Equal Weighted Indices Versus Market Capitalization Weighted Indices: Which Index Provided the Best Risk Adjusted Returns, the S&P 500 Equal Weighted or the S&P 500 Capitalization Weighted Index

Mitchell Miller
Davenport University

Dale Prondzinski
Davenport University

This study compares the returns of equal weighted indices versus market capitalization weighted indices. It compares the S&P 500 market weight index with the S&P 500 equal weight index, 2003-2021. In addition, a comparison was made between the SPDR S&P 500 market weight ETF and the Invesco S&P 500 equal weight ETF for varying time periods to analyze the behavior of the indices and to assess which index provided the best return on investment. The study found that on a risk-adjusted basis the mean weekly Sharpe ratios were not significantly different for the S&P 500 market weight index as compared to the S&P 500 equal weighted index for four of the five periods tested. However, for the period from April 2009 to March 2020 the S&P 500 index Sharpe ratio was statistically significant which indicated on a risk adjusted basis the capitalization weighted index outperformed the S&P 500 equal weighted index.

Keywords: equal weight index, market weight index, S&P 500, Exchange Traded Funds

INTRODUCTION

What Is a Stock Index?

Generally speaking, an index is simply a system to facilitate finding information. The system may be alphabetical or numerical. In the finance world, a stock market index is a system that facilitates the location, measurement, and analysis of stock data. The stock market index could measure the total stock market or a subset of the stock market, such as the S&P 500 index. Today, there are numerous stock market indices publishing detailed company, market capitalization, and market-specific information.

According to Lo (2016), stock indices also serve as benchmarks of risk-versus-reward performance and are used to construct diversified stock portfolios and investment vehicles. Consider, for example, stock indices such as the Dow Jones Industrial Average or the NASDAQ, each index representing a separate stock exchange.

Why Capitalization Weighted Indices Are the Standard?

The Dow Jones Industrial Average is 125 years old, and for all of its supposed drawbacks, it has been a good measure of the stock market. It was conceived in 1896 as a capitalization weighted index and has

risen from 40.94 to 34,323, or 83,737%, a testament to how it has functioned as the standard capitalization weighted index. In a capitalization weighted index, the higher the stock price, as measured by the market, the greater the company's weight in the index (Lahart, 2021).

This study's authors believe that market forces should dictate how strongly a company is represented in an index or benchmark. The perspective is that if a company is successful, then let the market dictate its value. The S&P 500 index is another standard benchmark index that measures the return of large capitalization stocks and is widely recognized as the measure of U.S. stock market performance dominated by the stocks of 500 of the largest U.S. companies. It is worthy to note that the Dow Jones Industrial Average and the S&P 500 have had strikingly similar trajectories over time. For example, over the past 30 years, each index has returned with dividends reinvested, about 11% annually (Lahart, 2021).

The companies comprising the S&P 500 represent 81% of the total U.S. stock market capitalization. These are the most prosperous companies in the U.S. As of 4/30/2021, the 10 largest holdings, equaling 28% of the S&P 500 total net assets include: Apple Inc.; Microsoft; Amazon; Alphabet; Facebook; Tesla; Berkshire Hathaway; JPMorgan Chase; Johnson & Johnson; and Visa Inc. (Vanguard, 2021).

The Growth of Indexing; Index Providers Are Reshaping Markets

Standard & Poor's corporate name is S&P Global, known as a creator of widely recognized financial market indices used as investment benchmarks. Standard & Poor's first stock market index was created in 1923; in 1957, Standard & Poor's introduced the S&P 500. Many in the investment community consider the S&P 500 a measure of the broad U.S. stock market and leading economic indicator.

The S&P 500 is quoted daily in the financial press and is a primary benchmark of investment portfolio performance. Enderle et al. (2003), research suggests that the existence of thousands of market indices supports the growth of market capitalization-weighted indices as the standard of stock and market performance measurement.

The S&P 500 Index is maintained by the S&P Index Committee, whose guiding principle is to ensure that the index is indicative of the economy and of the risk and return characteristics of the broad U.S. equity market (Elnekave, 2011).

Market forces required the addition of Tesla to the S&P 500 stock index in 2020. The company's exclusive focus on electric vehicles has excited the market, creating demand and positive earnings expectations. Fonda (2020) noted that the addition of Tesla's size and scope to the broad S&P 500 market gauge means that passive fund managers tracking the S&P 500 need to buy Tesla and sell other stocks to maintain their portfolio's ability to replicate/track the S&P 500 index.

It is widely known that much of the stock market's growth the past few years has been fueled by technology dominant 'FAANG' stocks: Facebook; Apple; Amazon; Netflix; and Google. These technology stocks dominate the capitalization-weighted S&P 500 index, representing approximately nineteen percent of the index. Fonda (2020) opined that the growth of indexing is dominated by a few large companies including S&P Global, MSCI, and FTSE Russell, owners of their respective indices.

Alternative Index Fund Iterations: How Indexing Has Evolved

Vanguard founder, John C. Bogle, founded the company in 1975 and structured Vanguard as a client-owned mutual fund company with no outside owners seeking profits. In 1976, Vanguard launched the first index mutual, a passive investment, intended to replicate, not beat, the performance of the broad market, represented by the S&P 500.

According to Kapadia (2014), index funds have grown because of the validity of Vanguard founder John Bogle's core insight underpinning passive/index investing. Over the intervening years, between the founding of the Vanguard S&P 500 index, alternative index funds have been created that allocate their funds to factors other than market value, investment strategies intended to increase diversification and optimize portfolio value. Popular alternative index choices include equal weighting securities and fundamental indexing, an investment style selecting securities based on financial performance metrics.

An equal-weighted index, such as the S&P 500 equal-weighted index, gives equal value to all stocks included in the index; each stock in the index thus has the same relative importance when determining the

index's value. While fundamental indexing is the most common form of alternative indexing, this study is limited to comparing the equal weight index to the capitalization-weighted index.

LITERATURE REVIEW

History of the S&P 500 Equal Weight Index as a Concept

In 1957, Standard & Poor's created the S&P 500 stock composite index. Though the S&P 500 has weathered harsh criticism and economic booms and busts, it remains the U.S. equity index of choice for the core of an equity portfolio. S&P 500 stock components are objectively selected by committee, and the S&P is almost perfectly correlated with a capitalization-weighted index of the 500 largest U.S. companies. The S&P 500 represents 75% of the total capitalization of the U.S. stock market (Malkiel, 2007).

S&P Global created the S&P 500 Equal Weight Index in January 2003, a version of the S&P 500 market capitalization-weighted index. Each of the versions of the S&P 500 is composed of the same stocks though with different weighting schemes, resulting in two indices with differing properties, qualities, attributes, and stock performance ("Indexing Philosophies", 2009).

Criticism of the S&P 500

Robert Arnott (Jamieson, 2005), chairman of Research Associates, LLC, and editor of the Financial Analyst's Journal, is a prominent critic of capitalization-weighted indices. Arnott's main complaint with capitalization-weighted indexes, such as the Standard & Poor's 500 stock index, is that they overweight overvalued stocks and underweight undervalued components, a flaw that cuts annual returns by several percentage points. Mr. Arnott comments that by letting the stocks with the largest market values dominate, cap-weighted indexes pull you into market bubbles.

The most frequent criticism of the S&P is that it fails to correct for bubbles in various market sectors. Active management, in principle, corrects for such biases, though historical evidence suggests that active managers have not been successful in avoiding overvalued sectors of the market. Another criticism is that the S&P weighting mechanism tends to overweight overvalued stocks.

Performance and Analytic Implications of Equal Weighting

There are exchange-traded funds (ETFs) that track each of the two indexes; however, even though they are basing their funds off the same companies, they behave very differently and can affect investments substantially. According to State Street Global Advisors Fund Action ("State Street To Issue Index Weighting Paper", 2006), early results judging the differences in returns from a market-cap-weight and an equal-cap weight ETF shows that equal weighting reduces risk.

Luxenburg (2006) argues that market weighting can be misleading; consider, for example, the conditions that existed in the late 1990s. As the bull market soared, prices of technology companies soared to new highs, and stocks like Microsoft and Intel came to account for a big percentage of the S&P. At the same time, out-of-favor stocks shrank in value. To avoid emphasizing a few stocks, some advisors suggest giving an equal weight to each of the 500 S&P stocks.

Alternatively, Indexing Philosophies ("Indexing Philosophies," 2009) suggest that equal weighted indexes tend to outperform when mid-and small-cap stocks are in favor; they are most likely to underperform when large company stocks are strong gainers. Moreover, since equal weighted indexes tend to rebalance quarterly, trading costs can add up (Sturm, 2010).

Why Equal Weighted Portfolios Outperform Price-Weighted Portfolios?

According to the Corporate Finance Institute (2019), indexes where the securities are weighted by market capitalization are considered the standard for stock investments. An index fund using market capitalization weights values each company differently based on their economic size. No matter if the company is small, medium or large, the index will reflect the size of the largest companies. For example, Barron's Market Watch advised that one way to act on the positive readings from market breadth indicators,

such as when the NASDAQ is strong, is to buy the equal weighted S&P 500 ETF. Its portfolio contains equal dollar amounts of each of the 500 stocks in the S&P 500 (Appel & Appel, 2006).

Malladi and Fabozzi (2017) provide a theoretical perspective why the equal-weighted portfolio outperforms other portfolio weighting strategies, using real-world data from 1926-2014.The authors demonstrate that a significant portion of the excess return is attributable to portfolio rebalancing. They show that because of equal weighting, the excess returns are higher than the higher costs incurred due to higher portfolio turnover. They conclude that even after accounting for higher portfolio turnover costs, equal-weighting makes economic sense.

Benefits of Capitalization Weighting

Estrada (2008) opines that at least three reasons exist for cap-weighting assets in an index such as the S&P 500. First, a cap-weighted index benchmark represents the options available to investors within an asset class. Second, a cap-weighted benchmark reflects the average return of investors in an asset class, and any index not weighted by capitalization cannot play this important role. Finally, modern portfolio theory suggests that the capitalization-weighted market portfolio is mean-variance efficient and thus provides the highest-risk adjusted return.

Eugene Fama's 1965 study provided evidence suggesting that the market portfolio cannot be outperformed; investors' best portfolio management strategy was to hold the market portfolio. The S&P 500 Index is the most commonly used benchmark for the market portfolio (Sturm, 2010).

Bolognesi et al. (2013) compared the two major equity index construction methodologies, the capitalization-weighting and equal weighted approaches. The authors report that, in general, the equity benchmarks chosen and adopted by mutual funds are weighted according to the market value of their outstanding shares. Theoretically, the accepted and universal use of this approach is based on the evidence that under a standard interpretation of the Capital Asset Pricing Model, popularized by William Sharpe, a capitalization-weighted portfolio (the market portfolio) is Sharpe Ratio maximized.

Operationally, capitalization-weighted portfolios are easy to implement, offer broad diversification, have low transaction costs, and are easily justified by the fact that capitalization-weighted portfolios adjust constituents' weights automatically as market prices move, resulting in fewer rebalancing trades. The result is that asset management companies avoid using benchmarks based on a different construction methodology, such as equal weighted indices (Bolognesi et al., 2013).

Leclerc et al. (2013) suggest that indices weighted by market capitalization are the standard equity benchmarks of the investment industry. The authors' research emphasized that market-cap weighting is the central organizing principle of good index construction for four important reasons: consistency in that all investors can hold a cap-weighted portfolio; cap-weighting is consistent with a buy-and-hold strategy requiring little trading; and market capitalization is highly correlated with trading liquidity and investment capacity, thus allowing the use of low-cost passive indexing on a large scale.

Why Market Weighting Can Be Misleading

Use of market weighting indices can be confusing; consider the S&P 500 index whose top ten holdings account for more than 29% of the index net assets. The S&P 500 top ten holdings include:

Apple; Microsoft; Alphabet; Amazon; Facebook; Tesla; NVIDIA; Berkshire Hathaway; JPMorgan Chase; & Johnson & Johnson. From this data, it can easily be discerned that how an index is weighted--market-weighted or equal-weighted--can make a huge difference in the value and performance of the index. The values of an equal-weighted index would be expected to differ, perhaps substantially, from a traditional market cap weighted index (Vanguard, 2021).

According to Barron's Market Watch, an advisory publication, the S&P 500's top 50 companies (by market capitalization) has a greater influence on the behavior of the S&P 500 index than the behavior of the remaining 450 (Appel & Appel, 2006). Fisher et al. (2015) argues that capitalization-weighted portfolios tend to overweight overvalued stocks and underweight undervalued stocks.

Value and Momentum as the Difference Makers in Indexes

By their nature, equal weighted indices are based on value; the value of market capitalization weighted indices are driven by the price momentum of the index components. Technically, for example, the S&P Equal-Weighted Indexmust maintain an equal weight of 0.2 for each of the 500 stocks in the index. As company share prices increase and decrease, S&P must buy and sell shares of companies to restore the equal weight balance.

Referring again to the S&P 500 market capitalization weighted index, the weighting of the company makeup of the index is driven the share prices of the respective company/companies. When a company's share price increases, S&P retains the shares, automatically allocating more weight to the company's stock. Consider Apple, Amazon, and Facebook, for example.

Equal-Weighted Indexes and the Power of the Small Business

Technically, equal-weighted indices tend to favor small-and mid-size companies by assigning each stock constituent the same weight as large-cap companies. The result is that each stock in the index, small, medium, or large exerts equal power in the index, compared to a market capitalization index such as the S&P 500.

Advantages of Equal-Weighted Index Funds

There are advantages of investing in equal-weighted index funds compared with a market capitalization weighted index. Pros of an equal-weighted index include:

- Equal-weighted indexes are more diversified than market-capitalization-weighted indexes and, therefore, may carry less risk.
- Equal-weighted funds focus on value investing, which is considered by many market analysts and investors to be a superior investing strategy.

French (2008) reports that equal-weighted indices have significantly outperformed market capitalization weighted indices since 1990. French reports that according to Srikant Dash, Standard & Poor's head of global research and design, over the long term, equal weighting does perform better, on an absolute and risk-adjusted basis. Equal weighting randomizes exposure to risk factors so the investor doesn't have to worry about which risk-factor exposure to take on.

From 1990-2009, the S&P Equal-Weighted Index posted a 9.1% average annual gain (dividends included), compared with the S&P capitalization-weighted index average annual return of 7.5% (Burton, 2009).

Bolognesi et al. (2013) find that the benefit that results from reweighting the portfolio into equal weights can be attributed to the fact that equal weighted portfolios implicitly follow a contrarian investment strategy because they rebalance away from stocks that increase in price. For example, according to this strategy, overvalued stocks are sold at each rebalancing, preventing the continued growth of their weight during financial bubbles.

Blackman (2013) reports that research from the London's Cass Business School suggests that market-capitalization weighted indexes trail those of so-called alternative indexes by as much as two percentage points a year over time. Investors' choice of a suitable stock index is a choice and investors have choices available. In his report, Blackman details that all of the 13 alternative indexes examined produced higher returns than a theoretical market-cap index. While the market-cap index generated a 9.4% annualized return over the full period, the other indexes delivered between 9.8% and 11.4%. The market-cap-weighted index was the weakest performer in every decade except the 1990s.

According to Goodman (2014), Chris Brightman, Chief Investment Officer of Research Affiliates, comments that simply equal-weighting the S&P 500 provides investors with an out-performance of two percentage points a year. Though the traditional concept of an index as a broad measure of the market weighted according to constituents' market value, or capitalization, remains the proper method for measuring the return of the market, it may be not be a good investment strategy.

Dieterich (2015) opines that proponents of equal-weighted ETFs have touted their benefits for years; his research suggests that equal weighting can deliver better-than-market returns in part because owners are

spared the whiplash of owning large amounts of overpriced stocks. Equal weighting also means a larger proportion of smaller companies, which tend to do better over the long term. However, to benefit from over-performance, investors need to stick with their equal-weighted investment choices when their performance lags the market.

Dieterich's (2016) article, "Equal Weight, Mixed Result," reports that indexes that adhere to market-cap-weighting schemes control more than 90% of equity ETFs. Steep declines in big companies tend to stir interest in unconventional index approaches, such as equal-weighted indexes. By design, ranking stocks equally dampens the impact when a high-profile stock flames out; weighting equality also dulls the impact of rising issues.

Franco et al. (2016) reported that the creation of the equally weighted index version of the S&P 500 index and its related exchange traded fund in 2003 paved the way to rethinking traditional benchmarks and offered solutions that correct market portfolio inefficiencies.

Disadvantages and Criticisms of Equal-Weighted Index Funds

Some of the disadvantages of equal-weighted index funds are:

- A higher turnover rate, hire transaction costs, and less favorable tax treatment.
- Greater vulnerability to market volatility and economic downturns; conversely, larger, blue chip type market-capitalization weighted indices tend to be more stable in down-type markets.
- Use of equal-weighted index funds as a viable alternative to a market capitalization weighted index as a measure of the total market.

Whether or not to embrace an equal-weighted index as an investment strategy depends on the investor's investment return perspective.

Lauricella and Gullapalli (2006) suggest that John Bogle, founder of the Vanguard Group and creator of the first index fund, derides equal weighted indices as "index nouveau", and depart from the basic premise of indexing. Bogle adds that from his perspective, equal weighting is a type of active management, trying to outperform the market.

Bolognesi et al. (2013) reported that the equal weighted approach has been criticized primarily because portfolios created using this methodology are not representative of the aggregate equity market, and because equal weighting treats large, mid, and small caps equally regardless of their market liquidity.

The Corporate Finance Institute (2019) reports that the S&P 500 Equal-Weighted Index beat the S&P 500 market capitalization weighted index from 2009 to 2018. Alternatively, it can be difficult to assess which index approach is better.

Burton (2009) reports that some investment advisors believe that equal-weighted offerings do not reflect the reality of the market and tend to carry greater volatility, heavier trading and higher fees that traditional index funds. The reasoning of these financial advisors is that the smaller stocks comprising the equal weighted index can be volatile, and the portfolio incurs transaction costs when it rebalances, usually quarterly, to give each stock the same weight.

Burton (2013) suggests that equal weighting has been getting too much attention, and that it's time investors scaled back their enthusiasm, as this niche strategy may not deserve equal billing with traditional index strategies. Switching to equal weighting can upset a portfolio allocation, as equal-weight funds quarterly rebalance all positions, selling winners and buying laggards, tilting the portfolio slightly towards value stocks, an approach that has produced above average returns over time, but demands a bargain-hunting mindset not shared by all investors.

Delege (2015) opines the challenges of equal weighting, suggesting that excessive portfolio turnover remains one of the key hurdles facing equal weighted indices. Equal weight indices need to be regularly rebalanced to counteract daily price changes of stocks in order to maintain equivalent market exposure, creating frictional trading costs and index tracking error. As well, though the S&P 500 equal weight index has delivered outperformance versus the S&P 500, equal weighting strategies in other equity markets haven't been nearly as good.

DATA AND METHODOLOGY

The following identifies the research process that was used to test the hypotheses that were derived from the research question.

Research Question

The study's primary research question was: During the May 2003 to July 2021 market cycles, which index, the S&P 500 equal weighted, or the S&P 500 capitalization weighted index, and exchange traded fund proxies outperformed the other.

Research Model and Variables

The study uses the S&P 500 Index (SPX) as the benchmark for the market weighted stock index and the S&P 500 Equal Weighted Index (SPW) as the benchmark for the equal-weighted stock index. The proxy used for the S&P 500 Index is the SPDR S&P500 ETF Trust (SPY) and the Invesco S&P 500 EW ETF (RSP) is the proxy for the S&P 500 Equal Weighted Index. The study is limited in scope as the S&P 500 Equal Weighted Index data became available in January 2003.

Hypotheses

Ten hypotheses, derived from the above research question, were tested.

Complete Time Period

$H1_0$: *For the time period May 2003 to July2021, the S&P 500 Index Sharpe ratio is not significantly greater than the S&P 500 Equal Weighted Index Sharpe ratio.*

$H1_a$: *For the time period May 2003 to July 2021, the S&P 500 Index Sharpe ratio is significantly greater than the S&P 500 Equal Weighted Index Sharpe ratio.*

Complete Time Period.

$H2_0$: *For the time period May 2003 to July 2021, the SPDR S&P 500 ETF Trust Sharpe ratio is not significantly greater than the Invesco S&P 500 Equal Weighted ETF Sharpe ratio.*

$H2_a$: *For the time period May 2003 to July 2021, the SPDR S&P 500 ETF Trust Sharpe ratio is significantly greater than the Invesco S&P 500 Equal Weighted ETF Sharpe ratio.*

Bull Market Time Period

$H3_0$: *For the time period May 2003 to September 2007, the S&P 500 Index Sharpe ratio is not significantly greater than the S&P 500 Equal Weighted Index Sharpe ratio.*

$H3_a$: *For the time period May 2003 to September 2007, the S&P 500 Index Sharpe ratio is significantly greater than the S&P 500 Equal Weighted Index Sharpe ratio.*

Bull Market Time Period

$H4_0$: *For the time period May 2003 to September 2007, the SPDR S&P 500 ETF Trust Sharpe ratio is not significantly greater than the Invesco S&P 500 Equal Weighted ETF Sharpe ratio.*

$H4_a$: *For the time period May 2003 to September 2007, the SPDR S&P 500 ETF Trust Sharpe ratio is significantly greater than the Invesco S&P 500 Equal Weighted ETF Sharpe ratio.*

Bear Market Time Period

H5₀: *For the time period October 2007 to March 2009, the S&P 500 Index Sharpe ratio is not significantly greater than the S&P 500 Equal Weighted Index Sharpe ratio.*
H5ₐ: *For the time period October 2007 to March 2009, the S&P 500 Index Sharpe ratio is significantly greater than the S&P 500 Equal Weighted Index Sharpe ratio.*

Bear Market Time Period

H6₀: *For the time period October 2007 to March 2009, the SPDR S&P 500 ETF Trust Sharpe ratio is not significantly greater than the Invesco S&P 500 Equal Weighted ETF Sharpe ratio.*

H6ₐ: *For the time period October 2007 to March 2009, the SPDR S&P 500 ETF Trust Sharpe ratio is significantly greater than the Invesco S&P 500 Equal Weighted ETF Sharpe ratio.*

Bull Market Time Period

H7₀: *For the time period April 2009 to March 11, 2020, the S&P 500 Index Sharpe ratio is not significantly greater than the S&P 500 Equal Weighted Index Sharpe ratio.*

H7ₐ: *For the time period April 2009 to March 11, 2020, the S&P 500 Index Sharpe ratio is significantly greater than the S&P 500 Equal Weighted Index Sharpe ratio.*

Bull Market Time Period

H8₀: *For the time period April 2009 to March 11, 2020, the SPDR S&P 500 ETF Trust Sharpe ratio is not significantly greater than the Invesco S&P 500 Equal Weighted ETF Sharpe ratio.*

H8ₐ: *For the time period April 2009 to March 11, 2020, the SPDR S&P 500 ETF Trust Sharpe ratio is significantly greater than the Invesco S&P 500 Equal Weighted ETF Sharpe ratio.*

Pandemic Decline and Recovery Time Period

H9₀: *For the time period March 12, 2020 to July 2021, the S&P 500 Index Sharpe ratio is not significantly greater than the S&P 500 Equal Weighted Index Sharpe ratio.*

H9ₐ: *For the time period March 12, 2020 to July 2021, the S&P 500 Index Sharpe ratio is significantly greater than the S&P 500 Equal Weighted Index Sharpe ratio.*

Pandemic Decline and Recovery Time Period

H10₀: *For the time period March 12, 2020 to July 2021, the SPDR S&P 500 ETF Trust Sharpe ratio is not significantly greater than the Invesco S&P 500 Equal Weighted ETF Sharpe ratio.*

H10ₐ: *For the time period March 12, 2020 to July 2021, the SPDR S&P 500 ETF Trust Sharpe ratio is significantly greater than the Invesco S&P 500 Equal Weighted ETF Sharpe ratio.*

Data Collection Methods

Secondary data were collected and analyzed from the Morningstar Direct database for the S&P 500 Index, the S&P 500 Equal Weighted Index, the SPDR S&P500 ETF Trust (SPY), and the Invesco S&P 500 EW ETF (RSP). The time period selected started at the inception of the S&P 500 Equal Weighted Index

and culminated July 2021.

Daily returns were extracted from the Morningstar Direct database for each index and ETF. Standard deviations, the average index and ETF returns, and the average risk-free returns were then calculated with the Microsoft Excel computer program using five daily data points. The Bank of America Merrill Lynch 3-month daily Treasury bill returns were used to calculate the Sharpe Ratio. The computations yielded 920 data points.

Daily data points were extracted and used for each set of paired index comparisons. The daily data points of paired indices were exported into the Microsoft Excel computer program spreadsheet. The means, variances, and related risk-adjusted measures of each of the paired indices were calculated, compared, and analyzed.

Data Analysis Methods

Data analysis was conducted using statistical analyses and hypothesis testing. Each data set was tested for normality using the Kolmogorov-Smirnov test (KS-test) and the Shapiro-Wilk test in the Statistical Package for the Social Sciences (SPSS).

If the KS-test and Shapiro-Wilk test found the data normally distributed, the F-test for two samples for variance was used to test if the variances were equal or unequal then the appropriate t-test was used to check for significant differences between the means of the two indices and ETF's. If the two tests for normality found the data originated from a non-normal distribution, the non-parametric Wilcoxon Signed Rank Test was used to test for significant differences between the means of the two indices and ETF's. The null hypothesis was rejected if the estimated p-value was less than 0.05.

RESULTS

The following details the results and findings of the study's hypotheses tests based on the data extracted from the Morningstar Direct Database and thereby address the study's research question. The findings are presented in the order in which the hypotheses have been stated.

Descriptive Statistics

Table 1 (Hypothesis 1) provides a comparison of the mean daily returns, mean weekly Sharpe Ratios, the standard deviations, and the variances for the S&P 500 Index against the S&P 500 Equal Weight Index for the May 2003-July 2021 time period. The mean daily return for the period was higher for the S&P 500 Equal Weight Index at 0.056 as compared to the S&P 500 Index return of 0.050.

The mean weekly Sharpe Ratio for the period for the S&P 500 Index was higher at 0.144 than the S&P 500 Equal Weight Index at 0.141. The standard deviation and variance were higher for the S&P 500 Equal Weight Index. The S&P 500 Equal Weight Index standard deviation was 0.547 and the variance was 0.299 while the S&P 500 Index was 0.524 and 0.275, respectively.

TABLE 1
NUMBER OF DATA POINTS, DAILY RETURNS, SHARPE RATIOS, STANDARD DEVIATIONS, VARIANCES, AND P-VALUES: S&P 500 INDEX TR VERSUS S&P 500 EW INDEX TR (MAY 2003-JULY 2021)

Number/Returns/Ratios/Standard Deviation/Variance/P-Value	Hypothesis Number	Time Period	Index	Index	P-Value
	$H1_0$	May 2003-July 2021	S&P 500 Index TR	S&P 500 EW Index TR	
Number of Data Points			920	920	
Mean Daily Return			0.050	0.056	
Mean Weekly Sharpe Ratio			0.144	0.141	
Standard Deviation			0.524	0.547	
Variance			0.275	0.299	
P-Value					0.406

Table 2 (Hypothesis 2) provides a comparison of the mean daily returns, mean weekly Sharpe Ratios, the standard deviations, and the variances for the SPDR S&P 500 ETF Trust (SPY) against the Invesco S&P 500 Equal Weighted ETF (RSP) for the May 2003-July 2021 time period. The mean daily return for the period was lower for the SPDR S&P 500 ETF Trust (SPY) than the Invesco S&P 500 Equal Weighted ETF (RSP). The difference between mean daily returns was 0.004.

The mean weekly Sharpe Ratio for the period for the SPDR S&P 500 ETF Trust (SPY) was higher than the Invesco S&P 500 Equal Weighted ETF (RSP) where the SPY Sharpe Ratio was 0.143 as compared to the RSP of 0.139. SPDR S&P 500 Equal Weighted ETF (SPY) standard deviation was 0.524 and the variance was 0.274 while the Invesco S&P 500 Equal Weighted ETF (RSP) was 0.546 and 0.298, respectively.

TABLE 2
NUMBER OF DATA POINTS, DAILY RETURNS, SHARPE RATIOS, STANDARD DEVIATIONS, VARIANCES, AND P-VALUES: SPDR S&P 500 ETF Trust (SPY) VERSUS INVESCO S&P 500 EQUAL WEIGHTED ETF (RSP) (MAY 2003-JULY 2021)

Number/Returns/Ratios/Standard Deviation/Variance/P-Value	Hypothesis Number	Time Period	ETF	ETF	P-Value
	$H2_0$	May 2003-July 2021	(SPY)	(RSP)	
Number of Data Points			920	920	
Mean Daily Return			0.050	0.054	
Mean Weekly Sharpe Ratio			0.143	0.139	
Standard Deviation			0.524	0.546	
Variance			0.274	0.298	
P-Value					0.301

Table 3 (Hypothesis 3) provides a comparison of the mean daily returns, mean weekly Sharpe Ratios, the standard deviations, and the variances for the S&P 500 Index TR against the S&P 500 Equal Weighted Index TR for the May 2003-Sept 2007 time period. The mean daily return of 0.072 for the period was greater for the S&P 500 EW Index TR as compared to the S&P 500 Index TR return of 0.058.

The mean weekly Sharpe Ratio for the period for the S&P 500 Equal Weighted Index TR was higher at 0.127 as compared to the S&P 500 Index TR at 0.103. The standard deviations and the variances tended to be close arithmetically. The S&P 500 Index TR standard deviation was 0.455 and the variance was 0.207 while the S&P 500 Equal Weighted Index TR was 0.495 and 0.245, respectively.

TABLE 3
NUMBER OF DATA POINTS, DAILY RETURNS, SHARPE RATIOS, STANDARD DEVIATIONS, VARIANCES, AND P-VALUES: S&P 500 INDEX TR VERSUS S&P 500 EW INDEX TR (MAY 2003-SEPT 2007)

Number/Returns/Ratios/Standard Deviation/Variance/P-Value	Hypothesis Number	Time Period	Index	Index	P-Value
	$H3_0$	May 2003-Sept 2007	S&P 500 Index TR	S&P 500 EW Index TR	
Number of Data Points			223	223	
Mean Daily Return			0.058	0.072	
Mean Weekly Sharpe Ratio			0.103	0.127	
Standard Deviation			0.455	0.495	
Variance			0.207	0.245	
P-Value					0.596

Table 4 (Hypothesis 4) provides a comparison of the mean daily returns, mean weekly Sharpe Ratios, the standard deviations, and the variances for the SPDR S&P 500 ETF Trust (SPY) against the Invesco S&P 500 Equal Weighted ETF (RSP) for the May 2003-Sept 2007 time period of the study. The mean daily return for the period was larger for the Invesco S&P 500 Equal Weighted ETF (RSP) at 0.070 as compared to the SPDR S&P 500 ETF Trust (SPY) return of 0.057.

The mean weekly Sharpe Ratio for the period for the SPDR S&P 500 ETF Trust (SPY) was lower than the Invesco S&P 500 Equal Weighted ETF (RSP) where the (SPY) Sharpe Ratio was 0.103 as compared to 0.125 for the (RSP). The standard deviation and the variance for the (SPY) were 0.455 and 0.207, respectively, whereas for the (RSP) they were 0.495 and 0.245, respectively.

TABLE 4
NUMBER OF DATA POINTS, DAILY RETURNS, SHARPE RATIOS, STANDARD DEVIATIONS, VARIANCES, AND P-VALUES: SPDR S&P 500 ETF TRUST (SPY) VERSUS INVESCO S&P 500 EQUAL WEIGHTED ETF (RSP) (MAY 2003-SEPT 2007)

Number/Returns/Ratios/Standard Deviation/Variance/P-Value	Hypothesis Number	Time Period	ETF	ETF	P-Value
	$H4_0$	May 2003-Sept 2007	(SPY)	(RSP)	
Number of Data Points			223	223	
Mean Daily Return			0.057	0.070	
Mean Weekly Sharpe Ratio			0.103	0.125	
Standard Deviation			0.455	0.495	
Variance			0.207	0.245	
P-Value					0.624

Table 5 (Hypothesis 5) provides a comparison of the mean daily returns, mean weekly Sharpe Ratios, the standard deviations, and the variances for the S&P 500 Index TR against the S&P 500 Equal Weighted Index TR for the Oct 2007-Mar 2009 time period. The mean daily return of 0.122 for the period was greater for the S&P 500 Equal Weighted Index TR as compared to the S&P 500 Index TR return of 0.120.

The mean weekly Sharpe Ratio for the period for the S&P 500 Equal Weighted Index TR was lower at 0.039 as compared to the S&P 500 Dividend Aristocrat Index at 0.048. The standard deviations and the variances tended to be close arithmetically. The S&P 500 Index TR standard deviation was 0.513 and the variance was 0.264 while the S&P 500 Equal Weighted Index TR was 0.567 and 0.322, respectively.

TABLE 5
NUMBER OF DATA POINTS, DAILY RETURNS, SHARPE RATIOS, STANDARD DEVIATIONS, VARIANCES, AND P-VALUES: S&P 500 INDEX TR VERSUS S&P 500 EQUAL WEIGHTED INDEX TR (OCT 2007-MAR 2009)

Number/Returns/Ratios/Standard Deviation/Variance/P-Value	Hypothesis Number	Time Period	Index	Index	P-Value
	$H3_0$	Oct 2007-Mar 2009	S&P 500 Index TR	S&P 500 EW Index TR	
Number of Data Points			76	76	
Mean Daily Return			0.120	0.122	
Mean Weekly Sharpe Ratio			0.048	0.039	
Standard Deviation			0.513	0.567	
Variance			0.264	0.322	
P-Value					0.914

Table 6 (Hypothesis 6) provides a comparison of the mean daily returns, mean weekly Sharpe Ratios, the standard deviations, and the variances for the SPDR S&P 500 ETF Trust (SPY) against the Invesco S&P 500 Equal Weighted ETF (RSP) for the Oct 2007-Mar 2009 time period of the study. The mean daily return for the period was larger for the Invesco S&P 500 Equal Weighted ETF (RSP) at 0.126 as compared to the SPDR S&P 500 ETF Trust (SPY) return of 0.120.

The mean weekly Sharpe Ratio for the period for the SPDR S&P 500 ETF Trust (SPY) was higher at 0.048 than the Invesco S&P 500 Equal Weighted ETF (RSP) at 0.040. The standard deviation and the variance for the SPDR S&P 500 ETF Trust (SPY) were 0.513 and 0.263, respectively, whereas for the Invesco S&P 500 Equal Weighted ETF (RSP) were 0.567 and 0.322, respectively.

TABLE 6
NUMBER OF DATA POINTS, DAILY RETURNS, SHARPE RATIOS, STANDARD DEVIATIONS, VARIANCES, AND P-VALUES: SPDR S&P 500 ETF TRUST (SPY) VERSUS INVESCO S&P 500 EQUAL WEIGHTED ETF (RSP) (OCT 2007-MAR 2009)

Number/Returns/Ratios/Standard Deviation/Variance/P-Value	Hypothesis Number	Time Period	ETF	ETF	P-Value
	$H4_0$	Oct 2007-Mar 2009	(SPY)	(RSP)	
Number of Data Points			76	76	
Mean Daily Return			0.120	0.126	
Mean Weekly Sharpe Ratio			0.048	0.040	
Standard Deviation			0.513	0.567	
Variance			0.263	0.322	
P-Value					0.921

Table 7 (Hypothesis 7) provides a comparison of the mean daily returns, mean weekly Sharpe Ratios, the standard deviations, and the variances for the S&P 500 Index against the S&P 500 Equal Weight Index for the Apr 2009-Mar 2020 time period. The mean daily return for the period was higher for the S&P 500 Equal Weight Index at 0.059 as compared to the S&P 500 Index return of 0.056.

The mean weekly Sharpe Ratio for the period for the S&P 500 Index was lower at 0.165 than the S&P 500 Equal Weight Index at 0.172. The standard deviation and variance were higher for the S&P 500 Equal Weight Index. The S&P 500 Equal Weight Index standard deviation was 0.570 and the variance was 0.325 while the S&P 500 Index was 0.553 and 0.306, respectively.

TABLE 7
NUMBER OF DATA POINTS, DAILY RETURNS, SHARPE RATIOS, STANDARD DEVIATIONS, VARIANCES, AND P-VALUES: S&P 500 INDEX TR VERSUS S&P 500 EW INDEX TR (APR 2009-MAR 2020)

Number/Returns/Ratios/Standard Deviation/Variance/P-Value	Hypothesis Number	Time Period	Index	Index	P-Value
	$H1_0$	Apr 2009-Mar 2020	S&P 500 Index TR	S&P 500 EW Index TR	
Number of Data Points			551	551	
Mean Daily Return			0.056	0.059	
Mean Weekly Sharpe Ratio			0.172	0.165	
Standard Deviation			0.553	0.570	
Variance			0.306	0.325	
P-Value					0.039

Table 8 (Hypothesis 8) provides a comparison of the mean daily returns, mean weekly Sharpe Ratios, the standard deviations, and the variances for the SPDR S&P 500 ETF Trust (SPY) against the Invesco S&P 500 Equal Weighted ETF (RSP) for the Apr 2009-Mar 2020 time period. The mean daily return for the period was lower for the SPDR S&P 500 ETF Trust (SPY) than the Invesco S&P 500 Equal Weighted ETF (RSP). The difference between mean daily returns was 0.002.

The mean weekly Sharpe Ratio for the period for the SPDR S&P 500 ETF Trust (SPY) was higher than the Invesco S&P 500 Equal Weighted ETF (RSP) where the SPY Sharpe Ratio was 0.170 as compared to

the RSP of 0.162. SPDR S&P 500 Equal Weighted ETF (SPY) standard deviation was 0.552 and the variance was 0.305 while the Invesco S&P 500 Equal Weighted ETF (RSP) was 0.569 and 0.324, respectively.

TABLE 8
NUMBER OF DATA POINTS, DAILY RETURNS, SHARPE RATIOS, STANDARD DEVIATIONS, VARIANCES, AND P-VALUES: SPDR S&P 500 ETF Trust (SPY) VERSUS INVESCO S&P 500 EQUAL WEIGHTED ETF (RSP) (APR 2009-MAR 2020)

Number/Returns/Ratios/Standard Deviation/Variance/P-Value	Hypothesis Number	Time Period	ETF	ETF	P-Value
	$H2_0$	Apr 2009-Mar 2020	(SPY)	(RSP)	
Number of Data Points			551	551	
Mean Daily Return			0.056	0.058	
Mean Weekly Sharpe Ratio			0.170	0.162	
Standard Deviation			0.552	0.569	
Variance			0.305	0.324	
P-Value					0.029

Table 9 (Hypothesis 9) provides a comparison of the mean daily returns, mean weekly Sharpe Ratios, the standard deviations, and the variances for the S&P 500 Index TR against the S&P 500 Equal Weighted Index TR for the Mar 2020-July 2021 time period. The mean daily return of 0.170 for the period was greater for the S&P 500 EW Index TR as compared to the S&P 500 Index TR return of 0.157.

The mean weekly Sharpe Ratio for the period for the S&P 500 Equal Weighted Index TR was lower at 0.193 as compared to the S&P 500 Index TR at 0.263. The standard deviations and the variances tended to be close arithmetically. The S&P 500 Index TR standard deviation was 0.449 and the variance was 0.202 while the S&P 500 Equal Weighted Index TR was 0.456 and 0.208, respectively.

TABLE 9
NUMBER OF DATA POINTS, DAILY RETURNS, SHARPE RATIOS, STANDARD DEVIATIONS, VARIANCES, AND P-VALUES: S&P 500 INDEX TR VERSUS S&P 500 EW INDEX TR (MAR 2020-JULY 2021)

Number/Returns/Ratios/Standard Deviation/Variance/P-Value	Hypothesis Number	Time Period	Index	Index	P-Value
	$H3_0$	Mar 2020-July 2021	S&P 500 Index TR	S&P 500 EW Index TR	
Number of Data Points			70	70	
Mean Daily Return			0.157	0.170	
Mean Weekly Sharpe Ratio			0.263	0.193	
Standard Deviation			0.449	0.456	
Variance			0.202	0.208	
P-Value					0.362

Table 10 (Hypothesis 10) provides a comparison of the mean daily returns, mean weekly Sharpe Ratios, the standard deviations, and the variances for the SPDR S&P 500 ETF Trust (SPY) against the Invesco S&P 500 Equal Weighted ETF (RSP) for the Mar 2020-July 2021 time period of the study. The mean daily

return for the period was larger for the Invesco S&P 500 Equal Weighted ETF (RSP) at 0.169 as compared to the SPDR S&P 500 ETF Trust (SPY) return of 0.157.

The mean weekly Sharpe Ratio for the period for the SPDR S&P 500 ETF Trust (SPY) was higher than the Invesco S&P 500 Equal Weighted ETF (RSP) where the (SPY) Sharpe Ratio was 0.263 as compared to 0.192 for the (RSP). The standard deviation and the variance for the (SPY) were 0.449 and 0.202, respectively, whereas for the (RSP) they were 0.455 and 0.207, respectively.

TABLE 10
NUMBER OF DATA POINTS, DAILY RETURNS, SHARPE RATIOS, STANDARD DEVIATIONS, VARIANCES, AND P-VALUES: SPDR S&P 500 ETF TRUST (SPY) VERSUS INVESCO S&P 500 EQUAL WEIGHTED ETF (RSP) (MAR 2020-JULY 2021)

Number/Returns/Ratios/Standard Deviation/Variance/P-Value	Hypothesis Number	Time Period	ETF	ETF	P-Value
	$H4_0$	Mar 2020-July 2021	(SPY)	(RSP)	
Number of Data Points			70	70	
Mean Daily Return			0.157	0.169	
Mean Weekly Sharpe Ratio			0.263	0.192	
Standard Deviation			0.449	0.455	
Variance			0.202	0.207	
P-Value					0.358

Results of the Study

Hypothesis 1

Weekly Sharpe ratios were calculated from daily returns for the S&P 500 Index TR and the S&P 500 Equal Weighted Index TR for the period May 2003 to July 2021 representing 920 periods. The KS-test and Shapiro-Walk test indicated a non-normal distribution for the period; therefore, the Wilcoxon Signed Rank test for variance was conducted as identified in the study's methodology section. The p-value for the period was 0.406. Given these results, the null hypothesis of the time period was retained. That is, the S&P 500 Index TR Sharpe ratio is not significantly different than the S&P 500 Equal Weighted Index TR Sharpe ratio for the period.

Hypothesis 2

Weekly Sharpe ratios were calculated from daily returns for the SPDR S&P 500 ETF Trust (SPY) and the Invesco S&P 500 Equal Weighted ETF (RSP) for the period May 2003 to July 2021, representing 920 periods. The KS-test and Shapiro-Wilk test indicated a non-normal distribution for the period; therefore, the Wilcoxon Signed Rank test for variance was conducted as identified in the study's methodology section. The p-value for the period was 0.301. Given these results, the null hypothesis for the time period was retained. Therefore, the SPDR S&P 500 ETF Trust (SPY) Sharpe ratio is not significantly different than the Invesco S&P 500 Equal Weighted ETF (RSP) Sharpe ratio for the time period.

Hypothesis 3

Weekly Sharpe ratios were calculated from daily returns for the S&P 500 Index TR and the S&P 500 Equal Weighted Index TR for the period May 2003 to September 2007 representing 223 periods. The KS-test and the Shapiro-Wilk test indicated a normal distribution for the period; therefore, the F-test for variance was used to test if the variances were equal or unequal then the appropriate t-test was used to check for significant differences between the means as identified in the study's methodology section. The p-value for the period was 0.596. Given these results, the null hypothesis for the time period was retained. Therefore,

the S&P 500 Index TR Sharpe ratio is not significantly different than the S&P 500 Equal Weighted Index TR Sharpe ratio the time period.

Hypothesis 4

Weekly Sharpe ratios were calculated from daily returns for the SPDR S&P 500 ETF Trust (SPY) and the Invesco S&P 500 Equal Weighted ETF (RSP) for the period May 2003 to September 2007, representing 223 periods. The KS-test and the Shapiro-Wilk test indicated a normal distribution for the period; therefore, the F-test for variance was used to test if the variances were equal or unequal then the appropriate t-test was used to check for significant differences between the means as identified in the study's methodology section. The p-value for the period was 0.624. Given these results, the null hypothesis for the time period was retained. Therefore, the SPDR S&P 500 ETF Trust (SPY) Sharpe ratio is not significantly different than the Invesco S&P 500 Equal Weighted ETF (RSP) Sharpe ratio for the time period.

Hypothesis 5

Weekly Sharpe ratios were calculated from daily returns for the S&P 500 Index TR and the S&P 500 Equal Weighted Index TR for the period October 2007 to March 2009 representing 76 periods. The KS-test and the Shapiro-Wilk test indicated a normal distribution for the period; therefore, the F-test for variance was used to test if the variances were equal or unequal then the appropriate t-test was used to check for significant differences between the means as identified in the study's methodology section. The p-value for the period was 0.914. Given these results, the null hypothesis for the time period was retained. Therefore, the S&P 500 Index TR Sharpe ratio is not significantly different than the S&P 500 Equal Weighted Index TR Sharpe ratio for the time period.

Hypothesis 6

Weekly Sharpe ratios were calculated from daily returns for the SPDR S&P 500 ETF Trust (SPY) and the Invesco S&P 500 Equal Weighted ETF (RSP) for the period October 2007 to March 2009 representing 76 periods. The KS-test and the Shapiro-Wilk test indicated a normal distribution for the period; therefore, the F-test for variance was used to test if the variances were equal or unequal then the appropriate t-test was used to check for significant differences between the means as identified in the study's methodology section. The p-value for the period was 0.921. Given these results, the null hypothesis for the time period was retained. Therefore, the SPDR S&P 500 ETF Trust (SPY) Sharpe ratio is not significantly different than the Invesco S&P 500 Equal Weighted ETF (RSP) Sharpe ratio for the time period.

Hypothesis 7

Weekly Sharpe ratios were calculated from daily returns for the S&P 500 Index TR and the S&P 500 Equal Weighted Index TR for the period April 2009 to March 2020 representing 551 periods. The KS-test and Shapiro-Walk test indicated a non-normal distribution for the period; therefore, the Wilcoxon Signed Rank test for variance was conducted as identified in the study's methodology section. The p-value for the period was 0.039. Given these results, the null hypothesis of the time period was rejected. That is, the S&P 500 Index TR Sharpe ratio is significantly different than the S&P 500 Equal Weighted Index TR Sharpe ratio for the period.

Hypothesis 8

Weekly Sharpe ratios were calculated from daily returns for the SPDR S&P 500 ETF Trust (SPY) and the Invesco S&P 500 Equal Weighted ETF (RSP) for the period April 2009 to March 2020, representing 551 periods. The KS-test and Shapiro-Wilk test indicated a non-normal distribution for the period; therefore, the Wilcoxon Signed Rank test for variance was conducted as identified in the study's methodology section. The p-value for the period was 0.029. Given these results, the null hypothesis for the time period was rejected. Therefore, the SPDR S&P 500 ETF Trust (SPY) Sharpe ratio is significantly different than the Invesco S&P 500 Equal Weighted ETF (RSP) Sharpe ratio for the time period.

Hypothesis 9

Weekly Sharpe ratios were calculated from daily returns for the S&P 500 Index TR and the S&P 500 Equal Weighted Index TR for the period March 2020 to July 2021 representing 70 periods. The KS-test and the Shapiro-Wilk test indicated a normal distribution for the period; therefore, the F-test for variance was used to test if the variances were equal or unequal then the appropriate t-test was used to check for significant differences between the means as identified in the study's methodology section. The p-value for the period was 0.362. Given these results, the null hypothesis for the time period was retained. Therefore, the S&P 500 Index TR Sharpe ratio is not significantly different than the S&P 500 Equal Weighted Index TR Sharpe ratio the time period.

Hypothesis 10

Weekly Sharpe ratios were calculated from daily returns for the SPDR S&P 500 ETF Trust (SPY) and the Invesco S&P 500 Equal Weighted ETF (RSP) for the period March 2020 to July 2021, representing 70 periods. The KS-test and the Shapiro-Wilk test indicated a normal distribution for the period; therefore, the F-test for variance was used to test if the variances were equal or unequal then the appropriate t-test was used to check for significant differences between the means as identified in the study's methodology section. The p-value for the period was 0.358. Given these results, the null hypothesis for the time period was retained. Therefore, the SPDR S&P 500 ETF Trust (SPY) Sharpe ratio is not significantly different than the Invesco S&P 500 Equal Weighted ETF (RSP) Sharpe ratio for the time period.

CONCLUSION

This study found that on a risk-adjusted basis the mean weekly Sharpe ratios were not significantly different for the S&P 500 Index as compared to the S&P 500 Equal Weighted Index for four of the five periods tested. However, for the period from April 2009 to March 2020 the S&P 500 Index Sharpe Ratio was statistically significant with a p-value of 0.039 which indicated on a risk adjusted basis the capitalization weighted index outperformed the S&P 500 Equal Weighted Index.

A review of the literature found that an equal weighted index outperformed a market capitalization index from 1990-2009 (Burton, 2009). In addition, a study conducted by the Corporate Finance Institute (2019) found that an S&P 500 Equal Weighted Index beat the market capitalization index from 2009-2018. Burton (2009). Finally, Todd Rosenbluth, head of ETF and mutual-fund research at the Center for Financial Research and Analysis, found that from 2010-2019 that equal weighting and market capitalization weighting outperformed each other for 5 of the 10 years during the period (Constable, 2020). For the entire period from 2003-2021, the authors of this study found that the S&P 500 Equal Weighted Index mean daily returns were higher than the S&P 500 Index at 0.056 to 0.050, respectively but the results were not statistically significant. These results are consistent with the findings from the previous research conducted.

When testing the exchange fund proxies for the two indices, the study found on a risk-adjusted basis the mean weekly Sharpe Ratios for the SPDR S&P 500 ETF Trust were significantly different from the Invesco S&P 500 Equal Weighted ETF only for the bull market period April 2009-March 2020. The statistical results indicated the SPDR S&P 500 ETF Trust outperformed the Invesco S&P 500 Equal Weighted ETF on a risk adjusted basis.

The findings of this study provide valuable insight into the pros and cons of the two types of index funds as investors attempt to seek the optimal portfolio to mirror the market given the associated risks in the environment. The choice of which strategy to use depends on the given investors propensity to accept risk. Given the current inflationary pressures on the economy the Federal Reserve's accommodative monetary policy will have to be modified at some point to manage the inflationary pressures if they are not transitory. If investors feel the Federal Reserve will have to act sooner than later, they may opt for the equal weighted index to potentially limit risk on the downside, if they believe inflation is transitory, they may opt for the capitalization weighted index.

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