CASE STUDY

Head, Shoulders, Knees, and...Tails?

How Passive Investing is Changing the Structure of Markets

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Introduction

The growth of passive investment strategies has had measurable effects on the structure of equity markets, creating both risks and opportunities. The solution is to construct portfolios capable of exploiting the phenomenon of passive investing using convex strategies — a solution that received a boost from recent regulatory changes.

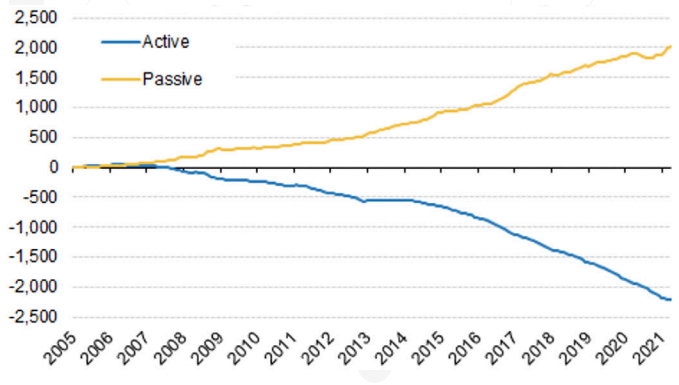
Passive Investing: A Good Idea Gone Too Far?

In the past 50 years, passive investing has grown from a novelty to the investment of choice for millions of investors around the world. In the United States, passive strategies now represent the majority of managed assets. Research on the impact of index inclusion for individual stocks has found large and permanent price increase effects. In the past few years, a growing body of research, both theoretical and empirical, also suggests the shift from active to passive is having meaningful impact on broader market behavior.

> *If everybody indexed, the only word you could use is chaos...The markets would fail.*
>
> — John Bogle, May 2017

Two justifications for passive investing are the Efficient Market Hypothesis (EMH), the view that the current price of securities fully reflects all available information, and the Capital Asset Pricing Model (CAPM), which suggests that a fund indexed to the "market" is the only form of risky exposure required to construct the optimal risk-adjusted return portfolio. The work of Bill Sharpe (creator of CAPM) was further influential in the growth of passive investing. In his widely cited paper, "The Arithmetic of Active Management", he concluded that the average active investor must underperform the average passive investor. And with this impressive theoretical backdrop, passive investing has indeed become the dominant

Figure 1: US Equity Mutual Fund + ETF Cumulative Flows ($bn)



Source: Morgan Stanley QDS, Strategic Insight SimFund

force in investor portfolios, as demonstrated in Figure 1, driven by perceptions of low cost, performance, and regulatory advantages. But as even passive investing advocates acknowledge, absent active management, security prices will no longer fully reflect all available information, and markets will no longer be fairly priced. This is exacerbated by growing evidence that markets are not nearly as efficient as initially presumed.

The Implications of Passive Dominance

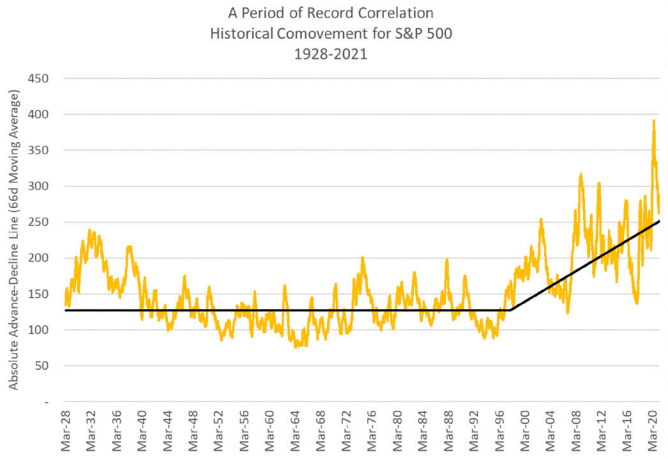
Evidence that the growth of passive investing has meaningfully affected market behavior is increasingly significant. Recent academic work by Gabaix at Harvard, Koijen at Univ of Chicago, Jonathan Parker of MIT, and Hao Jiang of Michigan State have supplemented practitioner analysis by Lasse Pedersen, Inigo Frazier-Jenkins, Corey Hoffstein and Michael Green. The impacts include increased correlations, higher valuations, and distorted return distributions.[1]

Since 1996, we have seen a dramatic increase in the underlying correlation of securities and the conditional correlation of securities across widely followed equity indices. Figure 2 shows the rolling 3 month average of the absolute S&P 500 Advance - Decline Index (absolute value of number of stocks advancing - number of stocks declining) from 1928-2020, adjusted for volatility.[2] These higher correlations increase the chances of extreme market movements as we saw in the February 2018 Volmaggedon, the March 2020 Covid-19 sell-offs, and the associated rebounds.

[1] In this paper we focus on the ramifications of passive investing, not the precise mechanism by which passive investing has directly caused these changes. We have fully modeled the causality of the growth of passive to these changes in market structure and will share these models in future writings.

[2] It is key to adjust for volatility, since correlation is affected by both covariance and volatility, the latter of which varies dramatically over our sample.

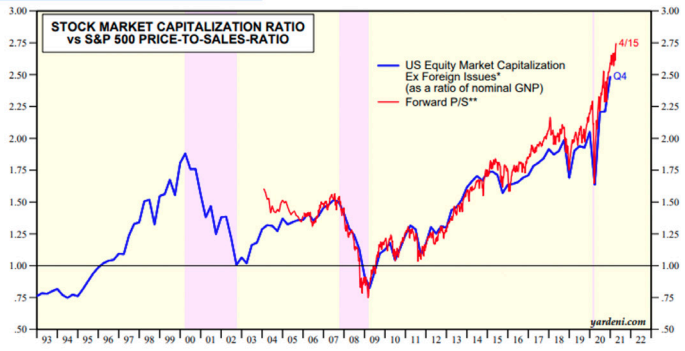
Figure 2: S&P 500 Correlation From 1928-2020



Source: Calculations by Simplify Asset Management

A second impact, higher valuations, is created by the mechanism of index construction. Since the most widely followed indices are weighted by float-adjusted market capitalization, incremental contributions (flows) add a higher proportion of marginal dollars to the securities that have recently risen while less capital is added to securities that have fallen in price. Since these movements are strictly a price phenomenon, rather than being driven by a change in fundamentals, the impact is to raise valuations over time. Recently, despite the economic uncertainty associated with the Global Pandemic, the S&P 500 eclipsed the record valuations of the March 2000 peak, as shown in Figure 3.

Figure 3: S&P 500 Valuations Since 1993



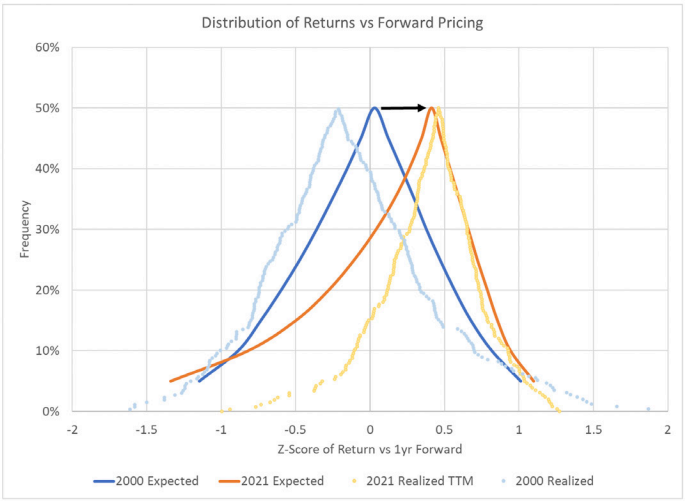
Source: Federal Reserve Board, Bureau of Economic Analysis, and Standard & Poor's

* Total excluding market value of holdings by US residents of foreign corporate equities, investment fund shares, and ADRs.

** S&P 500 index divided by S&P 500 year-ahead forward analysts' consensus expected revenues per share. Monthly through 2005, then weekly. Note: Shaded red areas are S&P 500 bear market declines of 20% or more. Yellow areas are bull markets.

The combination of rising inelasticity and valuations over the past 20 years logically creates a dramatic shift in the distribution of returns over that period, with the realized probability of both positive excess returns and extreme downside events rising significantly. Figure 4 shows the z-score of realized S&P 500 daily returns relative to forward pricing for 2000 and 2021, and you can starkly see the precise shift in the distribution we are expecting. The dips are getting deeper and more frequent but staying invested has been the "right" strategy despite rising valuations that would suggest lower forward returns. In casino parlance, the roulette wheel has become imbalanced: relative to a "fair" game, the frequency of excess positive returns has risen even as risks of extreme downside outcomes have also increased.

Figure 4: S&P 500 Returns Relative to Forward Pricing – 2000 vs 2021 (as of 6/11/2021)



Source: Calculations by Simplify Asset Management

Managing Portfolios Using Convexity

So, what is an investor or investment advisor to do under these conditions? When faced with increased prospects of severe adverse outcomes (a market crash) and yet a need to stay invested and capture the more frequent excess returns, the solution is to introduce "convex" strategies into portfolios. A convex strategy offers the possibility of outperformance in both up and down markets, at the cost of modestly lower returns in the event markets are relatively unchanged. This is accomplished by adding long option positions to an exposure on the underlying index.

Figure 5: Monte Carlo Simulation: Normal vs Fat-Tailed Return Distributions

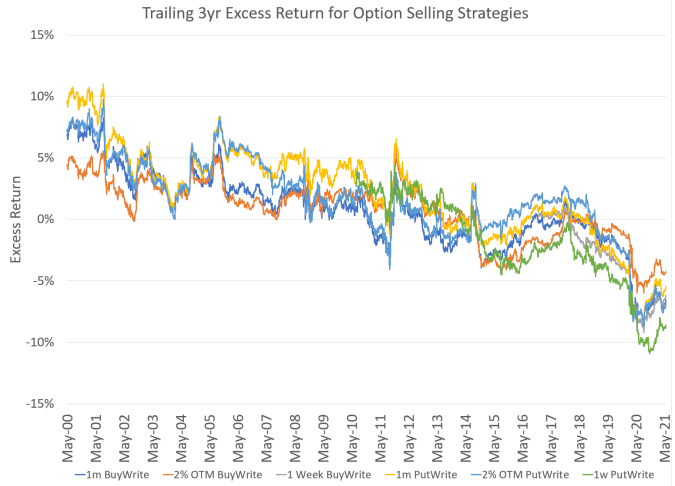
	Normal Distribution			Fat-Tailed Distribution		
	Index Only	with Convex Downside Protection	Difference	Index Only	with Convex Downside Protection	Difference
Average Return	**7.0%**	**6.7%**	**-0.3%**	**6.2%**	**7.0%**	**0.9%**
Standard Deviation	3.4%	3.0%	-0.4%	4.4%	3.8%	-0.6%
1st Percentile Return	-3.5%	-3.2%	0.3%	-4.6%	2.3%	6.9%
25th Percentile Return	4.7%	4.8%	0.1%	3.3%	4.6%	1.3%
Median Return	7.0%	6.7%	-0.3%	6.3%	7.1%	0.8%
75th Percentile Return	9.3%	8.7%	-0.7%	9.1%	9.5%	0.4%

Source: Calculations by Simplify Asset Management. The results are hypothetical results and are NOT an indicator of future results and do NOT represent returns that any investor actually attained. Hypothetical distributions presented are unmanaged, do not reflect management or trading fees, and one cannot invest directly in a distribution. Additional information regarding the construction of these results is available upon request. PLEASE SEE FULL DISCLOSURES BELOW.

The counterintuitive nature of a convex downside hedge is to sacrifice a portion of the "most common" (in statistics the "mode") outcome to protect against severe downside risks. But as a return distribution changes from normal to fat-tailed, the benefits of convexity become increasingly significant. Figure 5 shows a Monte Carlo simulation[3] with a downside convexity strategy[4] run over a 20 year period for two different distributions: normal and fat-tailed. Clearly, the downside convexity benefits shift the expected return from negative to positive when distributions look more like today's empirical returns, as reviewed in Figure 3. It should be noted that we also see similar benefits from downside convexity as we increase volatility.

Most long term investors have been told that buying options is a poor probability trade. Historically, investors have been rewarded by selling options to generate additional income. However, the distortions in market structure have lowered the excess return available to these strategies and created the opportunities to raise returns by adding convexity to a return profile. A clear pattern of structural decline in the returns associated with option selling strategies has continued over the past decade (see Figure 6); a shift we associate with the rise of passive strategies. If selling options delivers negative excess returns, mathematically, the excess returns must be accruing to the buyers. Importantly, this suggests the opportunity to capture excess return by buying options and enhance returns via convex strategies that incorporate both upside and downside components.

Figure 6: Excess Returns for Option Selling Strategies



Source: Calculations by Simplify Asset Management.

Parting Words

The growth of passive investing is systematically modifying equity return distributions. By introducing convex strategies into portfolio construction, we can improve equity outcomes by exploiting fatter left tails, thinner right tails, and rising volatilities. Ultimately, the mispricing of options against this changing market structure can become a source of excess return.

[3] Simulation interval is annual. Normal distribution has an 8% annual return and 15% standard deviation (i.e. "volatility). Our fat-tailed distribution assumes a 5df Student's t. Options are priced off of a normal model that has 5 volatility regimes that are based on trailing one year performance. 50% of option value is assumed monetized at the 1 year mark.

[4] S&P 500 index with 4 50% OTM option legs rolled from 15 months to 3 months, each 3 months apart.

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