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# Informed And Prudent Investment Decisions In The Dynamic Landscape Of Mutual Funds By Using Garch Index

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## ABSTRACT

This research paper provides a concise overview of a risk analysis conducted on mutual funds utilizing the GARCH (Generalized Autoregressive Conditional Heteroskedasticity) index. The primary aim is to effectively evaluate and quantify the inherent risk associated with mutual fund investments, leveraging a robust statistical model for comprehensive insights. Through meticulous examination of historical data from various mutual funds, the study harnesses the power of the GARCH model to estimate volatility and risk characteristics accurately. This analytical approach furnishes investors with a sophisticated tool to comprehend and navigate the intricacies of risk exposure within their investment portfolios.

The analysis entails the segmentation of data into distinct training and testing sets, facilitating rigorous evaluation and validation of the predictive accuracy of the GARCH model. By comparing predicted outcomes with actual data, the study assesses the reliability and robustness of the model across different market conditions. Notably, the precision of predictions is found to vary contingent upon the proximity between testing and training data, underscoring the dynamic nature of market volatility and risk dynamics.

Furthermore, the analysis delves into three fundamental categories of mutual funds—Growth, Fixed Income, and Balanced Funds—to elucidate the distinct risk profiles associated with each. This segmentation serves as a crucial framework for investors, empowering them to tailor their investment strategies in alignment with their risk tolerance and financial objectives. Notably, the evaluation highlights the pivotal role of volatility in shaping investment decisions, with funds exhibiting lower deviations from predicted returns deemed as low-risk investments, while those demonstrating higher returns alongside elevated volatility are classified as high-risk options. Ultimately, this nuanced understanding of risk dynamics equips investors with the insights needed to make informed and prudent investment decisions in the dynamic landscape of mutual funds.

## 1. INTRODUCTION

A mutual fund represents a collective pool of investments managed prudently by a fund manager, pooling funds from numerous investors with similar financial goals. These funds are then strategically invested in a diverse range of assets such as stocks, bonds, money market instruments, and other securities. The returns generated from these investments, including income and capital gains, are distributed proportionately among the investors after deducting fees and taxes, calculated based on the fund's Net Asset Value (NAV). Essentially, a mutual fund serves as a vehicle for investors to collectively participate in various financial markets, offering diversification and professional management.

Much like how the market price of an equity share is determined, a mutual fund unit's value is represented by its Net Asset Value per Unit. The NAV reflects the market value of all assets held by the fund on a given day, net of any liabilities and expenses. Calculated by dividing the total market value of the fund's assets by the number of units outstanding, NAV per unit signifies the value attributed to each investor's share in the fund. This metric serves as a crucial indicator of the fund's performance and allows investors to track the value of their investments over time.

Mutual funds present an attractive option for individuals seeking to grow their wealth without the need for substantial capital or the expertise to conduct market research. Professional fund managers oversee the investment decisions, aligning them

with the fund's objectives to maximize returns within specified risk parameters. While investors benefit from expert management and diversification, the fund house charges a fee for its services, typically deducted from the invested capital. Regulatory bodies such as the Securities and Exchange Board of India (SEBI) impose guidelines on mutual fund fees to ensure transparency and investor protection, thereby fostering trust and confidence in the mutual fund industry.

## 2. RISK ANALYSIS IN MUTUAL FUNDS

Risk analysis in mutual funds is a comprehensive process aimed at evaluating the potential risks associated with investing in a specific mutual fund. It encompasses a thorough examination of various factors that could impact the fund's performance and stability, empowering investors to make well-informed decisions aligned with their risk tolerance and financial goals.

**Key components of risk analysis in mutual funds include:**

1. **Market Risk:** This pertains to the possibility of financial losses stemming from fluctuations in broader market conditions. Economic shifts, interest rate changes, and geopolitical events can all influence market risk, necessitating careful consideration by investors.
2. **Volatility:** Volatility measures the degree of price fluctuations within a mutual fund. Higher volatility suggests greater potential for both gains and losses. Investors often assess volatility levels to gauge the suitability of a fund based on their risk appetite.
3. **Investment Style:** Different mutual funds adopt distinct investment styles, such as growth or value-oriented strategies. Analyzing these styles aids in understanding associated risks and aligning investment choices with individual preferences.
4. **Asset Allocation:** Mutual funds diversify their holdings across various asset classes like stocks, bonds, and commodities. Evaluating the fund's asset allocation helps determine its exposure to different market segments and associated risks.
5. **Historical Performance:** Past performance provides insights into a mutual fund's track record, including returns, volatility, and consistency. While historical data can inform decision-making, it's essential to recognize that past performance doesn't guarantee future results.
6. **Fund Manager Expertise:** The competence and experience of the fund manager significantly influence risk management. Evaluating the manager's track record and investment approach offers insights into their ability to navigate potential risks effectively.
7. **Expense Ratio:** The expense ratio reflects the costs associated with managing the mutual fund. Higher expense ratios can impact overall returns, making it crucial for investors to factor them into their risk analysis.
8. **Regulatory and Legal Risks:** Mutual funds are subject to regulatory requirements and legal constraints. Assessing the potential implications of regulatory changes or legal actions on the fund's operations is integral to comprehensive risk analysis.

To navigate the complexities of mutual fund investments effectively, investors should conduct thorough risk analysis to ensure alignment with their risk tolerance and financial objectives. Seeking guidance from financial advisors or utilizing online resources can aid in evaluating and comparing different mutual funds based on their risk profiles.

## 3. NEED FOR THE STUDY

The study addresses a critical gap in understanding among small and medium income groups regarding mutual fund investments. Typically, these investors prioritize returns without fully considering associated risks or the time value of returns. This study aims to provide a comprehensive perspective on mutual funds by incorporating both these crucial aspects, thereby empowering investors to make more informed decisions. By analyzing and presenting the risks alongside potential returns, the study seeks to enhance investors' understanding and awareness of the dynamics involved in mutual fund investments.

## 4. LITERATURE REVIEW

Fahim Afzal et al. (2021) conducted a study on the stochastic volatility of stock returns using a combined approach of dynamic conditional correlation (DCC) and generalized autoregressive conditional heteroscedasticity (GARCH) models. Their findings offer valuable insights for stockbrokers and investors, enhancing their understanding of market behavior and aiding in more accurate Value-at-Risk (VaR) forecasting.

Samir Mabrouk and Samir Saadi (2012) evaluated the performance of volatility models in estimating one-day-ahead VaR of stock market indices. Their study emphasized the importance of realistic assumptions in financial modeling, particularly in addressing volatility clustering and long-range memory.

Zhe Lin (2018) analyzed the stock market volatility of the SSE Composite Index using GARCH models, providing valuable insights into the index's dynamic properties. Their findings contribute to a better understanding of market behavior and offer practical suggestions for managing volatility.

Oana Mădălina Predescu and Stelian Stancu (2011) examined portfolio risk analysis during the global financial crisis, focusing on the benefits of international diversification. Their study sheds light on the evolving risk landscape and the effectiveness of diversification strategies amid economic turmoil.

Maoguo Wu and Yanyuan Wang (2018) investigated the impact of the 2008 financial crisis on major global stock indices using the GARCH-VaR approach. Their findings highlight the stability of certain indices before the crisis and the subsequent volatility experienced across different markets.

Reza Tehrani et al. (2014) evaluated the performance of Iranian mutual funds using VaR estimation methods. Their study underscores the importance of accurate risk measurement in mutual fund performance evaluation, offering valuable insights for investors.

Benzhao Zhang and Chi Zhang (2013) assessed the effectiveness of the GARCH-VaR method in measuring mutual fund risk in post-crisis China. Their findings emphasize the importance of robust risk measurement techniques in navigating volatile market conditions.

Ferikawita Magdalena Sembiring et al. (2016) developed an estimation model for measuring the performance of stock mutual funds using ARCH/GARCH models. Their research highlights the significance of addressing heteroscedasticity in performance measurement, offering practical implications for fund managers.

Sunitha Kumaran (2022) modeled the downside risk potential of mutual fund returns using various VaR estimation methods. Their study identifies the most effective model for predicting VaR, providing valuable insights for investors in the Saudi Stock Exchange.

Ngozi G. Emenogu et al. (2020) investigated the volatility of daily stock returns for Total Nigeria Plc using GARCH models and VaR estimation. Their findings contribute to a better understanding of stock market dynamics and offer recommendations for shareholders and investors.

Overall, the literature review highlights the importance of employing advanced modeling techniques, such as GARCH models, in accurately assessing risk and volatility in financial markets. These studies provide valuable insights for investors and financial professionals in making informed decisions and managing risk effectively.

## 5. OBJECTIVES OF THE STUDY

The primary objectives of this study are twofold. Firstly, the aim is to evaluate Net Asset Value (NAV) returns with a focus on incorporating the concept of time value into the analysis. By considering the time value of returns, the study seeks to provide a more comprehensive understanding of the performance of mutual funds. Secondly, the study intends to assess the risk associated with investing in mutual funds by employing the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model. Through this analysis, the study aims to quantify and analyze the level of risk inherent in mutual fund investments, thereby assisting investors in making more informed decisions.

In terms of scope, the study will primarily focus on two key aspects. Firstly, it aims to evaluate the accuracy of volatility predictions generated by the GARCH model. This involves examining how well the model predicts changes in volatility over time and assessing its effectiveness in capturing market dynamics. Secondly, the study seeks to understand the volatility patterns of different types of mutual funds, including growth, fixed income, and balanced funds. By analyzing volatility patterns across these fund categories, the study aims to identify any distinct trends or characteristics that may impact investment decisions. Overall, the scope of the study encompasses a thorough examination of volatility prediction accuracy and volatility patterns across various types of mutual funds.

## 6. RESEARCH METHODOLOGY

The research methodology employed for this study is an analytical descriptive approach focusing on the top ten mutual funds from each category of Growth Funds, Fixed Income Funds, and Balanced Funds. The study relies solely on secondary data sourced from the mutual funds industry, spanning a period of ten years. This data includes detailed information on the performance and characteristics of the identified mutual funds within the specified categories.

To prepare the data for analysis, it is segmented into testing data and training data, ensuring a comprehensive and structured approach to analysis. The testing data allows for the evaluation of model performance and accuracy, while the training data provides the basis for model development and calibration.

The primary tool utilized for risk analysis in this study is the GARCH (Generalized Autoregressive Conditional Heteroskedasticity) model. This statistical model is well-suited for analyzing and forecasting volatility in financial markets, offering insights into the dynamic nature of market fluctuations. As an extension of the ARCH (Autoregressive Conditional

Heteroskedasticity) model, the GARCH model incorporates autoregressive and moving average components to capture volatility patterns observed in financial time series data.

By leveraging the GARCH model, the study aims to gain a deeper understanding of the risk profiles associated with different categories of mutual funds. The model's ability to capture volatility dynamics will enable researchers to assess and quantify the level of risk inherent in each fund category, ultimately providing valuable insights for investors and stakeholders in the mutual funds industry.

**GARCH Model**

The GARCH (Generalized Autoregressive Conditional Heteroskedasticity) model is a statistical model used to analyse and forecast volatility in financial markets. It is an extension of the ARCH (Autoregressive Conditional Heteroskedasticity) model, which was introduced to capture the time-varying volatility patterns observed in financial data.

The GARCH model incorporates both autoregressive and moving average components to capture the persistence and volatility clustering observed in financial time series. It assumes that the conditional variance of the data is a function of past squared residuals or error terms, as well as past conditional variances.

The general form of a GARCH(p, q) model is as follows:

$$\sigma t2=\omega+\sum i=1p\alpha i\varepsilon t-i2+\sum j=1q\beta j\sigma t-j2$$

Where:

- $\sigma t2$ represents the conditional variance at time t.

- $\varepsilon t$ denotes the standardized residual or error term at time t.

- $\omega$ is a constant term.

- $\alpha i$ and $\beta j$ are the parameters of the model, which determine the impact of past squared residuals and past conditional variances, respectively.

- p and q represent the orders of the autoregressive and moving average components, respectively.

The GARCH model allows for capturing volatility clustering, which means that periods of high volatility tend to be followed by subsequent periods of high volatility, and vice versa. By estimating the parameters of the GARCH model using historical data, one can obtain forecasts of future volatility.

The GARCH model has been widely used in various areas of finance, including risk management, option pricing, portfolio optimization, and volatility forecasting. It provides valuable insights into the dynamics of volatility in financial markets and helps market participants make more informed decisions.

## 7. ANALYSIS AND INTERPRETATION

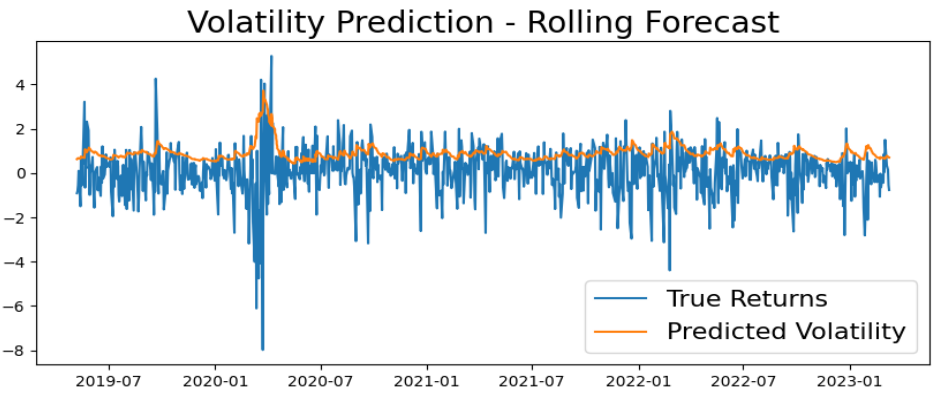
***BALANCED FUND 1***

**TABLE 1 BALANCED FUND 1**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 148.37 | 145.44 | 95% |
| **OVERVALUED** | 137.37 | 129.39 | 94% |
| **QTR1** | 124.83 | 114.67 | 92% |
| **QTR2** | 135.71 | 126.92 | 93% |
| **QTR3** | 150.44 | 146.78 | 98% |
| **UNDERVALUED** | 166.05 | 171.22 | 97% |
| **QTR3** | 160.54 | 161.98 | 99% |
| **QTR4** | 169.33 | 176.74 | 96% |
| **2021** | 204.34 | 250.89 | 82% |
| **UNDERVALUED** | 204.34 | 250.89 | 82% |

| | | | |
|---|---|---|---|
| **QTR1** | 185.43 | 206.84 | 90% |
| **QTR2** | 200.96 | 241.19 | 83% |
| **QTR3** | 212.26 | 269.36 | 79% |
| **QTR4** | 218.21 | 284.99 | 77% |
| **2022** | 224.19 | 300.43 | 75% |
| **UNDERVALUED** | 224.19 | 300.43 | 75% |
| **QTR1** | 218.09 | 283.48 | 77% |
| **QTR2** | 219.44 | 286.20 | 77% |
| **QTR3** | 226.13 | 305.46 | 74% |
| **QTR4** | 233.14 | 326.63 | 71% |
| **2023** | 229.54 | 314.54 | 73% |
| **UNDERVALUED** | 229.54 | 314.54 | 73% |
| **QTR1** | 229.54 | 314.54 | 73% |
| **GRAND TOTAL** | 193.93 | 236.00 | 84% |

**FIGURE 1 BALANCED FUND 1**




The discrepancy between the anticipated Net Asset Value (NAV) and the actual NAV is minimal, indicating a high level of prediction accuracy. Notably, the NAV appears to be overvalued in the year 2020, followed by a period of undervaluation starting from the third quarter of the same year and persisting into 2021, 2022, and 2023. It is observed that the prediction accuracy is at its peak in 2020, gradually diminishing in subsequent years. Additionally, these levels of accuracy suggest a relatively lower degree of volatility in the NAV fluctuations over the specified timeframe.

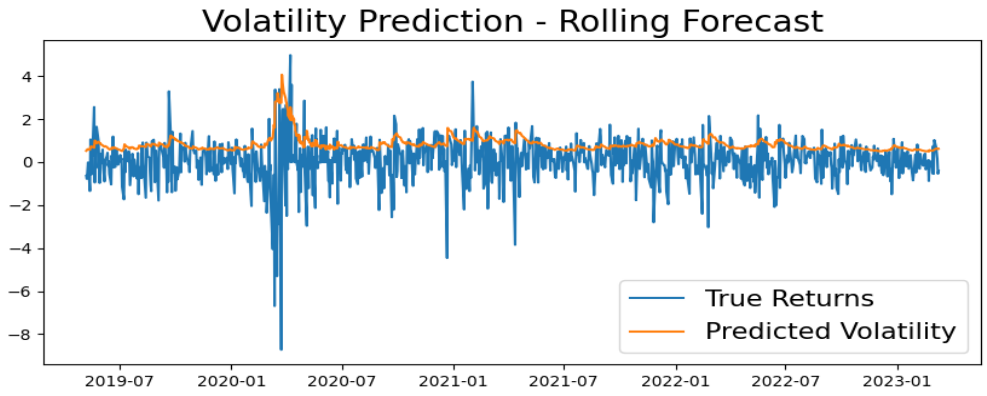
***BALANCED FUND 2***

**TABLE 2 BALANCED FUND 2**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 142.10 | 133.70 | 94% |
| **OVERVALUED** | 141.12 | 132.31 | 94% |
| **QTR1** | 127.20 | 116.02 | 91% |

| | | | |
|---|---|---|---|
| **QTR2** | 135.81 | 125.32 | 92% |
| **QTR3** | 146.25 | 138.65 | 95% |
| **QTR4** | 150.57 | 144.67 | 96% |
| **UNDERVALUED** | 164.02 | 164.91 | 99% |
| **QTR4** | 164.02 | 164.91 | 99% |
| **2021** | 186.65 | 206.69 | 91% |
| **UNDERVALUED** | 186.65 | 206.69 | 91% |
| **QTR1** | 172.98 | 180.03 | 96% |
| **QTR2** | 180.99 | 194.34 | 93% |
| **QTR3** | 191.07 | 214.69 | 89% |
| **QTR4** | 201.19 | 236.93 | 85% |
| **2022** | 206.32 | 248.31 | 83% |
| **UNDERVALUED** | 206.32 | 248.31 | 83% |
| **QTR1** | 203.71 | 242.41 | 84% |
| **QTR2** | 203.14 | 240.61 | 84% |
| **QTR3** | 206.30 | 247.89 | 83% |
| **QTR4** | 212.17 | 262.49 | 81% |
| **2023** | 212.74 | 263.77 | 81% |
| **UNDERVALUED** | 212.74 | 263.77 | 81% |
| **QTR1** | 212.74 | 263.77 | 81% |
| **GRAND TOTAL** | 179.92 | 199.43 | 89% |

**FIGURE 2 BALANCED FUND 2**



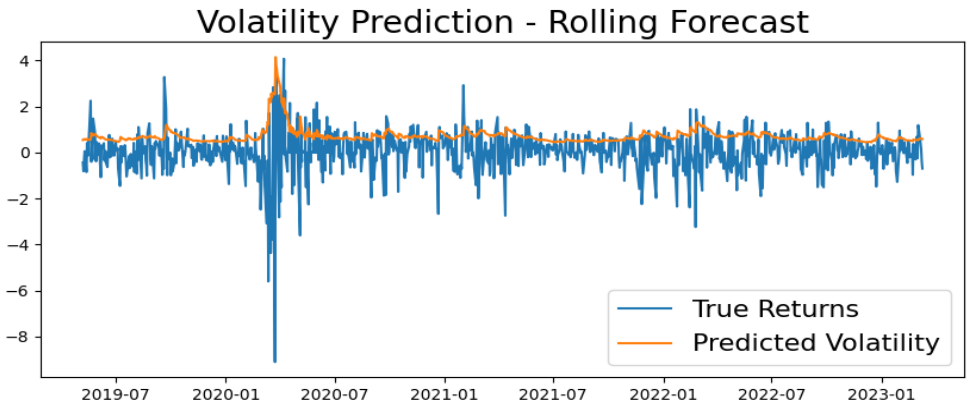

In this scenario, the disparity between the anticipated Net Asset Value (NAV) and the actual NAV is minimal, indicating a high level of prediction accuracy. Notably, the NAV is observed to be overvalued in the year 2020, followed by a trend of undervaluation starting from the fourth quarter of the same year and extending into 2021, 2022, and 2023. It's noteworthy that the prediction accuracy peaks in 2020, gradually tapering off in subsequent years. These consistent accuracy levels further suggest a relatively stable and less volatile NAV trend over the specified period.

***BALANCED FUND 3***

**TABLE 3 BALANCED FUND 3**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 136.78 | 124.55 | 91% |
| **OVERVALUED** | 136.78 | 124.55 | 91% |
| **QTR1** | 120.97 | 106.77 | 88% |
| **QTR2** | 126.83 | 112.19 | 88% |
| **QTR3** | 142.67 | 131.03 | 92% |
| **QTR4** | 152.80 | 144.87 | 95% |
| **2021** | 175.99 | 182.38 | 96% |
| **OVERVALUED** | 165.28 | 163.58 | 99% |
| **QTR1** | 164.78 | 162.85 | 99% |
| **QTR2** | 166.53 | 165.40 | 99% |
| **UNDERVALUED** | 180.84 | 190.90 | 95% |
| **QTR1** | 168.18 | 168.36 | 100% |
| **QTR2** | 173.93 | 178.06 | 98% |
| **QTR3** | 181.25 | 191.48 | 95% |
| **QTR4** | 186.00 | 200.57 | 93% |
| **2022** | 186.92 | 201.65 | 93% |
| **UNDERVALUED** | 186.92 | 201.65 | 93% |
| **QTR1** | 184.59 | 197.39 | 94% |
| **QTR2** | 182.14 | 192.17 | 95% |
| **QTR3** | 187.99 | 203.50 | 92% |
| **QTR4** | 193.00 | 213.62 | 90% |
| **2023** | 193.92 | 215.43 | 90% |
| **UNDERVALUED** | 193.92 | 215.43 | 90% |
| **QTR1** | 193.92 | 215.43 | 90% |
| **GRAND TOTAL** | 167.80 | 171.66 | 93% |

**FIGURE 3 BALANCED FUND 3**




The disparity between the anticipated Net Asset Value (NAV) and the actual NAV remains minimal, underscoring the high accuracy of the predictions in this scenario. Notably, the NAV is observed to be overvalued throughout the year 2020, followed by a trend of undervaluation starting from the first and second quarters of 2021, persisting into 2021, 2022, and 2023. It's noteworthy that the prediction accuracy peaks in 2020, gradually diminishing in the subsequent years. These consistent accuracy levels further suggest a relatively stable and less volatile NAV trend over the specified period.

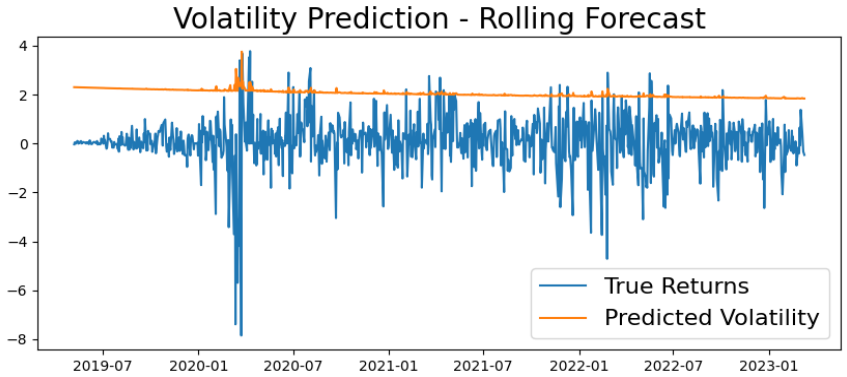
***BALANCED FUND 4***

**TABLE 4 BALANCED FUND 4**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 104.85 | 39.81 | 38% |
| **OVERVALUED** | 104.85 | 39.81 | 38% |
| **QTR1** | 80.79 | 31.22 | 39% |
| **QTR2** | 91.00 | 34.27 | 38% |
| **QTR3** | 114.61 | 43.37 | 38% |
| **QTR4** | 126.00 | 48.37 | 38% |
| **2021** | 158.28 | 67.18 | 42% |
| **OVERVALUED** | 158.28 | 67.18 | 42% |
| **QTR1** | 133.26 | 51.91 | 39% |
| **QTR2** | 156.61 | 65.46 | 42% |
| **QTR3** | 167.66 | 72.81 | 43% |
| **QTR4** | 175.01 | 78.18 | 45% |
| **2022** | 182.67 | 83.59 | 46% |
| **OVERVALUED** | 182.67 | 83.59 | 46% |
| **QTR1** | 178.38 | 80.47 | 45% |
| **QTR2** | 178.96 | 80.56 | 45% |
| **QTR3** | 182.75 | 83.39 | 46% |
| **QTR4** | 190.66 | 89.99 | 47% |

| | | | |
|---|---|---|---|
| **2023** | 190.97 | 90.13 | 47% |
| **OVERVALUED** | 190.97 | 90.13 | 47% |
| **QTR1** | 190.97 | 90.13 | 47% |
| **GRAND TOTAL** | 150.54 | 64.80 | 42% |

**FIGURE 4 BALANCED FUND 4**




The disparity between the expected Net Asset Value (NAV) and the actual NAV is substantial, indicating a low accuracy of prediction in this instance. Notably, the NAV appears consistently overvalued across all years under consideration. The accuracy is notably at its lowest in 2020, progressively increasing with each passing year. These accuracy levels suggest significant volatility in the NAV trend over the specified period.

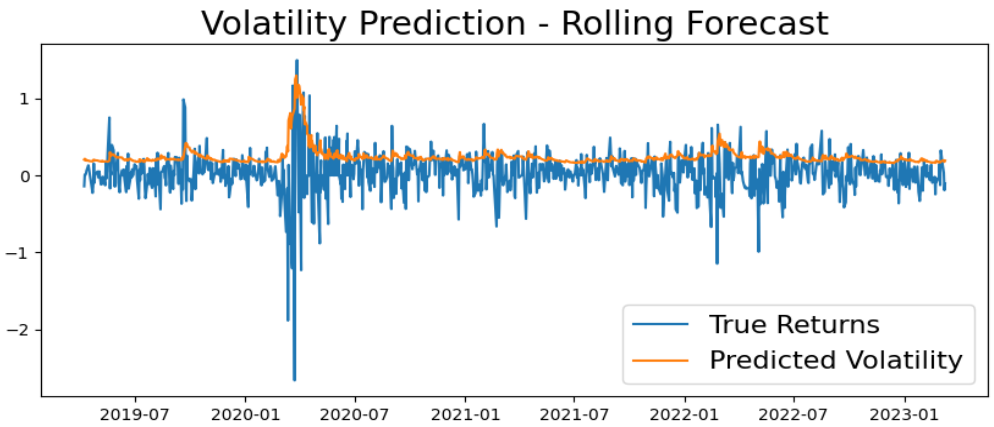
***BALANCED FUND 5***

**TABLE 5 BALANCED FUND 5**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 93.57 | 48.82 | 52% |
| **OVERVALUED** | 93.57 | 48.82 | 52% |
| **QTR1** | 87.17 | 45.79 | 53% |
| **QTR2** | 89.56 | 46.85 | 52% |
| **QTR3** | 95.63 | 49.77 | 52% |
| **QTR4** | 100.12 | 52.05 | 52% |
| **2021** | 108.11 | 56.39 | 52% |
| **OVERVALUED** | 108.11 | 56.39 | 52% |
| **QTR1** | 103.99 | 54.09 | 52% |
| **QTR2** | 105.98 | 55.18 | 52% |
| **QTR3** | 109.35 | 57.07 | 52% |
| **QTR4** | 112.92 | 59.13 | 52% |
| **2022** | 115.40 | 60.60 | 53% |
| **OVERVALUED** | 115.40 | 60.60 | 53% |
| **QTR1** | 113.63 | 59.53 | 52% |

| | | | |
|---|---|---|---|
| **QTR2** | 113.44 | 59.40 | 52% |
| **QTR3** | 116.02 | 60.95 | 53% |
| **QTR4** | 118.45 | 62.44 | 53% |
| **2023** | 119.05 | 62.81 | 53% |
| **OVERVALUED** | 119.05 | 62.81 | 53% |
| **QTR1** | 119.05 | 62.81 | 53% |
| **GRAND TOTAL** | 106.37 | 55.65 | 52% |

**FIGURE 5 BALANCED FUND 5**




In this scenario, there is a notable discrepancy between the expected Net Asset Value (NAV) and the actual NAV, indicating a low level of prediction accuracy. Throughout all years considered, the NAV consistently appears overvalued. Interestingly, the accuracy remains relatively constant as the years progress. These consistent accuracy levels suggest a persistent state of high volatility in the NAV trend over the specified period.

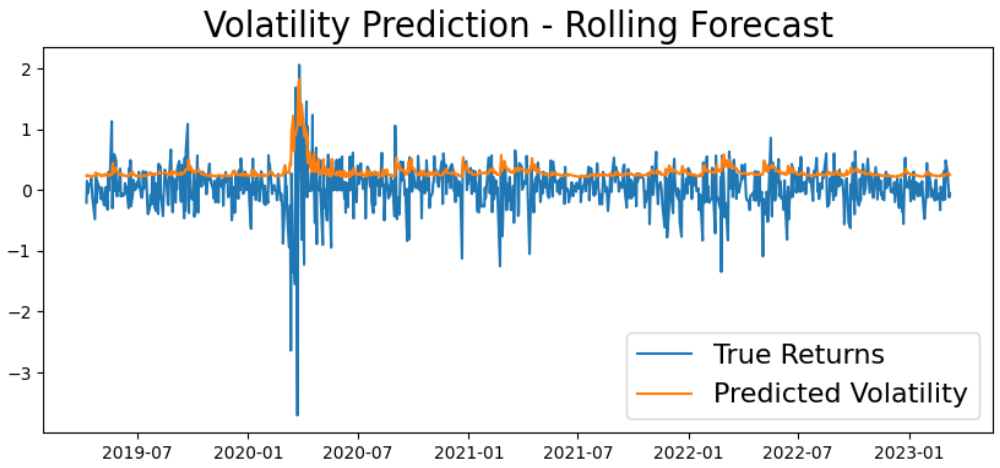
***BALANCED FUND 6***

**TABLE 6 BALANCED FUND 6**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 83.16 | 36.65 | 44% |
| **OVERVALUED** | 83.16 | 36.65 | 44% |
| **QTR1** | 74.18 | 33.52 | 45% |
| **QTR2** | 78.66 | 35.00 | 45% |
| **QTR3** | 85.54 | 37.47 | 44% |
| **QTR4** | 90.82 | 39.50 | 43% |
| **2021** | 102.60 | 44.44 | 43% |
| **OVERVALUED** | 102.60 | 44.44 | 43% |
| **QTR1** | 96.68 | 41.86 | 43% |
| **QTR2** | 100.08 | 43.30 | 43% |
| **QTR3** | 104.56 | 45.28 | 43% |

| | | | |
|---|---|---|---|
| **QTR4** | 108.82 | 47.23 | 43% |
| **2022** | 110.28 | 47.91 | 43% |
| **OVERVALUED** | 110.28 | 47.91 | 43% |
| **QTR1** | 108.78 | 47.20 | 43% |
| **QTR2** | 107.76 | 46.70 | 43% |
| **QTR3** | 110.75 | 48.12 | 43% |
| **QTR4** | 113.78 | 49.58 | 44% |
| **2023** | 114.61 | 49.99 | 44% |
| **OVERVALUED** | 114.61 | 49.99 | 44% |
| **QTR1** | 114.61 | 49.99 | 44% |
| **GRAND TOTAL** | 99.47 | 43.35 | 44% |

**FIGURE 6 BALANCED FUND 6**




In this scenario, there is a notable disparity between the expected Net Asset Value (NAV) and the actual NAV, indicating a low level of prediction accuracy. Throughout all years considered, the NAV consistently appears overvalued, showcasing a consistent trend. Remarkably, the accuracy remains constant over time. These consistent accuracy levels suggest a sustained state of high volatility in the NAV trend over the specified period.

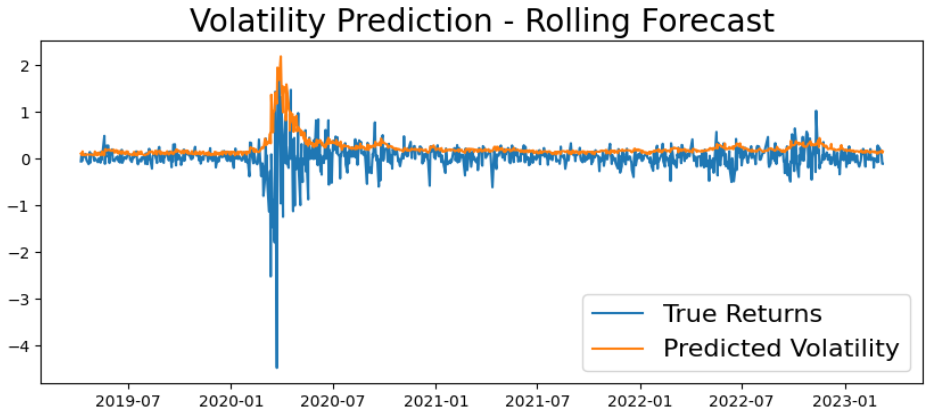
***BALANCED FUND 7***

**TABLE 7 BALANCED FUND 7**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 75.28 | 37.23 | 50% |
| **OVERVALUED** | 75.28 | 37.23 | 50% |
| **QTR1** | 67.78 | 34.56 | 51% |
| **QTR2** | 69.93 | 35.24 | 50% |
| **QTR3** | 78.38 | 38.33 | 49% |
| **QTR4** | 83.35 | 40.27 | 48% |

| | | | |
|---|---|---|---|
| **2021** | 92.51 | 44.14 | 48% |
| **OVERVALUED** | 92.51 | 44.14 | 48% |
| **QTR1** | 87.54 | 41.98 | 48% |
| **QTR2** | 91.05 | 43.48 | 48% |
| **QTR3** | 94.48 | 45.00 | 48% |
| **QTR4** | 96.78 | 46.04 | 48% |
| **2022** | 99.62 | 47.37 | 48% |
| **OVERVALUED** | 99.62 | 47.37 | 48% |
| **QTR1** | 97.38 | 46.31 | 48% |
| **QTR2** | 98.03 | 46.61 | 48% |
| **QTR3** | 99.71 | 47.40 | 48% |
| **QTR4** | 103.28 | 49.11 | 48% |
| **2023** | 104.99 | 49.95 | 48% |
| **OVERVALUED** | 104.99 | 49.95 | 48% |
| **QTR1** | 104.99 | 49.95 | 48% |
| **GRAND TOTAL** | 89.94 | 43.28 | 48% |

**FIGURE 7 BALANCED FUND 7**




In this scenario, there exists a significant gap between the expected Net Asset Value (NAV) and the actual NAV, indicating a low level of prediction accuracy. Notably, throughout all the years examined, the NAV consistently appears overvalued, displaying a persistent trend. Interestingly, the accuracy remains constant as the years progress, signaling a steady state of prediction consistency. These unchanging accuracy levels further imply a sustained period of high volatility in the NAV, highlighting the inherent instability within the specified timeframe.

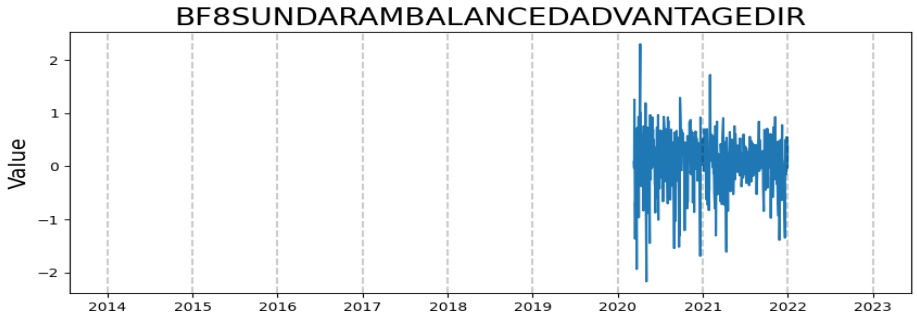
**BALANCED FUND 8**

**TABLE 8 BALANCED FUND 8**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 19.79 | 11.04 | 62% |
| **OVERVALUED** | 20.66 | 11.13 | 60% |

| | | | |
|---|---|---|---|
| **QTR1** | 10.49 | 10.05 | 96% |
| **QTR2** | 13.80 | 10.38 | 77% |
| **QTR3** | 23.28 | 11.39 | 49% |
| **QTR4** | 30.42 | 12.23 | 41% |
| **UNDERVALUED** | 8.17 | 9.82 | 83% |
| **QTR1** | 8.06 | 9.81 | 82% |
| **QTR2** | 8.40 | 9.84 | 85% |
| **2021** | 45.46 | 14.20 | 31% |
| **OVERVALUED** | 45.46 | 14.20 | 31% |
| **QTR1** | 39.21 | 13.34 | 34% |
| **QTR2** | 41.90 | 13.69 | 33% |
| **QTR3** | 48.38 | 14.60 | 30% |
| **QTR4** | 52.04 | 15.14 | 29% |
| **GRAND TOTAL** | 32.37 | 12.59 | 47% |

**FIGURE 8 BALANCED FUND 8**




In this scenario, there is a notable discrepancy between the expected Net Asset Value (NAV) and the actual NAV, indicating a low level of prediction accuracy. The NAV exhibits variability over the years, suggesting fluctuating trends. Importantly, the accuracy of predictions decreases as time progresses, highlighting a diminishing level of precision. These declining accuracy levels also suggest a period of high volatility in the NAV trend, reflecting the inherent instability within the specified timeframe.

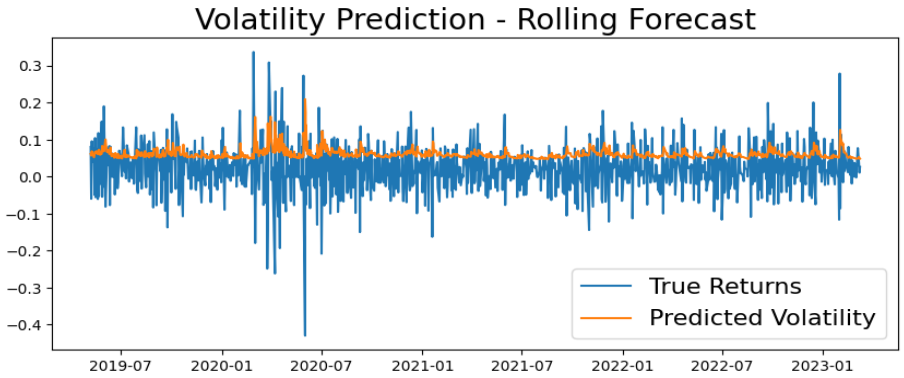
**BALANCED FUND 9**

**TABLE 9 BALANCED FUND 9**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL LEAVE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 59.76 | 25.31 | 42% |
| **OVERVALUED** | 59.76 | 25.31 | 42% |
| **QTR1** | 58.16 | 24.91 | 43% |
| **QTR2** | 59.13 | 25.15 | 43% |
| **QTR3** | 60.04 | 25.38 | 42% |

| | | | |
|---|---|---|---|
| **QTR4** | 61.03 | 25.63 | 42% |
| **2021** | 63.64 | 26.31 | 41% |
| **OVERVALUED** | 63.64 | 26.31 | 41% |
| **QTR1** | 61.93 | 25.87 | 42% |
| **QTR2** | 63.15 | 26.18 | 41% |
| **QTR3** | 64.30 | 26.49 | 41% |
| **QTR4** | 65.14 | 26.71 | 41% |
| **2022** | 68.29 | 27.57 | 40% |
| **OVERVALUED** | 68.29 | 27.57 | 40% |
| **QTR1** | 66.34 | 27.03 | 41% |
| **QTR2** | 67.66 | 27.39 | 40% |
| **QTR3** | 68.82 | 27.71 | 40% |
| **QTR4** | 70.36 | 28.14 | 40% |
| **2023** | 72.07 | 28.62 | 40% |
| **OVERVALUED** | 72.07 | 28.62 | 40% |
| **QTR1** | 72.07 | 28.62 | 40% |
| **GRAND TOTAL** | 64.33 | 26.52 | 41% |

**FIGURE 9 BALANCED FUND 9**




In this case, there's a significant disparity between the expected Net Asset Value (NAV) and the actual NAV, suggesting low prediction accuracy. Throughout all years, the NAV consistently appears overvalued, indicating a persistent trend. Surprisingly, the accuracy remains constant over time, implying consistent but inaccurate predictions. These unchanging accuracy levels point to sustained high volatility in the NAV, highlighting the instability within the specified timeframe.

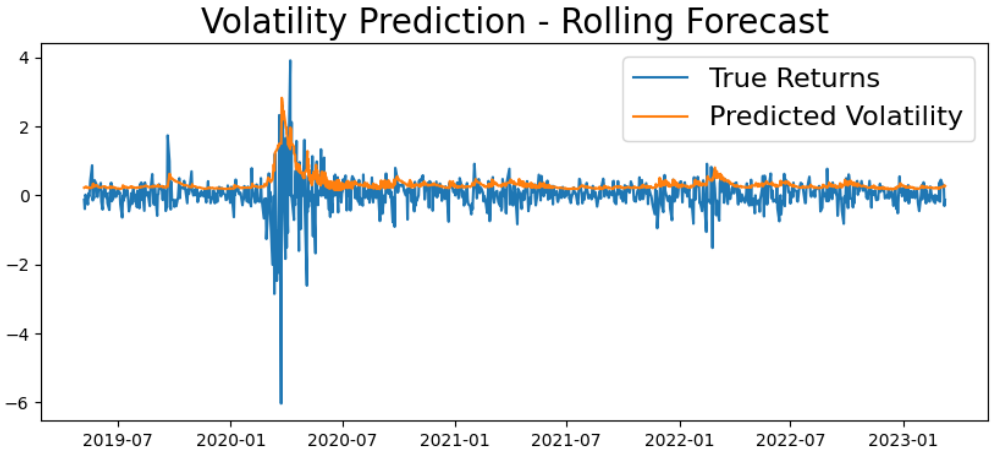
**BALANCED FUND 10**

**TABLE 10 BALANCED FUND 10**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 53.95 | 15.40 | 29% |
| **OVERVALUED** | 53.95 | 15.40 | 29% |

| | | | |
|---|---|---|---|
| **QTR1** | 43.83 | 13.96 | 32% |
| **QTR2** | 49.19 | 14.67 | 30% |
| **QTR3** | 56.92 | 15.83 | 28% |
| **QTR4** | 62.07 | 16.66 | 27% |
| **2021** | 71.57 | 18.32 | 26% |
| **OVERVALUED** | 71.57 | 18.32 | 26% |
| **QTR1** | 67.25 | 17.54 | 26% |
| **QTR2** | 69.11 | 17.86 | 26% |
| **QTR3** | 72.92 | 18.56 | 25% |
| **QTR4** | 76.87 | 19.30 | 25% |
| **2022** | 80.26 | 19.95 | 25% |
| **OVERVALUED** | 80.26 | 19.95 | 25% |
| **QTR1** | 78.15 | 19.54 | 25% |
| **QTR2** | 78.35 | 19.57 | 25% |
| **QTR3** | 80.68 | 20.03 | 25% |
| **QTR4** | 83.88 | 20.67 | 25% |
| **2023** | 85.34 | 20.97 | 25% |
| **OVERVALUED** | 85.34 | 20.97 | 25% |
| **QTR1** | 85.34 | 20.97 | 25% |
| **GRAND TOTAL** | 69.40 | 18.04 | 26% |

**FIGURE 10 BALANCED FUND 10**



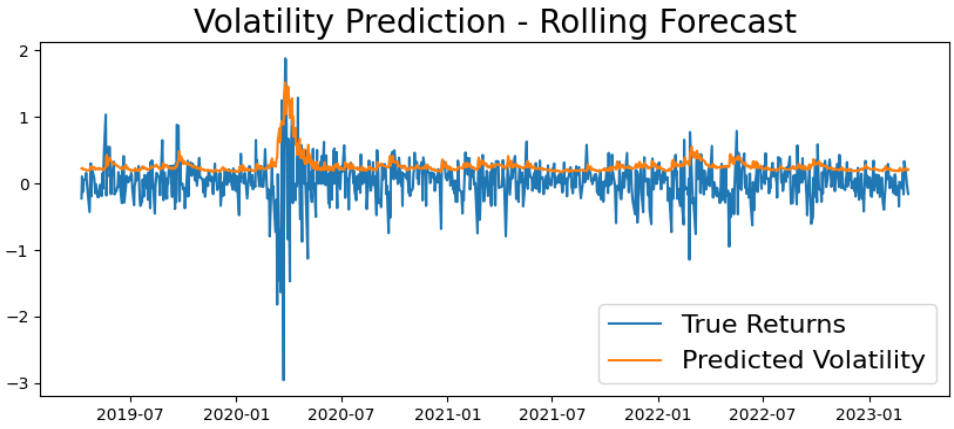

In this scenario, there's a notable discrepancy between the expected Net Asset Value (NAV) and the actual NAV, indicating a low level of prediction accuracy. Throughout all years examined, the NAV consistently appears overvalued, reflecting a consistent trend. Interestingly, the accuracy of predictions remains constant over time, suggesting a consistent yet inaccurate forecasting pattern. These unchanging accuracy levels hint at sustained high volatility in the NAV, underlining the inherent instability within the specified timeframe.

***FIXED INCOME FUND 1***

**TABLE 11 FIXED INCOME FUND 1**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 97.55 | 67.74 | 69% |
| **OVERVALUED** | 97.55 | 67.74 | 69% |
| **QTR1** | 89.76 | 62.68 | 70% |
| **QTR2** | 93.42 | 64.93 | 70% |
| **QTR3** | 99.94 | 69.28 | 69% |
| **QTR4** | 104.27 | 72.34 | 69% |
| **2021** | 113.28 | 79.17 | 70% |
| **OVERVALUED** | 113.28 | 79.17 | 70% |
| **QTR1** | 108.47 | 75.42 | 70% |
| **QTR2** | 111.29 | 77.56 | 70% |
| **QTR3** | 115.43 | 80.84 | 70% |
| **QTR4** | 117.71 | 82.68 | 70% |
| **2022** | 118.88 | 83.62 | 70% |
| **OVERVALUED** | 118.88 | 83.62 | 70% |
| **QTR1** | 117.97 | 82.88 | 70% |
| **QTR2** | 116.81 | 81.90 | 70% |
| **QTR3** | 119.23 | 83.89 | 70% |
| **QTR4** | 121.46 | 85.77 | 71% |
| **2023** | 122.02 | 86.23 | 71% |
| **OVERVALUED** | 122.02 | 86.23 | 71% |
| **QTR1** | 122.02 | 86.23 | 71% |
| **GRAND TOTAL** | 110.49 | 77.31 | 70% |

**FIGURE 11 FIXED INCOME FUND 1**



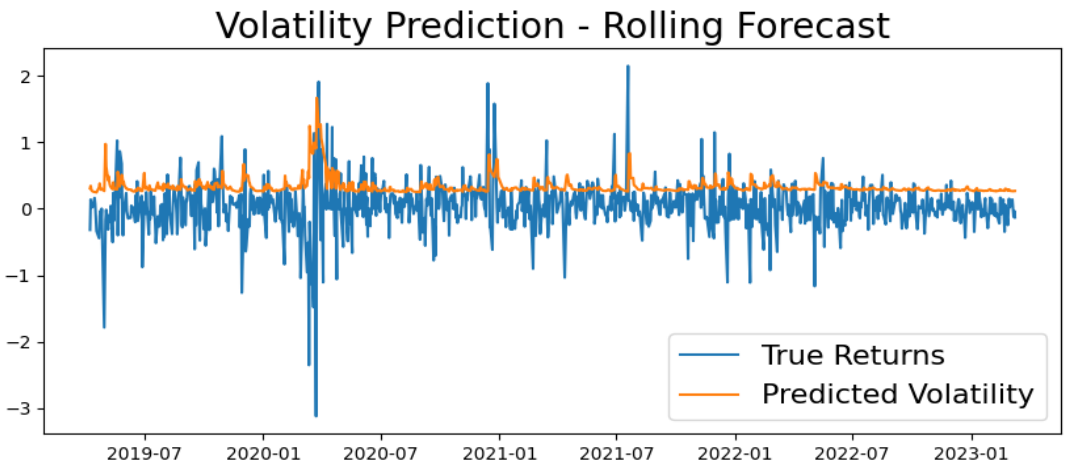
In this scenario, there's a notable disparity between the expected Net Asset Value (NAV) and the actual NAV, suggesting a medium level of prediction accuracy. Throughout all years examined, the NAV consistently appears overvalued, indicating a persistent trend. Surprisingly, the accuracy of predictions remains constant over time, suggesting a consistent but moderately accurate forecasting pattern. These unchanging accuracy levels still indicate high volatility in the NAV, underscoring the inherent instability within the specified timeframe.

***FIXED INCOME FUND 2***

**TABLE 12 FIXED INCOME FUND 2**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 106.44 | 60.67 | 57% |
| **OVERVALUED** | 106.44 | 60.67 | 57% |
| **QTR1** | 97.91 | 55.72 | 57% |
| **QTR2** | 102.05 | 58.00 | 57% |
| **QTR3** | 108.98 | 62.13 | 57% |
| **QTR4** | 113.62 | 65.09 | 57% |
| **2021** | 128.41 | 75.49 | 59% |
| **OVERVALUED** | 128.41 | 75.49 | 59% |
| **QTR1** | 120.81 | 69.87 | 58% |
| **QTR2** | 124.75 | 72.68 | 58% |
| **QTR3** | 131.62 | 77.81 | 59% |
| **QTR4** | 136.09 | 81.34 | 60% |
| **2022** | 137.62 | 82.54 | 60% |
| **OVERVALUED** | 137.62 | 82.54 | 60% |
| **QTR1** | 137.10 | 82.13 | 60% |
| **QTR2** | 136.00 | 81.21 | 60% |
| **QTR3** | 137.59 | 82.50 | 60% |
| **QTR4** | 139.75 | 84.29 | 60% |
| **2023** | 140.13 | 84.60 | 60% |
| **OVERVALUED** | 140.13 | 84.60 | 60% |
| **QTR1** | 140.13 | 84.60 | 60% |
| **GRAND TOTAL** | 124.92 | 73.47 | 59% |

***FIGURE 12 FIXED INCOME FUND 2***




In this scenario, there is a significant deviation between the expected Net Asset Value (NAV) and the actual NAV, indicating a low level of prediction accuracy. Throughout all the years considered, the NAV consistently appears overvalued, demonstrating a persistent trend. Surprisingly, the accuracy of predictions remains constant over time, suggesting a consistent but inadequately precise forecasting pattern. These stable accuracy levels still imply high volatility in the NAV, highlighting the inherent unpredictability within the specified timeframe.

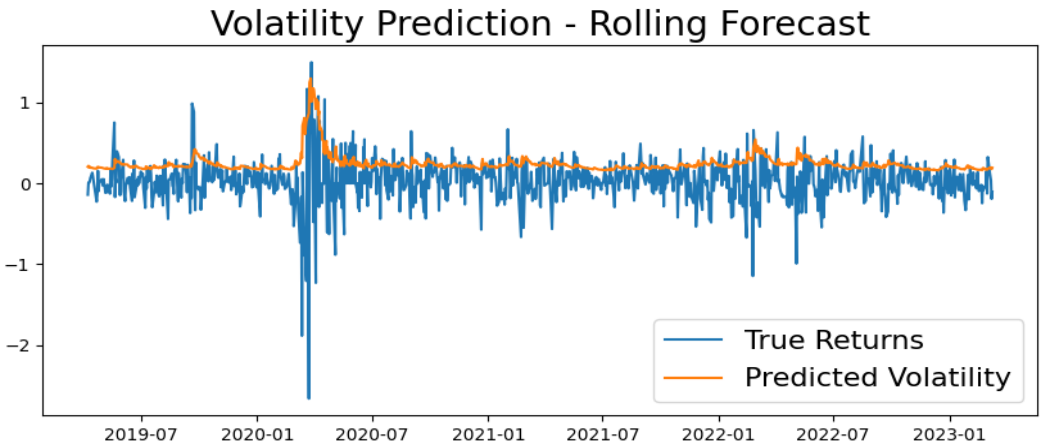
***FIXED INCOME FUND 3***

**TABLE 13 FIXED INCOME FUND 3**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 93.57 | 48.82 | 52% |
| **OVERVALUED** | 93.57 | 48.82 | 52% |
| **QTR1** | 87.17 | 45.79 | 53% |
| **QTR2** | 89.56 | 46.85 | 52% |
| **QTR3** | 95.63 | 49.77 | 52% |
| **QTR4** | 100.12 | 52.05 | 52% |
| **2021** | 108.11 | 56.39 | 52% |
| **OVERVALUED** | 108.11 | 56.39 | 52% |
| **QTR1** | 103.99 | 54.09 | 52% |
| **QTR2** | 105.98 | 55.18 | 52% |
| **QTR3** | 109.35 | 57.07 | 52% |
| **QTR4** | 112.92 | 59.13 | 52% |
| **2022** | 115.40 | 60.60 | 53% |
| **OVERVALUED** | 115.40 | 60.60 | 53% |
| **QTR1** | 113.63 | 59.53 | 52% |
| **QTR2** | 113.44 | 59.40 | 52% |
| **QTR3** | 116.02 | 60.95 | 53% |

| | | | |
|---|---|---|---|
| **QTR4** | 118.45 | 62.44 | 53% |
| **2023** | 119.05 | 62.81 | 53% |
| **OVERVALUED** | 119.05 | 62.81 | 53% |
| **QTR1** | 119.05 | 62.81 | 53% |
| **GRAND TOTAL** | 106.37 | 55.65 | 52% |

***FIGURE 13 FIXED INCOME FUND 3***




In this scenario, the discrepancy between the expected Net Asset Value (NAV) and the Actual NAV is considerable, pointing to a low level of prediction accuracy. Throughout all the years, the NAV consistently appears overvalued, indicating a persistent trend. Remarkably, the accuracy of predictions remains constant over time, implying a consistent yet insufficiently precise forecasting pattern. These stable accuracy levels still suggest high volatility in the NAV, underscoring the inherent unpredictability within the specified timeframe.

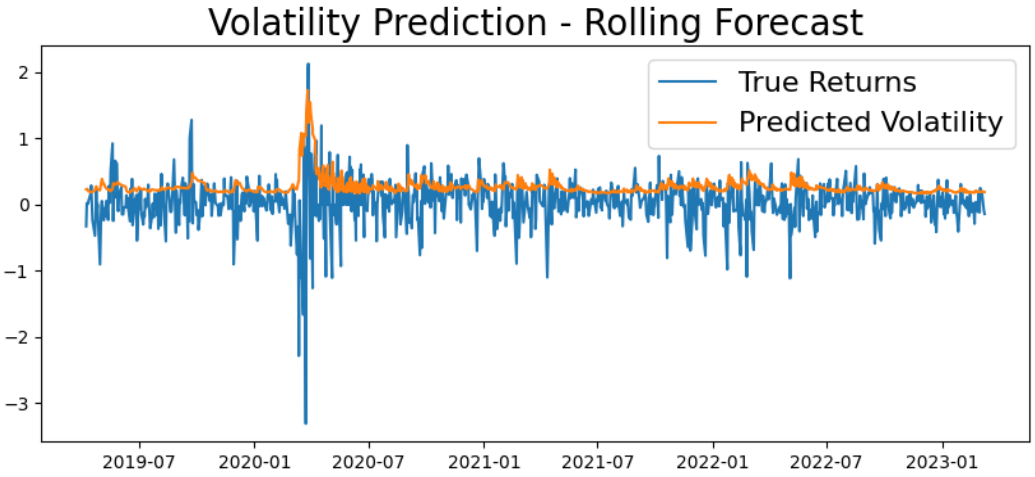
***FIXED INCOME FUND 4***

**TABLE 14 FIXED INCOME FUND 4**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 82.89 | 44.46 | 54% |
| **OVERVALUED** | 82.89 | 44.46 | 54% |
| **QTR1** | 75.67 | 41.38 | 55% |
| **QTR2** | 78.24 | 42.39 | 54% |
| **QTR3** | 85.06 | 45.36 | 53% |
| **QTR4** | 90.67 | 47.98 | 53% |
| **2021** | 102.02 | 53.75 | 53% |
| **OVERVALUED** | 102.02 | 53.75 | 53% |
| **QTR1** | 96.65 | 50.90 | 53% |
| **QTR2** | 99.53 | 52.38 | 53% |
| **QTR3** | 103.71 | 54.61 | 53% |
| **QTR4** | 107.97 | 56.97 | 53% |

| | | | |
|---|---|---|---|
| **2022** | 109.98 | 58.11 | 53% |
| **OVERVALUED** | 109.98 | 58.11 | 53% |
| **QTR1** | 108.26 | 57.12 | 53% |
| **QTR2** | 107.81 | 56.85 | 53% |
| **QTR3** | 110.57 | 58.44 | 53% |
| **QTR4** | 113.21 | 59.99 | 53% |
| **2023** | 113.97 | 60.44 | 53% |
| **OVERVALUED** | 113.97 | 60.44 | 53% |
| **QTR1** | 113.97 | 60.44 | 53% |
| **GRAND TOTAL** | 99.07 | 52.53 | 53% |

***FIGURE 14 FIXED INCOME FUND 4***




In this scenario, the discrepancy between the expected Net Asset Value (NAV) and the actual NAV is significant, indicating a low level of prediction accuracy. Throughout all the years, the NAV consistently appears overvalued, depicting a recurring trend. Interestingly, the accuracy of predictions remains constant over time, suggesting a consistent yet insufficiently accurate forecasting pattern. Despite this stable accuracy, the persistent overvaluation of NAV implies high volatility, highlighting the inherent unpredictability within the specified timeframe.

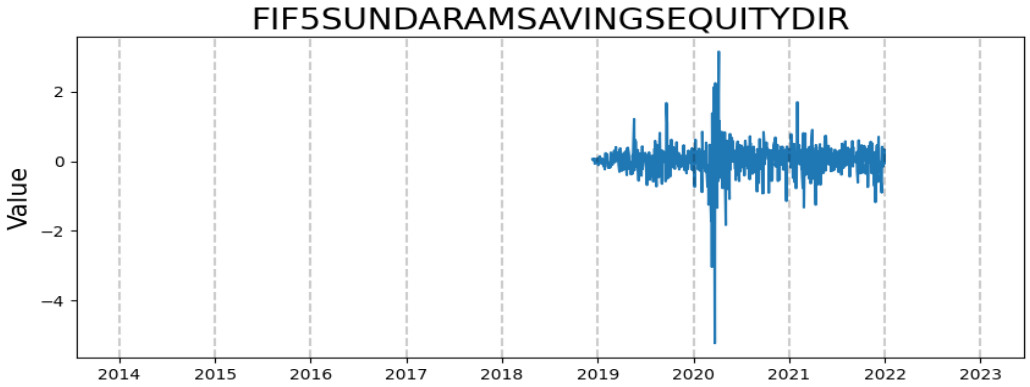
***15 FIXED INCOME FUND 5***

**TABLE 15 FIXED INCOME FUND 5**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2018** | 10.26 | 10.04 | 98% |
| **OVERVALUED** | 10.27 | 10.04 | 98% |
| **QTR4** | 10.27 | 10.04 | 98% |
| **UNDERVALUED** | 10.02 | 10.02 | 100% |
| **QTR4** | 10.02 | 10.02 | 100% |
| **2019** | 14.62 | 10.49 | 74% |

| | | | |
|---|---|---|---|
| **OVERVALUED** | 14.62 | 10.49 | 74% |
| **QTR1** | 11.11 | 10.13 | 92% |
| **QTR2** | 14.33 | 10.46 | 73% |
| **QTR3** | 14.95 | 10.52 | 71% |
| **QTR4** | 18.18 | 10.86 | 60% |
| **2020** | 18.13 | 10.82 | 62% |
| **OVERVALUED** | 18.69 | 10.88 | 62% |
| **QTR1** | 19.24 | 10.97 | 58% |
| **QTR2** | 13.81 | 10.34 | 76% |
| **QTR3** | 20.41 | 11.04 | 54% |
| **QTR4** | 25.12 | 11.57 | 46% |
| **UNDERVALUED** | 7.33 | 9.71 | 75% |
| **QTR1** | 7.29 | 9.71 | 75% |
| **QTR2** | 7.43 | 9.71 | 76% |
| **2021** | 34.66 | 12.72 | 37% |
| **OVERVALUED** | 34.66 | 12.72 | 37% |
| **QTR1** | 30.84 | 12.24 | 40% |
| **QTR2** | 32.26 | 12.41 | 39% |
| **QTR3** | 36.48 | 12.94 | 36% |
| **QTR4** | 38.86 | 13.25 | 34% |
| **GRAND TOTAL** | 21.99 | 11.29 | 59% |

***FIGURE 15 FIXED INCOME FUND 5***



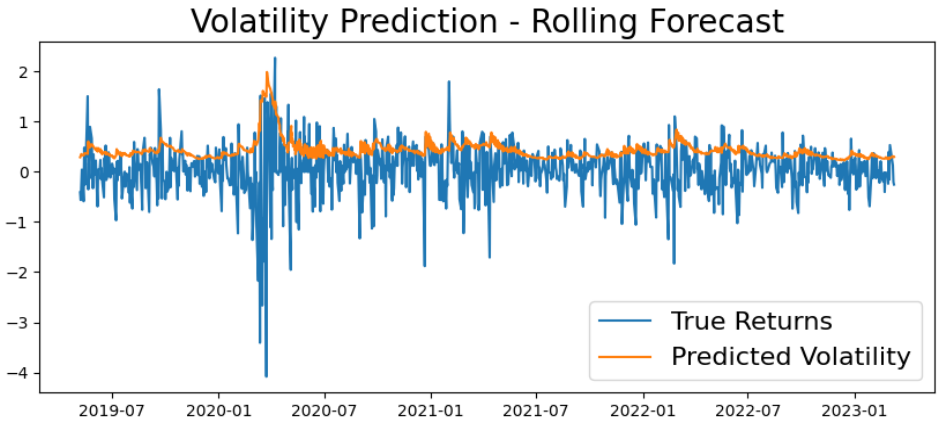

In this scenario, there is a notable discrepancy between the expected Net Asset Value (NAV) and the actual NAV, indicating a low level of prediction accuracy. The NAV exhibits variability over the years, suggesting changing trends. Importantly, the accuracy of predictions decreases as the years progress, highlighting a diminishing level of precision. These declining accuracy levels also suggest a period of high volatility in the NAV trend, reflecting the inherent instability within the specified timeframe.

***FIXED INCOME FUND 6***

**TABLE 16 FIXED INCOME FUND 6**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 76.29 | 38.43 | 50% |
| **OVERVALUED** | 76.29 | 38.43 | 50% |
| **QTR1** | 67.56 | 35.26 | 52% |
| **QTR2** | 71.86 | 36.73 | 51% |
| **QTR3** | 78.68 | 39.28 | 50% |
| **QTR4** | 84.07 | 41.45 | 49% |
| **2021** | 100.65 | 48.88 | 49% |
| **OVERVALUED** | 100.65 | 48.88 | 49% |
| **QTR1** | 93.86 | 45.65 | 49% |
| **QTR2** | 97.89 | 47.50 | 49% |
| **QTR3** | 103.75 | 50.34 | 49% |
| **QTR4** | 106.88 | 51.92 | 49% |
| **2022** | 109.02 | 52.99 | 49% |
| **OVERVALUED** | 109.02 | 52.99 | 49% |
| **QTR1** | 107.35 | 52.13 | 49% |
| **QTR2** | 106.69 | 51.76 | 49% |
| **QTR3** | 109.38 | 53.15 | 49% |
| **QTR4** | 112.71 | 54.93 | 49% |
| **2023** | 113.27 | 55.22 | 49% |
| **OVERVALUED** | 113.27 | 55.22 | 49% |
| **QTR1** | 113.27 | 55.22 | 49% |
| **GRAND TOTAL** | 96.13 | 47.16 | 49% |

**FIGURE 16 FIXED INCOME FUND 6**



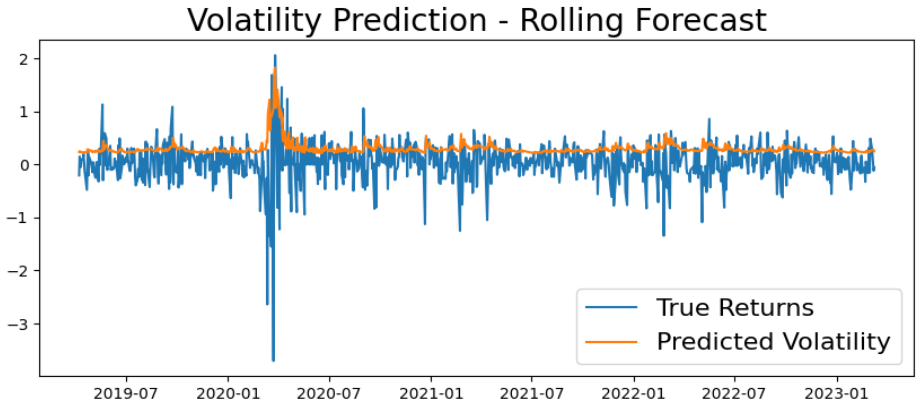
In this case, there's a noticeable difference between the expected and actual Net Asset Values (NAV), indicating that predictions aren't very accurate. The NAV consistently appears higher than expected every year, suggesting a recurring trend of overvaluation. Interestingly, the accuracy of predictions remains the same over time, showing a consistent but not very precise forecasting pattern. Despite this stability, the ongoing overvaluation of NAV suggests a high level of volatility, emphasizing the uncertainty within the specified timeframe.

***FIXED INCOME FUND 7***

**TABLE 17 FIXED INCOME FUND 7**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 83.16 | 36.65 | 44% |
| **OVERVALUED** | 83.16 | 36.65 | 44% |
| **QTR1** | 74.18 | 33.52 | 45% |
| **QTR2** | 78.66 | 35.00 | 45% |
| **QTR3** | 85.54 | 37.47 | 44% |
| **QTR4** | 90.82 | 39.50 | 43% |
| **2021** | 102.60 | 44.44 | 43% |
| **OVERVALUED** | 102.60 | 44.44 | 43% |
| **QTR1** | 96.68 | 41.86 | 43% |
| **QTR2** | 100.08 | 43.30 | 43% |
| **QTR3** | 104.56 | 45.28 | 43% |
| **QTR4** | 108.82 | 47.23 | 43% |
| **2022** | 110.28 | 47.91 | 43% |
| **OVERVALUED** | 110.28 | 47.91 | 43% |
| **QTR1** | 108.78 | 47.20 | 43% |
| **QTR2** | 107.76 | 46.70 | 43% |
| **QTR3** | 110.75 | 48.12 | 43% |
| **QTR4** | 113.78 | 49.58 | 44% |
| **2023** | 114.61 | 49.99 | 44% |
| **OVERVALUED** | 114.61 | 49.99 | 44% |
| **QTR1** | 114.61 | 49.99 | 44% |
| **GRAND TOTAL** | 99.47 | 43.35 | 44% |

**FIGURE 17 FIXED INCOME FUND 7**




In this scenario, we observe a substantial discrepancy between the anticipated and actual Net Asset Values (NAV), indicating a notable lack of precision in predictions. Across all years, the NAV consistently reflects higher values than expected, portraying a persistent trend of overvaluation. Interestingly, despite the passage of time, the accuracy of predictions remains consistently inadequate. This static accuracy level suggests a steady but insufficient forecasting pattern. Nevertheless, the persistent overvaluation of NAV implies a high level of volatility, underscoring the inherent uncertainty within the specified timeframe.

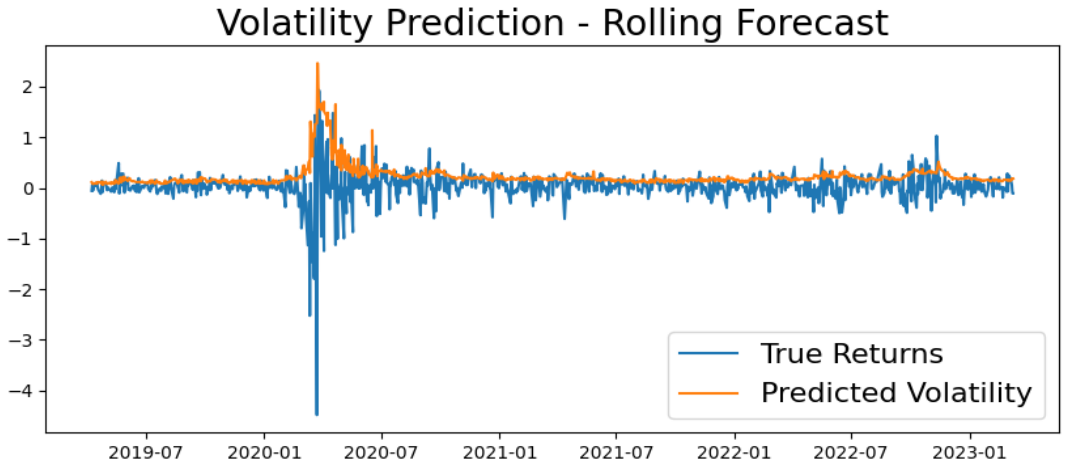
***FIXED INCOME FUND 8***

**TABLE 18 FIXED INCOME FUND 8**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 75.28 | 37.23 | 50% |
| **OVERVALUED** | 75.28 | 37.23 | 50% |
| **QTR1** | 67.78 | 34.56 | 51% |
| **QTR2** | 69.93 | 35.24 | 50% |
| **QTR3** | 78.38 | 38.33 | 49% |
| **QTR4** | 83.35 | 40.27 | 48% |
| **2021** | 92.51 | 44.14 | 48% |
| **OVERVALUED** | 92.51 | 44.14 | 48% |
| **QTR1** | 87.54 | 41.98 | 48% |
| **QTR2** | 91.05 | 43.48 | 48% |
| **QTR3** | 94.48 | 45.00 | 48% |
| **QTR4** | 96.78 | 46.04 | 48% |
| **2022** | 99.62 | 47.37 | 48% |
| **OVERVALUED** | 99.62 | 47.37 | 48% |
| **QTR1** | 97.38 | 46.31 | 48% |
| **QTR2** | 98.03 | 46.61 | 48% |
| **QTR3** | 99.71 | 47.40 | 48% |
| **QTR4** | 103.28 | 49.11 | 48% |

| | | | |
|---|---|---|---|
| **2023** | 104.99 | 49.95 | 48% |
| **OVERVALUED** | 104.99 | 49.95 | 48% |
| **QTR1** | 104.99 | 49.95 | 48% |
| **GRAND TOTAL** | 89.94 | 43.28 | 48% |

***FIGURE 18 FIXED INCOME FUND 8***




In this scenario, we observe a notable discrepancy between the expected and actual Net Asset Values (NAV), indicating a considerable lack of precision in predictions. Throughout all the years under consideration, the NAV consistently exceeds expectations, signaling a persistent trend of overvaluation. Interestingly, despite the passage of time, the accuracy of predictions remains consistently low. This steady accuracy level suggests a persistent but inadequate forecasting pattern. However, the sustained overvaluation of NAV implies a high level of volatility, highlighting the inherent unpredictability within the specified timeframe.

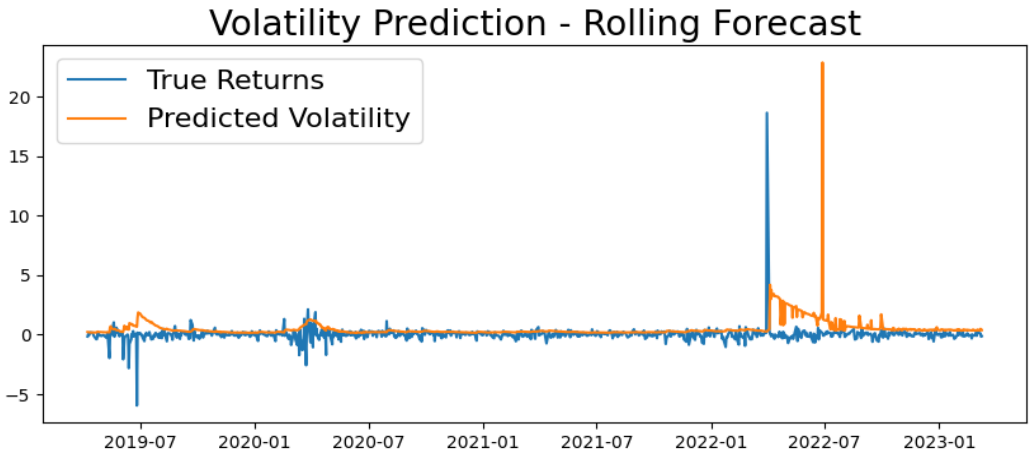
***FIXED INCOME FUND 9***

**TABLE 19 FIXED INCOME FUND 9**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 51.94 | 20.33 | 39% |
| **OVERVALUED** | 51.94 | 20.33 | 39% |
| **QTR1** | 45.76 | 19.11 | 42% |
| **QTR2** | 48.04 | 19.53 | 41% |
| **QTR3** | 53.92 | 20.71 | 38% |
| **QTR4** | 58.32 | 21.64 | 37% |
| **2021** | 64.86 | 23.10 | 36% |
| **OVERVALUED** | 64.86 | 23.10 | 36% |
| **QTR1** | 60.64 | 22.14 | 37% |
| **QTR2** | 62.87 | 22.64 | 36% |
| **QTR3** | 66.90 | 23.56 | 35% |

| | | | |
|---|---|---|---|
| **QTR4** | 68.84 | 24.02 | 35% |
| **2022** | 83.56 | 27.57 | 33% |
| **OVERVALUED** | 83.56 | 27.57 | 33% |
| **QTR1** | 69.16 | 24.09 | 35% |
| **QTR2** | 86.33 | 28.16 | 33% |
| **QTR3** | 88.28 | 28.71 | 33% |
| **QTR4** | 90.21 | 29.26 | 32% |
| **2023** | 90.65 | 29.38 | 32% |
| **OVERVALUED** | 90.65 | 29.38 | 32% |
| **QTR1** | 90.65 | 29.38 | 32% |
| **GRAND TOTAL** | 68.09 | 23.98 | 36% |

***FIGURE 19 FIXED INCOME FUND 9***




In this instance, we observe a significant discrepancy between the expected and actual Net Asset Values (NAV), indicating a notable lack of precision in predictions. Across all years, the NAV consistently demonstrates an overvaluation trend. Interestingly, despite the passage of time, the accuracy of predictions remains consistently low, indicating a steady but inadequate forecasting pattern. These persistent accuracy levels suggest a high degree of volatility inherent in the NAV, emphasizing the uncertainty prevailing throughout the specified timeframe.

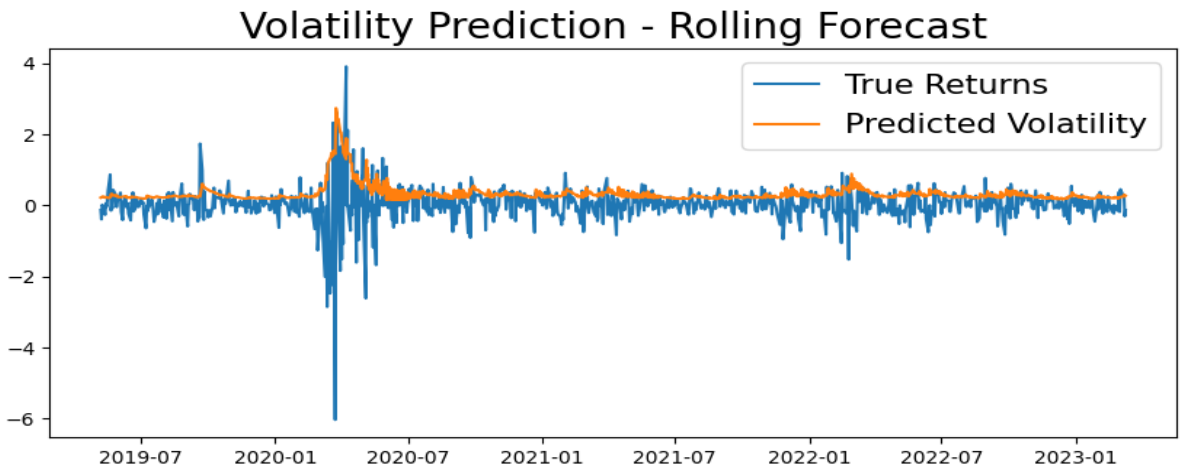
***FIXED INCOME FUND 10***

**TABLE 20 FIXED INCOME FUND 10**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 53.95 | 15.40 | 29% |
| **OVERVALUED** | 53.95 | 15.40 | 29% |
| **QTR1** | 43.83 | 13.96 | 32% |
| **QTR2** | 49.19 | 14.67 | 30% |
| **QTR3** | 56.92 | 15.83 | 28% |

| | | | |
|---|---|---|---|
| **QTR4** | 62.07 | 16.66 | 27% |
| **2021** | 71.57 | 18.32 | 26% |
| **OVERVALUED** | 71.57 | 18.32 | 26% |
| **QTR1** | 67.25 | 17.54 | 26% |
| **QTR2** | 69.11 | 17.86 | 26% |
| **QTR3** | 72.92 | 18.56 | 25% |
| **QTR4** | 76.87 | 19.30 | 25% |
| **2022** | 80.26 | 19.95 | 25% |
| **OVERVALUED** | 80.26 | 19.95 | 25% |
| **QTR1** | 78.15 | 19.54 | 25% |
| **QTR2** | 78.35 | 19.57 | 25% |
| **QTR3** | 80.68 | 20.03 | 25% |
| **QTR4** | 83.88 | 20.67 | 25% |
| **2023** | 85.34 | 20.97 | 25% |
| **OVERVALUED** | 85.34 | 20.97 | 25% |
| **QTR1** | 85.34 | 20.97 | 25% |
| **GRAND TOTAL** | 69.40 | 18.04 | 26% |

***FIGURE 20 FIXED INCOME FUND 10***



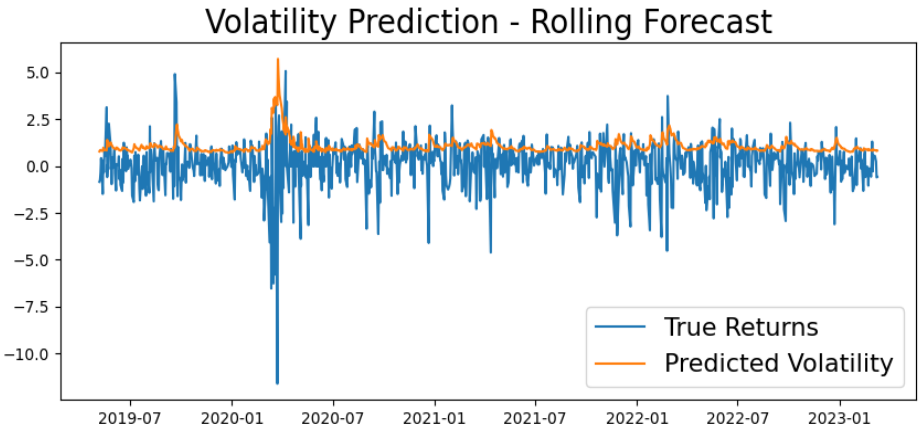

In this scenario, we observe a significant disparity between the expected and actual Net Asset Values (NAV), highlighting a notable lack of precision in predictions. Throughout all the years, the NAV consistently reflects an overvalued status. Surprisingly, the accuracy of predictions remains constant over time, suggesting a consistent but insufficient forecasting pattern. These consistent accuracy levels also imply a high level of volatility in the NAV, underscoring the inherent unpredictability within the specified timeframe.

***GROWTH FUND 1***

**TABLE 21 GROWTH FUND 1**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 583.48 | 1105.77 | 54% |
| **UNDERVALUED** | 583.48 | 1105.77 | 54% |
| **QTR1** | 568.04 | 954.63 | 60% |
| **QTR2** | 570.78 | 966.51 | 59% |
| **QTR3** | 590.39 | 1171.63 | 51% |
| **QTR4** | 603.41 | 1330.55 | 46% |
| **2021** | 639.53 | 1904.00 | 34% |
| **UNDERVALUED** | 639.53 | 1904.00 | 34% |
| **QTR1** | 623.23 | 1613.17 | 39% |
| **QTR2** | 631.53 | 1746.18 | 36% |
| **QTR3** | 647.23 | 2038.84 | 32% |
| **QTR4** | 655.62 | 2208.38 | 30% |
| **2022** | 655.96 | 2193.08 | 30% |
| **UNDERVALUED** | 655.96 | 2193.08 | 30% |
| **QTR1** | 653.26 | 2145.94 | 30% |
| **QTR2** | 650.00 | 2067.11 | 31% |
| **QTR3** | 657.74 | 2225.63 | 30% |
| **QTR4** | 662.90 | 2334.66 | 28% |
| **2023** | 661.53 | 2298.73 | 29% |
| **UNDERVALUED** | 661.53 | 2298.73 | 29% |
| **QTR1** | 661.53 | 2298.73 | 29% |
| **GRAND TOTAL** | 627.85 | 1759.51 | 39% |

**FIGURE 21 GROWTH FUND 1**



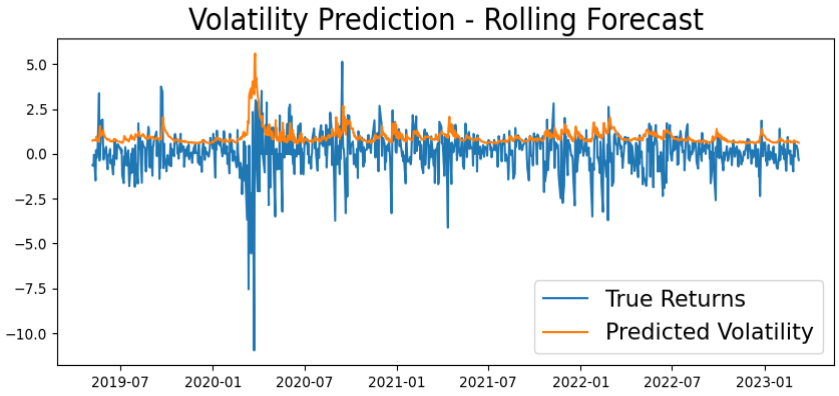
In this situation, there's a considerable difference between the anticipated and actual Net Asset Values (NAV), pointing to a limited accuracy in predictions. Throughout each year, the NAV consistently indicates undervaluation. However, there's a noticeable uptrend in prediction accuracy over time, corresponding with an increase in actual returns. Despite this enhancement in accuracy, the ongoing undervaluation of NAV suggests persistent volatility, highlighting the inherent unpredictability within the specified timeframe.

***GROWTH FUND 2***

**TABLE 22 GROWTH FUND 2**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 129.37 | 75.64 | 58% |
| **OVERVALUED** | 129.37 | 75.64 | 58% |
| **QTR1** | 109.60 | 62.10 | 57% |
| **QTR2** | 113.16 | 63.42 | 56% |
| **QTR3** | 137.01 | 80.24 | 58% |
| **QTR4** | 156.11 | 96.68 | 62% |
| **2021** | 203.25 | 155.42 | 76% |
| **OVERVALUED** | 203.25 | 155.42 | 76% |
| **QTR1** | 180.56 | 122.95 | 68% |
| **QTR2** | 196.37 | 143.50 | 73% |
| **QTR3** | 212.57 | 168.32 | 79% |
| **QTR4** | 222.86 | 185.98 | 83% |
| **2022** | 221.44 | 182.02 | 82% |
| **OVERVALUED** | 221.44 | 182.02 | 82% |
| **QTR1** | 221.44 | 182.72 | 82% |
| **QTR2** | 217.49 | 175.12 | 80% |
| **QTR3** | 222.27 | 183.18 | 82% |
| **QTR4** | 224.62 | 187.11 | 83% |
| **2023** | 223.10 | 184.10 | 83% |
| **OVERVALUED** | 223.10 | 184.10 | 83% |
| **QTR1** | 223.10 | 184.10 | 83% |
| **GRAND TOTAL** | 186.23 | 139.62 | 73% |

**FIGURE 22 GROWTH FUND 2**




In this scenario, there's a significant gap between the anticipated and actual Net Asset Values (NAV), suggesting a low accuracy in predictions. Throughout each year, the NAV consistently appears overvalued. However, there's a clear improvement in prediction accuracy over time, corresponding with an increase in actual returns. Despite this upward trend in accuracy, the persistent overvaluation of NAV implies high volatility, highlighting the inherent unpredictability within the specified timeframe.

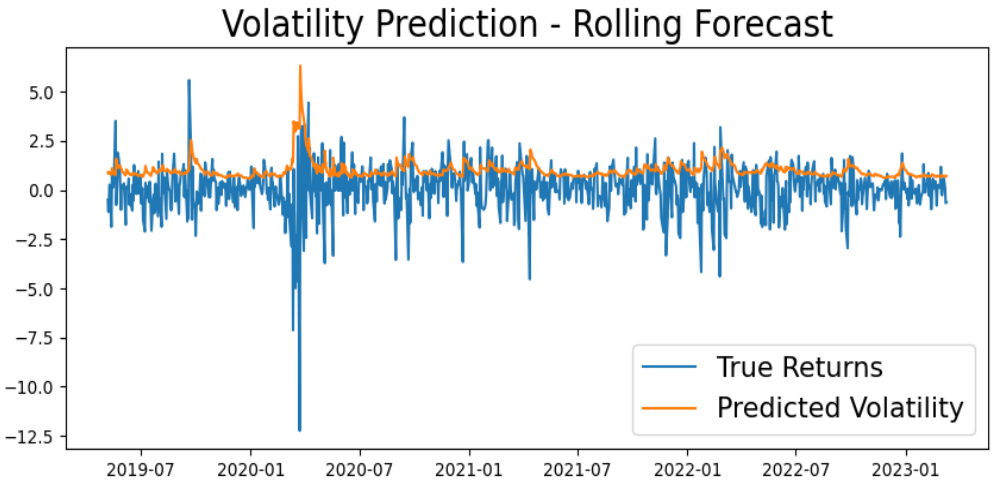
***GROWTH FUND 3***

**TABLE 23 GROWTH FUND 3**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 117.63 | 72.32 | 61% |
| **OVERVALUED** | 117.63 | 72.32 | 61% |
| **QTR1** | 98.79 | 60.29 | 61% |
| **QTR2** | 104.50 | 62.88 | 60% |
| **QTR3** | 124.85 | 76.69 | 61% |
| **QTR4** | 138.86 | 88.07 | 63% |
| **2021** | 178.24 | 130.06 | 73% |
| **OVERVALUED** | 178.24 | 130.06 | 73% |
| **QTR1** | 161.83 | 110.17 | 68% |
| **QTR2** | 172.12 | 121.55 | 71% |
| **QTR3** | 184.42 | 137.22 | 74% |
| **QTR4** | 194.12 | 150.71 | 78% |
| **2022** | 197.13 | 153.87 | 78% |
| **OVERVALUED** | 197.13 | 153.87 | 78% |
| **QTR1** | 193.96 | 149.76 | 77% |
| **QTR2** | 191.53 | 145.47 | 76% |
| **QTR3** | 200.14 | 158.19 | 79% |
| **QTR4** | 202.90 | 162.06 | 80% |
| **2023** | 200.74 | 158.42 | 79% |

| | | | |
|---|---|---|---|
| **OVERVALUED** | 200.74 | 158.42 | 79% |
| **QTR1** | 200.74 | 158.42 | 79% |
| **GRAND TOTAL** | 165.88 | 120.49 | 71% |

***FIGURE 23 GROWTH FUND 3***




In this scenario, there exists a significant disparity between the anticipated and actual Net Asset Values (NAV), indicating a low level of prediction accuracy. Throughout the years, the NAV consistently reflects overvaluation. However, there is an observable improvement in prediction accuracy over time, coinciding with an increase in actual returns. Despite this upward trend in accuracy, these levels still suggest a high degree of volatility in the NAV, underscoring the inherent unpredictability within the specified timeframe.

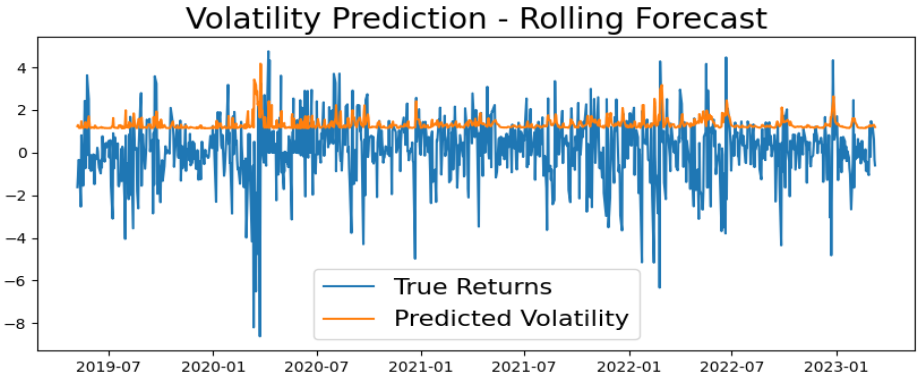
***GROWTH FUND 4***

**TABLE 24 GROWTH FUND 4**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 73.27 | 47.42 | 68% |
| **OVERVALUED** | 73.81 | 47.64 | 68% |
| **QTR1** | 38.66 | 32.83 | 87% |
| **QTR2** | 49.21 | 36.13 | 74% |
| **QTR3** | 88.78 | 53.51 | 60% |
| **QTR4** | 110.30 | 65.59 | 59% |
| **UNDERVALUED** | 27.28 | 29.07 | 94% |
| **QTR1** | 27.28 | 29.07 | 94% |
| **2021** | 163.45 | 112.61 | 68% |
| **OVERVALUED** | 163.45 | 112.61 | 68% |
| **QTR1** | 130.22 | 79.67 | 61% |
| **QTR2** | 158.05 | 104.97 | 66% |
| **QTR3** | 178.22 | 127.47 | 72% |

| | | | |
|---|---|---|---|
| **QTR4** | 186.45 | 137.44 | 74% |
| **2022** | 188.49 | 137.77 | 73% |
| **OVERVALUED** | 188.49 | 137.77 | 73% |
| **QTR1** | 188.17 | 138.68 | 74% |
| **QTR2** | 183.13 | 130.90 | 71% |
| **QTR3** | 186.59 | 134.40 | 72% |
| **QTR4** | 196.23 | 147.32 | 75% |
| **2023** | 199.77 | 151.89 | 76% |
| **OVERVALUED** | 199.77 | 151.89 | 76% |
| **QTR1** | 199.77 | 151.89 | 76% |
| **GRAND TOTAL** | 144.28 | 101.71 | 70% |

***FIGURE 24 GROWTH FUND 4***




In this scenario, there's a notable discrepancy between the expected and actual Net Asset Values (NAV), indicating a low level of prediction accuracy. Throughout all the years, the NAV consistently shows as overvalued. However, there's an improving trend in prediction accuracy over time, corresponding with an increase in actual returns. Despite this positive development, these accuracy levels still suggest a high degree of volatility in the NAV, emphasizing the inherent unpredictability within the specified timeframe.

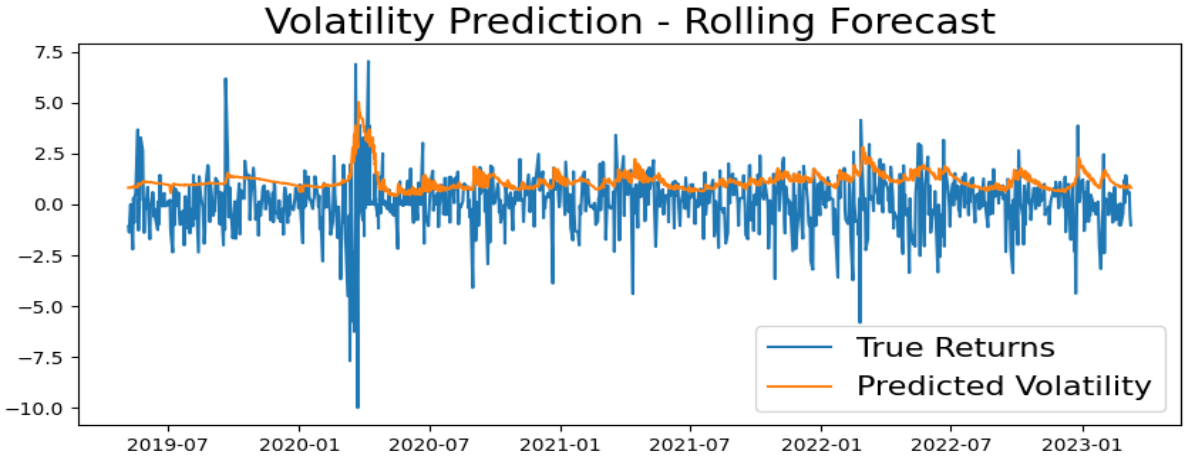
***GROWTH FUND 5***

**TABLE 25 GROWTH FUND 5**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 94.43 | 59.01 | 63% |
| **OVERVALUED** | 94.43 | 59.01 | 63% |
| **QTR1** | 66.75 | 44.92 | 68% |
| **QTR2** | 83.52 | 52.47 | 63% |
| **QTR3** | 100.62 | 62.02 | 62% |
| **QTR4** | 114.79 | 71.33 | 62% |
| **2021** | 155.28 | 106.77 | 68% |

| | | | |
|---|---|---|---|
| **OVERVALUED** | 155.28 | 106.77 | 68% |
| **QTR1** | 132.46 | 84.58 | 64% |
| **QTR2** | 151.12 | 101.60 | 67% |
| **QTR3** | 164.07 | 115.14 | 70% |
| **QTR4** | 172.90 | 125.18 | 72% |
| **2022** | 181.12 | 134.19 | 74% |
| **OVERVALUED** | 181.12 | 134.19 | 74% |
| **QTR1** | 174.48 | 126.42 | 72% |
| **QTR2** | 176.57 | 128.26 | 73% |
| **QTR3** | 182.57 | 135.52 | 74% |
| **QTR4** | 190.90 | 146.62 | 77% |
| **2023** | 190.46 | 145.38 | 76% |
| **OVERVALUED** | 190.46 | 145.38 | 76% |
| **QTR1** | 190.46 | 145.38 | 76% |
| **GRAND TOTAL** | 145.75 | 102.15 | 69% |

**FIGURE 25 GROWTH FUND 5**




In this scenario, there's a notable disparity between the anticipated and actual Net Asset Values (NAV), signalling a low accuracy in predictions. Across all years, the NAV consistently registers as overvalued. However, there's an improving trend in prediction accuracy over time, mirroring the rise in actual returns. Despite this positive trend, these accuracy levels still indicate significant volatility in the NAV, highlighting the inherent unpredictability within the specified timeframe.

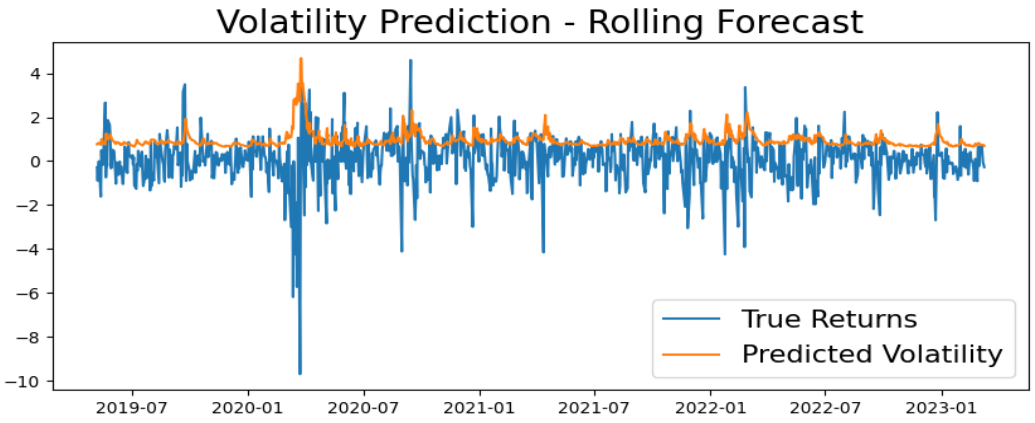
**GROWTH FUND 6**

**TABLE 26 GROWTH FUND 6**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 156.47 | 56.41 | 36% |

| | | | |
|---|---|---|---|
| **OVERVALUED** | 156.47 | 56.41 | 36% |
| **QTR1** | 137.69 | 46.81 | 34% |
| **QTR2** | 142.74 | 48.67 | 34% |
| **QTR3** | 163.46 | 59.73 | 36% |
| **QTR4** | 179.05 | 69.55 | 39% |
| **2021** | 215.29 | 99.74 | 46% |
| **OVERVALUED** | 215.29 | 99.74 | 46% |
| **QTR1** | 198.28 | 83.87 | 42% |
| **QTR2** | 210.25 | 94.30 | 45% |
| **QTR3** | 221.45 | 105.23 | 48% |
| **QTR4** | 230.73 | 115.15 | 50% |
| **2022** | 234.38 | 118.67 | 51% |
| **OVERVALUED** | 234.38 | 118.67 | 51% |
| **QTR1** | 230.21 | 114.13 | 50% |
| **QTR2** | 228.33 | 111.61 | 49% |
| **QTR3** | 236.18 | 120.56 | 51% |
| **QTR4** | 242.84 | 128.45 | 53% |
| **2023** | 240.03 | 124.71 | 52% |
| **OVERVALUED** | 240.03 | 124.71 | 52% |
| **QTR1** | 240.03 | 124.71 | 52% |
| **GRAND TOTAL** | 203.70 | 93.11 | 45% |

***FIGURE 26 GROWTH FUND 6***



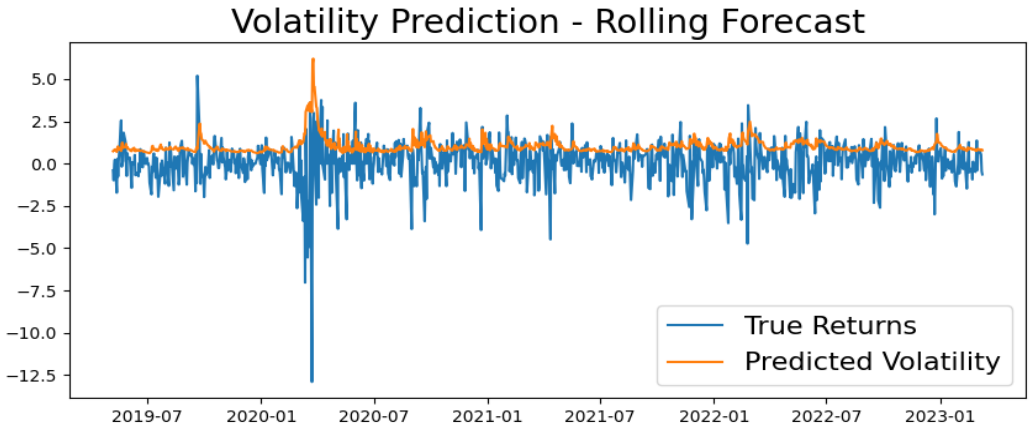

In this instance, there's a notable discrepancy between the projected and actual Net Asset Values (NAV), indicating a limited predictive accuracy. Throughout each year, the NAV consistently shows as overvalued. However, there's a positive trend of improving precision over time, aligning with a rise in actual returns. Despite this upward trajectory, these accuracy levels still imply substantial volatility in the NAV, highlighting the inherent unpredictability within the specified timeframe.

***GROWTH FUND 7***

**TABLE 27 GROWTH FUND 7**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 117.18 | 52.37 | 45% |
| **OVERVALUED** | 117.18 | 52.37 | 45% |
| **QTR1** | 99.49 | 44.23 | 44% |
| **QTR2** | 104.83 | 45.95 | 44% |
| **QTR3** | 123.89 | 55.36 | 45% |
| **QTR4** | 137.21 | 63.07 | 46% |
| **2021** | 170.77 | 87.77 | 51% |
| **OVERVALUED** | 170.77 | 87.77 | 51% |
| **QTR1** | 155.87 | 75.59 | 48% |
| **QTR2** | 165.95 | 83.29 | 50% |
| **QTR3** | 177.13 | 92.93 | 52% |
| **QTR4** | 183.70 | 98.91 | 54% |
| **2022** | 186.66 | 100.97 | 54% |
| **OVERVALUED** | 186.66 | 100.97 | 54% |
| **QTR1** | 182.52 | 97.28 | 53% |
| **QTR2** | 179.77 | 94.21 | 52% |
| **QTR3** | 188.54 | 102.53 | 54% |
| **QTR4** | 195.87 | 109.91 | 56% |
| **2023** | 196.54 | 110.40 | 56% |
| **OVERVALUED** | 196.54 | 110.40 | 56% |
| **QTR1** | 196.54 | 110.40 | 56% |
| **GRAND TOTAL** | 159.94 | 81.79 | 50% |

**FIGURE 27 GROWTH FUND 7**



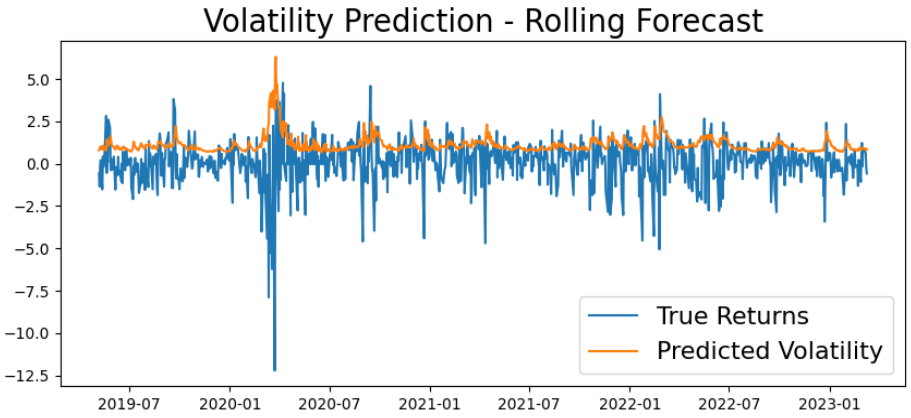
In this scenario, there exists a significant disparity between the anticipated and actual Net Asset Values (NAV), indicating a limited predictive accuracy. Throughout all the years, the NAV consistently reflects overvaluation. However, there's a positive trend of improving accuracy over time, aligning with a corresponding increase in actual returns. Despite this positive trend, these accuracy levels still imply significant volatility in the NAV, highlighting the inherent unpredictability within the specified timeframe.

***GROWTH FUND 8***

**TABLE 28 GROWTH FUND 8**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 135.25 | 38.89 | 29% |
| **OVERVALUED** | 135.25 | 38.89 | 29% |
| **QTR1** | 112.53 | 31.16 | 28% |
| **QTR2** | 120.57 | 33.21 | 28% |
| **QTR3** | 144.08 | 41.87 | 29% |
| **QTR4** | 158.56 | 48.13 | 30% |
| **2021** | 204.56 | 76.42 | 37% |
| **OVERVALUED** | 204.56 | 76.42 | 37% |
| **QTR1** | 180.60 | 59.73 | 33% |
| **QTR2** | 197.90 | 70.72 | 36% |
| **QTR3** | 215.15 | 83.72 | 39% |
| **QTR4** | 223.91 | 91.03 | 41% |
| **2022** | 228.88 | 94.57 | 41% |
| **OVERVALUED** | 228.88 | 94.57 | 41% |
| **QTR1** | 225.93 | 92.37 | 41% |
| **QTR2** | 222.68 | 88.90 | 40% |
| **QTR3** | 229.88 | 95.13 | 41% |
| **QTR4** | 237.12 | 101.94 | 43% |
| **2023** | 236.61 | 101.21 | 43% |
| **OVERVALUED** | 236.61 | 101.21 | 43% |
| **QTR1** | 236.61 | 101.21 | 43% |
| **GRAND TOTAL** | 191.64 | 71.41 | 36% |

**FIGURE 28 GROWTH FUND 8**




In this scenario, there's a clear gap between the anticipated and actual Net Asset Values (NAV), indicating a limited precision in predictions. Across all years, the NAV consistently reflects overvaluation. However, there's a positive trend of improving accuracy over time, mirrored by an increase in actual returns. Despite this improvement, these accuracy levels still suggest notable volatility in the NAV, underscoring the inherent unpredictability within the specified timeframe.

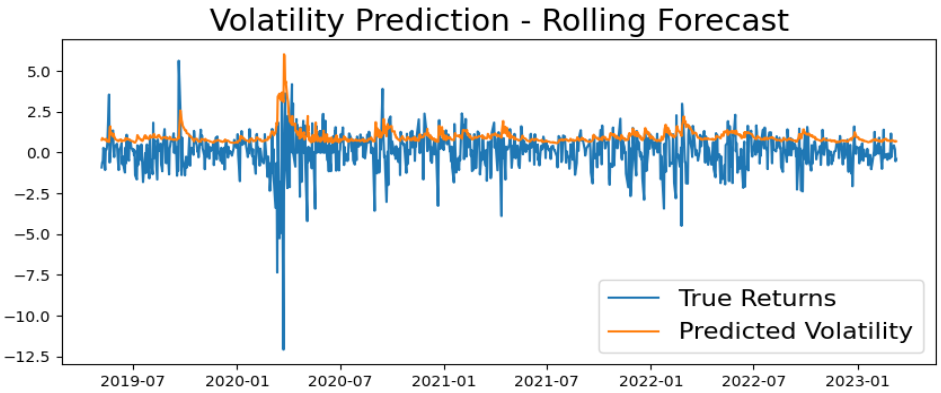
***GROWTH FUND 9***

**TABLE 29 GROWTH FUND 9**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 129.95 | 40.52 | 31% |
| **OVERVALUED** | 129.95 | 40.52 | 31% |
| **QTR1** | 113.24 | 34.53 | 30% |
| **QTR2** | 117.58 | 35.53 | 30% |
| **QTR3** | 136.02 | 42.56 | 31% |
| **QTR4** | 150.48 | 49.06 | 33% |
| **2021** | 187.15 | 70.60 | 38% |
| **OVERVALUED** | 187.15 | 70.60 | 38% |
| **QTR1** | 171.11 | 60.02 | 35% |
| **QTR2** | 181.85 | 66.59 | 37% |
| **QTR3** | 194.26 | 75.25 | 39% |
| **QTR4** | 200.93 | 80.22 | 40% |
| **2022** | 202.88 | 81.15 | 40% |
| **OVERVALUED** | 202.88 | 81.15 | 40% |
| **QTR1** | 199.73 | 78.96 | 40% |
| **QTR2** | 197.39 | 76.84 | 39% |
| **QTR3** | 205.10 | 82.77 | 40% |
| **QTR4** | 209.33 | 86.06 | 41% |
| **2023** | 208.54 | 85.27 | 41% |

| | | | |
|---|---|---|---|
| **OVERVALUED** | 208.54 | 85.27 | 41% |
| **QTR1** | 208.54 | 85.27 | 41% |
| **GRAND TOTAL** | 174.85 | 65.04 | 36% |

***FIGURE 29 GROWTH FUND 9***




The difference between the expected NAV and the Actual NAV is high as the accuracy of the prediction is low in this case . The NAV is overvalued in all the years The accuracy is increasing and the actual returns are also increasing with the years passing by. These accuracy levels also indicate high volatility.

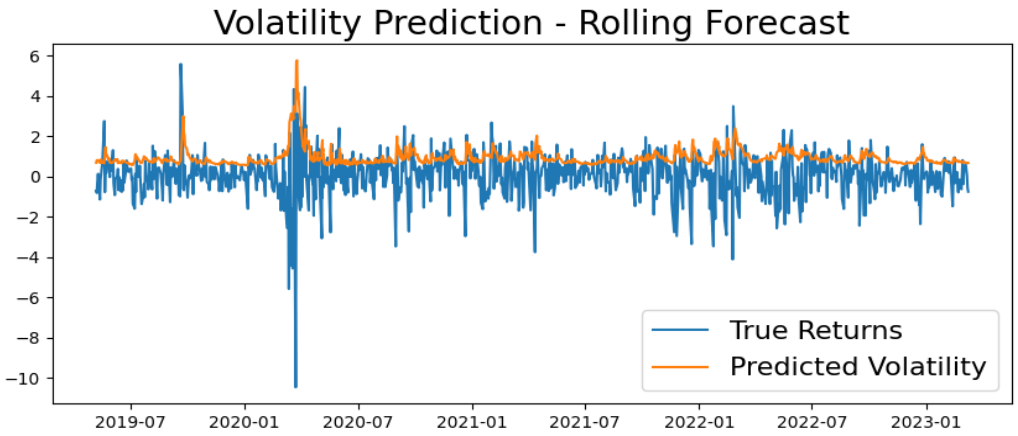
***GROWTH FUND 10***

**TABLE 30 GROWTH FUND 10**

| ROW LABELS | AVERAGE OF EXPECTED VALUE | AVERAGE OF ACTUAL VALUE | AVERAGE OF ACCURACY |
|---|---|---|---|
| **2020** | 130.06 | 42.81 | 33% |
| **OVERVALUED** | 130.06 | 42.81 | 33% |
| **QTR1** | 114.09 | 36.71 | 32% |
| **QTR2** | 120.69 | 38.78 | 32% |
| **QTR3** | 134.19 | 44.28 | 33% |
| **QTR4** | 146.91 | 50.18 | 34% |
| **2021** | 177.82 | 68.26 | 38% |
| **OVERVALUED** | 177.82 | 68.26 | 38% |
| **QTR1** | 162.67 | 58.49 | 36% |
| **QTR2** | 170.72 | 63.21 | 37% |
| **QTR3** | 184.76 | 72.65 | 39% |
| **QTR4** | 192.67 | 78.37 | 41% |
| **2022** | 188.44 | 74.44 | 39% |
| **OVERVALUED** | 188.44 | 74.44 | 39% |
| **QTR1** | 188.87 | 75.14 | 40% |
| **QTR2** | 182.91 | 70.50 | 39% |

| | | | |
|---|---|---|---|
| **QTR3** | 189.84 | 75.31 | 40% |
| **QTR4** | 192.19 | 76.86 | 40% |
| **2023** | 189.11 | 74.44 | 39% |
| **OVERVALUED** | 189.11 | 74.44 | 39% |
| **QTR1** | 189.11 | 74.44 | 39% |
| **GRAND TOTAL** | 166.37 | 62.33 | 37% |

**FIGURE 30 GROWTH FUND 10**




The difference between the expected NAV and the Actual NAV is high as the accuracy of the prediction is low in this case . The NAV is overvalued in all the years The accuracy is increasing and the actual returns are also increasing with the years passing by. These accuracy levels also indicate high volatility.

## 8. FINDINGS AND CONCLUSION

In the findings, it was observed that the majority of balanced funds were overvalued in 2020 and began to show signs of undervaluation towards the end of that year, continuing into 2021, 2022, and 2023. However, the accuracy of these predictions tends to decrease over the years. Similarly, the majority of fixed income funds tended to be overvalued over the years, with the accuracy remaining relatively constant. Additionally, the majority of growth funds also tended to be overvalued over the years, although the accuracy showed a slow increase. Among balanced funds, Quant Absolute Dir, ICICI Prudential Equity and Debt Dir, and HDFC Childrens Gift Dir exhibited the highest accuracy rates of 84%, 89%, and 93%, respectively. Canara Robeco Cons Hybrid stood out among fixed income funds with the best accuracy of 70%. For growth funds, Kotak Small Cap Dir, SBI Magnum Midcap Dir, and Quant Small Cap Dir demonstrated the highest accuracy rates of 73%, 71%, and 70%, respectively.

In light of the risk analysis results, it's imperative to devise effective risk mitigation strategies for the mutual funds. These strategies may encompass dynamic asset allocation, hedging techniques employing derivatives, or the implementation of stop-loss mechanisms to manage downside risk. The efficacy of these strategies should be evaluated rigorously through back testing or scenario analysis. Furthermore, it's crucial to present the risk analysis findings in a clear and concise manner tailored to the intended audience. This entails providing comprehensive reports that elucidate key risk metrics, portfolio allocation recommendations, and potential risk mitigation strategies.

To ensure the ongoing relevance of the risk analysis, it's essential to conduct periodic reviews accounting for changes in market conditions and fund performance. Continuous monitoring of GARCH-based risk measures is imperative, with updates to the analysis as new data becomes available. Additionally, the comparison between GARCH Model (1,1) and GARCH Model (2,2) suggests that the former demonstrates more accurate predictions based on the provided data. Thus, employing a robust GARCH Model is advisable for enhanced prediction accuracy.

Based on the analysis, the top-performing Balanced Funds for investment include Quant Absolute Dir, ICICI Prudential Equity and Debt Dir, and HDFC Childrens Gift Dir. For Fixed Income Funds, Canara Robeco Cons Hybrid emerges as the most favourable option. Similarly, the best Growth Funds to invest in are identified as Kotak Small Cap Dir, SBI Magnum Midcap Dir, and Quant Small Cap Dir.

The risk analysis conducted on mutual funds using the GARCH index offers investors crucial insights into volatility, risk, and potential losses tied to their investments. This analysis equips investors with the knowledge needed to make informed decisions, construct diversified portfolios, and implement effective risk management strategies. The GARCH index acts as a robust tool for comprehending and quantifying risk within mutual funds, empowering investors to pursue their investment goals while prudently managing their risk exposure.

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