

Fund Manager Due Diligence Analysis – SPY (S&P 500 ETF)

A Quantitative Approach to Risk and Performance Analysis for Retail Investors

Prepared by: Prathamesh Ankaram

Executive Summary

This project evaluates the SPY (S&P 500 ETF) using quantitative tools to provide actionable insights for retail investors. The analysis covers risk-adjusted performance, downside risk quantification, and portfolio diversification strategies.

1. Key Findings:

- SPY has a Sharpe Ratio of 1.25, indicating strong risk-adjusted returns.
 - The 5% Value-at-Risk (VaR) is -2.35%, representing a moderate downside risk.
 - SPY is well-suited as a core holding for diversified portfolios due to its stability and market exposure.
-

2. Objectives:

- Assess SPY's risk-adjusted performance using the Sharpe Ratio.
 - Simulate downside risks through Monte Carlo simulations.
 - Determine 5% VaR to quantify worst-case losses.
 - Provide actionable strategies for retail investors.
-

3. Methodology:

3.1 Risk-Adjusted Performance Analysis:

- Calculated the Sharpe Ratio to assess returns per unit of risk.

3.2 Monte Carlo Simulations:

- Generated 1,000 possible daily return scenarios to evaluate downside risks.

3.3 Value-at-Risk (VaR):

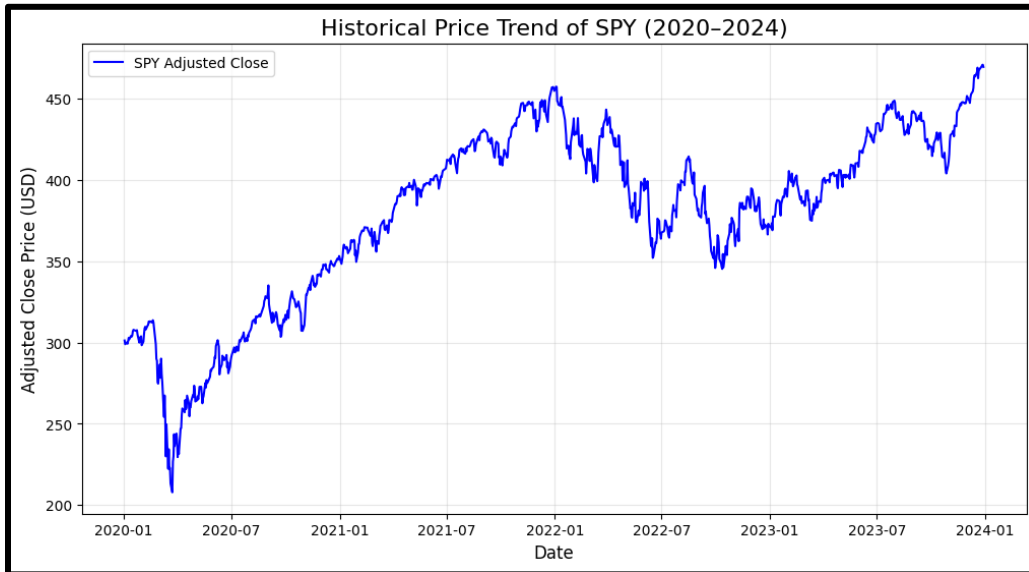
- Quantified maximum expected losses on 5% of trading days.

3.4 Portfolio Diversification:

- Recommended an asset allocation strategy to balance risk and reward.
-

4. Results & Visualizations

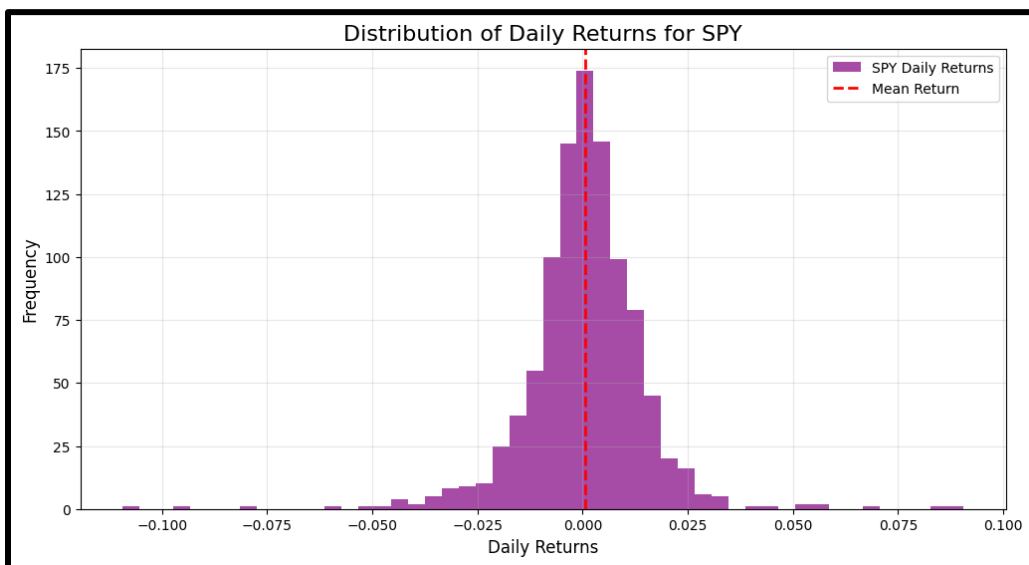
4.1 Historical Price Trend



Observations:

- **Long-Term Growth:** SPY's price shows a steady upward trend, driven by the overall performance of the U.S. equity market.
- **COVID-19 Crash:** A significant dip occurred in March 2020, where SPY lost ~30% of its value, reflecting the market panic.
- **Post-Recovery Growth:** After the crash, SPY quickly rebounded, demonstrating the resilience of large-cap U.S. equities.

4.2 Daily Returns Distribution

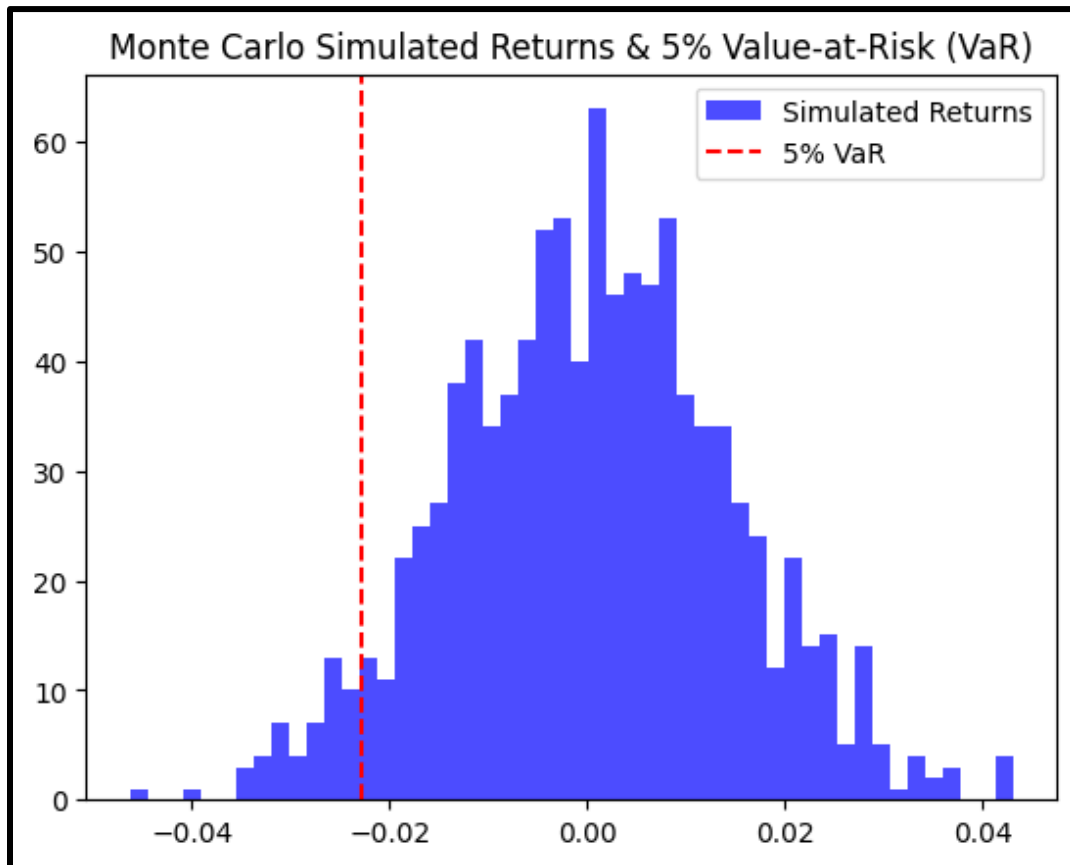


Observations:

- Mean Return (~0%): The average daily return is close to zero, indicating that SPY is a stable investment on a daily basis.
- Symmetrical Shape: The histogram shows a normal distribution, meaning most returns are near the average, with few extreme values.
- Low Frequency of Losses: Negative returns are less frequent than positive ones, highlighting SPY's overall upward trajectory.

4.3 Monte Carlo Simulation & VaR

Monte Carlo simulations generated 1,000 potential daily return scenarios for SPY. The 5% VaR was calculated from these results, representing the worst-case loss on 5% of trading days.

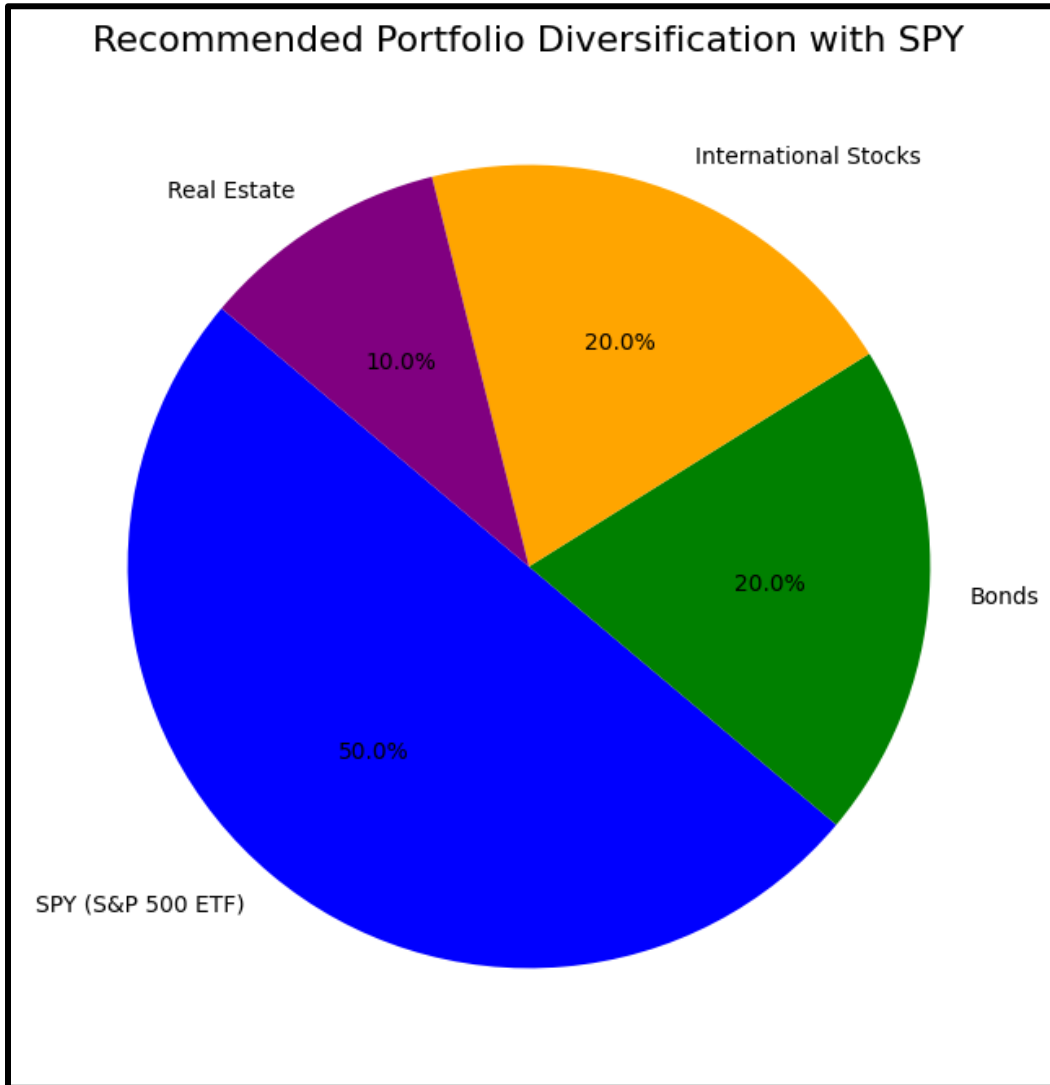


Observations:

- Clustered Returns (~0%): Most simulated returns are centered around the mean (0%), reinforcing SPY's stability.
- 5% VaR Threshold (-2.35%): The red dashed line indicates that on 5% of days, SPY may lose up to 2.35% of its value.

- Wide Range of Possibilities: Outliers on both sides represent rare extreme scenarios, with potential for both higher gains and losses.

4.4 Portfolio Diversification with SPY



SPY's broad market exposure makes it an ideal core holding in a diversified portfolio. A diversified strategy balances risk and enhances long-term returns.

Recommended Allocation:

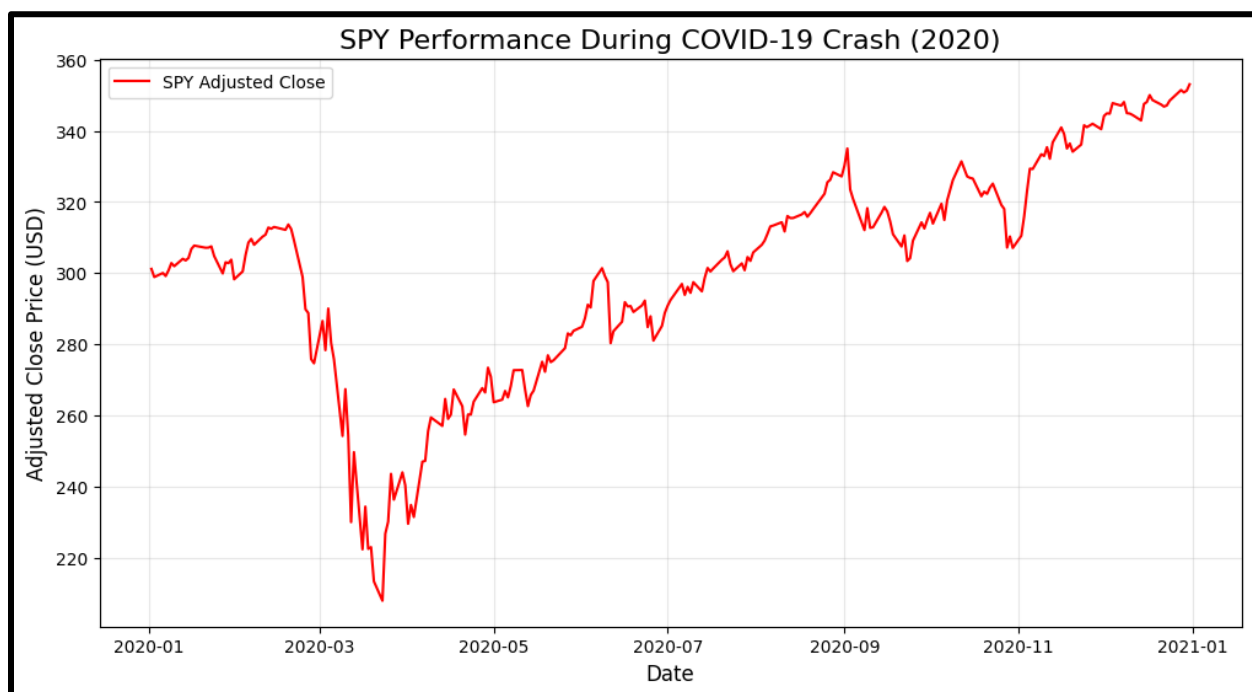
- 50% SPY (S&P 500 ETF): Core exposure to large-cap U.S. equities.
- 20% Bonds: Stability during market downturns.
- 20% International Stocks: Geographic diversification.
- 10% Real Estate (REITs): Income-generating assets with low correlation to equities.

Insights for Retail Investors:

- Why SPY as Core Holding? It offers consistent growth and exposure to 500 of the largest U.S. companies.
- Why Diversify? Combining SPY with bonds, international stocks, and REITs reduces the overall portfolio risk.
- Example: During the 2020 crash, bonds cushioned losses, while SPY recovered over time.

4.5 Stress Testing: SPY During COVID-19 Crash

Stress testing reveals how SPY performed during a market crisis (e.g., COVID-19 in March 2020).



Observations:

- Significant Drawdown (~30% Loss): SPY experienced a sharp decline during March 2020 due to market-wide panic.
- Rapid Recovery: By late 2020, SPY had fully recovered, demonstrating the resilience of large-cap U.S. equities.
- Steady Growth Post-Crisis: SPY resumed its upward trend after the crash, rewarding patient investors.

Insights for Retail Investors:

- Don't Panic Sell: Selling during downturns locks in losses. Staying invested allows participation in recoveries.

- Use Stress Testing to Plan: Allocate assets based on your ability to withstand market crashes.
-

Insights for Retail Investors (Recap)

- SPY as a Core Holding: With strong historical performance and low volatility, SPY should form the foundation of a portfolio.
- Prepare for Downside Risk: The 5% VaR of -2.35% suggests rare but manageable losses.
- Diversify to Reduce Risk: Complement SPY with bonds, international stocks, and REITs to weather downturns.
- Stay Long-Term Focused: The COVID-19 stress test shows that SPY rewards patience and avoids panic selling.
- Know Your Risk Tolerance: For conservative investors, SPY's moderate risk-return profile is ideal.