PLANCORP®
Your Financial Life Advocate.

Annual Investment Review - 2018

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Valuations and Return Expectations

Global stock markets spoiled investors in 2017 with big returns and almost no volatility. Not once did the S&P 500 experience a drawdown that exceeded three percent, and the average daily price change was the second lowest in history.

High returns and the lack of volatility makes 2017 a very tough act to follow, especially when you consider current valuation levels.

Valuation is one of the best indicators of future returns. Using the price-to-earnings (P/E) ratio, we can measure how much investors pay for a dollar of an investment's earnings.
As investors become more confident about an investment's future, they're willing to pay more for a dollar of earnings.

A popular variation of this valuation metric is the cyclically-adjusted price-to-earnings (CAPE) ratio. Instead of dividing price by the past 12 months of earnings as we do with the simple P/E ratio, the CAPE ratio divides price by the average inflation-adjusted earnings of the past ten years. The idea is to smooth out the good and bad years created by a business cycle.

At the depths of the Financial Crisis in March 2009, investors paid about $13 for cyclically-adjusted earnings. Fast-forward to today where confidence is much higher (investors are willing to pay more for stocks) and the CAPE ratio stands at 32.

That's high by historical standards and warrants our attention. Why? While it won't help predict the next crash, it can help us plan for the future.

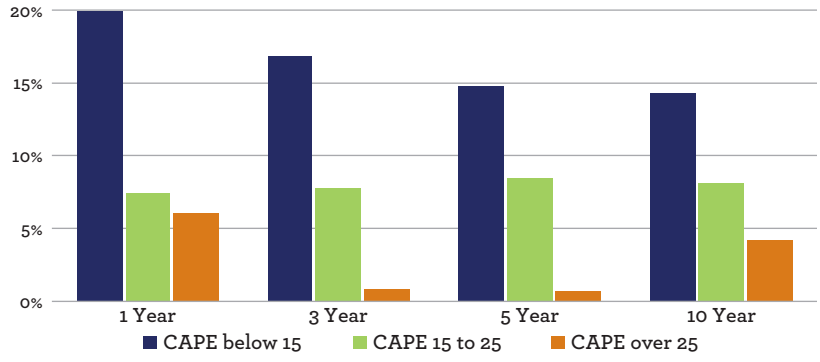
In this newsletter:

Using Valuation to Set Return Expectations

Valuation is a terrible timing tool, but it is useful in setting expectations about future returns.

Using monthly data from January 1926 through December 2017, the graphic below breaks out returns based on where the CAPE ratio stood at the beginning of each month in the data set. ›

S & P 500 Returns by Valuation



"Valuation is a terrible timing tool, but it is useful in setting expectations about future returns."

As you can see, we generally experience lower returns when valuations are high (stocks are more expensive) and higher returns when valuations are low (stocks are cheaper).

The next table looks more closely at the range of returns for periods following a CAPE ratio over 25, which is the situation we're in today.

S & P 500 Returns Following CAPE Over 25

	1 Year	3 Years	5 Years	10 Years
Average	5.39%	0.38%	0.71%	4.02%
Median	8.06%	0.54%	0.36%	5.14%
High	52.14%	29.69%	18.67%	9.28%
Low	-38.09%	-42.35%	-17.36%	-4.95%

High valuations typically result in below average returns, but the range of outcomes in this table remind us of that there are no certainties in investing.

Don't Predict, Plan

Valuations tend to stay at relatively high or low levels for extended periods of time. It's extremely difficult to predict how financial markets will perceive outcomes of the various global events occurring every day. The way we look at current valuations is that U.S. stock returns over the next decade have an increased probability of trailing historical average returns.

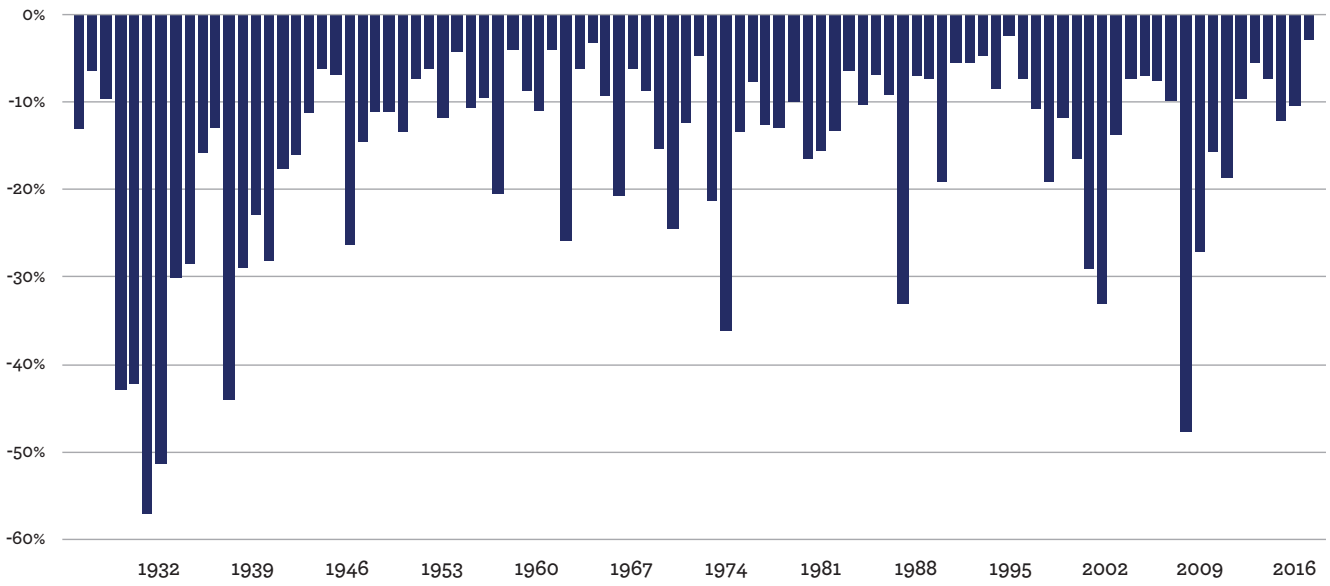
Even with the potential for lower returns, it's important to note that all of the return data in the table uses nominal returns, which aren't always as relevant to the financial planning process as real returns that account for inflation. Nominal returns don't need to be as high during periods of low inflation and low interest rates to have good financial planning outcomes.

"Rather than trying to predict the timing or cause of the next downturn, you're better off planning on historical levels of volatility persisting over time."

We never know when or why the next correction or bear market will happen. What we do know is that market downturns happen on a regular basis. Rather than trying to predict the timing or cause of the next downturn, you're better off planning on historical levels of volatility persisting over time.

The chart below depicts the worst drawdowns for the S&P 500 in every year dating back to 1926. Double digit losses occur in 65% of calendar years and nearly a quarter of the time losses are greater than 20%.

S & P 500 Worst Intra-Year Drawdowns: 1926-2016



The normalcy of market losses is also evident in a recent study by CFRA Research and S&P Global. During bull markets since 1945, the S&P 500 experienced a pullback of 5.0% to 9.9% once a year, a correction of 10.0% to 19.9% every 2.8 years, and a bear market decline of at least 20% every 4.7 years.

What does this tell us about investing in the market? Investors must be willing to lose money on occasion – sometimes a lot of money – to earn the average long-term return that attracts most people to stocks in the first place.

Volatility is Not the Enemy

Nobody enjoys losses. Our human instinct is to react to danger, specifically to run and hide from it. This instinct helped humankind from an evolutionary perspective, but it hampers our ability to make good investment decisions.

Remember, the uncertainty and market volatility that makes us uncomfortable is necessary in order for stocks to provide higher returns than bonds and cash. The good news is that you can reduce the chance of loss by agreeing to stay invested over a long period of time.

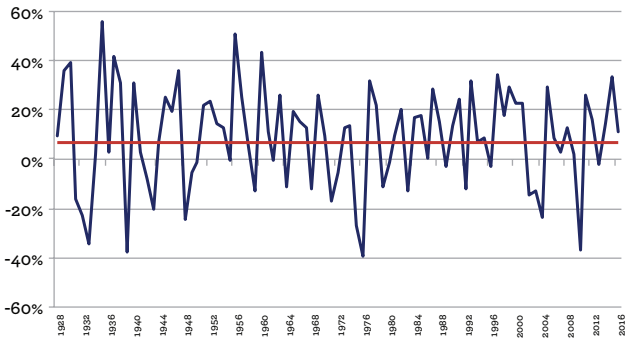
"The long-term feels like an eternity to live through in the moment, but those that maintain discipline will be rewarded over time."

You can see this by comparing one, three, and ten-year real returns (blue lines) to the average ten-year real return (red lines) on the total U.S. stock market. Markets are highly uncertain in the short-term. But in the long-term, the range of outcomes narrow.

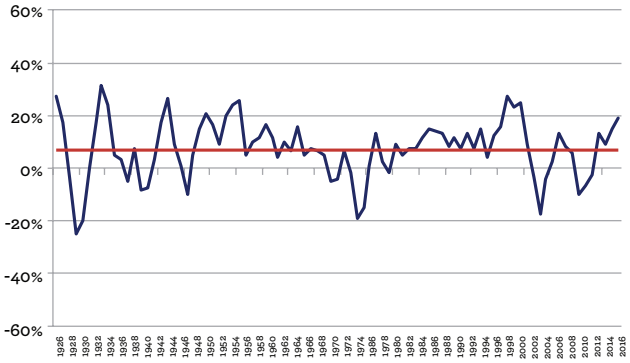
It takes a lot of self-control to earn market returns. You must sit tight during periods of low or negative return. This sounds easy in theory, but it's difficult to execute in the moment.

If you are nervous about the market, you are better off reviewing the underlying assumptions in your financial plan than making changes to your portfolio.

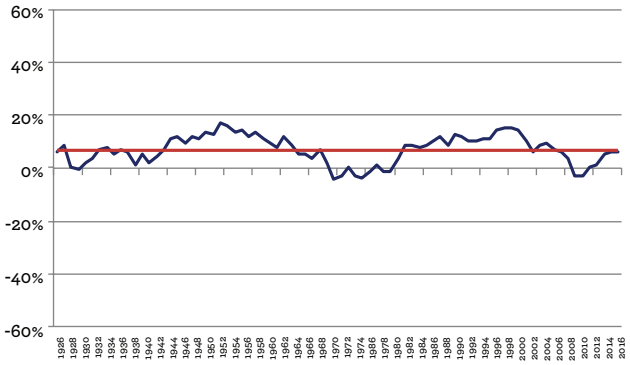
U.S. Stocks 1-Year Real Returns



U.S. Stocks 3-Year Real Returns



U.S. Stocks 10-Year Real Returns



A thoughtfully-crafted financial plan takes periods of bad performance into account through Monte Carlo analysis, and does so without emotion. That way you spend less time predicting and more time planning around things you can control like your asset allocation, savings or withdrawal rate, investment costs, and taxes.

The long-term feels like an eternity to live through in the moment, but those that maintain discipline will be rewarded over time.

Why Alternatives Are Bad for Your Portfolio

It's never been easier for investors to add alternative investments to their portfolios.

Proponents of alternative exposure typically cite the ability to improve returns or enhance diversification, but the data doesn't support these narratives.

As evidence-based investors, Plancorp seeks to implement strategies that are statistically robust, work in out-of-sample data sets, work across multiple asset classes, and are supported by sound economic logic.

Type I vs Type II Error

When the FDA evaluates a new drug, they seek to minimize the chance of approving a drug that is not beneficial to people's health or causes bad side effects. In doing so, they increase the probability of failing to approve a drug that would improve people's health. This is a tradeoff between minimizing Type I and Type II error.

The same tradeoff occurs when evaluating which exposures to include in your portfolio. You can minimize Type I error by owning a couple broad market index funds and never seeking further enhancements to your portfolio. Minimizing Type II error, on the other hand, means setting a very low bar for implementing a new strategy.

Either way, minimizing one error increases your chances of incurring the other. Investors should strive to strike a good balance, but also recognize that a great deal of investment success comes from avoiding mistakes.

In other words, investors should be more concerned with implementing a bad idea than missing out on a good one.

The False Promise of Enhanced Return

Data gathered from U.S. colleges and universities through an annual study by the National Association of College and University Business Officers (NACUBO) suggests that alternatives might not be as great in practice as they are in theory.

The most recent NACUBO-Commonfund Study of Endowments (NCSE) reviews asset allocations and performance for 805 U.S. endowments that manage $515.1 billion of assets. The average endowment was $649.9 million with a 53% allocation to alternative strategies.

These institutions are bursting with talented staff and resources to successfully implement a major allocation to alternative strategies. Even so, returns fall short of a simple blended index of stocks and bonds.

The table below outlines average annual returns from the study for periods ending June 30, 2016.

INSTITUTIONS & BENCHMARKS	1-Year	3-Years	5-Years	10-Years
Average Endowment	-1.9%	5.2%	5.4%	5.0%
Top 25% of Performers	-0.7%	6.1%	6.2%	5.6%
Bottom 25% of Performers	-3.3%	4.2%	4.5%	4.2%
Russell 3000 Index	2.1%	11.1%	11.6%	7.4%
MSCI World ex-US Index	-9.8%	1.9%	1.2%	1.6%
Barclays Aggregate Bond Index	6.0%	4.1%	3.8%	5.1%
Blended 60/40 Index	1.5%	6.6%	6.6%	5.4%

The Blended 60/40 Index is comprised of 42% Russell 3000 Index, 18% MSCI World ex-US Index, and 40% Barclays Aggregate Bond Index (a portfolio that could be purchased today for less than 0.10%).

If the best and brightest investment teams fail to improve outcomes using alternatives, then you can reasonably expect investors of all sizes wouldn't fare much better.

If the data isn't convincing enough, take it from Yale's Chief Investment Officer David Swensen. Mr. Swensen popularized the heavy use of alternative strategies within a Modern Portfolio Theory framework. But in his book *Unconventional Success*, he acknowledges that nearly all individuals and institutions would be better off in a low-cost portfolio of stocks and bonds:

> *"Talking heads prattle about the attractions of alternative asset classes. Wall Street pushes vehicles that allow investors to access inefficient markets. Investors require unusual self-confidence to ignore the widely hyped non-core investments and to embrace the quietly effective core investments."*

It's easy to run a backtest to find alternative strategies that would have improved performance, but applying a rigorous evidence-based process shows us that most backward-looking enhancements you could have made to your portfolio are the result of data mining or fund incubation. ›

Plus, each additional strategy included in your portfolio has a diminishing marginal benefit, and fees frequently offset the benefits of otherwise attractive diversifiers. This only increases the uncertainty regarding the net benefit from inclusion of alternative strategies.

When Fees Destroy Diversification

Few people understand how much of the diversification benefit fees consume. Consequently, it's common to see people build unnecessarily complex (and costly) portfolios in the name of diversification with unrealistic expectations for returns after fees and taxes.

A recent paper published in *Financial Analysts Journal* by William W. Jennings and Brian C. Payne compares the incremental benefit of diversification with the incremental cost of such diversification for institutional investors – their results show fees destroying a shockingly high portion of allocation alpha.[1]

U.S. equity market exposure explains a significant portion of the return and volatility for different asset classes, while the remaining risk-adjusted "allocation alpha" is the true benefit of an asset class outside traditional U.S. stocks, bonds and cash.[2]

Because allocation alpha is independent of overall market movement and does not rely upon active management, investors should only pay fees for the diversification benefit portion of an asset class. In the Jennings and Payne study, 22 of 45 asset classes were found to have positive allocation and fees that are below 50% of alpha.

The Jennings and Payne study focuses only on institutions that don't pay taxes, but diversifying asset classes tend to be less tax-efficient. For individual investors, taxes will further reduce allocation alphas and further eat into any potential diversification benefit.

Should Alternatives Have a Place in Your Portfolio?

Asset allocation is all about strategically diversifying across different types of investments so that all pieces of the portfolio don't rise and fall in unison. The greater the difference in movements between different asset classes, the better the diversification benefit.

The two asset classes that generally have the least similar fluctuations in prices are stocks and bonds, which partly explains why the broad asset allocation decision is an important one. Within both stocks and bonds, buying a mix of domestic and international securities can improve diversification.

Outside of stocks and bonds, we can include additional asset classes such as real estate or global bonds to further improve the level of portfolio diversification. Beyond that, there is little evidence that more exotic exposures such as commodities, private equity, or hedge fund strategies will improve investor outcomes.

To Add or Not To Add?

When we consider adding a new exposure to our portfolio, there are several methods we use to improve the decision making process.

Every potential change to the portfolio starts with a written hypothesis that can be tested using evidence. This helps protect ourselves from a tendency to seek out confirming information or being swayed by narrative.

Slow down the process. We aren't afraid to lay out a research and hypothesis-testing timeline that spans 12 to 24 months. Given our multi-decade time horizon, there is no reason to rush to a decision. Making frequent changes to the portfolio is a symptom of a sloppy investment process.

Understand how product methodology differs from the methodology in the underlying research. It's one thing to find an exposure you believe could benefit the portfolio. It's another thing to find a product that captures that exposure in a way that aligns with methodology in the research. Similarly, you must deeply understand the weaknesses in the underlying assumptions of a product's model.

Diversification and return benefits must always be considered in light of expenses and taxes. Extra fees can offset the benefits of otherwise attractive investments. Most published research focuses on cost at the fund level, but doesn't consider the portfolio level or unique end-user experience. Implementation expenses and trading costs should not be taken lightly.

Don't invest in something you couldn't live with for multiple decades. There are no strategies that work all the time. We knowingly accept tracking error, which can be negative for long stretches of time, in exchange for the opportunity to earn excess returns. Decisions should be made a multi-decade time horizon, otherwise you run the risk of not giving the underlying theory enough time to work.

Active vs. Passive: The Wrong Debate

Are you an active or passive investor?

This question gained prevalence in the last decade among investors and frequently invokes furious debate among financial professionals. The S&P Indices Versus Active (SPIVA) Scorecard serves as a de facto measure of who's "winning," and has continually shown that actively managed funds don't consistently beat the indices.

Active Loses Again

The most recent release shows more than 84% of all U.S. Equity Funds trailed their respective benchmarks over 15-year periods.

(The reason for using a 15-year period is to capture a full business cycle, but the results are equally dismal over one, three, five, and ten-year periods.)

International Equity Funds didn't fare any better, with failure rates over a 15-year period ranging from 83% to 95% across the different subcategories. Fixed Income Funds also struggled, with failure rates ranging between 70% and 90% over a 15-year period across the different subcategories.

The Winners Don't Keep Winning

For those funds that do manage to outperform, history suggests they are unlikely to do so in the future. The latest S&P Persistence Scorecard released in June 2017 showed most active managers that outperformed over a three- or five-year period fared much worse in the following three- or five-year period.

For example, among the top performing quartile of U.S. equity mutual funds over a five-year period ending in 2012, 49% of those funds ended up in the bottom half of performers over the next five years while another 11% had to merge or liquidate. These results are in line with past years of the Persistence Scorecard.

There will always be active managers that outperform the overall market, but it is extremely unlikely that any one person will identify managers that outperform in advance and consistently pick the best active manager for any given asset class.

The latter point is extremely important because the odds of your portfolio outperforming get progressively smaller as the number of funds in the portfolio increase.

You might conclude from this evidence that investors should only use index funds, which is far from being a bad conclusion, but also somewhat misses the mark.

Why Active or Passive is the Wrong Question

The active versus passive debate is flawed because you can be highly active using index funds and very passive using active funds.

The most passive investor who never makes changes to their portfolio or process still must make a series of active decisions at the onset of building a portfolio including asset allocation, investment vehicles, asset location, and rebalancing rules.

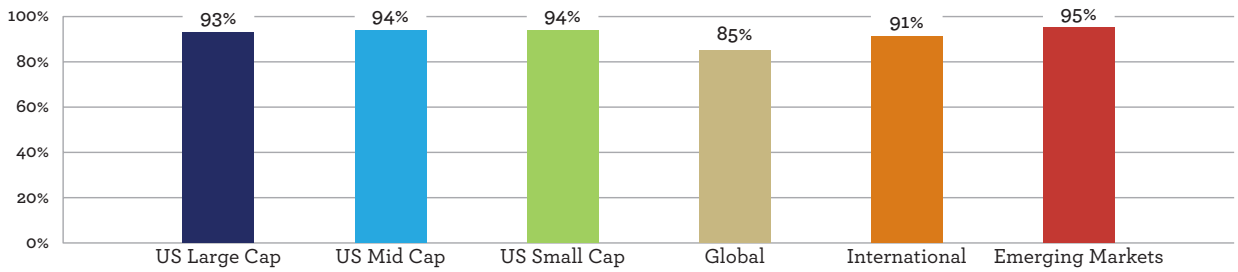
Even the act of doing nothing counts as a decision.

What Investors Should Focus on Instead

The real comparison should be low-cost versus high-cost, low-turnover versus high-turnover, and rules-based versus forecast-based approach. When you fall on the right side of these comparisons, you position yourself for better investment results. ›

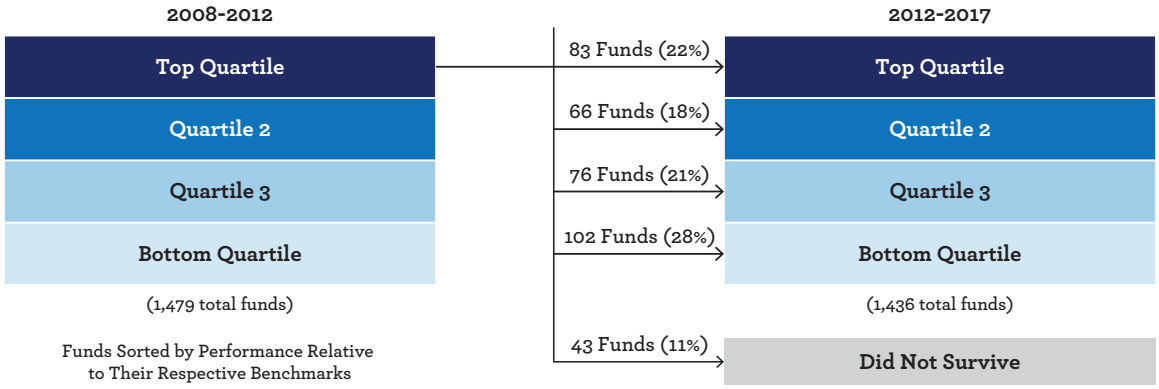
The Failure of Active Management[1]

Active Public Equity Funds That Failed to Beat the Index (15 Years as of 6/30/17)



Winners Don't Keep Winning[2]

Subsequent Performance of Top 25% of US Equity Funds (as of 6/30/2017)



Traditional active managers tend to be on the wrong end of these comparisons, while index funds are usually on the favorable side. That partly explains why there's so much focus on "active versus passive," but simplifying it to this leaves out a lot of important details. Here's how these factors can impact you as an investor.

1. *Low cost vs high cost*

The importance of low investment costs was first highlighted by Nobel Laureate William Sharpe's 1966 work on mutual fund performance, with several studies since identifying a close link between cost and performance.

The higher fees that come with actively managed funds is well documented, but those fees are taken directly out of performance on a daily basis so you may never see them. The impact is simple: the more you pay, the less you have in the end.

2. *Low turnover vs high turnover*

Equity funds with low turnover also have a distinct advantage over equity funds with high turnover. Turnover measures the frequency in which securities are traded over a 12-month period and serves as a good proxy for trading costs within equity funds.

Active managers tend to trade more frequently in attempt to add value, but trading costs related to brokerage fees, bid-ask spreads, and price impact can dramatically reduce a fund's performance. Evidence strongly suggests that equity funds with high turnover have lower rates of outperformance (turnover is a less useful metric with fixed income funds).

3. *Rules-based vs forecast-based*

Most active managers attempt to identify mispriced securities or correctly time market movements. Markets are complex adaptive systems (see page 10), which makes predicting market movements nearly impossible. In addition, the ultra-high competition for capturing profits doesn't leave much opportunity for outperformance to go around.

On the other hand, a rules-based approach doesn't make predictions about the direction of markets. It simply rebalances on a regular basis and allocates dollars according to the underlying methodology.

Other Considerations

Index funds are one of the greatest financial innovations for investors, but they aren't perfect. Index funds have shortcomings primarily related to price inefficiencies associated with annual index reconstitution, as well as style and size drift during the calendar year.

Similarly, Plancorp uses funds that actively deviate from an index in such a way that it ends up on the favorable side of these comparisons. These funds emphasize areas of the market that have been identified by academia to deliver higher expected returns over time by weighting according to relative valuation, size, profitability, or momentum.

With the distinction between active versus passive becoming less informative, investors must seek out information on more relevant characteristics when evaluating investments.

What You Need to Understand About Bonds

Interest rates have been on the rise since 2013, but it seems the yearly forecasts of market prognosticators spark more questions from investors about their bond portfolios than the actual rate changes do.

If you've been feeling curious or questioning your own bond holdings lately, let's take a look at some fundamentals so you can better understand these assets.

Measuring Return on Your Bond Portfolio

The total return you receive by holding a bond until it matures is measured by yield to maturity, which equals all interest payments you receive until maturity as well as any gain or loss of principal. For example, consider a bond with the following characteristics:

- 10-year term
- $1,000 face value
- $80 annual interest payment

If you bought this bond at par (meaning you paid the face value of $1,000), then the yield to maturity is 8.0%. If you bought the same bond at a discount of $900, then the yield to maturity is 9.6%.

The increase in yield results from buying the bond below its stated face value. This works the other way around, too. If you buy the bond at a premium of $1,100, then the yield to maturity is 6.6%. The decrease in yield results from buying the bond above its stated face value.

Bond Prices and Interest Rate Changes

Bonds experience price volatility in response to various factors, the most prevalent being changes in market interest rates.

As market interest rates rise, the prices of outstanding bonds with lower rates fall. Conversely, as interest rates fall, prices of outstanding bonds rise until their yield matches that of new bonds issued at the current rate. This relationship can be illustrated using a simplified yield calculation.[1]

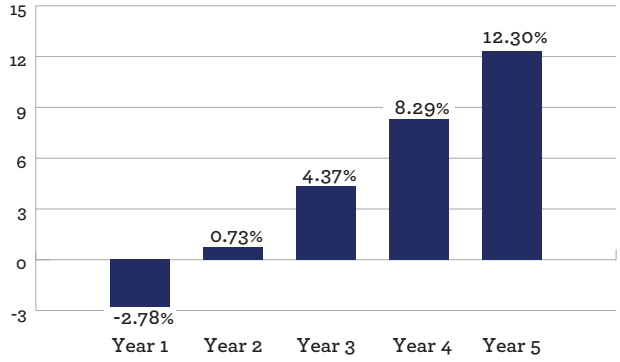
If you own a $1,000 bond with an annual interest payment of $80, your current yield is 8.0% ($80 / $1000 = 8.0%). If market interest rates rise to 9.0%, your bond decreases to roughly $888 ($80 / $888 = 9.0%).

If market interest rates fall to 7%, the price of your bond increases to $1142 ($80 / $1142 = 7.0%).

Rising rates result in immediate bond price declines, but long-term returns are actually enhanced due to the ability to reinvest at higher rates.

Consider the scenario below that depicts the impact of a one percentage point increase in yield on the cumulative total return of the Barclays Aggregate Bond Index, which yields 2.70% with a duration of 6.09 as of December 31, 2017.

Cumulative Bond Returns Following One Percentage Point Increase in Interest Rates[2]



As you can see, the one percentage point increase in interest rates results in a loss for Year 1, but by Year 2 the cumulative return turns positive because interest and principal reinvest at higher rates. Over time, the cumulative return grows even more as the benefit of higher rates compounds.

If you don't believe the math, check your returns instead. The benchmark 10-Year Treasury yield has risen since the summer of 2016. Shorter term 2-Year and 5-Year Treasury yields have risen since 2013. Despite rising rates, the fixed income allocation in Plancorp's model portfolio has a positive return.

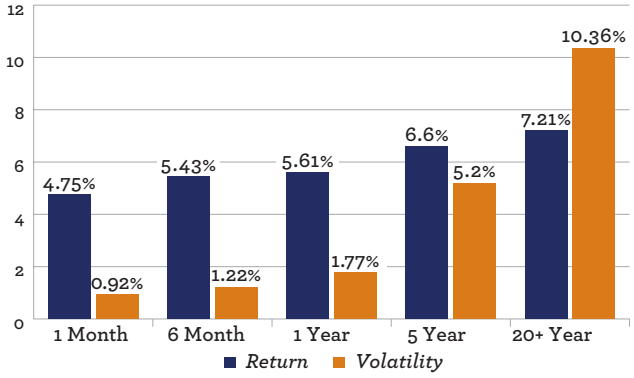
Drivers of Bond Performance: Term and Credit Risk

Relative returns are largely driven by the term and credit quality of a bond. Longer-term bonds experience bigger price movements for a given change in interest rates. Investors expect to be compensated for taking that extra risk as a result. ›

In the table below, you'll notice that 20+ Year bonds historically earned half a percentage point more than 5-Year bonds, but with roughly double the volatility.

Fixed Income Term Risk & Return[3]

(1964-2017)



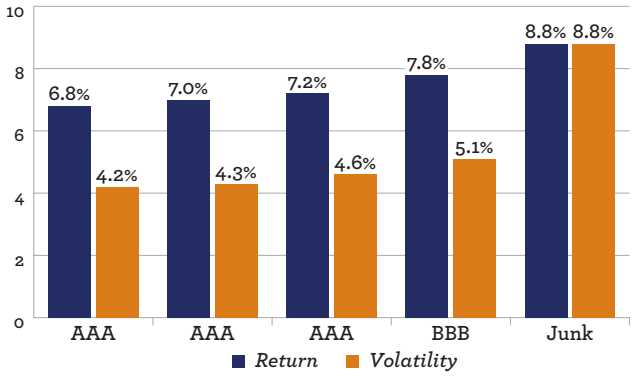
Although longer-term bonds offer higher yields, they don't necessarily offer enough of a return premium to justify the higher volatility when compared to short-term bonds.

By loaning money to a company with lower credit quality, investors face a higher risk of not receiving all of the promised interest and principal payments. In addition, lower rated bonds tend to drop more in value when the economy slows because recessions increase the likelihood of default. Consequently, investors require a higher yield to compensate for taking the extra risk.

The relationship between fixed income credit risk and historical returns is depicted below. As you can see, taking additional credit risk by lending to lower quality companies produces higher returns and higher volatility.

Fixed Income Credit Risk & Return[4]

(1988-2017)



However, much like our example of term risk, credit risk is only beneficial to a certain point. For example, junk bond returns are higher than BBB bonds, but they come with 72% greater volatility – not exactly something you want to see in the portion of your portfolio dedicated to safety.

Individual Bonds vs. Bond Funds

Many individual bondholders believe the implications of interest rate fluctuations don't impact them because they will receive their principal value on an individual bond if held to maturity. Similarly, some people perceive bond funds to be riskier since they never mature and fluctuate in price every day.

It's true that holding an individual bond to maturity will result in the return of principal, but those nominal dollars will be worth less with inflation and during periods of higher interest rates.

Additionally, the lack of price volatility in individual bonds is an illusion. Individual bond prices fluctuate every day, even if held to maturity, but you may not notice if the bond isn't re-priced every day.

"A portfolio of individual bonds is actually a form of a bond fund. The difference is that individual bond portfolios tends to have higher costs, less diversification, no global exposure, and cash drag."

As for the issue of bonds maturing, most individual bonds are part of a bond portfolio that never matures because investors usually reinvest the proceeds of maturing bonds into new bonds. In other words, a portfolio of individual bonds is actually a form of a bond fund. The difference is that individual bond portfolios tends to have higher costs, less diversification, no global exposure, and cash drag.

While people tend to focus more of their attention towards the stock portion of their portfolios, understanding the underlying fundamentals of your bond portfolio is important.

Thinking About Markets Like Piles of Sand

The idea of complex adaptive systems might sound overwhelming, but an experiment conducted by physicist Per Bak makes the concept easier to understand.

If you drop one grain of sand at a time onto an empty table, a small, cone-shaped pile begins to form. As the pile grows, eventually a grain of sand will hit the pile and trigger an avalanche.

If you've ever watched sand run through an hourglass, you might have noticed this dynamic in action. As the sand pours through the top glass and the pile below grows, small avalanches of sand start cascading down the side of the cone-shaped pile.

The longer the pile avoids an avalanche, the bigger the eventual sand avalanche will be.

Bak's experiment was designed to determine the exact conditions that would trigger that avalanche, but he found the sandpile to be completely unpredictable. Avalanches sometimes occurred after hundreds of grains were added. Sometimes they happened after thousands.

Bak came to realize the timing of an avalanche was not a function of the size of the pile or number of grains of sand, but instead was related to the interactions between those individual grains of sand.

The more grains of sand in the pile, the more interactions that occur between the individual grains and the more difficult it is to predict the next avalanche. Eventually, the pile reaches a critical point (called self-organized criticality) in which the pile transforms into something more complex and gains properties that must be considered separately from the individual pieces.

In other words, you can't study the individual grains of sand and understand the pile in its entirety.

Emergence in Financial Markets

Complex adaptive systems aren't necessarily complicated. It is the emergent behavior that arises from within these systems of individual agents that are more complex.

Consider a kaleidoscope in which the rules governing the function of the system are simple. However, small changes in the initial conditions of the system have significant effects that result in a rich variety of patterns. Even if you understand the rules governing the kaleidoscope, it is impossible to precisely anticipate how a small change will alter the patterns you see.

The same concept applies to the pile of sand. The rules governing the individual grains of sand are simple, but it's difficult predict when an avalanche will occur because of the way different grains of sand interact and adapt to each other.

Financial markets are another example, with millions of participants interacting with each other. Each participant brings diverse tastes and trading rules into the system. These rules adapt over time based on feedback. What emerges from interactions of investors is what Adam Smith famously called the "invisible hand."

Adam Smith's invisible hand suggests that when people are allowed to trade freely, self-interested traders in the market will compete with each other for profit opportunities, which in turn drives supply and demand towards an equilibrium price.

In other words, the millions of market participants competing for profits lead to highly efficient markets in which current prices reflect all available information and any inefficiencies in market prices cannot be systematically exploited.

This is a big part of what makes forecasting in financial markets so difficult. People place too much importance on explaining individual pieces of the market and not enough on how people perceive those pieces will interact with each other.

Even if you are aware of this dynamic, very few people have the capability to master the ever-changing mix of calculus and psychology.

The Problem with Predictions in Nonlinear Systems

A nonlinear system is one that does not produce the same result every time even though the inputs and conditions are the same. With the sandpile, you never know which grain of sand is going to cause an avalanche or how big the eventual avalanche will be because each grain of sand uniquely interacts with other grains to create a pile that is slightly different each time.

Like piles of sand, financial markets are also nonlinear systems. But they are far more complex. Sandpiles are ›

simply made up of interacting grains of sand. Financial markets are comprised of millions of interconnected inputs that adapt and learn over time.

All too often investors say some form of the following:

"I'm worried about _____ and think the market is going to crash. I want to reduce my exposure to stocks or make portfolio changes to prepare."

That blank space is always something different. Politics, the dollar, national debt, monetary policy, entitlement system, war, valuations, market highs, interest rates, Eurozone, China, etc. Most people fill in the blank with something specific after reading popular print or internet publications, listening to "pundits," or tuning in to social chatter.

Not only does this line of thinking entirely ignore the crowd's perception, it oversimplifies the many variables that impact market movements.

The stock market is a complex adaptive system in which linear thinking – A causes B – isn't sufficient. Most non-professional investors (along with many professionals) use linear reasoning when thinking about the stock market because the human brain is obsessed with precisely linking cause and effect.

Understanding the Financial Markets as Complex Adaptive Systems

Our innate human tendency to seek clean-cut reasons behind everything around us makes us highly susceptible to linear thinking. Exacerbating this is the fact that financial media presents its viewers with Wall Street "experts" that succinctly describe past events by explaining specific causes that led to specific market movements, all after the fact.

Market "experts" sound a lot like the description of historians that Per Bak describes in his book on self-organized criticality, *How Nature Works*:

> *"Historians explain events in a narrative language where event A leads to event B and C leads to D. Then, because of event D, event B leads to E. However, if the event C had not happened, then D and E would not have happened. The course of history would have changed into another sequence of events, which would have been equally well explainable, in hindsight, with a different narrative."*

The point isn't that cause and effect don't exist, but that they aren't proportional. Large fluctuations are more the result of the interactions within the complex adaptive system and less attributable to external or environmental factors.

If we start thinking of financial markets more like piles of sand, then we can no longer assume that a given action or event will produce a given reaction. As a result, worrying about the cause of the next crisis a futile exercise.

What All This Means for You as an Investor

There are some basic takeaways we can draw from thinking of financial markets more like sandpiles:

Avalanches are infrequent, so we shouldn't assume the next grain of sand will cause an avalanche.

Stock market returns follow a non-normal distribution that has more positive outcomes than negative outcomes.

Avalanches will eventually occur, so it is important you have a plan in place.

Rather than constantly worry about when or why the next avalanche is coming, you should plan on avalanches occurring with a similar frequency and magnitude as they have in the past. By carefully assessing your willingness and ability to take risk, we can build a portfolio you can stick with through poor market conditions.

Cause and effect are not neatly linked.

People place way too much emphasis on a few specific data points that allow for a narrative that closely links cause and effect. Complex adaptive systems take on additional characteristics that can't be accounted for by simply weighing the individual parts. This is a big reason it's impossible to make accurate predictions about the market.

Ignore predictions from Wall Street "experts."

Good investing is boring, but the media creates a sense of urgency and encourages bold predictions as if they are the source of an informational edge. Nobody is going to get major media attention for saying, "there's no way to know what markets will do next."

Evaluating Cash

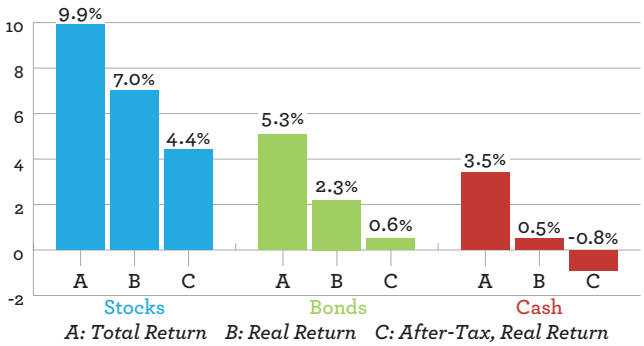
Step one to a successful retirement is saving money. Step two is growing your savings faster than inflation. Step three is sufficiently growing wealth without taking undue risks.

Holding too much of your money in cash can make this process difficult for two reasons. The first reason is that cash has provided poor long-term returns. Below we compare the historical returns of stocks, bonds, and cash in three different ways:

- Total Return (price appreciation and dividends/interest)
- Real Return (Total Return after inflation)
- After-Tax Real Return (Total Return after inflation and taxes)

The Impact of Inflation and Taxes on Stocks, Bonds, and Cash

(1926-2017)



A: Total Return B: Real Return C: After-Tax, Real Return

Stocks (blue bars) are the primary asset used to grow wealth beyond the rate of inflation. Bonds (green bars) do a decent job of maintaining purchasing power over time, but their primary role is to reduce overall portfolio volatility.

Cash (red bars) barely covers inflation and, even worse, it historically has generated a negative after-tax return. So at the end of the day, it doesn't pay to own cash from a performance perspective.

The second problem with holding too much cash is the psychological mind games that come into play. When stocks are going up, people frequently tell themselves that they will wait for a pullback to deploy excess cash. When stocks fall, there is an urge to wait for them to fall further.

A strategic cash buffer makes sense. The exact amount varies from person to person, but a good rule of thumb is 3-12 months of expenditures for someone that is still working and 12-24 months of expenditures for people in retirement. Different personal situations and risk tolerances dictate different cash strategies, but the real key is to have a plan that works for you and stick to it.

In an ideal world, we could meet all of our goals by simply being good savers and use safe, liquid assets such as cash. However, investors need to take risk in order to generate real returns.

SOURCES AND DISCLOSURES:

S&P 500 Index® is widely regarded as the best single gauge of the U.S. equities market, this market-capitalization-weighted index includes a representative sample of 500 leading companies in the foremost industries of the U.S. economy and provides over 80% coverage of U.S. equities.

CRSP U.S. Total Market Index includes nearly 4,000 constituents across mega, large, small and micro capitalizations, representing nearly 100% of the U.S. investable equity market.

Russell 3000 Index® measures the performance of 3,000 publicly held U.S. companies based on total market capitalization, which represents approximately 98% of the investable U.S. market.

MSCI All Country World ex-U.S. Index® captures large, mid and small cap representation across 22 of 23 Developed Markets countries (excluding the United States) and 23 Emerging Markets countries. With 6,161 constituents, the index covers approximately 99% of the global equity opportunity set outside the U.S.

The Barclays U.S. Aggregate Bond Index® covers the USD denominated, investment-grade, fixed-rate, and taxable areas of the bond market. This is the broadest measure of the taxable U.S. bond market, including most Treasury, agency, corporate, mortgage-backed, asset-backed, and international dollar-denominated issues, all with maturities of 1 year or more.

S&P MidCap 400 Index® consists of 400 mid-sized companies and covers approximately 7% of the U.S. equities market.

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S&P Global 1200 Index captures approximately 70% of the world's capital markets. The index is a composite of seven headline indices, many of which are accepted leaders in their regions, covering U.S., Europe, Japan, Canada, Australia, Asia ex-Japan, and Latin America.

S&P 700 Index measures the non-U.S. component of the global equity markets, covering all the regions included in the S&P Global 1200, excluding the U.S. (S&P 500).

S&P/IFCI Composite Index is widely recognized as a comprehensive and reliable measure of the world's emerging markets. It measures the returns of stocks that are legally and practically available to foreign investors.

MSCI World ex-U.S. Index® captures large and mid cap representation across 22 of 23 Developed Markets (DM) countries – excluding the United States. With 1,020 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

MSCI World Index® captures large and mid cap representation across 23 Developed Markets countries. With 1,652 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

Index performance returns do not reflect any management fees, transaction costs or expenses. Indexes are unmanaged and one cannot invest directly in an index.

PAST PERFORMANCE IS NO GUARANTEE OF FUTURE RESULTS. Investing involves risk. It should not be assumed that recommendations made in the future will be profitable or will equal the performance shown. Investment returns and principal value of an investment will fluctuate and losses may occur. Diversification does not ensure a profit or guarantee against a loss.

Why Alternatives Are Bad For Your Portfolio

1. Jennings, William W. and Brian C. Payne, "Fees Eat Diversification's Lunch," Financial Analysts Journal. March/April 2016.

2. Leibowtiz, Martin L. and Anthony Bova, "Allocation Betas," Financial Analysts Journal. July/August 2005.

Active vs. Passive: The Wrong Debate

1. Standard & Poor's Indices Versus Active Funds Scorecard, June 2017. Index used for comparison: US Large Cap—S&P 500 Index; US Mid Cap—S&P MidCap 400 Index; US Small Cap—S&P SmallCap 600 Index; Global Funds—S&P Global 1200 Index; International—S&P 700 Index; Emerging Markets—S&P IFCI Composite. Data for the SPIVA study is from the CRSP Survivor-Bias-Free US Mutual Fund Database.

2. The left column represents all US equity funds in the CRSP Mutual Fund Database with a complete return history for 2006–2010. The funds are sorted by performance relative to their benchmarks. Funds in the top quartile are then tracked and directed to their subsequent performance quartiles in the following 5-year period (2010–2015), or to the "Did Not Survive" category. Quartiles in the following period reflect all funds with a complete return history. Percentages may not total 100% due to rounding. Source: CRSP Survivor-Bias-Free US Mutual Fund Database.

What You Need to Understand About Bonds

1. The illustration using current yield rather than yield-to-maturity for the sake of simplicity. It also does not consider that a change in interest rates doesn't affect all bonds equally. Duration measures how sensitive a bond's price is to changes in interest rates. The higher a bond or bond fund's duration, the bigger the gains and losses are in response to a change in interest rates.

2. For ease of presentation, this analysis assumes a one-time parallel shift in yields and then no further fluctuation in interest rates. All income received is reinvested, which is extremely important because reinvesting income at higher rates helps offset the losses in the initial hike year and increases the total return of the bond portfolio over time.

3. One-month, five-year, and 20+ Year data uses Ibbotson indices. Six-month and one-year data uses Bank of America Merrill Lynch Indices.

4. Bank of America Merrill Lynch index data from Federal Reserve Economic Data (FRED).

Evaluating Cash

1. Total Return indices: stocks are represented by the CRSP 1-10 market portfolio, bonds are represented by five-year US Treasury Notes, and cash is represented by one-month US Treasury bills. Real Returns are the Total Return indices less the US Consumer Price Index. After-Tax, Real Return Data comes from BlackRock.