The Shortcomings of Modern Portfolio Theory In Today’s Macroeconomic Environment

Why the Secular Shifts Toward Low Yields, Heightened Correlations, and High Tail-Risk Volatility Recommend Greater Exposure to Private Market Assets

Introduction

When it comes to investing, the importance of asset allocation is difficult to overstate. According to a study by Ibbotson and Kaplan, on average, asset allocation explains roughly 90% of returns variability over time.¹ Historically, Modern Portfolio Theory and its intellectual offshoots, which we will hence collectively describe as traditional portfolio theory, have been the cornerstone of many investors’ allocation strategies. This theory generally suggests that investors should diversify their portfolios among stocks and bonds, with their proportionate allocation to each determined by their age—a proxy for risk tolerance.

We argue that, although it may have once served as a useful tool, traditional portfolio theory falls short for the twenty-first century investor for three main reasons:

1. Secularly Low Yields
2. Heightened Correlations
3. Pronounced Tail-Risk Volatility

These trends, which we believe are the inexorable result of structural market shifts that have taken root since at least the mid-1990s, will likely cause investors who follow the traditional allocation model to construct suboptimal portfolios that fail to maximize risk-adjusted returns in the foreseeable future. We argue that traditional portfolios fail to adeptly account for the current low-interest-rate environment and slow-growth economic forecasts, the extraordinarily high degree of correlation between stocks and bonds today, as well as elevated intra-equity correlations, and the rising beta of all publicly-traded assets. Exacerbating matters, traditional portfolio theory offers minimal protection from heightened macroeconomic volatility, black swans, and structural drivers of equity market heteroskedasticity, rendering investors more vulnerable to significant losses in the event of an economic downturn or other exogenous shock.

We believe the solution to these shortcomings lies in diversification across both public and private investments. We will show that allocations that include private market exposure may generate significantly higher risk-adjusted returns than their traditional peers. This is due both to the fact that private investments frequently generate returns well in excess of those offered by publicly-traded instruments, as well as the fact that they typically exhibit lower covariance with public investments than those investments do amongst themselves. Hence, private market exposure is able to boost risk-adjusted yields both through higher return potential, and through the mitigation of portfolio-level risk. We believe that in boosting exposure to private market

assets, investors will be positioned to replicate the outstanding returns of the large institutions and high-net-worth individuals who have long benefited from greater exposure to these assets:

Traditional Portfolio Theory -- An Overview

In 1952, Harry Markowitz introduced Modern Portfolio Theory with the publication of his paper “Portfolio Selection” in *The Journal of Finance*. In the paper, Markowitz emphasized the foundational importance of diversification across uncorrelated assets. In the paper, Markowitz uses a mathematical model known as mean-variance optimization, which assumes that for every level of risk there is a portfolio that will generate a maximum expected return.² Plotting these ideal portfolios on a chart yields an *efficient frontier*, as illustrated below.³

Critically, Markowitz emphasized that in order to reduce the return variance of a portfolio with a given expected return level, investors must diversify their holdings across uncorrelated assets.

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³ Ibid.
To quote the paper, the “presumption that the law of large numbers applies to a portfolio of securities cannot be accepted.” He emphasizes:

*Not only does the [mean-variance] hypothesis imply diversification, it implies the “right kind” of diversification for the "right reason." The adequacy of diversification is not thought by investors to depend solely on the number of different securities held. A portfolio with sixty different railway securities, for example, would not be as well diversified as the same size portfolio with some railroad, some public utility, mining, various sort of manufacturing, etc. [...] Similarly in trying to make variance small it is not enough to invest in many securities. It is necessary to avoid investing in securities with high covariances among themselves.*

Today, Markowitz’s findings are generally used to justify the standard portfolio allocation model, whereby investors subtract their age from 100 to determine their proportionate exposures to stocks and bonds. Assuming the average investor begins investing when they are 30 years old, portfolio theory dictates that 70% of their portfolio should be allocated to stocks and 30% to bonds. The investor’s equity allocation is thought to offer mitigated variance through diversification across industries, geographies, and other firm-specific characteristics, while bonds are thought to offer further hedging through an assumed inverse correlation with stocks. As we will show, upon deeper analysis, many of these foundational assumptions fall down in today’s world, hence calling into question the efficacy of traditional portfolio theory.

**Institutional Insights**

The rapidly shifting nature of institutional allocations strongly reinforces the supposition that the traditional portfolio allocation model is failing. A recent Pew study found that public pension plans have more than doubled their alternative investment allocations over the past decade, and now hold a collective $255 billion in private equity assets. Meanwhile, a survey conducted by the McKinsey Global Institute (MGI) among institutional funds representing nearly $7.5 trillion in investable assets found that more than three-quarters are “likely” or “very likely” to enhance their private equity investing capabilities.

But while institutional investors are dramatically shifting their allocation strategies, individual investors have yet to follow suit. The robust and growing institutional allocations to private investments stand in stark contrast with individual investor allocations.

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4 Ibid.
5 Ibid.
This must change because the underlying forces driving institutional investors away from public equities and fixed-income instruments and toward private equity, hedge funds, venture capital, and real assets are not idiosyncratic to large investors. To the contrary, the shift in institutional allocations is symptomatic of broader changes in the macroeconomy that may also profoundly influence risk-adjusted returns for retail investors.

**Why Traditional Portfolio Theory Falls Short**

We believe that traditional portfolio theory is increasingly falling short for the modern investor due to three major trends: a dim projected outlook for long-term bond and equity holders, heightened correlations, and increased tail-risk volatility.

**Secularly Lower Yields**

In the aftermath of the 2007-08 financial meltdown, a combination of the global flight to quality and the unprecedented government strategy of quantitative easing have pushed bond yields to historic lows.\(^9\) However, yields had been falling for quite some time in a pattern that predates the crisis:\(^{10}\)

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\(^9\) Ibid.
\(^{10}\) Ibid.
Corporate bonds demonstrate a similar pattern:¹¹

While the declining yields on bonds over the past several decades have largely been driven by the Fed’s aggressive monetary policy and widespread investor de-risking in the aftermath of the financial crisis, secular trends such as a higher savings rate, increased savings inflows from emerging markets, and a reduction in the relative prices of capital goods have also played a role.¹² Not only has the low-yield environment presented a challenge for short-term investors looking to boost returns, it is also looking significantly less encouraging for long-term bondholders. With developed world 10-year bond yields now ranging from around 3% to negative, bonds have little room for further price appreciation.¹³

Similarly, the outlook for public equities offers little cause for optimism. Though equity returns have significantly outstripped the long-term historical average over the past 30-years, evidence suggests that this has been driven by a serendipitous confluence of forces unlikely to continue.¹⁴

As MGI states:

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The past 30 years have been a golden age for companies, and for large North American and Western European companies in particular. [...] That era, we found, is now ending.\(^{15}\)

For starters, the dramatic decline in inflation since the 1970s provided a tailwind for equity investors.\(^{16}\) According to data from the Federal Reserve Bank of St. Louis, US inflation fell from nearly 14% in 1980 to less than 1.3% in 2016.\(^{17}\) In turn, this has supported higher equity payout and PE ratios over the past 30 years.\(^{18}\) Additionally, falling corporate taxes have supported robust growth in corporate profits. The US statutory corporate income tax rate fell by more than 30% over the past 30 years. Concomitantly, North American publicly listed firms grew their post-tax margins by 60% over the past three decades.\(^{19}\) The past three decades also benefited from rising productivity and increased labor force participation in emerging markets, which helped produce a 3.6% average annual real world GDP growth rate from 1985-2015.\(^{20}\)

That said, many of these trends appear to have run their course. With the inflation rate considerably below its long-term historical average, there is little room left for further compression. And while President Trump has expressed his intent to lower the corporate tax rate to 15%, he will face stark opposition and significant obstacles.\(^{21}\) Although growth in emerging markets has been a boon over the past several decades, it has begun to slow in major economies like China, whose GDP gains in early 2015 fell to levels not seen since the 2007-2008 financial meltdown. Meanwhile, as growth in China slows, birth rates in the US and other industrialized nations continue to fall or stagnate, and the aging of the boomer generation is expected to remove significant numbers of workers from the labor force.\(^{22}\)

In sum, the tailwinds that have benefited investors over the past several decades are losing steam. MGI projects that, even in an optimistic scenario, equity returns will fall by 140-240 basis points, over the coming years.\(^{23}\) This has profound implications for retail investors. As MGI points out, in such a scenario, a 30-year old would have to work seven years longer or nearly double her rate of savings to retire at the same age and with the same level of financial security as an investor who benefited from the favorable trends of the past several decades.\(^{24}\)

**Heightened Correlations**

A cornerstone of Markowitz’s theory as first expounded in *The Journal of Finance* is the importance of investing in *uncorrelated assets*. Unfortunately, heightened correlations between

\(^{15}\) Ibid.

\(^{16}\) Ibid.


\(^{19}\) Ibid.


\(^{23}\) Ibid.

\(^{24}\) Ibid.
stocks and bonds, coupled with rising covariance between equities, are rendering it increasingly difficult for retail investors to build truly diversified portfolios.

According to MGI, real total public equity returns in the US from 1985-2014 averaged nearly 8% per annum. Meanwhile, over the same period, US bonds produced approximate 5% real annualized total returns. Historically, stocks and bonds were assumed to be inversely correlated — a flight to quality typically means investors will rotate funds out of the stock market into high quality corporate bonds and treasurys, thought to be a risk-free safe haven. Conversely, when times are good, investors have historically been known to rotate funds out of bonds into riskier stocks, pushing bond prices down and yields higher. However, recent history demonstrates that this is not always the case. In the aftermath of the global financial crisis, an aggressive monetary policy intended to jumpstart the economy—coupled with a range of secular forces—has helped drive bond yields to historic lows, while public equities have concurrently seen healthy appreciation after bottoming out in 2008.

Though past is not necessarily prologue, data suggest that the relationship between stock and bond prices is simply not reliable enough to ensure that bonds will act as a sufficient hedge for dips in public equity markets. PIMCO analyzed a historical data set that included S&P returns and long Treasuries from June 1927-2013. The full sample average correlation between stocks and bonds was 10% but the spread was wide, varying from -93% to +86%. Moreover, PIMCO performed a statistical regression to isolate the causes of the volatile correlation patterns observed, and found that higher inflation and real interest rates have statistically significant bearing on bond-equity correlations, with correlations tending to rise positively with both inflation and interest rates. This suggests that a shift in the macroeconomic regime could negatively impact the usefulness of bond-equity diversification as a portfolio hedging tool.

Meanwhile, correlations between public equities have been on the rise. Much of this is attributable to the increasing concentration of the stock market. Although the aggregate capitalization of publicly listed companies in the US has more than doubled since 1998, the ranks of those companies has been slashed roughly in half:

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26 Ibid.
28 Ibid.
29 Ibid.
To be fair, Markowitz’s original argument stated that "the adequacy of diversification [...] does not] depend solely on the number of different securities held," but rather on the cross-industry diversification of those securities.\(^{31}\) However, research from JPMorgan shows that, in fact, cross-industry equity correlations are at their highest level on record:\(^{32}\)

Moreover, the trend is expected to continue—JPMorgan projects the future long-term correlation between domestic equities at roughly 35%, compared with the historical average of 28%.\(^{33}\)

Of course, there still remains a universe of investment instruments available on public markets traditionally thought to bear low correlations to public equities. However, data suggest that correlations between stocks and potential hedging tools such as high-yield bonds, public REITs, currencies, commodities, and foreign equities have similarly risen.\(^{34}\) JPMorgan finds that the correlations between equities, credit, foreign exchange, interest rates, and commodities more than doubled on average over the past two decades:\(^{35}\)

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\(^{33}\) Ibid.

\(^{34}\) Ibid.

\(^{35}\) Ibid.
While rising correlations between equities and other publicly-traded alternative instruments are largely a product of recent macroeconomic volatility, they have also been driven by secular forces such as the integration of the global economy and capital markets, the liberalization of good and labor flows, new alpha-extraction techniques, and the increasing indexation of the financial world.36

Importantly, structurally higher cross-asset allocations have dramatic implications for retail investors. As PIMCO explains, “An environment of stronger global correlations makes it more challenging to construct a truly diversified and resilient portfolio.”37 JPMorgan quantifies the cost of the trend, and finds that the risk capital sacrificed due to rising covariances over the past 15 years could have increased annualized investor yields by more than 300 basis points.38

**Pronounced Tail-Risk Volatility**

Conditional heteroskedasticity is a long-established feature of equity markets. As Schwert and Seguin write in the *Journal of Finance*, “heteroskedasticity in stock returns is a pervasive phenomenon.”39 The time-varying volatility of stock returns stems from a variety of forces ranging from black swan events and cognitive biases to what Cutler, Poterba, and Summers refer to as “informational freeloading,” which exacerbates the impact of relatively modest price fluctuations.40

This structural vulnerability of equity markets has been all-too-apparent in particular over the past several decades, which have seen a dramatic increase in volatility compared with decades

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prior. Over the past two decades alone, there were roughly 120 days during which domestic equity markets moved by 3% or more, compared with just over 80 days in the previous half-century.41

![Display 1: Extreme Volatility Leaves Deep Scars](image)

The leptokurtic distribution42 of stock market returns since the financial crisis in particular is illustrated by the CBOE Volatility Index, which measures return volatility for the S&P 500:43

![CBOE Volatility Index](image)

As the chart shows, since Lehman Brothers filed for Chapter 11 bankruptcy protection in September of 2008, volatility as measured by the index increased by nearly 30%.

Heightened volatility in equity markets has been driven largely by the increasing frequency of “fat-tail events” such as the 2007-2008 global credit crisis and the 2013 taper tantrum. As

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42 The fact that stock return distributions typically exhibit significant kurtosis and conditional heteroskedasticity rightly raises another inherent flaw in Modern Portfolio Theory, which is the implicit reliance on variance as a measure of risk. Though we believe mean-variance optimization (“MVO”) analysis can still be useful and provide meaningful insights for investors, we caution against overstating the potential precision of MVO in generating optimal portfolio allocations, due to the inherent methodological constraints contained therein.
Blackstone explains, “technically speaking, a fat-tail event is three standard deviations (“three sigma”) away from the mean and has only a 0.1% probability of happening[...]. But in reality these “low probability” events occur far more frequently.”

The rising frequency of these “fat-tail events” is important because such events tend to heighten cross-equity correlations and thereby diminish the expected returns of traditional portfolios on a risk-adjusted basis. The below chart illustrates how correlations tend to rise in response to macroeconomic shocks like QE and Brexit.

![Figure 3: An index marks periods of significant changes in correlation structure](image)

Volatility is also important to consider because of its influence on individuals’ investing habits. For instance, a UBS survey found that Millennials—whose formative investing years coincided with one of the worst macroeconomic shocks in recent memory—are more than twice as likely Gen Xers to describe their investing habits as “conservative.” Correspondingly, Millennials on average were found to hold more than 50% of their assets in cash and less than 30% in equities. Interestingly, this trend was found to persist even among older Millennials with six figures in assets, who on average hold more than 40% of their portfolios in cash.

As we will discuss later, we do not dispute inherently the strategy of trying to minimize exposure to macroeconomic volatility, but believe there are ways Millennials and others may accomplish this without sacrificing the potential lifetime returns of their investment portfolios at the altar of stability. This brings us to the benefits of investing in private market instruments, which we argue can offer both higher return potential and lower variance, thereby boosting risk-adjusted yields.

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47 Ibid.
48 Ibid.
Modern Portfolio Theory 2.0

Shifting Winds

In an environment plagued by low yields and slow-growth projections, rising cross-asset correlations, and heightened volatility, industry players are starting to realize that traditional portfolio theory is simply falling short. For instance, target-date funds are shifting to more aggressive equity exposures than the conventional 100-minus-your age model would predict, as illustrated in the below chart.\(^49\)

![Growing Equity Allocations Among Target-Date Funds](chart)

However, we believe that increasing equity exposure is an imprudent response to current trends, as it renders investors vulnerable to relatively low projected yields compared with recent history, as well as to higher return variance due to heightened intra-equity correlations, as discussed previously. Rather than shifting the sliding scale toward stocks, we believe that investors would be better served by integrating private market investments into their portfolios. We argue that private market instruments have the potential both to boost expected returns and minimize variability, thereby producing higher risk-adjusted mean returns.

A More Efficient Frontier

There is a wealth of evidence suggesting that private market investments boost returns. Though not directly indicative of retail investor outcomes, institutional fund performance offers a window of insight into the return benefits to be expected by increasing one’s private market exposure.

For instance, the private investment holdings of the California Public Employees’ Retirement System generated 20-year annual net class returns of 12.3%, compared with 8.2% for its public equity holdings—a 410 basis point spread.\(^50\)

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\(^49\) Based on publicly available allocation data accessed July 2017.

One could also consider the success of the Yale endowment, which has consistently outperformed its brethren by allocating a significant proportion of its assets under management to non-traded investments like private equity and real estate.\textsuperscript{51} Even in 2016—a challenging year for most university endowments—Yale bested rivals like Harvard and Princeton, largely thanks to its real estate allocation.\textsuperscript{52}

Numerous studies offer further validation. A Cambridge Associates study found that, for the fiscal year ended June 30, 2015, the median annual return for institutions with more than 15% of AUM in private investments was 370 basis points above that realized by institutions with less than 5% of AUM in private investments.\textsuperscript{53} The report concludes that “the evidence strongly supports the view that an allocation of 15% or more of a portfolio to private [investments] leads to higher returns and should be taken seriously by all investors.”\textsuperscript{54} Meanwhile, an empirical analysis by Dyck and Pomorski finds that, among institutions, a standard deviation increase in private equity holdings corresponds with 4% greater annual returns, while a two standard deviation increase corresponds with 7.4% greater annual returns.\textsuperscript{55}

\textsuperscript{53} The 15% Frontier. Cambridge Associates, 2016.
\textsuperscript{54} Ibid.
Beyond looking at institutional fund performance, further evidence of private investment outperformance is offered by a direct comparison of historical private equity returns to returns across publicly-traded assets.\textsuperscript{56}

![Private Equity Has Often Outperformed Other Asset Classes](image_url)

Importantly, increased exposure to private market investments has been demonstrated to not only boost returns, but to do so on a risk-adjusted basis. Since private investments offer lower covariance to public investments than publicly-traded investments do amongst themselves, the inclusion of private investments within a portfolio is able to appreciably reduce return variance--or risk--at the portfolio level. As Markowitz emphasizes, diversification is only effective as a protection against volatility insofar as a portfolio is diversified across assets with low covariance. Diversification among correlated assets is not an effective risk mitigant. However, diversification among uncorrelated assets is an extremely powerful risk reducer due to the fact that returns among uncorrelated assets are unlikely to swing (up or down) in tandem.

Because private assets offer relatively low beta and enhanced protection from market volatility, they should enhance variance-adjusted expected returns through portfolio-level risk reduction--a supposition borne out by the empirical data. For instance, one study found the Cambridge Associates US Private Equity Index to have a Sharpe ratio more than 2.5x that for the S&P 500 and more than 3x that for the Russell 2000.\textsuperscript{57} Similarly, the NCREIF National Index Sharpe Ratio outstripped the FTSE NAREIT Equity REIT Index’s risk-adjusted returns more than three-fold:\textsuperscript{58}

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\textsuperscript{57} Egizi, Jeff, and Jeremey Evnine. \textit{Revisiting the Case for the Endowment Model}. Athena Capital Advisors, 2015.

\textsuperscript{58} Ibid.
Empirical analyses demonstrate how increased private market exposure simultaneously enhances returns and lowers portfolio variance. Wells Fargo finds that diversification across private assets is critical to preserving capital in down markets, as private assets tend to mitigate downside risk, while still offering significant participation in upside return capture. \(^{59}\)

Along similar lines, a TIAA report finds that a portfolio with roughly 30% exposure to private commercial real estate assets adds more than 50 basis points of expected return and shaves off roughly 80 basis points of returns variability, resulting in a risk-adjusted return more than 40% above that for a traditional portfolio. \(^{60}\)


Importantly, the results of this analysis have been demonstrated to be robust across empirical methodologies. As TIAA rightly points out, mean-variance optimization has its limits and academic critics, many of whom claim that the methodology implicitly underestimates the kurtosis of typical return distributions. Historically, TIAA has used VaR and CVaR analysis—which utilize probabilistic models of expected returns rather than relying on variance as a measure of risk—to test its general recommendation of a greater portfolio allocation to private assets. Importantly, both analyses produced similar efficient frontiers to the mean-variance analysis, further supporting the argument for a more generous allocation to private real estate assets than that which has been traditionally recommended.

Notably, much of the reduced volatility offered by private real estate assets is a product of their illiquidity—since private real estate assets are relatively difficult to dispose of, they are largely insulated from speculation, and there is a substantially lessened risk of “sell-offs” in the face of macroeconomic tail events. As TIAA states, “real assets are powerful diversifiers, with low or negative correlations to traditional stocks and bonds—and to each other. As private investments, they tend not to move in lockstep with traditional assets or commodities because they are relatively illiquid and not exposed to speculative trading in public markets.”

To reinforce the point, consider that the correlation between public REITs and equities is more than twice that between public equities and private real estate assets.

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61 Ibid.
62 Ibid.
63 Ibid.
This goes a long way toward explaining the dramatic disparity between NCREIF and NAREIT risk-adjusted yields, as noted above.

Importantly, studies suggest that increased private market exposure enhances risk-adjusted returns for investors across the risk tolerance spectrum. This implies that even conservative investors (as many Millennial investors profess to be) could still benefit substantially from increasing their private market holdings. As Blackstone reports, increased allocations to private alternative assets boost returns and mitigate portfolio risk irrespective of an individual investor’s risk tolerance.64

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TIAA similarly finds that, irrespective of age and risk tolerance, all investors could increase their risk-adjusted returns through greater exposure to private real estate investments.\(^65\)

### Real Asset Exposure Improves Performance Across the Risk Spectrum

![Image of pie charts showing allocations and performance across different portfolio types](https://example.com/real-asset-exposure-fig)

As illustrated above, even a portfolio heavily weighted toward fixed income could boost its Sharpe ratio by 20% through increased exposure to privately-held real assets.\(^66\)

To sum, increased exposure to private market investments—which offer a combination of higher returns potential, lower correlations to the broader market, and relative protection from macroeconomic volatility—can demonstrably boost expected return rates and mitigate portfolio volatility. Moreover, this finding applies both to conservative and risky portfolios.

### Conclusion

Investors today face a plethora of challenges: low yields on fixed-income instruments and troubling future prospects for long-term bondholders, slow growth projections that could diminish equity returns relative to recent history, and rising cross-asset correlations that render it difficult to construct a truly diversified portfolio protected from macroeconomic volatility.

That said, we believe there is a clear path to mitigating these obstacles: **increased allocations to private market assets**. We believe this strategy has the potential to significantly increase risk-adjusted yields through a combination of reduced volatility and higher expected return rates.

We live in a rapidly changing world, dominated by social media sites and apps that didn’t even exist several years ago. As the ways we do everything from shop to socialize to consume media have transformed dramatically, so too must the manner and markets in which we invest. Finance has historically been a laggard when it comes to adopting change, but it’s finally time, and the potential benefits make it incumbent.

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\(^{66}\) Ibid.