**Back testing TQQ Executive Summary**

DASC 2103

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**Central Question**

Our main question behind this project was to determine if it is possible to accumulate wealth over a long time period by holding leveraged ETF’s, such as TQQQ. Our belief is that the stigma behind long-term investments has some validity to it. Additionally, we want to determine if there is any split that would further increase our profits and reduce our risk.

**Purposed Solution**

Using portfolio diversification and daily rebalancing to achieve high rates of return while mitigating the associated risks inherent with leverage.

**Methodology**

Comparing the performance of baseline indices to their daily rebalanced portfolio splits: 50/50 TQQQ & SPY Split, 50/50 TQQQ & GLD Split, 60/40 TQQQ & GLD Split, 80/20 TQQQ & GLD Split. Were [QQQ](https://www.invesco.com/qqq-etf/en/about.html) is Nasdaq-100 index, [SPY](https://www.direxion.com/product/daily-sp-500-bull-bear-3x-etfs?keyword=s%26p%20500%20index%20fund&gad=1&gclid=CjwKCAjw3ueiBhBmEiwA4BhspO6aPFbjFJ5rl_xbFMaCq5ihFbmE6zXDs9A5eLbfNZ_5GhDXqgGtZRoC1asQAvD_BwE) is the S&P 500 index, [GLD](https://www.spdrgoldshares.com/usa/financial-information/) tracks the price of gold, and [TQQQ](https://www.proshares.com/our-etfs/leveraged-and-inverse/tqqq) which tracks the 3x daily return of QQQ.

**Our Analysis & Findings**

In our analysis, we tested TQQQ's performance from several important dates, including its inception in 2010, its all-time high in November 2021, the COVID bear market rally starting in February 2020, and the current date minus one year. We found that investing in TQQQ alone had heavily biased results, and a more balanced approach was needed for more stable returns.

When testing from inception, we found that holding only TQQQ had a CAGR of 37.19%, but this was heavily biased due to rapid growth in 2021 and early 2022. A more sensible investment strategy would be to use a 50/50 gold split for a CAGR of 30.44%. Below pictures CAGR to the left and Cumulate Returns to the right.

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However, trying to time the market proves to be difficult. Investing in TQQQ at its all-time high would have resulted in a CAGR of -55.15%, whereas a 50/50 split with gold had a CAGR of -18.06%; both terrible returns.

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In contrast, investing during the COVID bear market rally would have yielded a positive CAGR of 11.59% with a 50/50 split and only a slight negative CAGR of -0.43% with TQQQ alone, proving that splits provide a much quicker rebounding effect.

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Furthermore, entering a year ago today would also yield poor performance across all indices and splits, with gold showing to be the only inflationary hedge.

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To further analyze TQQQ's performance, we conducted a Monte Carlo Simulation using 100 random date intervals since its inception. This allowed us to calculate the average CAGR for each split and provided additional insight into the potential returns and risks associated with each approach. We encourage readers to test the following CAGR’s combined with their own investment plans to see what they should consider investing in given their own financial goals([Interactive Investment Calculator](https://www.calculator.net/investment-calculator.html)).

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**Concluding Thoughts**

Firstly, we need to recognize that when it comes to investing, there's no one-size-fits-all approach. Each investor has their own financial goals and time horizons to meet those goals, which means that their investment strategy should be tailored to their unique needs. For instance, younger investors in their 20s who have a higher risk tolerance may consider allocating a larger percentage of their portfolio into high-risk investments like TQQQ or even going all-in on it. This is because they have more time for the market to recover in the event of a dip. On the other hand, more moderate-risk tolerant investors may want to consider a more balanced approach by combining TQQQ with more traditional ETFs. This approach can help balance risk while still providing potential for growth. Finally, for investors who are more risk-averse or approaching retirement, sticking to traditional ETFs may be the most suitable option as they are more stable and have lower risk profiles. Ultimately, it's important for each investor to assess their own risk tolerance and investment goals to determine the best strategy for their needs.

**GitHub Link**

[**Click Here For Code**](https://github.com/bja107/DASC_2103/blob/main/DASC_2103_Project.ipynb)