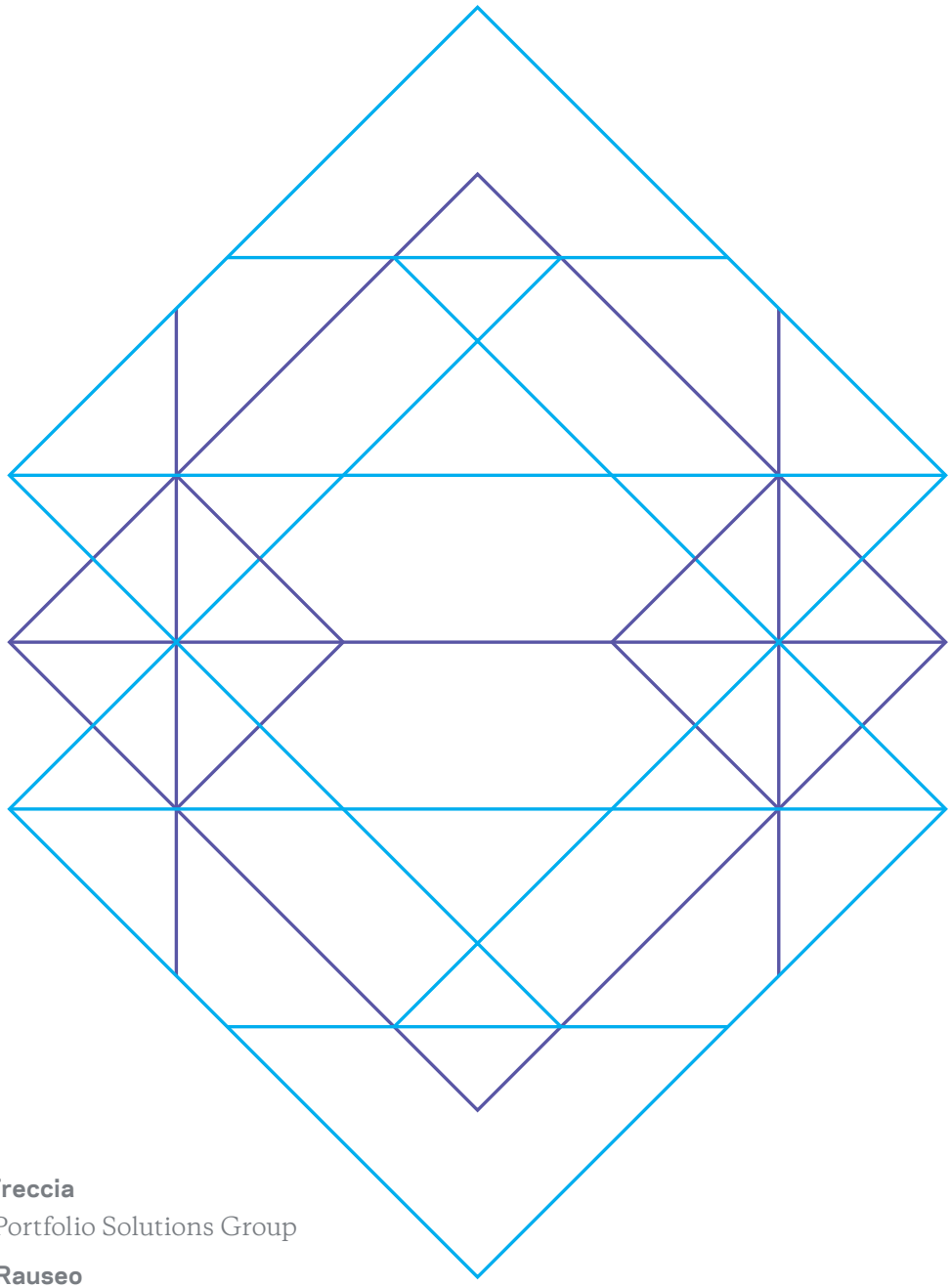
DC Solutions Series | January 2017

Defensive Equity Part 2



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This is part two of a two-part series. The first paper introduced the concept, economic intuition and evidence for defensive equities while this paper describes ways of implementing defensive equities in a defined contribution portfolio.

Introduction

Defined Contribution (DC) savers try to maximize two basic investment outcomes: wealth accumulation and wealth preservation. There is a trade-off: for many investors, the asset class meant to promote wealth accumulation (equities) is different than the ones designed to promote wealth preservation (i.e., cash, bonds).

Defensive equity seeks to provide the "best of both worlds," promoting not only wealth accumulation by delivering the equity risk premium but also wealth preservation by investing in less risky equity securities. This paper describes ways to implement defensive equities within a retirement portfolio.

First, What Are Your Goals?

How can retirement savers use a strategy that is designed to generate similar returns to equities but with potentially less risk? We consider two objectives, both illustrated in Figure 1:

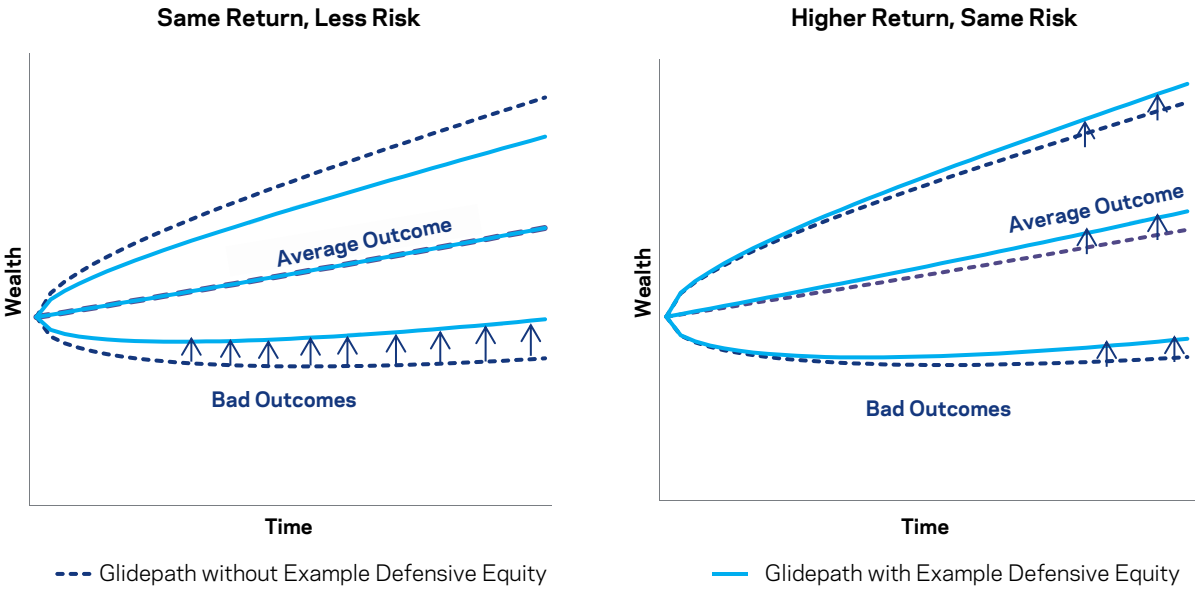
1) Reduce the range of undesirable retirement outcomes (left)

2) Increase expected final wealth (right)

Before turning to data, we first note the *intuition* of how these two objectives work: investors seeking to primarily reduce downside risk may replace a portion of their existing equity allocation with defensive equities; and investors looking to achieve higher wealth may replace a portion of their equity *and* bond allocations with defensive equities (and of course, investors seeking a combination of these objectives would do something between these two "extremes").

Figure 1

Illustration of Two Different Objectives: Reduce Risk (Left), Increase Return (Right)



Boundaries of each curve contain approximately 95% of outcomes.

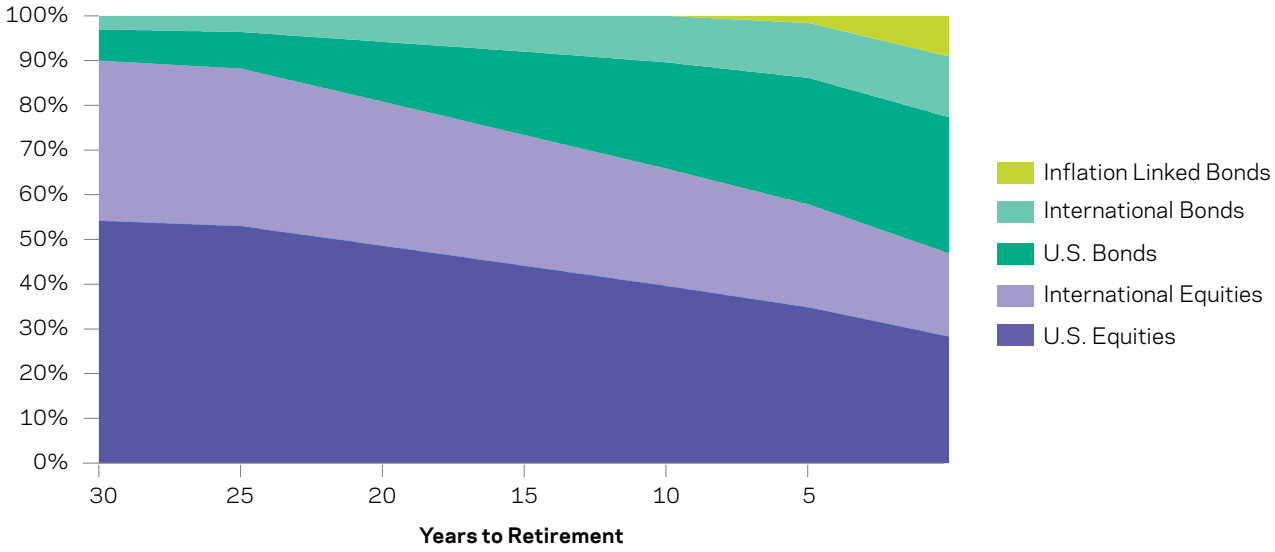
Source: AQR. These charts are for illustrative purposes only and are not representative of any actual portfolios. "Example Defensive Equity" represents an illustrative portfolio which seeks to capture the defensive equity premium by overweighting low-beta stocks (relative to capitalization-weighted benchmark), thus lowering volatility, while potentially experiencing a "market-like" return. For more information on the defensive equity premium, see part 1 of this series (Mones, Truax and Villalon (2016) "Understanding Defensive Equity") which outlines the similar average long term returns experienced by both low and high-beta stocks.

Starting Point: the "Original Glidepath"

To make our implementation examples relevant for a broad range of investors, we build an "original glidepath" (Figure 2), which is representative of all of Vanguard's target date fund options.[1] Not surprisingly, equities (purple) are the dominant asset class early in an investor's saving life (left side of the chart); and as the investor nears retirement, the retirement portfolio allocates more to fixed income (green). We use this "original glidepath" as our starting point to assess the potential benefits of incorporating defensive equities.[2]

Figure 2

The "Original Glidepath"



Source: AQR, Vanguard. For illustrative purposes only and not representative of any AQR product or investment.

1 Source: Vanguard. Vanguard target date fund allocations are as of June 30, 2016. Vanguard is the largest provider of TDFs (managing ~30% of the $763B market at the end of 2015, according to Morningstar's annual Target-Date Fund Landscape report) and thus is used as the starting point for the analysis. We anticipate the results to be generally similar for any of the largest TDFs.

2 Importantly — as with all analysis in this paper — the "original glidepath" is just an input. Investors can apply the framework described here for a variety of glidepaths and portfolio objectives.

What Does Implementation Look Like?

Focus on Reducing Risk

Investors seeking to reduce the range of undesirable outcomes may consider replacing a portion of their equity allocation with defensive equities. How much depends on the specific objectives and risk tolerance of the investor, but for simplicity we show the case for an investor who replaces half of their U.S. equity allocation (dark blue) with an allocation to U.S. defensive equities (purple), shown on the left side of Figure 3.[3]

Focus on Increasing Return

Defensive equities, by construction, tend to have less risk than equities.

Thus, an allocation to defensive from traditional equities will potentially reduce a portfolio's overall risk. How can an investor use defensive equities to *improve returns while maintaining overall risk*? One possibility is to fund the defensive allocation from both stocks and bonds, as shown on the right side of Figure 3. To make this new portfolio easily comparable to the starting "original glidepath," we've chosen the combination of stocks and bonds so that the volatility of the new portfolio is identical to the volatility of the "original glidepath."[4]

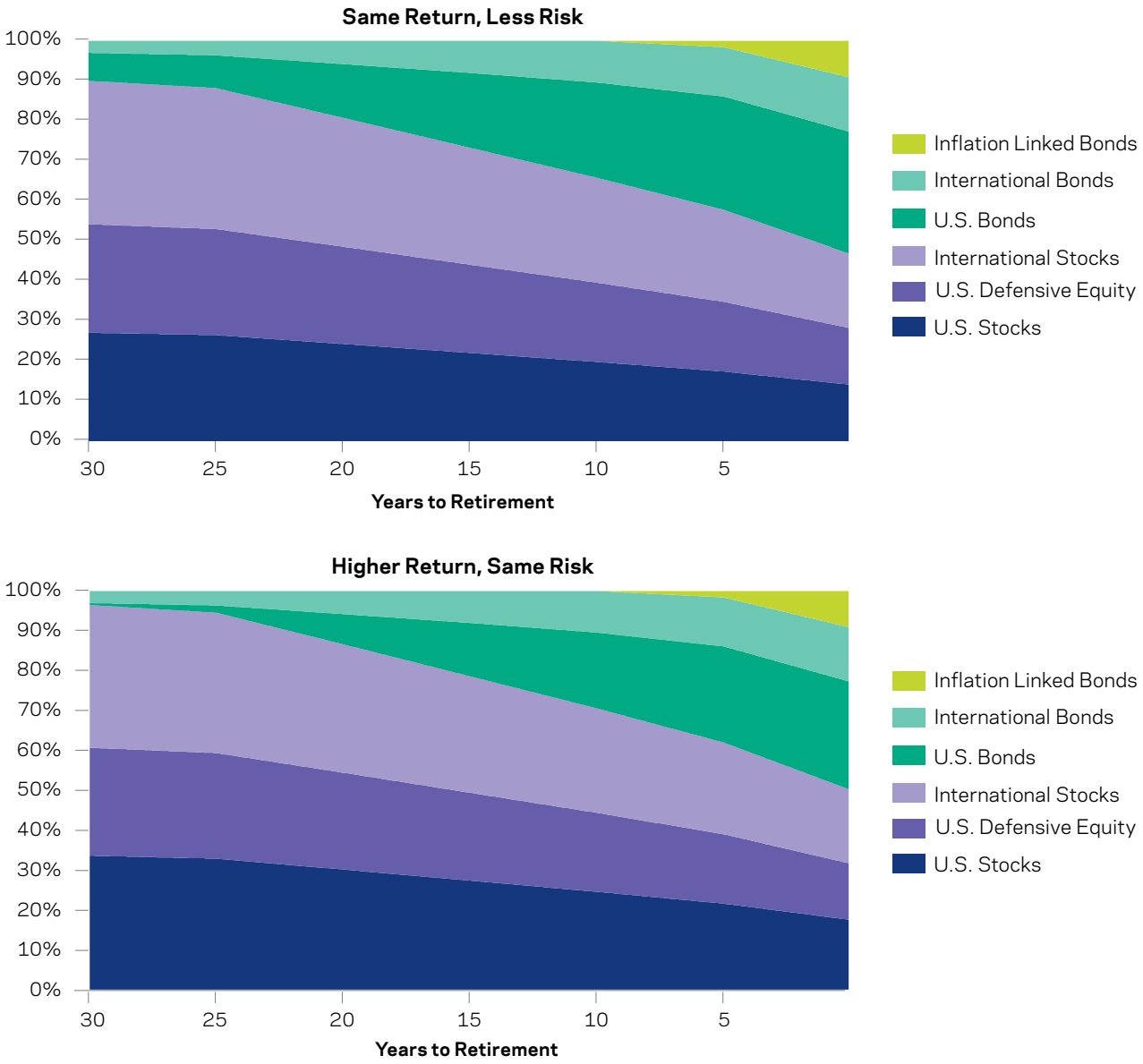
3 We've chosen U.S. equities for simplicity, but note that the economic rationale and empirical evidence supporting defensive equities holds in international markets as well. Thus, investors may well choose to allocate a portion of their international equity allocations to defensive strategies, and expect broadly consistent findings as we show here for the U.S. Please see appendix for asset class proxy information.

4 For simplicity, all changes to this portfolio are within the U.S. assets — thus, this example uses U.S. equities and U.S. bonds to fund the allocation to U.S. defensive equities. Please see appendix for asset class proxy information.

Figure 3

Implementing Defensive Equities in a Glidepath

Objective: Risk Reduction, Same Average Return (Top); Same Volatility, Higher Return (Bottom)



Source: AQR, Vanguard. For illustrative purposes only and not representative of any AQR product or investment. Allocation methodologies described in preceding section, starting from the "Original Glidepath" illustrated in Figure 2. Please see appendix for asset class proxy information.

Results: What Does Our Analysis Show?

We summarize our implementation examples in Figure 4. For the risk reduction implementation (blue column), the result over our 30-year sample is a reduction in the volatility of portfolio returns, while maintaining (in this case slightly improving) the portfolio's average return. For the return enhancing implementation (green column), we find the same portfolio volatility as the starting portfolio (in this case, by construction), with the benefit coming entirely in the form of higher average returns, from 9.0% to 9.4%.

A note on magnitudes: We are taking a *hypothetical portfolio-level* perspective here. While the reduction in portfolio volatility in the first implementation example, and the improvement in average returns in the second implementation example may not seem huge, it is because we are altering only components of the portfolio (i.e., in the first implementation example, we only adjust the U.S. portion of the equities allocation). Had we instead reported results for only the "equities sleeve", we would see a larger reduction in volatility.

We also report the real (that is, inflation-adjusted) ending wealth improvement in Figure 4. To make this representative, we take the perspective of an "average investor" with a median income in 2015, and calculate what that corresponds to in inflation-adjusted terms in 1986, assuming a 2% annual real growth in income (as a worker's real salary can be expected to increase with experience). We assume this investor saves (either individually or with employer matching) 9% of his/her salary and makes contributions to his/her retirement portfolio monthly.[5] As shown in Figure 4, over 30 years both of these implementations produced an improvement in real ending wealth.

Figure 4

Hypothetical Portfolio Statistics, January 1986–December 2015

	Original Glidepath	Same Return, Less Risk	Higher Return, Same Risk
Annual Return	9.0%	9.2%	9.4%
Volatility	11.1%	10.4%	11.1%
Sharpe Ratio	0.47	0.53	0.51
% Real Ending Wealth Improvement	--	4.4%	6.8%

Source: AQR, Vanguard, Bloomberg, Barclays Live, GFD, DataStream, Ibbotson Associates. AQR U.S. Defensive Equity backtest is based on the AQR U.S. Defensive Equity Strategy; net of transaction costs, financing costs and advisory fees (0.30% annually). Returns are shown in USD. The risk free rate used is the Merrill Lynch 3-Month T-Bill. Volatility is calculated on monthly returns. Additional details on backtest methodology and asset class proxies are in the appendix. These are not the returns of an actual portfolio AQR manages and are for illustrative purposes only. Hypothetical performance results have certain inherent limitations, some of which are disclosed in the appendix.

5 We note that we've chosen these inputs as a representative base case for the average investor. However, this same framework can be applied for investors with different savings rates, etc.

Considerations for Sizing a Position in Defensive Equity

The sizing of a position in defensive equity is highly dependent on the investor's specific circumstances, objectives and risk tolerance. While the analysis above shows the effects of incorporating defensive equity into a glidepath structure, Figure 5 outlines various pro-rata distributions from the "original glidepath" into defensive equity. The table shows that incremental increases to defensive equity, funded pro-rata from all asset classes, yield higher real ending wealth values with minimal changes in volatility.[6] As a result, both the funding source(s) and the allocation amount can be used as levers by investors to properly match the potential benefits of defensive equity with their portfolio objectives. We believe this approach is superior to more traditional mean variance optimizations, which may suggest allocations to defensive that are larger than what plan sponsors are comfortable implementing.

Figure 5

Hypothetical Portfolio Statistics for Pro-Rata Defensive Equity Allocations, January 1986–December 2015

	3% Allocation	5% Allocation	7% Allocation	10% Allocation
% Real Ending Wealth Improvement	1.8%	2.9%	4.1%	6.0%
% Change in Volatility from Original Glidepath	-0.1%	-0.1%	-0.2%	-0.2%

Source: AQR, Vanguard, Bloomberg, Barclays Live, GFD, DataStream, Ibbotson Associates. AQR U.S. Defensive Equity backtest is based on the AQR U.S. Defensive Equity Strategy; net of transaction costs, financing costs and advisory fees (0.30% annually). Returns are shown in USD. The risk free rate used is the Merrill Lynch 3-Month T-Bill. Volatility is calculated on monthly returns. Additional details on backtest methodology and asset class proxies are in the appendix. These are not the returns of an actual portfolio AQR manages and are for illustrative purposes only. Statistics are shown for pro-rata allocations from all asset classes to U.S. Defensive Equity in the amounts indicated in the table. Hypothetical performance results have certain inherent limitations, some of which are disclosed in the appendix.

6 This finding is similar to that of the return enhancing implementation, in which defensive equity is also funded from both equity and fixed income.

Conclusion

Defensive equities may be best-known for the role they might play in addressing wealth preservation. As demonstrated in our sample analysis, lower volatility empirically leads to potentially smaller drawdowns in the worst periods for equity markets, which is clearly valuable near retirement when investors have less time to ride through a market drawdown.[7]

This paper takes a more general perspective, and evaluates defensive equity's potential benefits *throughout* the lifecycle, using an "average glidepath" and an "average investor" as our starting points. We find that defensive equities may be valuable even for investors with different objectives, recognizing of course that the best implementation will necessarily depend on specific circumstances and constraints.

Finally, the framework used in this paper can be applied to more specific cases — from adjusting the glidepath to the savings rate. This flexibility in design can also be applied to the vehicle decision, as, for example, the risk reduction properties of defensive equity may also fit well in a white-labeled solution. We encourage investors to see if this general framework can be a useful tool to evaluate whether defensive equities can add value to their specific portfolios.

7 Defensive equities may also be valuable for younger savers too; those who allocate to them may be less likely to "throw in the towel" after a severe —and potentially prolonged — bear market, and thus remain invested over the long run.

Appendix

AQR U.S. Defensive Equity Backtest Methodology

AQR U.S. Defensive Equity Strategy:

- **Universe:** Liquid tradable universes for U.S. (roughly equivalent to the Russell 1000). Quarterly rebalancing frequency.
- **Risk model:** Barra USE3L model. Performance is measured after AQR's proprietary t-cost estimates.

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	Proxy 2		Proxy 1	
Asset Class	**Start Date**	**Data Series**	**Start Date**	**Data Series**
U.S. Stocks	Jan-86	Ibbotson SBBI U.S. Large Stock TR Index	Feb-88	S&P 500 TR Index
U.S. Defensive Equity			Jan-86	
Intl Stocks			Jan-86	MSCI World Ex-U.S. TR Index
U.S. Bonds			Jan-86	Barclays U.S. Aggregate TR Index
Intl Bonds	Jan-86	GFD/DataStream International Bond Series*	Feb-01	JPMorgan Global Ex U.S. GBI 7-10 Year TR Index
Inflation Linked Bonds	Jan-86	AQR U.S. TIPS Series**	Mar-97	Barclays U.S. TIPS TR Index

* The dataset represents a GDP-weighted average of government bonds from Germany, France, Netherlands, Canada, Japan, Italy, Australia, UK and Spain. International bond data switches from GFD to DataStream based upon each country's data availability in DataStream.

**The series represents U.S. TIPS of varying maturities prior to the inception of the Barclays U.S. TIPS Index. TIPS returns prior to the index are created using government yields, consensus inflation expectations and realized inflation.

The **S&P 500 Index** is a market capitalization index that is designed to measure equity market performance of the 500 largest U.S. companies listed on the NYSE or NASDAQ.

The **MSCI World Ex-U.S. Index** is a free, float-adjusted market-capitalization weighted index designed to measure the performance of large and mid cap securities across developed markets, excluding the U.S.

The **Barclays U.S. Aggregate Index** is a broad-based index that measures the performance of treasury, government-related, corporate, MBS, ABS, and CMBS bonds issued in the U.S.

The **Ibbotson SBBI U.S. Large Stock Index** tracks the monthly return of S&P 500. The historical data before 1970 back to 1926 is calculated by Ibbotson.

The **JPMorgan Global Ex U.S. GBI 7-10 Year Index** represents global bonds excluding the U.S. with maturities between 7-10 years.

The **Barclays U.S. TIPS Index** includes all publicly issued, U.S. Treasury inflation-protected securities that have at least one year remaining to maturity, are rated investment grade, and have $250 million or more of outstanding face value.

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