

Portfolios, Risk & COVID-19

How Professional Advice May Have Protected Investors

Executive Summary

In the decade-plus following the 2008 Financial Crisis, US equities maintained an extended “bull market” period of consistently above-average performance and below-average volatility. Lasting from 2009 through early 2020, the bull market in US equities ran for 132 months in total and 19 months beyond the record set in the 1990s. Additionally, market volatility was limited as the Cboe Volatility Index (^VIX) spent 76% of trading days in the decade 2010-2019 below its lifetime average.

As a result of these favorable market conditions and relatively low portfolio risk metrics they produced, investors grew increasingly accustomed to strong performance with very little downside risk. The direct connection between performance and risk estimates created complacency, especially among retail investors, and exacerbated COVID-19’s negative impact on investor portfolios in March 2020.

Through an analysis of portfolio risk metrics, this study identifies factors that contributed to a “worst case scenario” far beyond what risk managers and investors could have expected. An additional investigation into fund flows in 2019 and early 2020 indicates that retail investors may have been less prepared for the market shock of COVID-19 than institutional and advised investors, who have access to more advanced risk-mitigating strategies.

This study of portfolio performance and risk highlights the following: portfolio risk metrics are often inadequate based on their inputs, often recent market performance data; awareness of diversification benefits and the potential pitfalls of ETF investing is vital for investors; and professional investing strategies like profit-taking and portfolio rebalancing can protect investors from the “worst case scenario.”

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Introduction

Portfolio risk metrics are critical to evaluating any investment strategy. While portfolio performance tells investors the gains or losses that a strategy has accumulated, risk metrics add context by defining the uncertainty an investor took on to achieve that performance. The often-quoted maxim “risk is reward” highlights the connection between the uncertainty of future investment performance—risk—and the potential payout for taking on that uncertainty—reward. As such, investors and portfolio managers rely on both risk metrics and performance metrics when making investment decisions.

Because the risk metrics that are commonly employed by investors must rely on historical performance data to estimate a portfolio’s future risk, therein lies a shortcoming: the most popular and regularly-used risk metrics consider only recent market performance when setting expectations for the future.

Trends in Portfolio Risk Metrics

Through examining trends in portfolio Value-at-Risk (VaR) and Expected Shortfall for representative Conservative, Balanced, and Aggressive Portfolios, two factors became abundantly clear: by its nature, a relatively stable market with few material drawdowns will lead to deceptively low risk expectations across all portfolio allocations; and, as the 2008 Financial Crisis fell out of lookback periods used by common risk metrics, investors’ expectations of risk were lowered even further.

All representative portfolios in this study were built using widely available Vanguard® mutual funds. The Conservative Portfolio uses a 20% equity, 80% fixed income allocation, the Balanced Portfolio uses a 50% / 50% allocation, and the Aggressive Portfolio is 80% equity, 20% fixed income.¹

¹ See Data & References for Vanguard® funds and allocations used.

Value-at-Risk and Expected Shortfall Explained

Value-at-Risk (VaR) and Expected Shortfall are risk metrics used by portfolio managers to set investor expectations for a strategy’s “worst case scenario” in terms of performance. Using actual portfolio performance data, VaR and Expected Shortfall give a statistically-based estimation of portfolio risk. Both metrics can be expressed using different confidence levels and time periods.

This study examines the following variations of VaR and Expected Shortfall:

Monthly Value-at-Risk (VaR) 1% – 1Year, 5Y, 10Y & 15Y Lookbacks

Estimates with 99% confidence the maximum percent-loss a portfolio might suffer in a given month; based on actual portfolio performance during the defined lookback period. *E.g. If a portfolio’s monthly VaR-1% is 10%, the portfolio’s maximum expected loss in 99% of months is 10% of its value.*

Monthly Expected Shortfall 1% – 1Year, 5Y, 10Y & 15Y Lookbacks

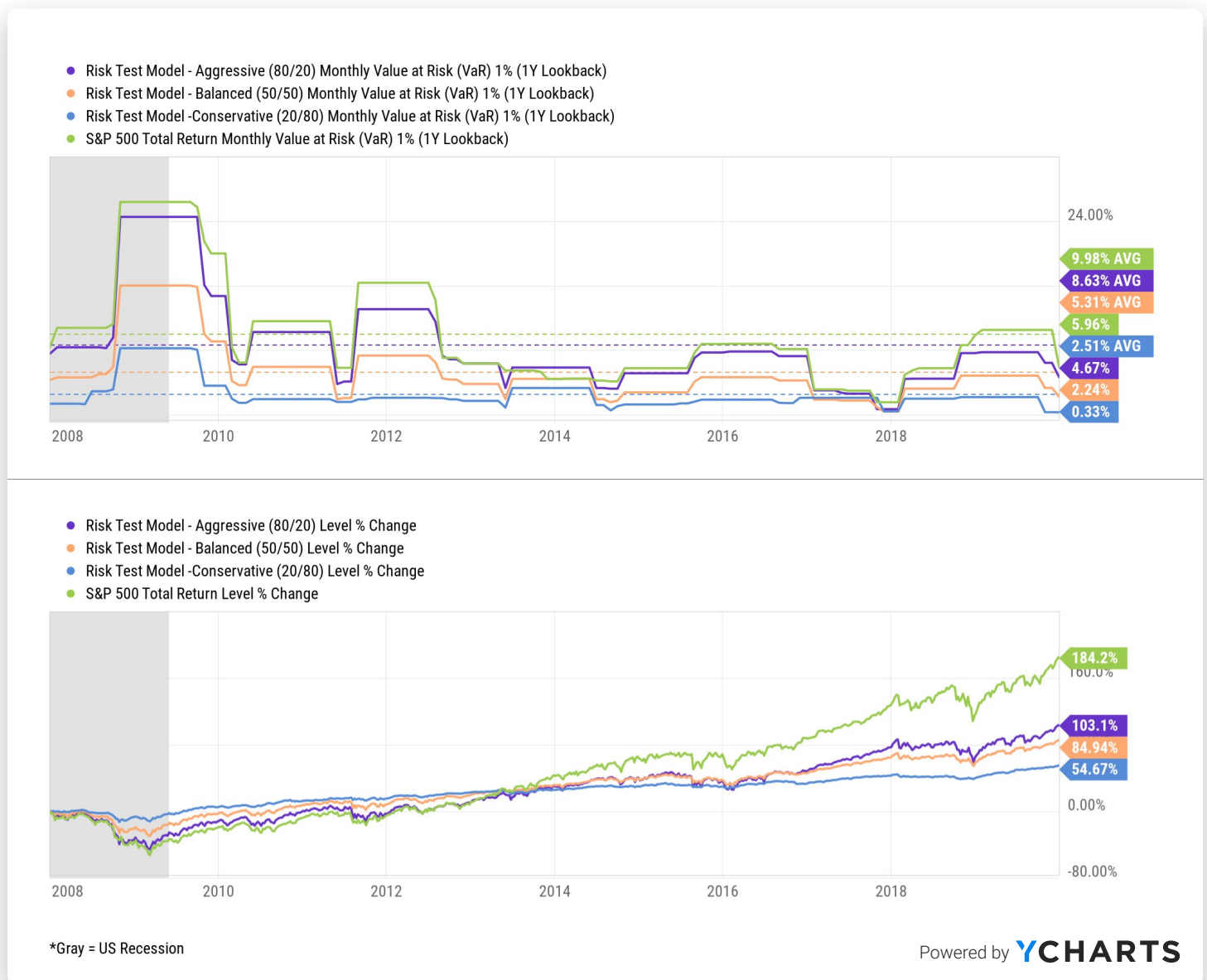
Estimates the percent-loss a portfolio might suffer in the 1% of extreme cases beyond VaR’s 99% confidence level; based on actual portfolio performance during the defined lookback period. *E.g. If a portfolio’s monthly Expected Shortfall-1% is 15%, the portfolio’s maximum expected loss during the most extreme 1% of months is 15% of its value.*

The 11-Year Bull Market set deceptively low risk expectations

In June 2009, the US Economy emerged from a recessionary period caused by the '08 Financial Crisis. After the stock market had bottomed-out earlier in the year, US equities began a consistently up-and-to-the-right trajectory. During what would become a historically long bull market, strong and consistent performance among stocks greatly impacted the risk metrics that estimate a portfolio's "worst case scenario."

As demonstrated by the upper panel of **FIGURE 1**, Monthly Value-at-Risk-1% (1Y Lookback) for the Aggressive, Balanced, and Conservative Portfolios, as well as the S&P 500 Total Return index, trended lower during the years 2010-2019. Additionally, the spread between risk levels for portfolios of varying allocations narrowed considerably. The rallying market, illustrated by the S&P 500's 184.2% total return in the lower panel, is the cause of the trends exhibited by portfolio VaR.

FIGURE 1



Looking at VaR and Expected Shortfall metrics with extended lookback periods, as in [FIGURE 2](#) below, the trend from [FIGURE 1](#) is maintained. At the end of 2019, both metrics indicated that the “worst case scenario” for each risk allocation would be markedly less significant than those little more than a decade ago.

On December 31, 2019, VaR for the Balanced Portfolio (50% equity, 50% fixed income) was anywhere from 5% to 58% lower than the metric’s trailing 11-year average. Downside expectations for Aggressive and Conservative Portfolio allocations were similarly well below their trailing averages, with the exception of 15-year lookback metrics. **Even though stock and fixed income allocations within the three portfolios went unchanged, the estimated maximum monthly loss for each had decreased dramatically.**

FIGURE 2

VaR 1% (Monthly):									
	Conservative			Balanced			Aggressive		
	Avg. 2008-2019	EOY 2019	% Lower than Trailing Avg	Avg. 2008-2019	EOY 2019	% Lower than Trailing Avg	Avg. 2008-2019	EOY 2019	% Lower than Trailing Avg
1y Lookback	2.51%	0.33%	-86.9%	5.31%	2.24%	-57.8%	8.63%	4.67%	-45.9%
5y Lookback	3.95%	2.03%	-48.6%	7.77%	4.17%	-46.3%	12.18%	6.93%	-43.1%
10y Lookback	3.52%	2.06%	-41.5%	7.46%	4.68%	-37.3%	12.40%	7.81%	-37.0%
15y Lookback	3.13%	3.16%	1.0%	6.85%	6.50%	-5.1%	11.71%	11.52%	-1.6%

Expected Shortfall 1% (Monthly):									
	Conservative			Balanced			Aggressive		
	Avg. 2008-2019	EOY 2019	% Lower than Trailing Avg	Avg. 2008-2019	EOY 2019	% Lower than Trailing Avg	Avg. 2008-2019	EOY 2019	% Lower than Trailing Avg
1y Lookback	2.72%	0.36%	-86.8%	5.84%	2.37%	-59.4%	9.48%	4.70%	-50.4%
5y Lookback	4.60%	2.15%	-53.3%	9.21%	4.65%	-49.5%	14.57%	7.67%	-47.4%
10y Lookback	5.65%	2.40%	-57.5%	11.40%	5.71%	-49.9%	17.65%	9.93%	-43.7%
15y Lookback	5.27%	5.42%	2.8%	10.74%	11.03%	2.7%	16.77%	17.14%	2.2%

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The 2008 Financial Crisis moves out of scope for common risk metrics

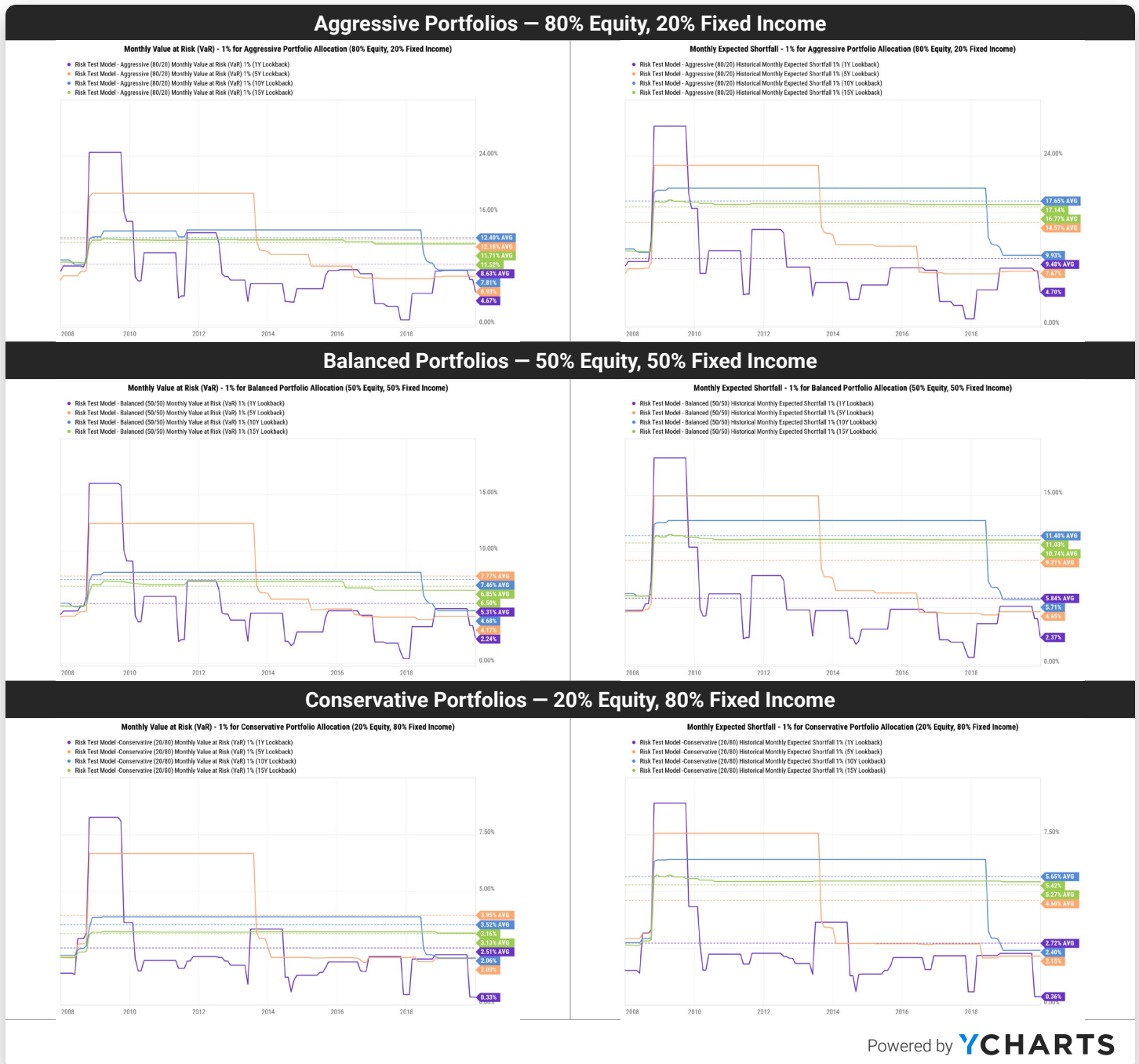
Causing the largest percent drawdown in the S&P 500’s history—more than 55% from its previous high²—the ‘08 Financial Crisis left a considerable impression on investors and their portfolios. Just after the crisis, metrics that estimate a portfolio’s worst-case drawdowns jumped because their inputs now included days and months of historically poor market performance.

² The S&P 500 Total Return index peaked at 2,447.03 on Oct. 9, 2007 and fell to 1,095.04 on Mar. 9, 2009. $(2,447.03 - 1,095.04) / 2,447.03 = 55.3\%$

Ironically, the longest sustained bull market in the S&P 500's history came immediately after, beginning in 2009 and continuing through early 2020. As the market climbed to 337 new all-time-highs from 2010-2019, compared to only 13 new highs from 2000-2009³, the significant drawdowns of 2008 moved out of scope for regularly used trailing lookback periods.

FIGURE 3 shows a commonality in Monthly Value-at-Risk and Expected Shortfall trends for the Aggressive, Balanced, and Conservative Portfolios. The charts plot four versions of either Monthly VaR 1% or Monthly Expected Shortfall 1%, each of which use differing lookback periods of 1, 5, 10, and 15 years. The ubiquitous pattern in each chart is the sharp drop in risk expectations provided the different lookback periods. VaR and Expected Shortfall using a 1-Year Lookback fell sharply in 2009, the 5-Year Lookbacks fell sharply in 2013, and so on.

FIGURE 3



Leading into 2020, most versions of VaR and Expected Shortfall no longer considered data from the market's worst-ever drawdown. Instead, their trailing lookback periods included only historic market growth and record-low volatility.⁴

The implication for investors was that, despite no changes to their allocations, the Conservative, Balanced, and Aggressive Portfolios looked a lot less risky in 2020 than they had in years prior. The market conditions that started in 2009 and ran through 2020—a historically long sustained bull market with no material drawdowns—set deceptively low expectations of portfolio risk.

Actual Market Events in Q1 2020

At the conclusion of 2019, a year in which the S&P 500 Total Return climbed 31.5%, VaR metrics indicated with 99% certainty that even in its worst month, the Conservative Portfolio would lose between 0.33% and 3.16% of its value, depending on the lookback period being used. Expected Shortfall, meant to account for the 1% of scenarios that VaR doesn't consider, indicated the same Conservative Portfolio's worst month could range from a 0.36% to 5.42% loss. In March 2020, the Conservative Portfolio actually fell 8.24%, more than double what VaR estimated with 99% certainty.

The Balanced and Aggressive Portfolios fell 17.42% and 27.43%, respectively, while the S&P 500 Total Return fell 33.79% that month. **FIGURE 4** illustrates the spread between what Monthly VaR and Expected Shortfall predicted as of December 31, 2019 and the three portfolios' actual drawdowns in March 2020—their real “worst case scenario.”

FIGURE 4

Actual Q1 2020 Drawdown Beyond 2019 Year-End Risk Metrics						
	Conservative		Balanced		Aggressive	
	VaR 1%	Exp. SF 1%	VaR 1%	Exp. SF 1%	VaR 1%	Exp. SF 1%
1y Lookback	7.9 pts	7.9 pts	15.2 pts	15.1 pts	22.8 pts	22.7 pts
5y Lookback	6.2	6.1	13.3	12.8	20.5	19.8
10y Lookback	6.2	5.8	12.7	11.7	19.6	17.5
15y Lookback	5.1	2.8	10.9	6.4	15.9	10.3

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Even if investors were aware of what VaR and Expected Shortfall were indicating, **reality was far worse than the expectations set by these statistically-informed risk metrics.** Compared to both VaR and Expected Shortfall for all four lookback periods, the actual drawdown in the Conservative Portfolio was anywhere from 2.8-7.9 percentage points worse than estimates; similarly, the Balanced and Aggressive Portfolios fell 6.4-15.2 points and 10.3-22.8 points beyond estimates, respectively.

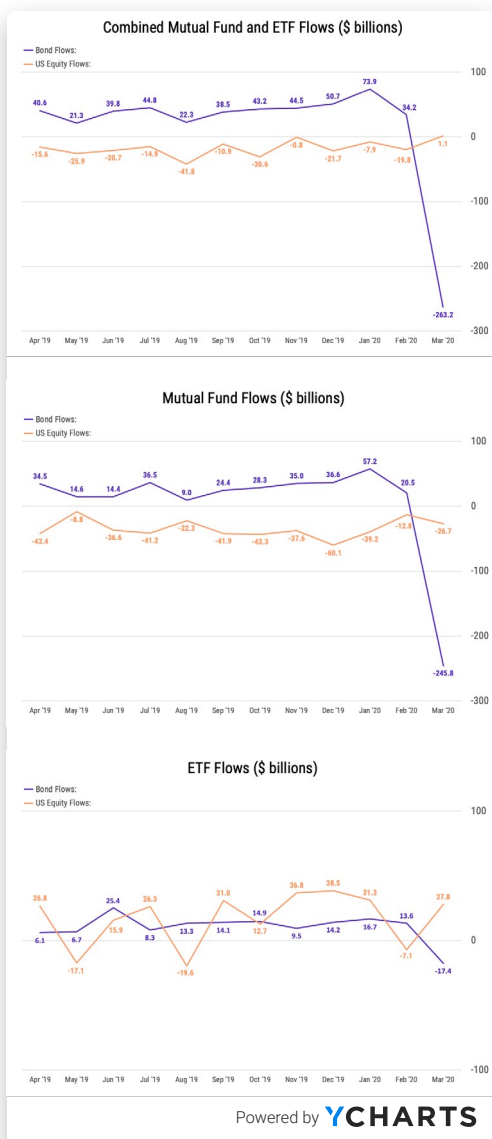
⁴ In the decade 2010-2019, the VIX closed 594 days above its then-lifetime average level, 19.15. From 2000-2009, the VIX closed 1454 days above the lifetime average. [YCharts.com. https://ycharts.com/indices/%5EVIX/level](https://ycharts.com/indices/%5EVIX/level)

All of this said, it's important to note that investors who participated in US equities' historic bull market, and especially those with aggressive allocations, were rewarded with strong performance for more than a decade. However, the portfolio drawdowns of March 2020 were a steep and unexpected cost to pay for accumulated returns, especially if portfolio rebalancing or profit-taking efforts were not in place.

The estimated levels of risk in the three representative portfolios and the actual events of March 2020 illustrate how a singular event in the US stock market can lead to an unexpected disaster for investors of every stripe; however, an investigation of aggregated fund flows adds much needed color to investors' actual sentiments over the year leading up to the COVID-19 crisis of March 2020, when US equities were climbing and risk metrics continued trending lower.

Fund Flows Reveal Behavior of Retail and Institutional Investors

FIGURE 5



As investors purchase new shares of a mutual fund or exchange traded fund (ETF), the fund's managers then have more cash to buy more holdings. Similarly, as fund holders sell their shares, fund managers sell out of positions and use that cash to pay investor redemptions.

By comparing aggregated data across fund categories, fund flows can help indicate investor demand based on the size and trends of fund inflows and outflows for different asset types. Using flows into/out of US equity and fixed income funds as a proxy for demand and market sentiment, it can be concluded that investors became increasingly bearish throughout the twelve months prior to March 2020.

During that time, combined monthly flows into fixed income mutual funds and ETFs ranged from \$24 to \$71 billion per month, while US equity mutual funds and ETFs saw between -\$1 and -\$71 billion outflows per month, as shown in **FIGURE 5**. Only in March 2020, after COVID-19 led to the market's significant 34% drawdown, did fund investors move money away from fixed income and into US equity funds.

However, by breaking out mutual fund and ETF flows, we may gain further insight into the behaviors of both institutional and retail investors.

Mutual funds, more heavily used by financial advisors and institutional investors, exhibited largely persistent flows for both US equity and fixed income funds over the twelve month period. ETFs, extremely popular with retail investors, were more sporadic. Flows into fixed income ETFs were regularly positive but flows in US equity-centric ETFs moved inconsistently, setting period highs in November and December 2019.

The differences in ETF and mutual fund flows might indicate that the sustained bear market gave retail investors, and especially those who didn't experience the '08 Financial Crisis, a false sense of security. Meanwhile, institutional and advised investors were more strategic about limiting risk, likely through profit-taking and rebalancing.

Another deduction from **FIGURE 5** is that investors preferred ETFs over mutual funds to achieve US equity allocations. Incorporating the popularity of ETFs that track market indices⁵, this preference created additional risks due to those products' lack of downside protections. **While an actively managed mutual fund can adjust its holdings as the market moves, indexed ETFs must track the performance and results of their underlying index.**

In the wake of COVID-19, both ETF and mutual fund flows reversed their dominating trends in March 2020; however, the order of magnitude seen in mutual fund flows also points toward more strategic decision-making by advised and institutional investors. Likely due to portfolio rebalancing and opportunistic buying, these investors collectively moved about \$246 billion out of fixed income mutual funds in response to the pullback in US equities.

Key Learnings for Investors & Advisors

In pursuit of better and more informed investment decision making in the future, investors and financial advisors can glean from this study several truths about portfolio risks and the implications of certain investing behaviors.

1 Portfolio risk metrics are materially affected by often inadequate lookback periods

As demonstrated by deceptively low portfolio risk estimates and the actual events of March 2020, it's important that metrics' lookback histories include times of material volatility. To produce more informed risk measurements that can more accurately predict investors' "worst case scenarios," be intentional when defining your lookback periods and take note if the lookback does not include significant market events.

2 Investors should be aware of implications from little-to-no diversification in their portfolios and ETF investing

The potential downfalls of aggressive equity allocations and ETF investing vehicles have been identified and discussed at length in the wealth management industry. With the caveat that aggressive strategies benefited greatly during the historic bull market, the consequences of COVID-19 in March 2020 and months following support arguments in favor of portfolio diversification. Additionally, it's critical that investors are aware that popular indexed ETFs follow the market with little to no risk controls.

3 Professional strategies like profit-taking and portfolio rebalancing protect investors from "worst case scenarios"

The value of sound investing advice and risk management is made clear by comparing the actions of institutional/advised investors and retail investors throughout 2019 and early 2020. Investment professionals with knowledge of market cyclicity and methods for managing portfolio risk—such as profit-taking and rebalancing—can add considerable value to investors. Through both experience and foresight, financial advisors' expertise can be influential in preserving portfolio value and setting expectations during market-wide crises.

⁵ Chen, J. (2020, Jan 5). Index Investing. Investopedia. Retrieved from <https://www.investopedia.com>

Data & References

Holdings & Weights for Representative Portfolios	Conservative Allocation	Balanced Allocation	Aggressive Allocation
Vanguard® Total Bond Market Index Inv (VBMFX)	49%	35%	15%
Vanguard® Short-Term Bond Index Inv (VBISX)	30%	15%	5%
Vanguard® Total Intl Stock Index Inv (VGTIX)	15%	15%	20%
Vanguard® Total Stock Mkt Idx Inv (VTSMX)	5%	30%	50%
Vanguard® Emerging Mkts Stock Idx Inv (VEIEX)	1%	5%	10%

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Key Stats (7)

Stock Net Allocation	Bond Net Allocation	Cash Net Allocation	Alpha
59.28%	37.64%	2.91%	0.04
Beta (3Y)	Annualized 1-Year Total Returns (Daily)	Annualized Standard Deviation of Monthly Returns (3Y Lookback)	Max D
0.5205	15.04%	6.30%	11.0

Top 10 Holdings (7)

Symbol	Target Weight	Current Weight
* YIII	35.30%	38.16%
* BND	27.40%	26.65%
* VVUS	23.50%	23.94%
* BNDX	11.80%	11.33%
* VBMFX	7.00%	1.94%

Fund Summary - Equity

US Equity Major Funds Return Summary

Name	1W	1M	YTD	1Y
QQQ Invesco QQQ Trust	7.93%	-8.29%	0.40%	-1.44%
SPY SPDR® S&P 500 ETF	6.76%	-8.70%	0.10%	-5.14%
VIG Vanguard Dividend Appreciation ETF	5.69%	-9.32%	-0.64%	-3.05%
VO Vanguard Mid-Cap ETF	6.03%	-10.06%	-0.30%	-10.09%
VB Vanguard Small-Cap ETF	6.42%	-11.17%	-0.08%	-10.12%
VTI Vanguard Total Stock Market ETF	6.71%	-9.09%	0.08%	-5.80%

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