

Does Higher Ex-Ante Volatility Predict Higher Subsequent Monthly Excess Returns?

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Abstract. This study examines whether a higher ex-ante volatility of large-capitalization United States stocks higher monthly excess returns. By using monthly stock data for Standard & Poor's 500 (S&P 500) companies from 2015 to 2024, the study measures ex-ante volatility as the annualized standard deviation of each stock's previous 12 months of returns. The dependent variable is the excess return of the next month, and the Fama-French market excess return is added as a control for general market fluctuations. Based on the above results, volatility has a weak but positive effect on future excess returns. Stocks with higher ex-ante volatility have generated higher average monthly excess returns, but this positive correlation is no longer statistically significant after controlling for systematic market risk. Period analysis shows that the above relationship is not always the case. Volatility has little independent predictive power before the public health event. During the public health event, the association between volatility and the future excess return is much stronger and still significantly positive after controlling for the Fama-French market excess return. The effect is still positive but has decreased. Therefore, based on the above data, volatility may offer a higher risk premium in times of financial instability.

Keywords: ex-ante volatility, excess returns, risk-return trade-off, market risk

1. Introduction

The relationship between risk and return is a crucial idea in finance. Investors usually expect higher returns when they face higher risk. Therefore, stocks with higher volatility have larger price changes and are considered riskier. However, researchers have found different results on whether the riskier stocks actually attain a higher excess return [1]. Some studies have found that a higher risk is associated with a larger excess return. Others have determined that low-risk stocks have performed as well as or better than high-risk stocks [2]. This paper examines whether higher ex-ante volatility predicts higher future monthly excess returns among large-cap U.S. stocks. The data includes companies in the S&P 500 from 2015 to 2024. According to the connection between volatility and future excess returns, this paper will investigate whether the traditional risk-return relationship holds in the U.S. stock market from 2015 to 2024.

The relationship between risk and return is a central topic in finance [3]. According to the Capital Asset Pricing Model, investors require a higher expected return for bearing more risk [4]. Risk affects the level of return on investment [5]. The above studies offer the theoretical basis for the idea

that riskier stocks should have higher returns [6]. Stock returns cannot be expressed in a single measure of risk [7]. Fama-French three-factor model uses market beta, size and book-to-market ratio as its main pricing factors. Based on the above analysis, the connection between risk and return may be more complicated than previously thought. Recently, some research has been carried out on the link between volatility and returns. Stocks with high volatility generally had lower future returns than expected [8]. Lower-volatility stocks sometimes outperform high-volatility stocks [9]. Therefore, high risk is not always associated with high returns according to the above results.

Previous research has explored the connection between risk and stock returns through the lens of the traditional risk-return theory, market risk, and stock volatility. Some studies have shown that a higher risk is related to a higher return, and at the same time, other research has found that low-volatility stocks outperform high-volatility stocks. However, no one has conducted research on whether ex-ante volatility predicts monthly excess returns under different stock and time conditions. Therefore, this study will take large-cap U.S. stocks from the S&P 500 in 2015-2024 as the research sample. Using monthly data and panel regression to determine whether the past 12 months of volatility predict next-month excess returns. The Results show that the connections change over time. Volatility has little predictive power before a public health event, is strongly positive during a public health event, and remains positive but weaker after a public health event. Empirically, the above results provide a basis for an all-around assessment of volatility risk premiums for market participants in investment allocation.

2. Data and methods

The study uses monthly adjusted stock prices of S&P 500 companies from 2015 to 2024. The risk-free rate and the Fama-French market excess return are also added to cover general market changes. The unit of analysis is a stock-month. Ex-ante volatility of a stock refers to the standard deviation of its returns over the past 12 months. This paper examines whether lagged volatility can predict a stock's excess returns in the following month. To isolate the effect of volatility on future returns, Fama-French market excess returns are included as a control variable for systematic market risk in the regression [10].

A panel regression model will be employed to test the hypothesis of this study, and each stock-month will serve as an observation unit. The sample is a large-cap U.S. stock from the S&P 500 between 2015 and 2024. The dependent variable is the next-month excess return of stocks, which is the monthly stock return minus the risk-free rate. The main independent variable is ex-ante volatility, measured by the annualized standard deviation of the stock's previous 12 months of returns. This represents the risk level known before the next month's return. The core coefficient of lagged ex-ante volatility reflects the predictive power of historical volatility over subsequent excess returns. Fama-French market excess returns are used as control variables to rule out the effect of a general market decline.

3. Results

Table 1 shows that lagged volatility has enough variation for the test of future excess return prediction. The range is 6.2% - 215.5%, and the median is 25.1%. Most observations fall between 19.5% and 33.1%. A large number of volatility values have been collected from different sections, and thus one can evaluate the risk of these stocks at various times and determine whether there is a correlation between historical volatility and future excess returns.

Table 1. Summary statistics

Variable	N	Mean	Std_Dev	Min	P25	Median	P75	Max
Return	51575	0.0108	0.0895	-0.8425	-0.0384	0.0108	0.0587	1.8143
Excess Return	51575	0.0094	0.0894	-0.8425	-0.0399	0.0094	0.0573	1.8142
Lagged 12m Volatility	51575	0.2806	0.1316	0.0620	0.1946	0.2506	0.3309	2.1551

Table 2 shows the relationship between ex-ante volatility and future returns for the five volatility groups of these stocks. Average excess returns increase from 0.78% in the lowest-volatility group to 1.14% in the highest-volatility group. At the same time, return risk also increases, with standard deviation rising from 6.69% to 12.42%. Overall, this provides initial evidence that higher-volatility stocks may earn higher future returns. However, panel regression analysis is adopted to examine the relationship rigorously after controlling for aggregate market factors.

Table 2. Average return by volatility quintile

Bucket	N	Avg return	Avg excess return	Std dev of return	Avg lagged vol
Q1 (lowest vol)	10,362	0.92%	0.78%	6.69%	16.70%
Q2	10,292	0.99%	0.85%	7.24%	21.70%
Q3	10,290	1.09%	0.95%	8.11%	25.70%
Q4	10,294	1.13%	0.99%	9.09%	31.10%
Q5 (highest vol)	10,337	1.28%	1.14%	12.42%	45.10%

Table 3 examines the relationship between past volatility and future monthly excess returns. In Model 1, lagged volatility has a coefficient of 0.0652 with a p-value of 0.014, showing a significant positive relationship. However, after adding Fama-French market excess return in Model 2, the coefficient falls to 0.0279 and becomes insignificant $p = 0.118$. Meanwhile, Fama-French market excess return is highly significant as a coefficient = 1.016, $p < 0.00$, showing that market performance strongly affects stock returns. Overall, the results provide limited support for the hypothesis because the volatility effect is no longer statistically significant after controlling for market risk.

Table 3. Regression results

Model	Variable	Coef	SE	t	p
1_no_control	const	-0.0089	0.0070	-1.2767	0.2042
1_no_control	Lagged_Vol	0.0652	0.0261	2.4952	0.0140
2_with_control	const	-0.0088	0.0048	-1.8520	0.0665
2_with_control	Lagged_Vol	0.0279	0.0177	1.5745	0.1181
2_with_control	Fama-French market excess return	1.0155	0.0799	12.7087	0

Table 4 shows the data from the three time periods. From February 2015 to February 2020, during the period before the public health event, there is no evidence of a volatility premium. Without controls, lagged volatility has a coefficient of 0.0089 and a t-value of 1.8414. It does not meet the criteria for significance. After adding Fama-French market excess returns, the coefficient is negative and insignificant. The t-value is -1.0284. Volatility is thus not a good indicator of future

returns in a stable market environment. Instead, large fluctuations across the entire market are responsible for changes in stock returns.

Table 4. Regression results in different periods

Period	Model	Variable	Coef	t	N	R ²
Pre-public health event	1_no_control	const	0.006	4.8431	25429	0.0001
Pre-public health event	1_no_control	Lagged_Vol	0.0089	1.8414	25429	0.0001
Pre-public health event	2_with_control	const	0.0006	0.5795	25429	0.2022
Pre-public health event	2_with_control	Lagged_Vol	-0.0044	-1.0284	25429	0.2022
Pre-public health event	2_with_control	control	0.9604	80.2592	25429	0.2022
public health event	1_no_control	const	-0.0697	-13.8005	4471	0.0749
public health event	1_no_control	Lagged_Vol	0.2253	19.0244	4471	0.0749
public health event	2_with_control	const	-0.03937	-10.5056	4471	0.5001
public health event	2_with_control	Lagged_Vol	0.0811	8.9971	4471	0.5001
public health event	2_with_control	control	1.2288	61.6397	4471	0.5001
Post-public health event	1_no_control	const	-0.0045	-3.0028	21675	0.0047
Post-public health event	1_no_control	Lagged_Vol	0.0446	10.0919	21675	0.0047
Post-public health event	2_with_control	const	-0.009	-6.8731	21675	0.2323
Post-public health event	2_with_control	Lagged_Vol	0.031	7.9635	21675	0.2323
Post-public health event	2_with_control	control	0.9005	80.1644	21675	0.2323

During the time of the public health crisis from March to December 2020, the positive correlation between ex-ante volatility and future excess returns was relatively high. The volatility coefficient in the simple model is 0.2253, with a t-value of 19.0244, and after controlling for the Fama-French market excess return, it is still positive at 0.0811 and has a t-value of 8.9971. It can be seen that during a time of high uncertainty, high-volatility stocks had higher future excess returns. The R² of the regression model is also about 0.50. Therefore, volatility explains a larger proportion of the fluctuations in returns during this crisis sub-period. From 2021 to 2024, after the public health event, the effect of volatility was positive but reduced. After controlling for the Fama-French market excess return, the coefficient of lagged volatility is 0.031, and the t-value is 7.9635. It is still statistically significant. Therefore, volatility still contains some information about future returns, but the effect is relatively small compared to the period of public health problem. In short, the link between volatility and returns varies across different time periods. A relatively high-volatility stock is not necessarily one with a high return, and such instability is often worse during a recession. The period of the public health event appears to be the reason for the positive correlation between volatility and future returns in the entire sample.

Overall, these results show that the relationship between volatility and future excess return changes depending on different market condition and time periods. Higher volatility does not always lead to higher returns, but it becomes more important during periods of high uncertainty. The public health event period appears to be the main factor driving the positive relationship between volatility and future excess returns in the full data sample.

4. Conclusion

Based on the above period analysis, the risk-return relationship is not uniform across all times. Before the public health event, volatility had little independent predictive power after controlling the Fama-French market excess return. However, during the public health crisis, the correlation was relatively high. High-volatility stocks achieved a considerable excess return even after controlling for the Fama-French market excess return. Volatility is now relatively more explanatory of changes in future returns under conditions of high financial instability. The positive effects of the public health event have decreased over time, and they have been further eroded in the relatively stable market environment since then. Volatility is not generally associated with a higher rate of return. Volatility has thus begun to offer a relatively higher risk premium in times of economic uncertainty because investors demand greater compensation for bearing higher risk. Therefore, the connection among risk and return will be altered under all-around conditions of the market. Thus, there will be changes in stock prices and an economic downturn that affect the investment returns of these stocks.

This study also has some deficiencies. First, the results may not be generalizable to all enterprises because the sample only includes large-capitalization United States stocks. Second, the sample period of 2015-2024 is relatively short and contains only one main crisis period. Thus, the extent of a long-term trend may not be fully revealed. Finally, other reasons for fluctuations in stock prices, such as company features and extra risks, are not accounted for in this model. Future research could increase the sample size by adding more companies, extend the time period, add other variables, in order to explore how volatility relates to future returns more deeply. In short, this study has found some weak but real evidence that higher ex-ante volatility is associated with larger excess returns. All of the above samples show that high-volatility stocks are associated with higher future returns, but this effect is reduced after controlling for the Fama-French market excess return.

References

- [1] Lachance, M. (2023). Night trading: Lower risk but higher returns? *Review of Financial Economics*, 41(4), 347–363.
- [2] Aslanidis, N., Christiansen, C., & Kouretas, P. G. (2023). The effects of high uncertainty risk on international stock markets. *Annals of Operations Research*, (prepublish), 1–21.
- [3] Ullah, S., Jabeen, M., Farooq, M., et al. (2025). Revisiting the relationship between idiosyncratic risk and stock returns: A quantile regression analysis in the context of an emerging market. *Journal of Economic and Administrative Sciences*, 41(3), 1135–1158.
- [4] Van Dinh, D. (2023). Analyzed relationship between risks and expected returns. *Journal of Economic and Administrative Sciences*, 39(4), 749–759.
- [5] Kibe, N. M. (2025). Influence of risk management practices on the financial performance of investment firms trading at the NSE. *International Journal of Economics and Finance*, 17(3), 106–106.
- [6] Bozza, A. C. (2024). When investing in stocks, is boring better? Introducing the "high volatility anomaly" in a post-meme stock world. *Journal of Mathematical Finance*, 14(3), 356–364.
- [7] Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33(1), 3–56.
- [8] Xiao, C., Huang, W., & Newton, P. D. (2024). Predicting expected idiosyncratic volatility: Empirical evidence from ARFIMA, HAR, and EGARCH models. *Review of Quantitative Finance and Accounting*, 63(3), 979–1006.
- [9] Baker, M., Bradley, B., & Wurgler, J. (2011). Benchmarks as limits to arbitrage: Understanding the low-volatility anomaly. *Financial Analysts Journal*, 67(1), 40–54.
- [10] Kashyap, S. (2023). Review on volatility and return analysis including emerging developments: Evidence from stock market empirics. *Journal of Modelling in Management*, 18(3), 756–816.