



M E K E T A I N V E S T M E N T G R O U P

BOSTON MA

CHICAGO IL

MIAMI FL

PORTLAND OR

SAN DIEGO CA

LONDON UK

LONG-TERM TREASURIES IN A DIVERSIFIED PORTFOLIO

Timur Kaya Yontar

MEKETA INVESTMENT GROUP
100 Lowder Brook Drive, Suite 1100
Westwood, MA 02090
meketagroup.com

February 2018

M E K E T A I N V E S T M E N T G R O U P

100 LOWDER BROOK DRIVE SUITE 1100 WESTWOOD MA 02090

781 471 3500 fax 781 471 3411 www.meketagroup.com



INTRODUCTION

Investors have long been aware of the advantages of holding fixed income securities. High-quality bonds, in particular, have historically been used as “anchors to windward” in conjunction with other assets. While the total return from most bonds is typically lower than that from equity-type assets¹, the opportunity cost incurred by holding bonds can be offset by a number of potential benefits. These advantages are pronounced for bonds issued by the U.S. Treasury, and long-term Treasuries have heightened impact due to their longer duration. In this paper we will describe the primary benefits that Treasuries, as a special type of high-quality fixed income, can contribute at the total portfolio level.

DEFINITIONS AND BENCHMARKS

“Long-term U.S. Treasuries” should be taken to mean fixed-rate U.S.-dollar-denominated nominal debt issued by the U.S. Treasury, with maturities greater than 10, and up to 30, years. The leading benchmark for such assets is the Bloomberg Barclays US Long Treasury Total Return index, which measures US dollar-denominated, fixed-rate, nominal debt issued by the US Treasury with maturities of 10 to 30 years. Average maturity is about 25 years and duration is 17.5 years. Therefore, a one percentage-point increase in yields for these bonds would result in approximately a 17.5% decline in price.

BENEFITS OF LONG-TERM TREASURIES

- Value retention during equity declines
- Liquidity
- Portfolio volatility dampener
- Long duration enhances impact without leverage
- Income
- Risk-free asset class for long-dated guaranteed payments

Value Retention during Equity Declines

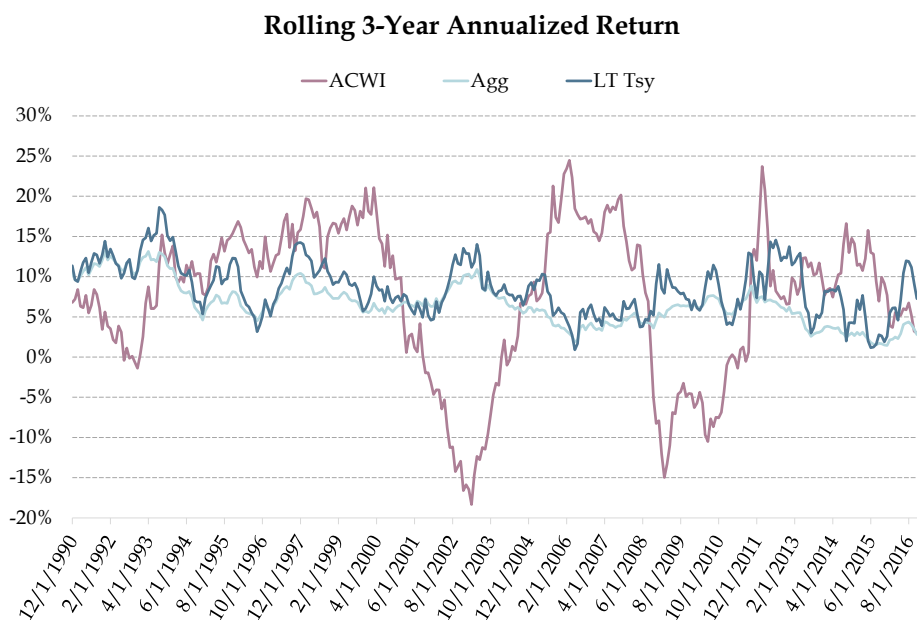
Most institutional portfolios are dominated by equities (and equity-like assets) because both theory and history have shown that only a high exposure to equity markets delivers, over the long term, returns that meet the objectives of those institutions. On the downside, high returns from equities are accompanied by high volatility, so equity-dominated portfolios can suffer severe declines during periodic, inevitable short-term crises. When such crises occur, tapping distressed-priced equities as a source for spending² will force paper losses to be realized, which substantially erodes the value of the portfolio and impairs its ability to rebound. To mitigate this risk, a well-constructed portfolio can partly allocate to assets that have minimal equity beta and, thus, retain value, or even appreciate, during those equity downturns; these assets can then fund outflows for some period, providing equities the time to recover.³

¹ This is expected from capital markets theory. Since equities are subordinate to bonds in firms’ capital structure, they present higher risk to investors and must compensate them with higher returns.

² Such as for an endowment, or for a cash-flow-negative pension.

³ See Appendix B for detail.

Most portfolio hedges require a tradeoff between greater portfolio resiliency during crises and the opportunity cost of lower long-term returns for the hedging assets. Hedging assets like these are uncommon – a characteristic of such equity crises is that “systemic risks” are heightened, in which most assets begin to move together. It is often said that correlations among them “go to 1” because most investors are seeking to sell their risk assets in a flight to safety, and the selling pressure further drives down prices. It is, therefore, desirable to identify which asset classes’ return streams remain independent of the group tendency and can serve as safe havens.



The graph of rolling annualized returns clearly illustrates the volatility of global equities (in red) compared to the relative lack of volatility of bonds, whether investment-grade (in light blue) or long-term U.S. Treasuries (in dark blue). While clearly prone to greater fluctuations than their shorter-duration fixed income counterparts due to their greater duration exposure, long-term Treasuries’ returns are far steadier than those generated by equities; additionally, the fluctuations tend to move in opposite directions, attesting to long-term Treasuries’ diversifying role as a safe haven.

Cumulative Returns

Historical Scenario	Cash	Agg	Long Tsy	U.S. Eq	HF
Taper Tantrum (May-Aug 2013)	0.0%	-3.7%	-11.6%	3.0%	-0.4%
Global Financial Crisis (Oct 2007 - Mar 2009)	3.1%	9.3%	24.5%	-43.8%	-15.6%
2008 Calendar Year	1.7%	5.2%	24.0%	-37.0%	-19.0%
Popping of the TMT Bubble (Apr 2000 - Sep 2002)	9.9%	28.6%	35.5%	-43.8%	-2.1%
LTCM (Jul - Aug 1998)	0.8%	1.8%	4.1%	-15.4%	-9.4%
Asian Financial Crisis (Aug 1997 - Jan 1998)	2.4%	4.9%	8.6%	3.6%	1.7%
Rate spike (1994 Calendar Year)	3.9%	-2.9%	-7.6%	1.3%	4.1%
Crash of 1987 (Sep - Nov 1987)	1.4%	2.2%	2.6%	-29.5%	-7.8%
Strong dollar (Jan 1981-Sep 1982)	24.4%	29.9%	28.4%	-2.3%	-3.8%
Stagflation (Jan - Mar 1980)	2.9%	-8.7%	-13.6%	-4.1%	-1.9%
Stagflation (Jan 1973- Sep 1974)	13.5%	7.9%	-1.8%	-42.6%	-15.7%

Examining the behavior of various asset classes during actual crisis periods provides further evidence of the potential benefits of long-term Treasuries. In the eleven historical scenarios examined, long-term Treasuries retained value best (and actually appreciated) in six of the tracked periods, and came in a close second in a seventh scenario. For nearly all of these cases, equities suffered declines, many of them quite severe. None of the other potential hedges – cash, investment-grade bonds, or hedge funds – protected nearly as well. On the flip side, however, long-term Treasuries performed worst in three of the scenarios, which were periods in which interest rates rose markedly. We will consider this potential drawback of the asset class below.

Fixed income assets correlate little with equity. Over the last 26 years, the average 3-year rolling correlation to broad global equities (as measured by the MSCI ACWI index) was 0.08 for the Barclays Aggregate Index and -0.09 for the Barclays Long-Term Treasury Index. Corporate fixed income issues do possess exposure to credit risk, which has some relation to equity market risk,⁴ but government-issued fixed income has little chance of default, and U.S. Treasury issues have virtually none.

The main risk for Treasuries is interest rate exposure: as rates increase, the value of a future stream of interest payments declines. The more payments remain in that stream, the more severe will be the impact of a rise in rates – measured by the duration of the bond. Central banks such as the U.S. Federal Reserve often lower rates in response to a sharp equity market downturn, intending to stimulate the economy, and in the process increase the value of bonds. Long-term U.S. Treasuries are expected to retain value or appreciate in such periods, and have done so historically. This is because they have little equity beta, *de minimis* credit exposure, and interest rate exposure that benefits them, augmented by a long duration. Furthermore,

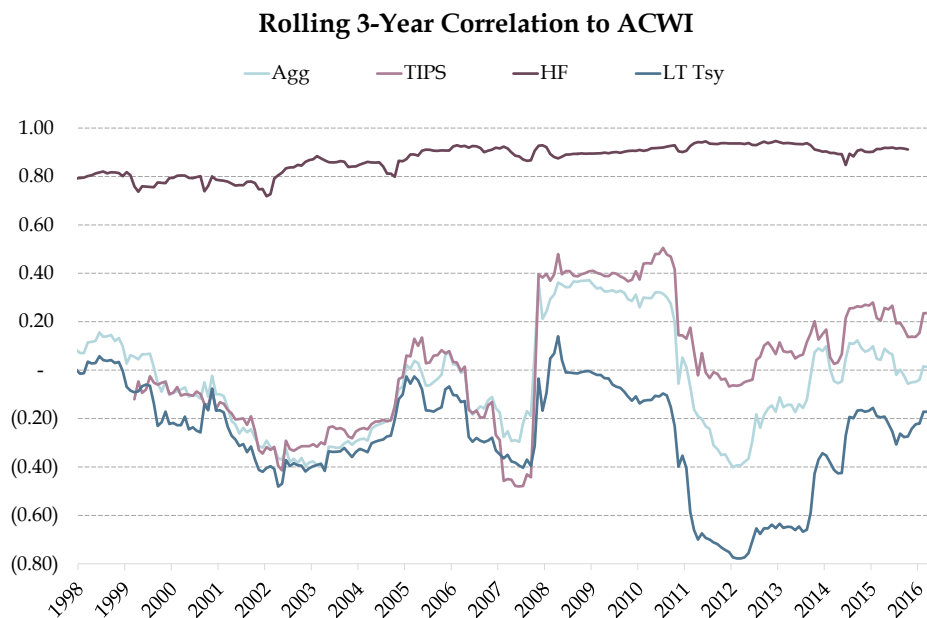
⁴ Market environments that put pressure on earnings, which can affect equity values, may also put pressure on firms' ability to service their debt, increasing the chance of default.

investor perception of long-term U.S. Treasuries as a safe haven itself augments their value during crises, as money flows their way during crises and bids up their prices.

Liquidity

Holding a hedge that retains or gains in value during equity declines does an investor little good if the asset is not liquid and available to fund spending. However, U.S. Treasuries are the deepest and most liquid government securities market in the world, with tight bid/ask spreads. Spreads are normally $1/32^{\text{nd}}$ of a point for on-the-run 30-year bonds, and $1/16^{\text{th}}$ of a point for off-the-run; in contrast, less liquid fixed income issues such as high-yield corporate bonds usually trade with spreads from $1/2$ to 1 full point. Average daily volumes for long-term Treasuries are high, at \$33 billion (compared with \$107 billion for all corporate bonds). Although traded over-the-counter (“OTC”) rather than through an exchange, there are many counterparties available, usually broker-dealers. Owners of Treasuries should expect strong demand at any time, especially during equity market downturns when other investors often seek to buy Treasuries as flight-to-safety assets. Furthermore, liquidity is enhanced by a robust exchange-traded market in Treasury futures. In summary, long-term U.S. Treasuries provide not only a hedge but a spendable hedge in equity-dominated portfolios.

Portfolio Volatility Dampener



Treasuries’ tendency to zig when equities zag – that is, not to move in lockstep with equities, to a greater extent than most other asset classes, as shown in the graph – is what makes them a hedge component within a portfolio; additionally, this low correlation dampens total portfolio volatility. In terms of risk metrics, this low correlation results in a greater reduction in standard deviation than other fixed income diversifiers, and a greater increase in risk-adjusted return as measured by the Sharpe ratio.

More tangibly, the gains in Treasuries can partially offset the losses in equities, with larger gains the longer the Treasuries' duration. This reduces the fluctuations in the portfolio's value over time, which in turn, smooths distributions from the portfolio calculated based upon a spending rule, causing less variable impact upon an operating budget or benefit stream funded by those distributions. The reduced variation to both the asset value and to distributions is likely to have a positive effect on the behavior of portfolio stakeholders. Stakeholders should be better able to tolerate the muted ups and downs, and therefore less prone to take rash action during the down periods – such as de-risking and impairing the portfolio's ability to take part in a rebound.

Portfolio Expected Returns, Volatility, and Sharpe Ratios

	All IGB	All Tsy	70 U.S. Equity / 30 U.S. Bond			
			30 IGB / 0 Tsy	25 IGB / 5 Tsy	20 IGB / 10 Tsy	15 IGB / 15 Tsy
Expected Return (20y)	3.5%	3.9%	6.7%	6.8%	6.9%	6.9%
Standard Deviation	4.0%	12.5%	12.7%	12.6%	12.4%	12.3%
Sharpe Ratio (20y)	0.18	0.09	0.31	0.32	0.33	0.34

This behavior may also be seen in modeled portfolios with increasing amounts of long-term Treasuries. We show a simple 70% equity / 30% bond mix, where the bond component reflects different mixes of investment-grade bonds and long-term Treasuries. In isolation, long-term Treasuries appear unattractive, with a low Sharpe ratio. But because of their very low correlation to equities, introducing them as part of a diversified blend both increases expected returns and decreases volatility, improving risk-adjusted returns. A similar effect occurs when comparing a blend of equities plus long-term Treasuries to a blend of equities plus cash.

Long Duration Enhances Impact Without Leverage

Duration measures the average timing of remaining cash flows – interest payments and principal – from a bond. The longer the duration, the further in the future that cash flows will be received, on average. Mathematically, duration is also (approximately) the percentage change in the value of a fixed income security that accompanies a one percentage-point change in interest rates. Thus, longer-duration Treasuries are expected to appreciate more when rates fall, as policymakers combat equity market downturns (although certainly when rates are near historic lows there is less room for them to fall). This effect could be achieved with a larger exposure to shorter-duration bonds, but the opportunity cost of that large an allocation may be prohibitive. Alternatively, a like-sized position in shorter-duration bonds could be levered to create a similar response to changes in rates, but many institutional investors' policies prevent utilizing leverage in this way. At one extreme, the ability to invest in Treasury strips – bonds that do not pay interest but only promise the repayment of principal at maturity – enables leverage-shy investors to maximize the duration effect of holding long-term Treasuries.

Income

Due to the safety of this asset class, part of why they can be useful as a hedge, Treasuries' returns are lower than those of most other potential hedging assets, incurring an opportunity cost. However, because they still have interest rate risk and inflation risk, and for a longer time period than bonds with shorter duration, long-term Treasuries must adequately compensate investors for these exposures. The income from interest coupons enhances their attractiveness – investors in Treasuries are paid for holding them, unlike the explicit cost of hedging by other means such as equity options, where investors must pay a premium for the protection.

Risk-free asset class for long-dated guaranteed payments

Although well beyond the scope of this report, we see long-term Treasuries used to hedge long duration pension and insurance-like payments. In fact, since the yield curve is typically upward-sloping, cash is the lower returning and riskier investment versus a long-dated Treasury (with the same duration as the payment), since shorter-term investments will need to be re-invested and there is the risk that future interest rates will decline.

CONSIDERATIONS OF LONG-TERM TREASURIES

All investments come with tradeoffs. Despite the many benefits of holding long-term Treasuries, there are countervailing considerations. Here we list those that we view as most important:

- Low yields
- Inflation risk
- Line-item volatility
- A low-rate environment

Low Yields

Even though bonds pay income, their relative safety – particularly for investment-grade bonds – when compared with equities limits the allocation that should be held in a portfolio because of the opportunity cost. This drawback is more pronounced for Treasuries because their credit risk is virtually zero. Unlike corporate bond issues with such exposures, they need not compensate investors with a higher interest rate.

Inflation Risk

Except for inflation-linked bonds such as Treasury Inflation-Protected Securities (TIPS), fixed-income instruments possess inflation risk. This is because the income they deliver is fixed in nominal terms – the coupon is the semiannual interest rate times the principal of the bond and it is paid in current dollars. Inflation reduces the value of current dollars; thus, even if a bond issuer pays all its interest coupons and returns the principal, the presence of inflation causes the bondholder to be worse off because purchasing power was not preserved.

Line-Item Volatility

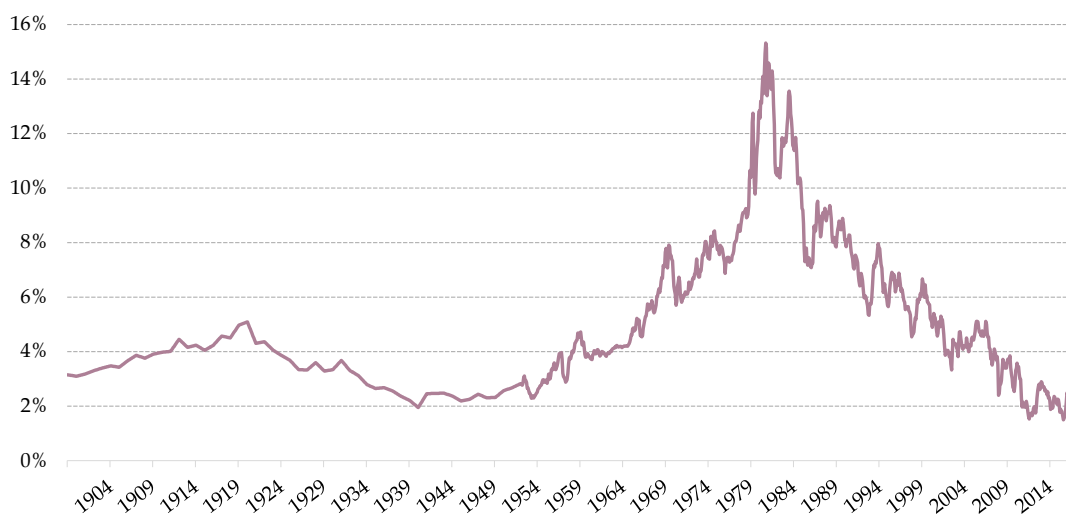
We have discussed above how Treasuries' returns have minimal to negative correlation to those of equities. When equities are declining, Treasuries' potential to appreciate can mitigate equity losses, which helps the portfolio and feels great to investors; it's always a relief to see something going up in a tough market environment. But the reverse will typically be true as well. Despite delivering interest income, the total return on Treasuries may be negative if their market value declines sufficiently due to rising interest rates, particularly for long-term Treasuries whose value is more sensitive to rate changes. This would often happen during an equity bull market.

Nevertheless, from a behavioral standpoint, investors may forget to look at the full portfolio and instead focus on the negative return from that specific line-item, questioning why they hold this declining asset while all others are posting gains. Furthermore, as long-term Treasuries have more exposure to changes in rates, they are more volatile than shorter-term issues, and investors could lament the swings resulting from duration exposure in this position. Investors may need reminders that long-term Treasuries play a hedging role in the portfolio, that insurance may feel costly when it is not needed but proves its value in bad times, and that it is risky to try to market-time the purchase of insurance.

A Low-Rate Environment

Investment theory would suggest that we are unlikely to see long-term Treasuries produce returns as high as they have delivered over the past thirty or so years. This is because one of the drivers of those returns has been the tailwind of falling rates. In the early 1980s, long-term Treasuries were yielding over 14%, a level that has come down in fits and starts, but inexorably since then, reaching all-time lows in the summer of 2016. Despite a subsequent rebound, it remains a low-rate environment, at levels that had not been seen since the early 1950s. This environment has been a consequence of the unprecedented Federal Reserve purchases of government and other bonds called "quantitative easing" that ultimately totaled multiple trillions of dollars – demand for such bonds raised their prices and depressed their yields. Interest rates this low have become "the new normal" in recent years, and it is uncertain when central bank intervention will be decisively dialed back after having started down this slippery slope.

U.S. 10-Year Treasury Yield



Still, it is probable that rates will rise eventually, and that prospect gives pause to investors considering long-term Treasuries – were that to happen, shouldn't they expect these bonds to lose value (and more so than shorter-duration bonds)? Probably, although as with any investment, prices change when expectations change – to the extent that a gradual rise in rates is already expected, current prices will reflect that, and investors should theoretically only see losses if the rate rises surprise with their suddenness or magnitude.

Long-term Treasuries' Performance during Periods of Rate Rises

Start	End	Months	Initial Yield	Yield Change	Total Return*	Notes
Jul-54	Oct-57	39	2.47%	1.26%	-2.45%	Gradual
Apr-58	Jan-60	21	3.12%	1.25%	-5.82%	Moderate
May-61	Aug-66	63	3.73%	1.07%	1.40%	Very gradual
Jan-67	Nov-67	10	4.40%	1.04%	-12.24%	Sharp
Aug-68	Jun-70	22	5.04%	1.95%	-7.07%	Sharp
Nov-71	Aug-74	33	5.44%	1.89%	-0.99%	Moderate
Dec-76	Mar-80	39	6.39%	5.48%	-5.62%	Very sharp
Jun-80	Sep-81	15	9.40%	4.74%	-16.20%	Extremely sharp
Nov-82	Jun-84	19	10.18%	2.86%	-1.32%	Very sharp; offset by high yield
Apr-86	Oct-87	18	7.59%	2.02%	-0.01%	Sharp; offset by flight to safety at end
Dec-89	Sep-90	9	8.02%	1.09%	-1.91%	Sharp; offset by high yield
Oct-93	Nov-94	13	5.90%	2.26%	-10.58%	Very sharp
Jan-96	Jun-96	5	6.07%	1.13%	-7.01%	Very sharp, but short period
Oct-98	Jan-00	15	5.24%	1.57%	-5.08%	Sharp

* Total return is annualized for periods longer than 12 months.

History confirms that more muted losses happen when rates rise gradually, as shown by the performance of long-term Treasuries during the second half of the twentieth century, when rates followed an upward trajectory through the early 1980s, before starting their secular declining trend. During timeframes when yields increased by at least a full percentage point, the more gradual the increase, the less impact there was on total return. (The only exceptions were during the 1980s when the initial yield was high enough to partly offset the losses from sharply rising rates.) This low-rate environment's starting point is not too different from the initial yields in the 1954 and 1958 examples. Will rates rise, and if they do, how swiftly?

Asymmetry of possible outcomes is another concern: rates have a lot of room to rise, implying potential downside for bond values, but not as much room to fall. Is the insurance benefit of bonds in general and long-term Treasuries in particular as meaningful as it was when rates were higher? Probably not, since rates supposedly can only go so low; however, the belief that 0% is an absolute floor was proven incorrect when European and Japanese central banks adopted negative interest rates. The Federal Reserve has not followed suit, but the policy option remains available if faced with a weak economy or market crisis. Since moves toward negative interest rates would be a surprise in the current environment, the positive impact on the value of long-term bonds could be substantial. During a downturn, even if their potential upside is capped, long-term Treasuries still represent one of the most protective assets.

INVESTABLE VEHICLES

The more information about investments available to investors widely, the more that market prices – which simply reflect what investors know about the value of investments – should fully reflect that available information. In turn, this means that their future value should be unpredictable, so active management should not be able to hold a performance edge, and passive management (with its lower costs) should be preferable. A test of this unpredictability for different asset classes is whether their prices follow a random walk. For long-term Treasuries, we find that except over short periods (i.e., within two weeks⁵), their prices are consistent with a random walk, so we cannot expect active management to outperform (see Appendix C). This makes intuitive sense: in contrast with, for example, high-yield bonds, where active research may provide information about issuers' credit quality that confers an investment edge, such diligence about the issuer of Treasuries – the U.S. Government – is not likely to reveal any such nuances; there is little unpriced risk to their highly certain cash flows. The relatively limited number of actively-managed strategies in the U.S. government bond space provides evidence that the investment management community may have little conviction in their ability to sustainably add value in this asset space (although some may be achievable on the margins). A review of the current fund universe revealed fewer than ten such strategies, a paucity compared to the 400 investment-grade bond funds that benchmark themselves to the Bloomberg Barclays U.S. Aggregate index.

⁵ Regarding this possible short-term inefficiency: it could point to an active management opportunity, but as it would involve frequent trading (holding periods of ten days or shorter), any potential for alpha might well be eaten up by transaction costs.

Meketa Investment Group, therefore, recommends that investors planning to hold long-term Treasuries should do so passively, via a low-cost index fund. These can be had for expense ratios as little as 10 basis points from leading providers of such vehicles.

CONCLUSION

Most institutional portfolios require long-term returns that can only be delivered by portfolios dominated by equities, but equities are volatile. During crises when equity prices fall to distressed levels, if required distributions are funded by selling equities, the ability of portfolios to recover could be permanently impaired. This problem could be exacerbated by behavior in such financial disasters, when investors/decision-makers may be tempted to de-risk their portfolios. Holding diversifying hedges that retain value or appreciate during equity crises, and that may be spent in lieu of equities to fund distributions, offers a solution to this challenge, albeit with opportunity cost and other concerns that must be addressed.

Fixed income has long been utilized for this diversifying spendable hedge role. Meketa Investment Group believes that long-term U.S. Treasury bonds hold several advantages within the wide range of available fixed income instruments. Their correlation with equities has historically been low, and, importantly, stays uncorrelated in crises; indeed, they tend to perform better than their long-term average return during those difficult periods. They are liquid and safe from credit risk; their longer duration heightens the diversification impact for a given allocation size and generates more interest income. Long-term Treasuries are an excellent protective asset.

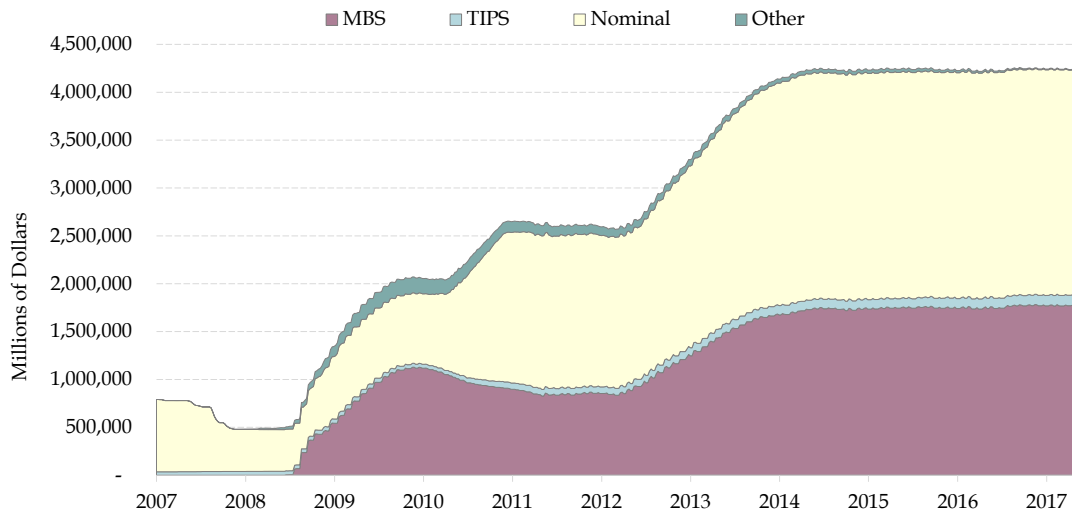
With that being said, investors must also remain aware that yields from long-term Treasuries are on the low end for fixed income assets, and that inflation would be damaging to their real value. Additionally, investors must acknowledge that in a rising rate environment, even though the rest of the portfolio might be doing well, long-term Treasuries would likely struggle, creating behavioral pressures around whether to continue to hold this line-item as insurance. Finally, in a low-rate environment, investors may question whether it is the right time to hold such an asset, but we believe that these assets could still offer meaningful protection in a downturn.

As long-term Treasuries are highly liquid and offer little informational advantage to investors, we consider them to be efficient, and recommend that investors seek exposure via passive and low-cost vehicles.

APPENDIX A: CENTRAL BANK INTERVENTION

During and after the Global Financial Crisis, the U.S. Federal Reserve’s policy of “quantitative easing” created demand for government fixed income securities, driving their prices up and their yields down. These purchases totaled several trillion dollars before tapering off in 2014.

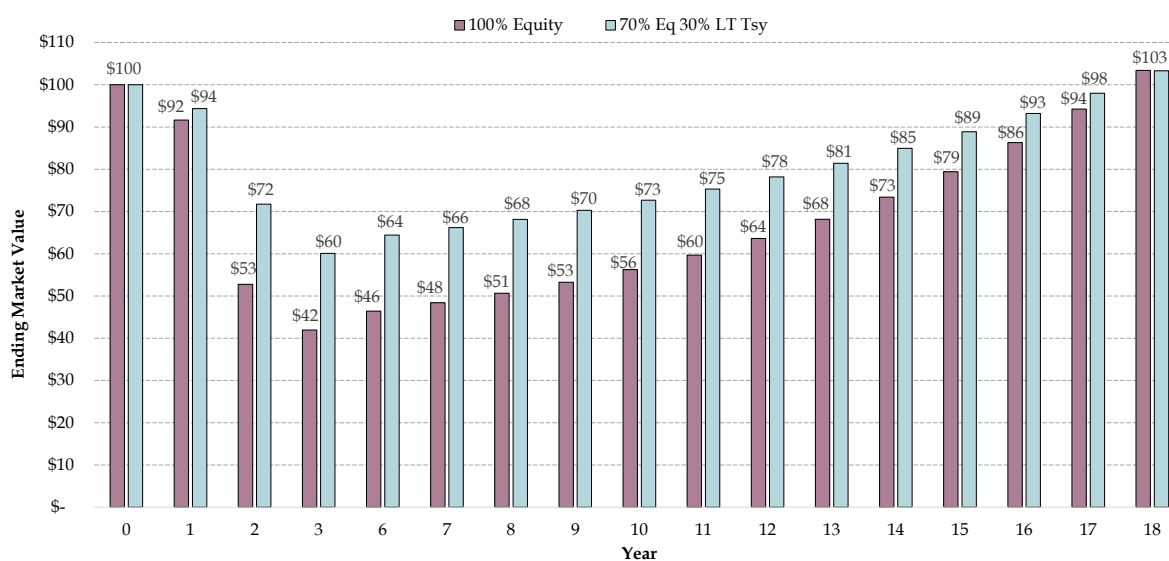
U.S. Federal Reserve Balance Sheet Assets



APPENDIX B: STRESS-TESTING A CASH-FLOW-NEGATIVE PORTFOLIO

We stress-test portfolios by subjecting them to the returns experienced during the Global Financial Crisis, albeit spread over three years, and by assuming annual spending outflows of 5% of the initial value. A 100% equity portfolio would retain only 42% of its initial value, whereas one allocating 30% of assets to long-term Treasuries would retain 60%. For the all-equity portfolio to fully rebound while continuing to cover spending, equities' average return would have to exceed Treasuries' by 15 percentage points for a 15-year period – a daunting hurdle.⁶ More realistic returns in line with long-term historical averages would likely leave that portfolio permanently impaired, simply because so much of the annual return must be earmarked to cover outflows, providing little to support growth of the corpus during the recovery.

3-Year Sharp Decline, 15-Year Robust Equity Recovery, Negative Cash Flows



⁶ If equities return 15% compounded over the subsequent 15 years, the all-equity portfolio can cover spending and recover its initial value. If long-term Treasuries return 0% over the same period, the 70/30 portfolio will return 10.5% compounded over 15 years, and can cover spending and recover its initial value. While this spread level has occurred historically – the 15-year periods comprising 1942–1956, 1944–1958, and 1947–1961 – it is rare.

APPENDIX C: EFFICIENCY OF LONG-TERM TREASURIES

The Efficient Market Hypothesis claims that market prices for assets should and do fully reflect all available information, which means that future prices should be unpredictable. If they are, then that asset should be efficient, and active management should not be able to consistently outperform the market. It is possible to test whether a future price equals the current price plus a random error term with an average value of zero (the Random Walk Hypothesis), or if there is a statistically-significant inequality. For long-term Treasuries, we find that their prices *are* consistent with a random walk, *except* over a two week or shorter period (see highlighted cells in table, for which the t-stats are of sufficient magnitude to indicate statistical significance), and thus they are an efficient asset class that is likely best accessed passively.

Time Period	Number of Weekly Observations	Lag K 2	4	8	16
Long Term Treasuries					
1994-03-04/2005-11-25	613	0.91	0.89	0.87	0.75
	Normal T-Stat	-2.34*	-1.51	-1.10	-1.40
	Robust T-Stat ⁷	-2.25*	-1.49	-1.07	-1.37
2005-12-02/2017-08-25	614	0.87	0.91	0.92	0.89
		-3.14*	-1.16	-0.70	-0.61
		-2.97*	-1.05	-0.61	-0.53
1994-03-04/2017-08-25	1226	0.89	0.90	0.90	0.84
		-4.01*	-1.83	-1.18	-1.26
		-3.71*	-1.64	-1.03	-1.09

⁷ Robust T-stats are heteroscedasticity-robust computed following Lo and MacKinlay.

DISCLAIMERS

This document is for general information and educational purposes only, and must not be considered investment advice or a recommendation that the reader is to engage in, or refrain from taking, a particular investment-related course of action. Any such advice or recommendation must be tailored to your situation and objectives. You should consult all available information, investment, legal, tax and accounting professionals, before making or executing any investment strategy. You must exercise your own independent judgment when making any investment decision.

All information contained in this document is provided “as is,” without any representations or warranties of any kind. We disclaim all express and implied warranties including those with respect to accuracy, completeness, timeliness, or fitness for a particular purpose. We assume no responsibility for any losses, whether direct, indirect, special or consequential, which arise out of the use of this presentation.

All investments involve risk. There can be no guarantee that the strategies, tactics, and methods discussed in this document will be successful.

Data contained in this document may be obtained from a variety of sources and may be subject to change. We disclaim any and all liability for such data, including without limitation, any express or implied representations or warranties for information or errors contained in, or omissions from, the information. We shall not be liable for any loss or liability suffered by you resulting from the provision to you of such data or your use or reliance in any way thereon.

Nothing in this document should be interpreted to state or imply that past results are an indication of future performance. Investing involves substantial risk. It is highly unlikely that the past will repeat itself. Selecting an advisor, fund, or strategy based solely on past returns is a poor investment strategy. Past performance does not guarantee future results.