

# Impact of Covid-19 on Mutual Fund Returns by Style

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## ABSTRACT

This quantitative investigation examined the mutual fund performances (1 and 3-year annual returns) by fund size and style (large-cap growth, large-cap blend, and large-cap value) during the COVID-19 pandemic. The study data were obtained from Morningstar 4 and 5-star fund ratings controlling the standard deviation and top-10 holdings of the United States equity MF. The Morningstar 1-year and 3-year annual returns were utilized for the study. The General Linear Model— Multivariate Analysis method was utilized for this investigation. The investigation revealed that the large-cap (growth, blend, and value) fund category produced superior annual returns during the COVID-19 pandemic. The covariate standard deviation impacted the 1- and 3-year annual returns. However, the Top-10 percentage asset holdings had mixed results on the 1-year and 3-year annual returns. The investigation showed performance differences among fund sizes and styles based on the expected utility theory. Investors and asset managers should consider fund style and size to make short-term and long-term financial investment decisions during bear market periods such as the COVID-19 pandemic.

**Keywords:** Mutual funds, fund investment style, fund ratings, market return, COVID-19.

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## **INTRODUCTION**

Mutual Fund (MF) investments have grown in popularity largely because of diversification and lower systematic risk, increased returns (Walia & Kumar, 2013), and meeting retirement and other long-term goals. Despite their favorability, the industry experienced a downward trend because of the global economic slowdown because of the coronavirus (COVID-19) pandemic systematic risk. The industry growth is forecast to be 3.1% through 2025 totaling 28.9 trillion in total assets. This was a decline of 10.2 percent compared to prior periods (ICI, 2023). In the US, there were 7,393 (6,585 actively managed and 517 passively managed) mutual funds (ICI, 2023). Also, Mutual funds are known for providing low-cost and efficient investment alternatives. The mutual funds were not immune from the global COVID-19 pandemic that negatively disrupted the financial market and world economies. The total assets of mutual funds decreased by 11.6% to EUR 15.68 trillion as of Q1 2020 largely because of the COVID-19 outbreak (European Mutual Fund Industry, 2022). Mutual funds performed better compared to the market index which resulted in 0.15 positive alpha (Alqadhib et al., 2022).

The Active equity mutual funds were no exception to the pandemic even with their performance superiority compared to passive funds, particularly during recessionary and COVID-19 periods (Moskowitz, 2000; Glode, 2011). Pástor and Vorsatz (2020) analyzed active mutual funds during the COVID-19 stock market meltdown (S&P 500 Index) and indicated that mutual funds lost 34% of their value between February and March 2020. The active mutual funds underperformed by 5.6% or 29.1% annualized return (Pástor & Vorsatz, 2020) contrary to other studies (Moskowitz, 2000; Glode, 2011). This study explored the performance of mutual fund size and investment style during the COVID-19 pandemic period. Pástor and Vorsatz's (2020) study covered the pandemic period of two years compared to prior studies (Glode, 2011; Kacperczyk et al., 2016; Moskowitz, 2000) which may show complete performance returns. The pandemic continued until the production of vaccines in early 2022. However, the financial market rebounded before the availability of vaccines. The MF were favorable in the late 1990s (measured by the S&P 500) and further experienced a decline in mid-2000 through mid-2003 (ICI – Fact Book 2010). The mutual funds between 2010 to 2019 were highly liquid (cash flows of \$2.2

trillion) compared to the pandemic outbreak in March 2020 (Szymczyk et al., 2022; (Kargar et al., 2021). This was a period of high turnover volume sales (Falato et al., 2021). Mutual fund market liquidity has been widely studied in recent history (Brunnermeier & Pedersen, 2009; Chebbi et al., 2021; Foley et al., 2021; Zaremba et al., 2021). The Investment Company Institute (ICI-2023) reported that 115.3 million Americans and 68.6 million households invested in MF in 2022 to achieve their long-term financial investment (retirement, medical costs, and education) purposes (Galagedera et al., 2018). Although investment in MF provides diversification benefits however excessive diversification may be counterproductive. Several theories such as the Bayesian learning theory, personal belief, or salience theories postulate investment types and risk and return (Gallagher, 2014; Greenwood & Nagel, 2009; Chernenko et al., 2016; Bordalo et al., 2013). This could lead to lower risk and increased fund expenses associated with the fund turnover ratio (purchases or sales over average total net assets) ultimately harming the fund performance.

There has been increased research on MF performance, risk, and expense ratios. It's suggested that fund flows, size, and fund management fees affect prices (Alqadhib et al., 2022). Despite the body of research on MF (performance, risk, expense ratios, tax), not a single study (according to the best of our knowledge) considered annual fund performance relative to fund size, styles, and fund ratings during the pandemic period of the US Equity mutual funds. However, many studies have pointed out that larger-size funds perform better than smaller funds largely because of economies of scale and lower transaction costs (Margaritis et al., 2007; Murthi et al., 1997; Tuzcu & Ertugay, 2020). Large-cap funds experience lower risk and higher average returns (Ahmad & Norman, 2015). Investors consider alternative mutual funds such as the Multicap funds (a mix of large, mid, and small-cap funds) and thematic (sector-specific) funds. Morningstar classifies 70% of the capitalization of the US market in large-cap funds, small-cap blend classified in small stocks, and value funds with slow growth (low growth rates for earnings, sales, book value, and cash flow), and low valuation (low price ratios and high dividend yields). The growth funds (greater risk) focus on aggressively expanding industries (Bessler et al., 2021).

The fund sizes (large-cap, mid-cap, and small-cap) and investment styles (growth, blend, and value) funds (Stella & Seiler, 2002) were referred to as fund categories in this study. This study aimed to determine whether

fund size and style produce different and equitable performance results (Arshanapalli et al., 2007) during the COVID-19 pandemic. Fischer and Overkott (2015) investigated the performance of 4,147 MF categories and indicated indifferent performance and poor Alpha. These funds exhibited time-varying risks and premium exposures. The value funds (loading) and growth funds decreased momentum loading during the periods of expected market risk premium (Fischer & Overkott, 2015). A question for a future investigation remains whether the Morningstar fund ratings (1–5-star ratings) have significant efficiency (Watson et al., 2011) during the COVID-19 pandemic. This study explored the large-cap fund styles and relative annual returns (1 and 3 years) for 4 and 5-star rated funds (fund performance relative to peers) while controlling standard deviation or total risk (STD-performance variation to the mean) and the percentage of the top-ten holdings in assets (Top10-H). The Morningstar star classification included the top 10 (5-Star), the next 22.5% (4-Star), the next 35% (3-Star), the next 22.5% (2-Star), and the bottom 10% (1-Star) ratings. The Top-10 asset holdings included a higher percentage in the top-10 total asset holdings (more concentrated funds in a few companies (Bello & DeRidder, 2010) during COVID-19 periods (Kargar et al., 2021). The performance of MF can be driven by sector investment concentration and across industries to identify margin returns for the top funds in a particular industry/sector (Goldman et al., 2016). These sector/industry or thematic fund concentrations (25 percent fund holdings in a sector) include energy, financial services, health care, precious metals, real estate, technology, and utilities (Fitzpatrick et al., 2012). The Fama and French five-factor model (Alqadhib et al., 2022) showed significant mutual fund performance of actively managed portfolios in Saudi Arabia in a study of 79 mutual funds that showed a 0.15% favorable alpha.

There is a general belief that mutual funds growth performs better than blend and that blend funds perform better than value funds for 1-year (1-YR), 3-year (3-YR), and 5-year (5-YR) annual returns (total return). It is suggested that value funds tend to yield growth on a long-term basis. A study by Luo (2022) for the period 2007-2008 and 2014-2015 in the Chinese mutual fund market (China Stock Market and Accounting Research Database and the Wind Database) revealed that managers who invested in less overvalued funds following the 2007/8 recession experienced lower returns. The risk preference assumption suggested that investors who

experienced loss were unwilling to risk similar investments in the future (Luo et al., 2021). Hsu et al. (2016) argued that the timing of an investment (in and out of MF) plays a critical role in realizing sound returns compared to a buy-and-hold strategy. This could be true for value MF and realize higher returns before a bearish market of expected poor returns that decreased by 2 percent. The result was consistent with the average fund investor (Hsu et al., 2016). The investigation further suggested that the return is lower in growth funds than value funds and a bigger gap in larger-cap than small-cap funds (Hsu et al., 2016). The finding was inconsistent with a recent study by Pástor and Vorsatz, (2020). Arshanapalli et al. (2007) who investigated the style-timing fund families based on a multinomial logit model concluded a better portfolio performance. Investors should incorporate the timing of large-cap growth, large-cap blend, and large-cap value equity-style indexes in their portfolio to realize excess returns and factor fundamental and technical analysis (Arshanapalli et al. 2007). A recent study that covered mutual fund performance comparison in Europe during the COVID-19 period observed investor behavior transitioning from riskier to relatively safer investment options in terms of size and investment objectives (Rizvi et al., 2020). The study further revealed investment switch to non-cyclical sectors and investment away from highly infected countries.

The Morningstar fund efficacy (Blake & Morey, 2000) allows investors to make informed financial decisions. The fund's historical rating implies that the highest performers are assigned 5-Star than 4-Star funds forward (Watson et al., 2011; Blake & Molly, 2002; Pástor & Vorsatz, 2020). There has been an ongoing debate among researchers and financial analysts about whether growth funds perform better compared to blend and value funds in terms of 1-YR, 3-YR, and 5-YR annual returns. It was suggested that large-cap growth funds tend to perform better compared to mid or small-cap funds (Ongaki, 2021). Funds are generally affected by many factors including the STD (total risk) and the TOP10-H. However, no research predicted the COVID-19 pandemic's effect on fund performances relative to fund size and style. We examined whether performance difference exists among the fund size (large cap) and style (growth, blend, and value) during the COVID-19 period considering covariates (standard deviation and Top-10 Holdings. The mutual funds (periods after 2008 recession) returned 19.67 percent for a 5-year annualized return compared to the S&P 500 index of 17.94 percent return (Fan, 2018). We examined whether the result was consistent during the COVID-19 period.

Many sustainable funds have gained significant attention over the past few years because of their superior performance during the COVID-19 pandemic period of 1.32 and 6.96 annually. The high-sustainable funds attract investment interest and return between 5.28% and 5.76% per annum during the market crash and are consistent with the COVID-19 period. The trend continued during the post-crash pandemic (Fang & Parida, 2022). Popescu and Xu (2017) concluded that poor-performing funds showed an increased risk during the expansionary periods and reduced risks during contracting periods consistent with an earlier study (Kacperczyk et al., 2008). However, the large-value funds' 5-year Alpha was significant considering risk-adjusted returns (Fan, 2018). The fund performance and risk depend on the business's economic cycle. The performance differs across fund styles and categories. The value and small-cap funds produced better outcomes than Growth and Large-cap funds in the periods 2006-2016 (De Mingo-López et al., 2022). This was contrary to Ongaki's Study (2021) where large-cap growth performed well than their predecessors. This study explored the performance of fund style and size during the COVID-19 period. The fund risk and whether a boom or recessionary period may affect fund performance (Popescu & Xu, 2017). Stella and Seiler (2002) found that neither the growth nor value funds produced superior returns compared to a benchmark (concerning fund size). However, the growth and value funds returned better results relative to their small fund classification (Chen et al., 2004). The result did not hold when controlling for fund size. The result was mixed for medium-sized counterpart funds (Stella & Seiler, 2002). Mutual funds are equally affected by the business cycle however proven to perform better compared to the market indexes. Mutual fund diversification and resilience tend to attract many investors during economic contraction associated with high volatilities. The COVID-19 pandemic has prompted this investigation to assess the impact of the COVID-19 pandemic and the performances of US mutual funds (size and style). We examined whether the Morningstar fund classifications could predict future investment returns. The result will provide useful information to identify suitable funds during bad economic periods to optimize portfolio return (Watson et al. 2011). Pástor and Vorsatz (2020) revealed that growth funds produced better returns during the COVID-19 pandemic than value funds. This result was consistent with Ongaki's (2021) study that explored mutual fund investment style, size, and Morningstar ratings.

The Morningstar Ratings, introduced in 1985, have garnered increased attention as they offer a simplified method for identifying favorable performance among thousands of mutual funds and constructing diversified investment portfolios (Del Guercio & Tkac, 2008). This approach is rooted in the efficient market hypothesis (Fama et al., 1969), suggesting that security prices reflect publicly available information, or the alternative theory of market inefficiency (Shiller, 2003), proposing that security prices deviate from their fundamental values. The theory provides investors with a forward-looking mechanism to identify and invest in profitable securities using Morningstar ratings and fund performances. Grossman and Stiglitz (1980) present an efficiently inefficient market theoretical framework due to information asymmetry or transaction costs. However, it is essential to remember that historical performance may not necessarily predict future gain opportunities (Jensen, 1968). Grinblatt and Titman (1992) argued that considering past performance can be informative when evaluating thousands of mutual funds. The Morningstar has gained widespread popularity, significantly influencing fund inflows and outflows. Studies (Del Guercio & Tkac, 2008) have found correlations between fund holdings and turnover, as well as fund flows and Morningstar measures such as fund ratings and returns. Morningstar mutual fund ratings and categories play a crucial role in investors' financial decisions, with research suggesting that star ratings influence fund flows more than performance. However, fund efficacy considers both fund performance and risk, exemplified by the interplay of positive abnormal upgrades and negative abnormal downgrades in terms of star ratings and fund flows (Blake & Morey, 2000). No specific theory however Morningstar is rooted in the expected utility theory for Risk-Adjusted Return (Morningstar, 2021) that investors have a choice to buy a risk-free asset rather than a risky portfolio (Vinod, 2004). The Morningstar measures a fund's excess risk return over the risk-free rate and beyond and that investors are risk averse and base their decisions under uncertainty and expected (Vinod, 2004). The expected utility theory postulates that a decision is guided by value outcome or utility considering options maintaining the arithmetic structure of the Sharpe Ratio (Sharpe, 1966).

## **Research Objective**

The investigation examined whether the Morningstar 4 and 5-Star fund categories by size (large-cap) and style (growth, blend, and value funds) of

US equity MF have any predictive power to evaluate future performance (1-YR and 3-YR annualized returns) while controlling covariates (STD and TOP10-H).

## **LITERATURE REVIEW**

The performance of MF investments (stocks, bonds, MF, and others) depends on favorable and unfavorable market business cycles. The world economy experienced an unfavorable capital market during the COVID-19 outbreak (early 2020). This resulted in global economic contraction negatively affecting the financial market and the mutual fund industry (Szymczyk, 2022). The pandemic prompted market selloff volume redemptions (Falato et al., 2021) resulting in liquidity constraints and lower returns. The COVID-19 market risk prompted investors to avoid lower-return funds in favor of higher premiums. Studies have shown that human capital efficiency plays a vital role in mutual fund performance during economic meltdown including the COVID-19 period (Hasnaoui et al., 2021). The study investigated 2,044 equity funds in Asia (seventeen countries) to determine fund performance regarding human capital efficacy. The domestic US equity MF investments have grown largely because of their popularity in diversification to mitigate unsystematic risk. More so sustainable funds and recently created (socially responsible: Environmental Social and Governance-ESG and Corporate Social Responsibility-CSR) funds have grown in popularity because of their performance sensitivity (Fang & Parida, 2022). These funds attracted more investors at a rate of 5.52% than traditional funds and the trend continued into the pandemic period at 8% growth (Hartzmark & Sussman, 2019). Guimarães and Malaquias (2023) investigated 3,840 equity mutual funds during the periods of financial constraints and the COVID-19 Pandemic between January 2006 and December 2020 and revealed similar results. The investment in sustainable funds resulted in better risk-adjusted returns compared to conventional funds. None of the studies investigated the fund size and investment style to evaluate fund performance. The Morningstar tools help investors determine fund performance based on fund size, style, and the fund star ratings. Morningstar provides a fund rating system that filters through thousands of MFs. The tool provides valuable information to help investors identify and predict the fund's future performances (Stella & Seiler, 2002) considering the market risk (beta-systematic risk), total risk



(standard deviation), fund turnover (sales), top-level holdings (assets), price earning, price-book ratio, and taxes to make future investment financial decisions to maximize short and long-term expected returns (1-YR, 3-YR, and 5-YR annual returns). The question is to compare the performance of mutual during the pandemic and whether the results are consistent with prior studies. This study examined the performances (1 and 3-year annual returns) of the 4 and 5-star fund ratings US equity MF while controlling standard deviation and the top-10 holding in assets during the COVID-19 period. This investigation explored large-cap growth, large-cap blend, and large-cap value. The mid and small caps were eliminated because of fund efficacy classifications. No study investigated the US equity MF's performance style and size during COVID-19.

Stella and Seiler (2002) investigated 180 funds of different investment categories and revealed mixed results. The result of value and growth funds produced a higher risk and return (Stella & Seiler, 2002). The Mid-cap growth funds and small-cap funds had a higher fund risk (Stella & Seiler, 2002). The large and medium funds (value and growth) produced superior returns compared to the small-cap index or Russell 2000 benchmark (Stella & Seiler, 2002). Badrinath and Gubellini (2012) suggested that small and medium active growth funds tend to achieve superior returns and reduced fund risk exposure compared to passive portfolio investment strategy (index) during bad economic market conditions. The value funds stock portfolios are susceptible to risk and superior returns (Badrinath & Gubellini, 2012). Another study explored equity mid-cap MF in the periods 2010 and 2013 (Panda & Moharana, 2014) indicating a lower-risk investment in mid-cap funds (80% of the sample size) that performed better than the benchmark. Milan and Eid (2014) found that high turnover rate funds negatively affected MF's performance (no superior returns relative to passive investment) considering the fund's turnover transaction costs and fees. Cremers and Petajisto (2009) examined trading transaction costs (before and after) and suggested that the lower turnover rate funds resulted in below-average performance compared to the benchmark. Wermers (2000) indicated that high turnover rate funds produced the highest returns despite high transaction costs and charges. However, Chen et al. (2000) suggested that those funds traded (buy/sell) for a year. Gupta-Mukherjee (2013) concluded that funds with a higher historical turnover rate generated superior returns and were consistent with Wermer's (2000) investigation. Kaushik and

Barnhart (2009) found a positive correlation between fund performance, the TOP10-H, and the fund turnover ratio. The study sampled 72 months between 2001 and 2006 that included 4,640 (monthly returns) funds (Kaushik & Barnhart, 2009). The TOP10-H or top quartile funds than the bottom quartile funds experienced excess monthly returns compared to the S&P 500 index by 410 basis points or 49.2 percent in annual returns. The bottom-tier funds underperformed (Kaushik & Barnhart, 2009). This result suggested that the higher turnover ratio and the percentage of investment within the TOP10-H or the higher weighted holdings in assets produced superior (abnormal) returns than their predecessors (Kaushik & Barnhart, 2009). The poor performance portfolio was positively related to load and size funds. Rakesh (2012) suggested that a higher percentage of funds that produced higher returns (funds that beat the market) were correlated with higher risks. This result was supported in another investigation by Babalos et al., (2015). This notion confines with the principle of finance (risk and return tradeoff). Arugaslan et al. (2007) suggested that the highest returns funds lost their performance superiority when considering the funds' inherent risks. Vijayakumar et al. (2012) analyzed fund characteristics (market return, standard deviation, fund size, turnover ratio, income ratio, and expenses ratio) and found possible return associations. The risk (STD), fund size, and expense ratio were associated with a higher return than turnover rates. Walia and Kumar (2013) suggested that fund managers may not maximize equity returns (ROI) by investing heavily in risky assets without considering the product quality, business cycle, and risk-return tradeoff of an investment portfolio. Karoui and Meier (2015) concurred that low-performing funds than average funds experienced higher standard deviation and return.

The buy/hold strategies study examined the market conditions of 5,565 actively managed funds U.S. equity MF in the period between 1991 and 2010. The investigation considered market conditions and volatility. The large-cap MF mimics the index and investors consider a fund's category as an investment strategy. Yalavatti and Bheemanagouda (2017) found that large-cap equity MF produced better market returns compared to the benchmark (NSE Nifty 50) on all metrics categories in the India market index. Manju (2011) concluded that the performance of the MF versus the market is a win-win situation in which some funds performed better than the market and vice versa. An earlier study concluded that MF categories could provide pertinent information to investors and fund managers to formulate

a future winning portfolio (Swinkels & Liam, 2007). A recent study found a linear positive relationship between fund size and fund efficacy (Tuzcu & Ertugay, 2020). The study data source from Capital Market Board and Financial Information News Network comprised 62, 65, and 66 funds in the year 2015, 2016, and 2017, respectively. The investigation centered on fund size and fund manager relationship for data envelopment analysis in Turkey. Further, the study showed fund size and performance favorable relationship (Tuzcu & Ertugay, 2020). The fund size and fund manager showed a positive relationship during high systematic risks (COVID-19 period). Another study by Nawazish et al. (2020) suggested that human capital efficiency was favorable in increased or resilient fund performance during the COVID-19 pandemic. The study explored mutual funds in several Latin American states and the periods overlapping the COVID-19 outbreak. Gupta and Pareek (2020) revealed similar results suggesting that fund managers pay greater attention to fund size (larger in assets) to mitigate risks and maximize optimal fund performance returns (attention gap model) for a large pool of domestic equity mutual funds in the United States. It was concluded that larger active funds create sufficient value due to economies of scale comparable to index funds than smaller-size funds that underperform on an after-cost basis.

The behavioral finance concept suggests that Investors' sentiments are irrational or rational depending on market conditions attributed to risk and return (BU, 2019). Large-cap stock funds tend to follow the market momentum investment strategy as opposed to the diversification features of large-cap blends and value funds (Ang et al., 2017). The question is whether the sentiment holds and is consistent during the COVID-19 period. Herrmann et al. (2016) concurred that the style-shifting of MF's investment strategy not only predicted future performance but also earned 2.4% higher returns than before returns. The study included 2,631 daily returns of US active equity MF. Goldman et al. (2016) indicated that industry-sector concentration of one or two top 10 industry sectors produced better performance results considering market conditions (industry concentration index, size, and the fund's investment objectives). The result did not hold in a study by Ang et al. (2016). The investigation suggested that large holding funds produced better returns by controlling the fund size and fees. Patel (2018) recommended a portfolio simplification strategy by reducing expenses to optimize fund performance. Another study by Bessler et al.

(2021) investigated systematic factors that measured active US mutual funds from 1990 to 2016 and suggested that high-risk exposure funds returned higher performance and alpha than the lower-risk exposure funds. The investigation considered fund tracking errors, fund size, investment style, or holdings-based measures. The high return was (smallest funds at 2.32% and 2.28% largest funds) attributed to the fund's active management and high change fund exposure (Bessler et al., 2021).

Despite increased research in MF performance returns, a few studies have investigated the fund categories' risks and the fund ratings as significant factors that affect portfolio returns. The latest study we could find goes back to 2002 (Stella & Seiler, 2002). The study examined US equity MF in six categories (large growth, large value, medium growth, medium value, small growth, and small value) over six years. The investigation examined fund sizes and style annual returns considering per unit of risk (Stella & Seiler, 2002). Babalos et al. (2015) investigated fund size and fund risk and concluded that the fund with higher risk produced superior performance. The study was consistent with the findings of Bessler et al. (2021). The result was mixed concerning large-cap funds. There was some evidence in support of large-cap funds except for funds within certain sectors/industries (technology). The current investigation explored 4 and 5-star fund ratings and categories (LG, LB, and LV) relative to 1 and 3-year annual returns. Many financial asset management firms utilize the Morningstar rating system and fund categories to make investment choices to estimate future expected returns (1-YR, 3-YR, and 5-YR annual returns). The investors' performance expectation is high on equity MF and there is a general belief that growth funds perform better than blend and that blend funds perform better than value funds concerning 1-year, 3-year, and 5-year annualized returns (Blake & Morey, 2000). This research would shed light on determining whether fund categories and Morningstar ratings produce different annualized returns (1 and 3 years) controlling covariate variables (standard deviation and the Top-10 Holding).

## **RESEARCH METHODOLOGY**

### **Data**

This study examined whether differences exist in annual returns (1-YR & 3-YR) among US equity MF (4 and 5-Star) investment categories (large-cap growth, large-cap blend, and large-cap value) controlling covariate variables (STD and TOP10-H). The US equity MF research data was obtained from the Morningstar database system of 4 and 5-star Morningstar ratings. Other non-US, bond funds, non-equity, real estate, international, thematic, multi-cap, and target funds were not considered. The study data covered the period between September 2019 and September 2022 (the COVID-19 period) as calculated in the Morningstar Inc. database system. The data period (2019-2022) was assumed to be the COVID-19 performance of 1 and 3-year annual returns. The data information was analyzed to determine performances among fund size (large cap) and investment style (growth, blend, and value). The result was further analyzed and compared with earlier studies to establish MF performance consistencies (Ongaki, 2021). Any fund without a ticker symbol was deleted from the study. Many researchers have utilized the Morningstar Inc. database to extract reliable data and valuable information (Galagedera, et al. 2018; Pástor & Vorsatz (2020). The study relied on the Morning Star US equity fund categories and investment classification (style and size). The Morningstar dataset contains valuable information that could be used to analyze funds' annual returns, net asset value, fund investment objectives, expense ratios, turnover ratios, tax ratios, risk, and other relevant characteristics of MF (Park, 2016). The specific data for this investigation included 1 (1-YR) and 3-year (3-YR) annualized returns during the Coronavirus period (COVID-19) classified as Dependent Variables (DV) and Standard Deviation (STD) and the top-10 percentage holding in assets (Top10-H) covariates variables. The funds selected included the Morningstar fund efficacies of 4 and 5-star ratings obtained in the Morningstar dataset. The Morningstar return assumes the reinvestment calculation of income and capital gains distributions (Stella & Seiler, 2002). The funds included active and passively managed domestic equity MF.

The annualized geometrical mean of the excess returns model calculations and the Morningstar return calculations are based on historical

excess returns rather than forecasts and other probabilities of future returns as shown below (Carluccio et al., 2023; Morningstar, 2021).

$$ER_t = \frac{1+TR_t}{1+FRT} - 1$$

$$MRAR(\gamma) = \left[ \sum_{t=1}^T (1 + ER_t)^{-\gamma} \right]^{\frac{-12}{\gamma}} - 1$$

Morningstar annualized geometric means of excess return = MRAR

Geometric excess return at time t =  $ER_t$

Total return for risk-free rate =  $FRT$

Total return for a month at time t =  $TR_t$

The number of months in the time period = T

The final data included large-cap funds. The mid and small-cap funds were eliminated after data cleaning of the outliers and nonsignificant results. Also, the fund turnover was eliminated from the study because of the nonsignificant result. The top 10 asset holdings and standard deviation were included in the final data tabulation and analysis. The mutual fund industry classifies funds by size and style. A fund worth \$2 billion or less is classified as a small-cap, a fund that holds between \$1 and \$10 billion as mid-cap, and a large-cap for holding over \$10 billion in assets (FINRA, 2022). The MF categories consist of Large-cap Growth (LG), Large-cap Blend (LB), Large-cap Value (LV), Mid-cap Growth (MG), Mid-cap Blend (MB), Mid-cap Value (MV), and Small-cap Growth (SG), Small-cap Blend (SB), and Small-cap Value (SV) funds. This study includes LG, LB, and LV as IV (coded as 1, 2, and 3 dummy variables in SPSS). The fund categories were 4 and 5-Star Morningstar ratings (coded as 1 and 2 dummy variables in SPSS). No analysis was performed on fund star ratings. The funds with zero performance values and blanks were excluded from the study's final data. The Morningstar data were exported to Excel and the Excel final data was imported into SPSS software version 27. The final sample size of the US equity MF included 103 funds of actively and passively managed funds (Table 1). The large-cap performance means returns (1 and 3 years) are shown in Tables 1 and 2. The large-cap value outperformed the large-cap

blend and growth for the one-year return with a mean of -4.05 (Table 1). The marginal means showed relative results (Table 2). Also, the large-cap growth (3-year mean) outperformed the large-cap blend and large-cap value with a mean return of 13.11 (Table 1). However, the 3-year marginal means were similar across the investment fund styles (Table 2). The 1 and 3-year mean performance will be analyzed to determine the mean statistically significant (P-value or  $P < .05$ ) difference. The standard deviations were fairly similar across the fund categories (Table 1). It appeared that the large-cap growth funds suggested higher returns and moderate standard deviation. The skewness and kurtosis were within the normal data distribution range of .5 or at least within the acceptable range of +/-3 (playkurtic).

**Table 1: Descriptive Statistics**

	Fund Category	Mean	Std. Deviation	N
1YR Ret	1	-15.67	2.85	13
	2	-11.06	2.65	63
	3	-4.05	2.73	27
	Total	-9.80	4.61	103
3YR Ret	1	13.11	1.81	13
	2	12.34	1.57	63
	3	10.73	0.95	27
	Total	12.01	1.66	103

Own source

**Table 2: Estimated Marginal Means**

Dependent Variable	Fund Category	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
One_YRRet	1	-14.754a	.65	-16.034	-13.474
	2	-10.704a	.27	-11.247	-10.161
	3	-5.315a	.53	-6.373	-4.257
Three_YRRet	1	11.987a	.34	11.316	12.658
	2	11.976a	.14	11.691	12.26
	3	12.119a	.28	11.565	12.673

a Covariates: Top10AssetHold = 32.02, StdDev5Y = 17.09.

## **METHODOLOGY**

The purpose of this quantitative study was to examine whether performance (1-YR and 3-YR) differences exist among the US equity MF 3-level fund categories (large-cap growth, large-cap blend, and large-cap value) controlling covariate variables (STD and TOP10-H). The MANCOVA research method design enabled the investigation. The MANCOVA was sufficient to examine two-way tests. The DV included 1-year and 3-year annual returns of the 3-level IV (LG, LB, and LV) controlling two covariate variables (top 10 asset holding and standard deviation). The design allowed us to investigate the fund association among groups and sub-groups (categories-size and investment style) considering confounding variables (STD and TOP10-H). The efficacy (four and five stars) factors include fund performance, transaction cost, risk, and total returns (Watson et al. 2011). The higher the fund-star rating the higher its efficacy which translates to higher performance. The adjusted risk is associated with sales transaction costs in comparison to similar funds (fund category). The top 10 percent of funds receive five-star ratings and the bottom 10 percent receive one-star ratings (Fan, 2018). The fund with a minimum of three historical data on a Morningstar Risk-Adjusted Return was measured. The top 10% of the funds in each category receive 5 stars, the next 22.5% receive 4 stars, the next 35% receive 3 stars, the next 22.5% receive 2 stars and the bottom 10% receive 1 star (Del Guercio & Tkac, 2008; Morningstar, 2021). The 1-YR and 3-YR geometric mean annualized calculation (Fan, 2018). The Morningstar annualized total rate of return (distribution reinvestment of income and capital gains) is computed by dividing the change in NAV (Net Asset Value) by the initial NAV (Stella & Seiler, 2002). The fund's performance compared to other similar fund categories (Stella & Seiler, 2002). The mid-cap and small-cap funds were removed from the final sample size because of the low sample size and outliers. Therefore the entire fund categories were removed. This could have skewed the test results and analysis. This action criteria significantly decreased the final sample size. The final sample included 103 funds of the large-cap (LG, LB, and LV) as shown in Table 1. The large-cap blend represented a higher percentage of the sample size compared to fund categories (large growth and large value) funds (Table 1). The annual performance returns and other measurement information reflect the S&P 500 index or market benchmark. The study result was not analyzed with the market benchmark. The terms covariates,



controlling, confounding, or intervening variables were interchangeably used in this investigation.

1. This study would be beneficial to fund managers and individual investors to examine the performance of fund categories to make financial investment decisions. The identification of suitable fund categories in the short and long-term goals (time horizon) and the effect of intervening factors (covariates). Because of the limited scope of this investigation, the price earning and book price ratios were not evaluated. This could be an opening in future research. The research data and methodology assumed the following factors.
2. The study postulated the utility theory with other underlying theory characteristics embedded in mutual funds.
3. The research data (the fund categories and the associated performances of US MF) were generated from the Morningstar system.
4. The expense and tax were excluded from the study (complexity of obtaining consistent and associated relevant data).
5. The funds examined in this study included annualized returns for 1-YR and 3-YR presumed for the three years between 2020 and 2022 (COVID-19 period).
6. The Morningstar fund size, styles, fund ratings, and time horizon are assumed to be consistent with the historical returns. We further assumed the same information provided to prospective investors considering MF's investment in various business cycles and markets (market gains and losses alike).
7. The domestic US equity MF includes investment size and style (large-cap growth, large-cap blend, and large-cap value funds).
8. The General Linear Model-multivariate parametric Analysis methods were utilized.

9. The covariates variables were utilized in the research methodology to reduce error variance and thus to increase outcome precision power without obscuring the phenomenon and the study outcome.

## **Assumptions**

The assumptions for the MANCOVA method were partially satisfied for data residuals normal distributions data, no extreme outliers (extreme outliers removed), independent sample, homoscedasticity, and no missing cases. The Shapiro-Wilk indicated a statistically significant result that data was not confining to the normality test ( $P < .05$ ) except for the standard deviation covariate. However, several visual inspections showed a normal dataset to satisfy MANCOVA assumption requirements. The scatterplot showed a linear relationship of 1-year and 3-year (dependent variables) and STD and Top10-H covariates. There were no extreme outliers when stem-leaf plots were visually inspected. The skewness and kurtosis are robust measures for normally distributed data (Field, 2013), and data within the  $\pm 5$  range is approximately symmetric (D'Agostino & Stephens, 1986). The covariates (STD and TOP10-H) were not highly correlated (the highest was less than .42 based on the Pearson correlation matrix). The Pearson correlation matrix between DVs (1-year and 3-year) annual returns was .46. Tabachnick and Fidell (2012) suggested that no correlation should be above  $r = .90$  when evaluating MANCOVA assumptions. Leven's test was statistically significant for one year return ( $P < .00$ ) and three years statistically nonsignificant ( $P > .63$ ). However, Box's test result was significant ( $P < .05$ ). However, the analysis of Box's Test of equality of covariance (that homogeneity of equality variance) suggests that when Box's test is greater than .001 it's recommended to use Wilks' Lambda and when less than .001 to utilize Pillai's Trace (Multivariate Tests). The interaction between covariates and independent variables showed mixed results. The IV (Fund Category) covariate (standard deviation) and top 10 asset holdings were non-significant p-values greater than .05 (Table 4). In the interaction between the fund category and top 10 holdings, the P-values were greater than .05 (statistically nonsignificant) as shown in Table 4. In the interaction between the fund category and standard deviation, the P-values were greater than .05 (statistically nonsignificant) as shown in Table 4. Also, the tests of between-subjects effects were nonsignificant for fund category (IV), standard deviation, and the top 10 asset-holding covariates variables

about 1-year and 3-year annual returns (Table 5). The assumptions were satisfactory to move forward with the study. The following sections include results and conclusions.

**Table 3: Tests of Normality**

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
1YR Ret	.175	103	.00	.924	103	.00
3YR Ret	.103	103	.01	.965	103	.01
Top 10-H	.112	103	.00	.958	103	.00
STD	.098	103	.02	.978	103	.08

a. Lilliefors Significance Correction

**Table 4: Multivariate Tests**

	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.091	4.513b	2	90	.01	.091
	Wilks' Lambda	.909	4.513b	2	90	.01	.091
	Hotelling's Trace	.100	4.513b	2	90	.01	.091
	Roy's Largest Root	.100	4.513b	2	90	.01	.091
FundCatgr* Top10AssetHold	Pillai's Trace	.067	1.570	4	182	.18	.033
	Wilks' Lambda	.934	1.571b	4	180	.18	.034
	Hotelling's Trace	.071	1.571	4	178	.18	.034
	Roy's Largest Root	.064	2.903c	2	91	.06	.060
FundCatgr* Top10AssetHold* StdDev5Y	Pillai's Trace	.090	1.426	6	182	.21	.045

**Table 5: Tests of Between-Subjects Effects**

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1YR Ret	1825.565a	11	165.96	44.483	.00	.843
	3YR Ret	195.878b	11	17.807	18.804	.00	.694
Intercept	1YR Ret	27.071	1	27.071	7.256	.01	.074
	3YR Ret	0.004	1	0.004	0.005	.95	.000
FundCatgr * Top10-H	1YR Ret	11.429	2	5.714	1.532	.22	.033
	3YR Ret	1.219	2	0.609	0.644	.53	.014
FundCatgr * Top10-H * STD	1YR Ret	18.736	3	6.245	1.674	.18	.052
	3YR Ret	1.8	3	0.6	0.634	.60	.020

a R Squared = .843 (Adjusted R Squared = .824) R Squared = .824) b R Squared = .694 (Adjusted R Squared = .694)

## RESULTS

The investigation was to determine the US equity MF (large cap; LG, LB, and LV) and associated statistical significance differences performance of 1-YR and 3-YR annual returns controlling covariate variables (STD and TOP10-H). The General Linear Model-Multivariate test was used in SPSS version 27 for the result and analysis (full factorial output analysis). The final data included 103 large-cap (LG, LB, and LV) US Equity MF (Table 1). Box’s Test of equality of covariance result was nonsignificant ( $P > .001$ ) and used Wilks’ Lambda or Pillai’s Trace (Multivariate Tests) when p-values are less than .001. The IV (Fund Category) covariate (standard deviation) and top 10 asset holdings were statistically significant p-values of less than .05 and significant effect size (Table 6). The Wilks Lambda and Pillai’s Trace MANCOVA multivariate test result for fund category controlling covariates (standard deviation and top 10 asset holding) were statistically significant ( $P < .05$ ). Leven’s test of equal variance was nonsignificant to satisfy the dependent variables assumption (1 and 3-year annual return).

**Table 6: Multivariate Tests**

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	0.491	46.767b	2	97	.00	.491
	Wilks' Lambda	0.509	46.767b	2	97	.00	.491
Top10AssetHold	Pillai's Trace	0.094	5.021b	2	97	.01	.094
	Wilks' Lambda	0.906	5.021b	2	97	.01	.094
StdDev5Y	Pillai's Trace	0.744	140.818b	2	97	.00	.744
	Wilks' Lambda	0.256	140.818b	2	97	.00	.744
FundCatgry	Pillai's Trace	0.563	19.214	4	196	.00	.282
	Wilks' Lambda	0.437	24.855b	4	194	.00	.339

The tests of between-subject effects results (without the covariates) were statistically significant for 1 and 3-year annual returns ( $P < .05$ ) as shown in Table 7. The large-cap value performed better and outperformed the large-cap blend and growth relative to 1-year return with a mean of -4.05 (Table 1) and statistically significant ( $P < .05$ ). The deeper analysis

of the one-year mean indicated that the large-cap growth (3-year mean) outperformed the large-cap blend and large-cap value with a mean return of 13.11 (Table 1). However, the mean differences were not statistically significant. The results suggested that the large-cap value preferred fund category for the one-year annualized return. The standard deviations (total risk) were similar across the fund categories (Table 1). However, the 3-year standard deviation was much lower than the other two fund categories. The statistically significant finding is supported by Shiller (2003) that securities deviate from their fundamental values and provide a forward-looking model to identify a class of profitable funds using the Morningstar fund ratings and risk-adjusted performances (1-year and 3-year annual returns).

The tests of between-subjects effects were statistically significant for fund category (IV) and 1-year annual return means controlling covariates (standard deviation and the top 10 asset-holding) as shown in Table 7. The annual returns (1-YR) controlling standard deviation and the top 10 asset holding (covariates) were statistically significant as shown in Table 7 with a 50% effect size (partial Eta Squared). However, the 3-year annual return result was statistically nonsignificant as shown in Table 7. Investors should not use past performance to predict future gain opportunities (Jensen, 1968). Analyzed individually, the top 10 asset holdings had a statistically significant impact on the 3-year annual returns (3-YR) than the 1-year annual returns. Also, the standard deviation had a statistically significant result on the 1 and 3-year annual returns (1-YR and 3-YR). In summary, the tests of between-subjects effects were statistically significant ( $P < .05$ ) for the fund category, relative to 1 year annualized return (Table 7) controlling standard deviation and the top 10 asset holding covariates. Also, the fund category did not have a statistically significant ( $P > .05$ ) effect on the 3-year annual return controlling standard deviation and the top 10 asset holdings ( $P > .05$ ) as shown in Table 7. Grinblatt and Titman's (1992) study suggested that past performance can be valuable in filtering and identifying better-performing funds from thousands of mutual funds. The Morningstar fund star ratings and performance outcomes have gained investors' attention to influence fund inflows and outflows (Del Guercio & Tkac, 2008). Carluccio et al. (2023) introduced a cardinal basis rather than ordinal for risk-adjusted performance measures to receive ratings relative to the benchmark. Carluccio et al. (2023) argued that funds failed to perform despite their star ratings.

**Table 7: Tests of Between-Subjects Effects**

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	One_YRRet	1753.804a	4	438.45	104.48	.00	.810
	Three_YRRet	169.163b	4	42.291	36.713	.00	.600
Intercept	One_YRRet	141.992	1	141.99	33.835	.00	.257
	Three_YRRet	18.617	1	18.617	16.161	.00	.142
Top10AssetHold	One_YRRet	6.201	1	6.201	1.478	.23	.015
	Three_YRRet	11.543	1	11.543	10.021	.00	.093
StdDev5Y	One_YRRet	314.605	1	314.61	74.967	.00	.433
	Three_YRRet	83.422	1	83.422	72.419	.00	.425
FundCatgry	One_YRRet	418.065	2	209.03	49.81	.00	.504
	Three_YRRet	0.207	2	0.103	0.09	.91	.002

a R Squared = .810 (Adj. R Squared = .802) b R Squared = .600 (Adj R Squared=.583)

Because of the 3-level fund categories (LG, LB, and Lv) and the statistically significant result on the 1-year annual return, the Post hoc analysis (Tukey and Bonferon) was performed to determine the specific of the large-cap fund level results (style). The post hoc tests revealed that 1-year annual returns had mean statistically significant differences among funds categories (large-cap growth, large-cap blend, and large-cap value). Tukey and Bonferon’s examination of investment style combination (LG, LB, and LV) funds post hoc test results were statistically significant relative to 1-year annual returns (Table 9). The Bonferroni pairwise comparison confirmed that the one-year results were statistically significant (Table 10).

Table 9: Multiple Comparisons

Dependent Variable	FundCatgry (I)	FundCatgry (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
One_YRRet	Tukey HSD	1	-4.616	0.821	.00	-6.569	-2.663
		3	-11.617	0.910	.00	-13.782	-9.453
		2	4.616	0.821	.00	2.663	6.569
		3	-7.001	0.620	.00	-8.476	-5.526
		1	11.617	0.910	.00	9.453	13.782
		2	7.001	0.620	.00	5.526	8.476
	Bonferroni	1	-4.616	0.821	.00	-6.615	-2.617
		3	-11.617	0.910	.00	-13.832	-9.402
		2	4.616	0.821	.00	2.617	6.615
		3	-7.001	0.620	.00	-8.510	-5.491
		1	11.617	0.910	.00	9.402	13.832
		2	7.001	0.620	.00	5.491	8.510

**Table 10: Pairwise Comparisons**

Dependent Variable	(I) Fund Catgry	(J) Fund Catgry	Mean Difference (I-J)	Std. Error	Sig.b	95% Confidence Interval for Differenceb	
						Lower Bound	Upper Bound
One_YRRet	1	2	-4.616*	0.821	.00	-6.615	-2.617
		3	-11.617*	0.91	.00	-13.832	-9.402
	2	1	4.616*	0.821	.00	2.617	6.615
		3	-7.001*	0.62	.00	-8.51	-5.491
	3	1	11.617*	0.91	.00	9.402	13.832
		2	7.001*	0.62	.00	5.491	8.51

The broad-level analysis of results and the Post hoc results suggested that large-cap funds (size) determine one-year annual return controlling standard deviation and top-10 asset holding covariates. The associated effect size (Partial Eta Squared) for 1 year was 67% (Table 8). The result was consistent with Babalos et al. (2015). The finding indicated that the large growth, blend, and value funds were related to higher fund efficiency based on stochastic frontier analysis (Babalos et al., 2015). An earlier study concluded that trading inefficiency was experienced in lower-size funds (Indro et al., 1999). The blend and value funds experienced significant gains in information and returns than growth funds (Indro et al., 1999). The investigation concluded that higher risk equates to higher fund efficiency which translates to fund performances about price-earnings and book price ratios (Babalos et al., 2015). Although the findings were mixed in terms of returns (1 and 3 years annual returns), the Morningstar fund efficacy considers both fund performance and risk, exemplified by the interplay of positive abnormal upgrades and negative abnormal downgrades in terms of star ratings and fund flows (Blake & Morey, 2000).

**Table 8: Tests of Between-Subjects Effects**

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	One_YRRet	1438.746a	2	719.373	99.043	.00	.665
	Three_YRRet	66.746b	2	33.373	15.5	.00	.237
Intercept	One_YRRet	7297.703	1	7297.703	1004.74	.00	.909



	Three_ YRRet	10080.651	1	10080.65	4682.01	.00	.979
FundCatgry	One_ YRRet	1438.746	2	719.373	99.043	.00	.665
	Three_ YRRet	66.746	2	33.373	15.5	.00	.237
<hr/>							
a R Squared = .665 (Adjusted R Squared = .658)							
b R Squared = .237 (Adjusted R Squared = .221)							
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## Limitations and Implications

The research constraints included the adequate availability of data to avoid data cleaning. However, data cleaning removed outliers that are common in research. The data included 103 funds in the final study (large-cap growth, blend, and value). A significant number of funds were eliminated from the final study as a result of data cleaning (outlier funds) and many fund categories did not meet the US Equity Mutual funds. This investigation could have explored many covariates to efficiently reflect a complete study analysis. Also, the action could have extended and complicated the scope of this study. We assumed the information provided in the Morningstar was accurate including the annual return calculations and covariates. These included the performance calculation metrics (1-YR and 3-YR) annual returns and covariates variables (STD and TOP10-H). Future research should compare the fund categories relative to the benchmark (S&P 500, etc.), and international funds, a larger sample size, and the fund star rating analysis. The sample size was limited to four and five-star fund efficacy provided by the Morningstar dataset system. The period assumed between 2020, 2021, and 2022 during the pandemic. The study period could have included many systematic factors beyond COVID-19. Other factors which could have affected the study result include inflation, interest rates, politics, and global. It is important to compare fund performance according to fund categories or groups to reach a firm conclusion. It would be beneficial to explore other performance metrics such as price book ratios and price-earnings ratios when evaluating annual returns and Morningstar fund ratings. Lastly, future research can replicate this study to examine the impact of COVID-19 to include all-star rating funds (1, 2, 3,4, and 5) beyond the 4 and 5-star ratings. The result showed that mutual funds perform differently across fund sizes and styles. The study provides fund managers and investors with useful portfolio management information and asset allocation to optimize returns (De Mango-Lopez, 2022). The outcome of this study enables fund

managers to consider fund size and investment style to achieve alpha. The study adds to the literature by analyzing the impact of COVID-19 mutual fund performance on making informed financial investment decisions. Lastly, it is necessary to balance the investment portfolio considering the business economic periods (boom and bear market) and/or unique systemic factors, globally.

## **DISCUSSIONS AND CONCLUSIONS**

The result suggests that despite the mutual fund diversification benefits, the MF investment is not immune from systemic factors such as the COVID-19 outbreak (Alqadhib, 2022) like the market index (SP 500). The multivariate Mancova Pillai's Trace and Wilks lambda analyses revealed that covariates (standard deviation and top 10 asset holding) were statistically significant and influenced the fund performance (1 and 3-year annual returns). The result was true when analyzing independent variables (fund categories; large-cap growth, blend, and value). The results of fund categories (large-cap growth, blend, and value) were significant (1-year annual returns and not the 3-year annual return) consistent with Grinblatt and Titman (1992) that past performance can be valuable to identify possible future investment funds. The alternative cardinal rank scale may require further consideration even though it is confined to the Morningstar return calculation except the cardinal scale versus the ordinal scale (Carluccio et al., 2023)The covariates standard deviation and top 10 asset holding were statistically significant for the 1- and 3-year annual return outcome. However, the covariate of the top 10 asset holding was statistically significant for the 3-year annual return outcome and not the 1-year annual return. We can conclude that large-cap US MFs perform differently and are influenced by many factors including the standard deviation. The standard deviation and top 10 asset holdings should be considered when evaluating 1-year annual returns. The result showed that the top 10 asset holding did not affect the 3-year annual return. The large-cap growth MF outperformed all other fund categories (large-cap blend and large-cap blend) on the 3-YR annual returns and was statistically significant. The large-cap growth fund category had the largest standard deviation on the 3-year annual returns. The standard deviation for the 1-year annual return was fairly the same and within the margin of error. Investors and fund managers would likely achieve similar performance (1 and 3 years)

for large caps when considering the fund's standard deviation. However, the large-cap performance (1-year) was favorably compared to 3-year when considering covariate (top 10 asset holding). The non-significant result on the top 10 asset holding was inconsistent with many bodies of research and the principles of finance (Rajkumar & Rau, 2010). Relative to the principles of finance that suggest that higher risk may translate to higher return and higher turnover may result in higher fund performance. The Post hoc analysis revealed that the fund category (LG, LB, and LV) affects the 1-year annual return, and a statistically significant result exists. We should keep in mind that the data analysis was from the COVID-19 pandemic difficult to replicate because of market volatility and high inflation which may skew comparative performance calculations. Morningstar mutual fund ratings and categories help investors identify possible profitable funds based on 4 and 5-star ratings. This can be interpreted as fund ratings influencing fund flows more than performance (Blake & Morey, 2000).

Generally, the Morningstar system provides valuable information compared to alternatives such as Sharpe ratios, Jensen, and four-index alphas (Blake & Morey, 2000). The conclusion was consistent with a prior study that investors should evaluate and consider fund style and size when selecting investment choices and estimating future returns of the US equity MF (Stella & Seiler, 2002). It is important to note that the large-cap produced better performance in 1-YR and 3-YR, annual returns. This was consistent with an earlier study by Chen et al. (2004) that large-cap funds produce better performance than small-cap funds regardless of fees and expenses. However, large-cap funds are widely favored because of superior return and low expense ratio (Yan, 2008). Broadly, the study result was consistent with previous findings that large-cap (fund size) tend to produce superior annual returns (Tuzcu & Ertugay, 2020; Wermer, 2000; Yalavatti & Bheemanagouda, 2017; Pástor & Vorsatz, 2020). However, a comprehensive study (Stella & Seiler, 2002) produced mixed results consistent with 3-year annual return nonsignificant findings.

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