradley and Wurgler showed that, contrary to modern financial theory, lower risk stocks as measured through beta tended to outperform higher risk stocks [8]. Although the CAPM indicates that a higher beta should drive higher expected investment returns, their data revealed that the opposite was often the case, a phenomenon which they named the "low beta anomaly." They explained this anomaly might be the case since investors often chase higher volatility stocks, causing these stocks to be overpriced and subsequently underperform. Baker, Bradley and Taliaferro conducted further research in 2018 [9].

3. Data and Methodology

Data was collected and analyzed using the Equity Screening and Equity Backtesting Functions on Bloomberg using Bloomberg historical pricing data. The securities analyzed were U.S. publicly traded common stocks with market capitalizations exceeding $500 million (to ensure the data set only includes individual stocks and excludes smaller, illiquid stocks) excluding ETFs, Mutual Funds, Indices, Investment Funds and Closed End funds. The stock data was then divided into equally weighted portfolios, sorted by risk decile based on volatility, which was calculated as the standard deviation of day-to-day logarithmic historical price changes over each trailing 30-day period.

The ten portfolios that were divided by volatility deciles were analyzed over a 30-year time horizon from April 30, 1994 through April 30, 2024 with each portfolio rebalanced on a monthly basis to fit the defined parameters and remain equally weighted. Each of the ten volatility portfolios were also benchmarked against the S&P 500 Index over the same period.

Several data points were measured and compared for each of the ten volatility portfolios: total return, arithmetic mean annual return, standard deviation, daily beta versus the S&P 500 Index, alpha and Sharpe Ratio. Both cumulative and mean annual return were measured to determine the performance of each volatility portfolio over the 30-year period. Standard deviation and beta were calculated to determine the risk of each volatility portfolio. Alpha and Sharpe Ratio were calculated to measure risk-adjusted performance of each volatility portfolio.

4. Empirical Results and Discussion

The statistics for the ten portfolios sorted by volatility decile from V1 (lowest volatility) to V10 (highest volatility) that were defined in the previous section are outlined in Table 1 and Figures 1-3.

Table 1. Statistics for stock portfolios selected by volatility decile from April 30, 1994 to April 30, 2024.

	Volatility Decile									
	(Lowest) V1	V2	V3	V4	V5	V6	V7	V8	V9	(Highest) V10
Total Return (%)	2473.3%	3388.8%	3378.2%	301.8%	2655.4%	2305.0%	1086.7%	879.4%	132.3%	−46.4%
Mean Return (%)	12.06%	13.69%	13.90%	14.00%	13.55%	13.25%	11.16%	11.33%	7.46%	4.98%
Standard Deviation	11.78	15.42	17.21	18.67	20.18	21.59	23.73	26.6	30.99	36.28
Beta	0.55	0.75	0.84	0.9	0.98	1.04	1.13	1.23	1.39	1.53
Alpha	4.34	4.04	3.47	2.89	1.81	0.99	−2.03	−2.98	−8.44	−13.13
Sharpe Ratio	0.84	0.75	0.69	0.64	0.58	0.53	0.39	0.36	0.18	0.06

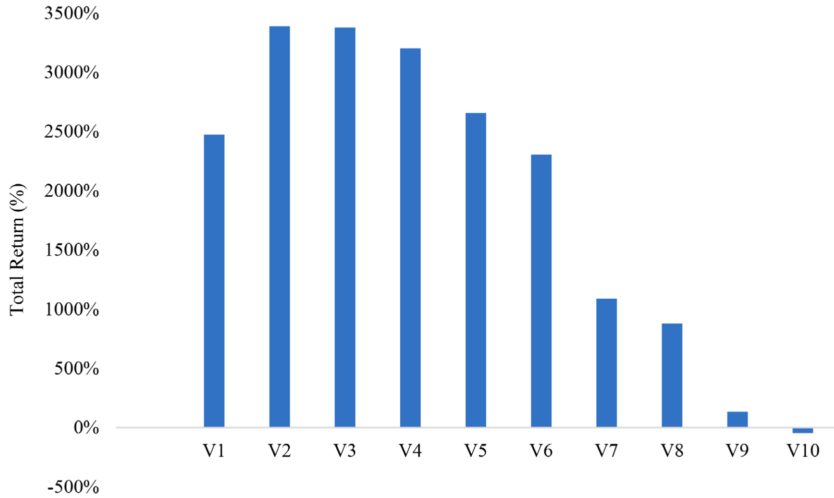

Figure 1. Total return by volatility decile from April 30, 1994 to April 30, 2024.

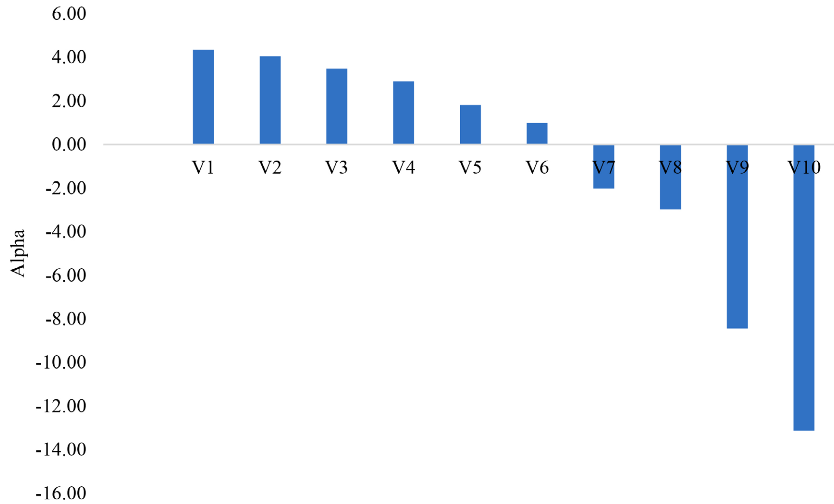

Figure 2. Portfolio alpha by volatility decile from April 30, 1994 to April 30, 2024.

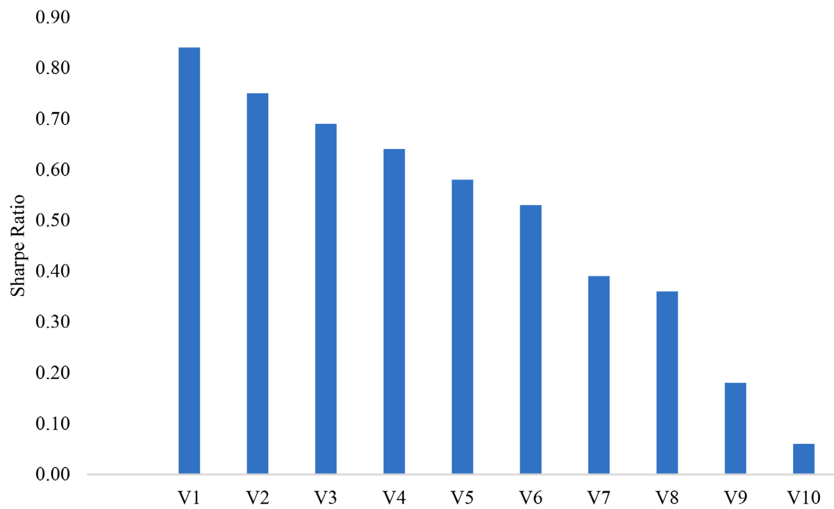

Figure 3. Sharpe ratio by volatility decile from April 30, 1994 to April 30, 2024.

Contrary to modern financial theory that suggests that higher risk should bring higher expected return, the lowest volatility deciles generated far greater total and mean annual returns than the highest volatility deciles. As shown in **Table 1** and **Figure 1**, the greatest total return was realized by the V2 portfolio (3388.8%) while the lowest return was realized by the highest volatility decile V10 (−46.4%). Therefore, an investor in the V2 lower volatility stocks outperformed the most volatile stocks by 3435.2%. The level of return degradation is particularly notable at high levels of volatility as the V7 portfolio had a cumulative return of less than half of any of the lower volatility portfolios, the V9 portfolio had less than 1/6 the total return of the V8 portfolio and the V10 portfolio had a total return that was actually *negative*. While the V10 portfolio had a mean return of 4.98%, it had a negative cumulative return due to the differences of geometric mean returns (which correspond to the cumulative return) versus the arithmetic mean. For example, a portfolio with a return of +50% followed by a return of −50% would have a cumulative return of −25% despite its arithmetic mean return being 0%, highlighting a key issue for investments with extreme return volatility.

As shown in **Table 1**, the standard deviation of the various portfolios increased with each portfolio, as expected, as each portfolio was sorted based on volatility decile and since volatility was measured by the standard deviation of day-to-day logarithmic historical price changes over a trailing 30-day period. The standard deviation of the price changes was 36.28 for the highest volatility decile, more than three times the lowest volatility decile.

The beta of each portfolio also increased as the volatility increased, as expected, since the beta is measured as the sensitivity of the portfolio to the S&P 500 index, which should be directly influenced by portfolio volatility. A beta of 1.0 would indicate the portfolio moves in line with the market and therefore would be assumed to have a similar risk to the market while a beta greater than 1.0 would have higher risk than the market and a beta lower than 1.0 would have lower risk than the market. The lowest volatility decile portfolio had a beta of 0.55 suggesting it is considerably less risky than the market and the highest volatility portfolio had a beta of 1.53 suggesting it is much riskier than the market.

As shown in **Table 1** and **Figure 2**, alpha consistently declined as portfolio volatility increased. Since alpha measures the excess return on the portfolio relative to the return predicted by the portfolio's beta, the lowest volatility portfolios were far superior to the highest volatility portfolios. The alpha of the lowest volatility portfolio V1 was 4.34, suggesting significant outperformance compared to returns predicted by its beta of 0.55 while the highest volatility portfolio V10 performed very poorly with an alpha of −13.13. In fact, portfolios V6 through V10 all produced negative alpha.

Sharpe Ratio also consistently declined as portfolio volatility increased as shown in **Table 1** and **Figure 3**. Since Sharpe Ratio is the performance of a security compared to its risk and therefore should be independent of risk (as defined by volatility), it is notable that higher volatility portfolios had far lower Sharpe Ratios than the lower volatility portfolios. While the lowest volatility portfolio V1 had a Sharpe Ratio of 0.84, the highest volatility portfolio V10 had a Sharpe Ratio of just 0.06.

The results of this study are striking. The highest returns were achieved by the *lowest* risk portfolios defying the commonly held principle of higher risk, higher return. In fact, the data shows that in each instance that higher risk (as measured by stock volatility) was introduced to the portfolio, the risk-adjusted performance of the portfolios progressively and significantly declined.

These results are consistent with the findings of Baker, Bradley and Wurgler (2011) that low beta stocks have historically outperformed high beta stocks, an observation they described as the "low beta anomaly" [8]. They explained that one of the reasons for this anomaly was investor preference for risky stocks, leading to these stocks being overpriced and leading to lower returns. In a post "meme stock" and "WallStreetBets" world where investors lost money after paying high prices for several of the most volatile stocks, this observation seems particularly relevant today.

However, the results of this new study suggest that perhaps the most notable anomaly is a "high volatility anomaly." While the lowest volatility portfolios in the study clearly generated the highest returns and best alpha and Sharpe ratios consistent with the findings of Baker, Bradley and Wurgler., the highest volatility portfolio (V10) appears to be the largest outlier. During the analysis period of April 30, 1994 through April 30, 2024, an investor in the S&P 500 Index would have earned a total return of 1872.7% but an investor in the V10 portfolio would have *lost* nearly half of his or her investment despite having to withstand significantly more volatility [3]. And, while the three lowest volatility and beta portfolios had an alpha of over 3.0 (again, consistent with the "low beta anomaly"), the two highest volatility portfolios V9 and V10 had alpha of −8.44 and −13.13, respectively, an extraordinary underperformance that appears even more remarkable. The impact of geometric mean return versus arithmetic mean return is also stark as the V10 portfolio had an arithmetic mean return of 4.98% yet cumulatively declined by 46.4%, highlighting the damaging effects of extreme volatility. A portfolio that declines 50%, would have to then increase by 100% to break even; so, despite the arithmetic mean being zero, the portfolio still will have declined by 25%.

As investors continue to monitor the implications of the "meme stock" and "WallStreetBets" phenomenon and wonder if higher volatility "get rich quick" stocks are worthwhile, this study reaches a very definitive conclusion: when investing in stocks, boring is indeed better.

5. Conclusion

This study reveals that U.S. publicly traded stocks with higher volatility have substantially underperformed lower volatility portfolios, contradicting the traditional financial theory that higher risk equates to higher returns. Portfolios in the highest volatility deciles exhibited lower cumulative and mean annual returns, lower alpha and worse Sharpe Ratios compared to those in the lowest volatility deciles. These results support the notion of the "low beta anomaly" and highlight the existence of a "high volatility anomaly," where the highest volatility stocks substantially underperform despite their higher risk. The findings suggest that in the context of the "meme stock" phenomenon and beyond, investors should consider avoiding high-volatility stocks to achieve better risk-adjusted returns. This study underscores the importance of re-evaluating investment strategies that prioritize high volatility with the expectation of higher returns and emphasizes that lower risk can lead to better financial outcomes. Thus, when it comes to investing in stocks, boring certainly appears to be better.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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