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**DECEMBER 14, 2017**

**AGENDA ITEM 5  
INFORMATION ITEM**

**SCHOLARSHARE INVESTMENT BOARD**

*Review of 2018 Asset Allocation Recommendation for the ScholarShare 529 College Savings Plan*

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***Background***

Each year, the ScholarShare Investment Board (SIB or Board) and the program manager, TIAA-CREF Tuition Financing, Inc. (TFI), review the asset allocation of the investment portfolios for the ScholarShare College Savings Plan (Plan) to determine if any changes are necessary to continue to meet its investment objectives.

For 2018, TFI has provided its “2018 Asset Allocation Recommendation” (Exhibit A), which highlights the analysis completed for their recommendation, which includes the possibility of introducing a new asset class to the Plan’s investment line-up. The analysis includes a review of the current market environment and the Plan’s underlying funds.

PCA and SIB staff have reviewed TFI’s recommendation and due to the complexity associated with the introduction of a new asset class, SIB staff and PCA recommend that TFI provide a general overview of the new asset class at this meeting and revisit this agenda item in first quarter 2018 following a more in-depth analysis from PCA of this potential change.

***Presenters***

Jeremy Thiessen, Senior Director, TIAA-CREF Tuition Financing, Inc.  
Eric White, Principal, Pension Consulting Alliance, LLC

# 2018 Asset Allocation Recommendation

Prepared by TIAA-CREF Tuition Financing, Inc.  
December 14, 2017



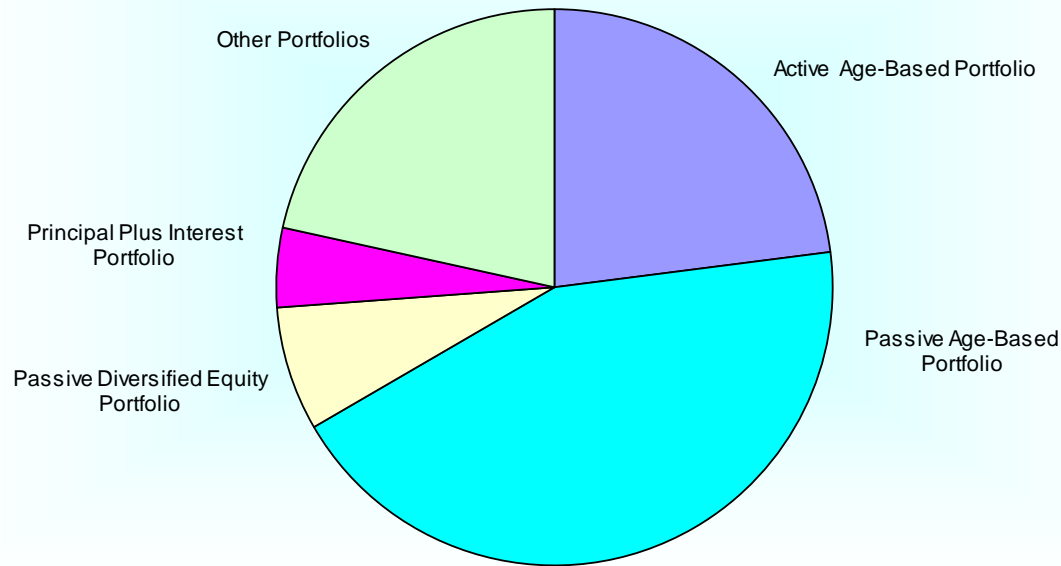
BUILT TO PERFORM.

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- TFI has completed this year's asset allocation study and evaluated ScholarShare as follows:
  - **Fixed Income strategy for low yields and rising rates:** A closer look at fixed income diversification including emerging markets debt
  - **Investment Menu:** Investment portfolio choices span the risk spectrum and cater to a wide variety of different types of investors
  - **Strategic Positioning:** Equity: the domestic equity portfolio is well balanced with no unintended biases (growth vs. value, large cap vs. small cap); Fixed Income: while duration is strategically defensive, the current environment still poses challenges to a bond portfolio that is primarily index-based
  - **Underlying funds:** All underlying funds currently in the program are achieving their objective of either delivering high return potential, mitigating market risk, or providing diversification or other favorable investment characteristics
- ***If emerging markets debt asset class is an area of interest, we can continue to explore this strategy for inclusion in asset allocation recommendation***

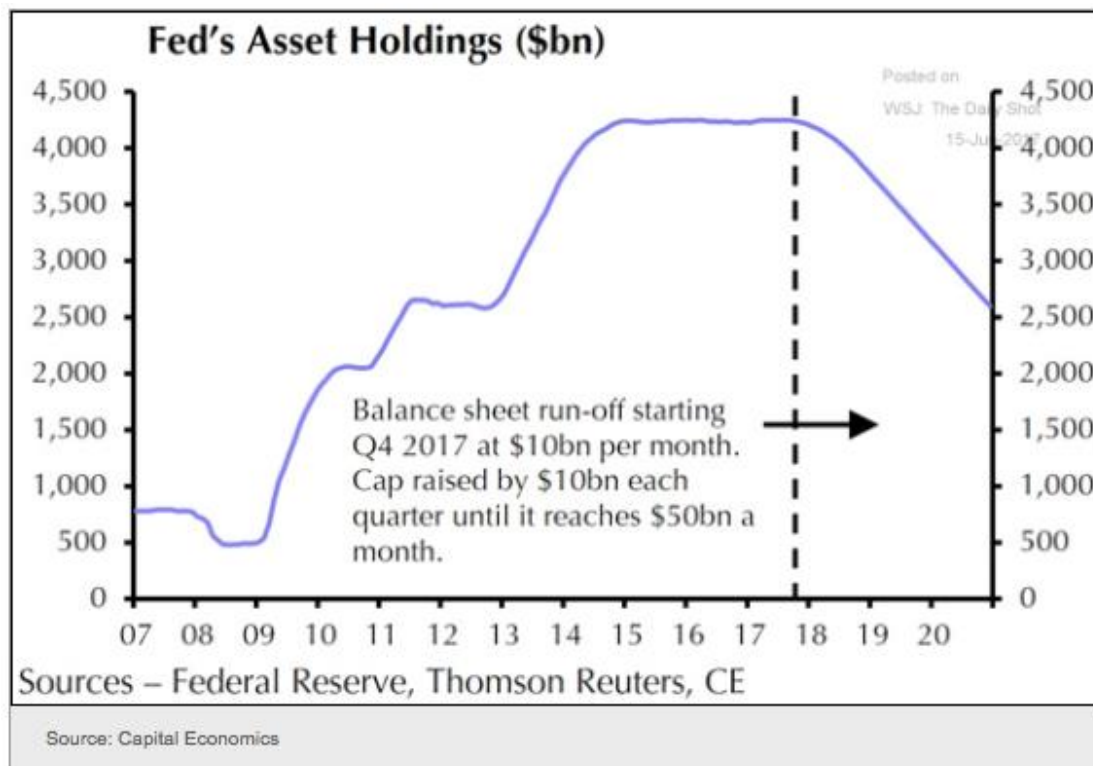
# Assets by Investment Portfolio as of 09/30/17: \$7.94 Billion



Portfolio	% of Assets	\$ Millions	Portfolio	% of Assets	\$ Millions
Passive Age-Based Portfolio	43.65%	\$ 3,464	Principal Plus Interest Portfolio	4.61%	\$ 366
Active Age-Based Portfolio	22.97%	\$ 1,824	Other Portfolios (see below)	21.55%	\$ 1,711
Passive Diversified Equity Portfolio	7.22%	\$ 573			

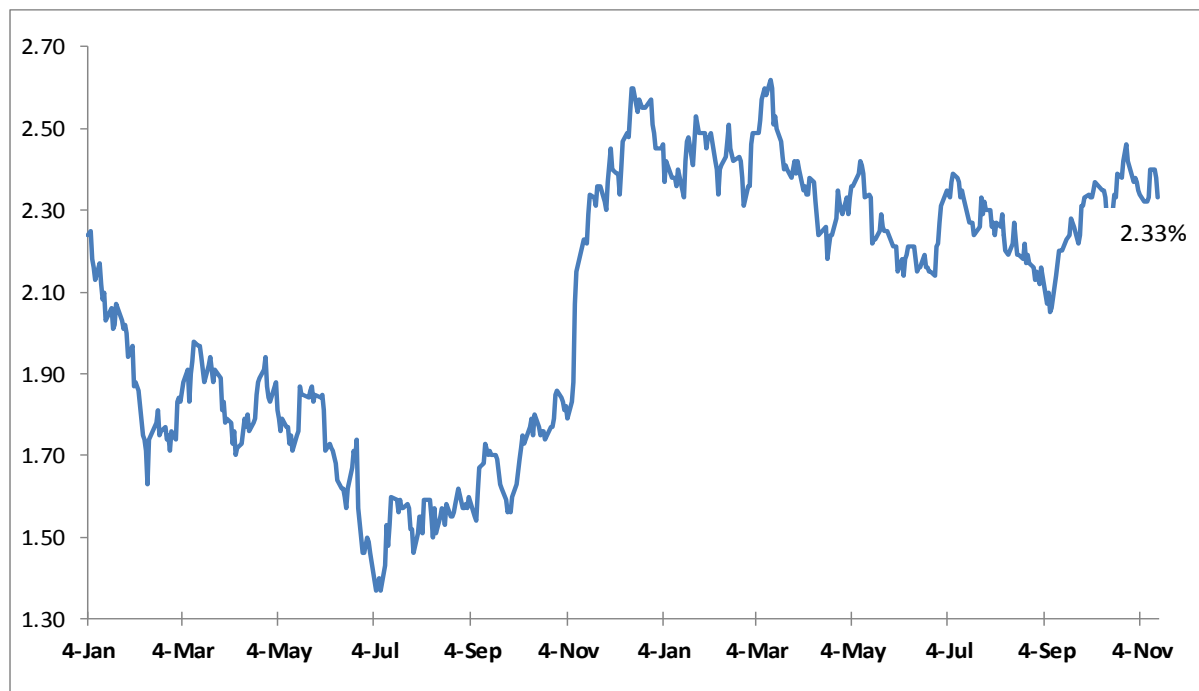
Other Portfolios					
Portfolio	% of Assets	\$ Millions	Portfolio	% of Assets	\$ Millions
Index U.S. Large Cap Equity Portfolio	4.37%	\$ 347	Active Moderate Growth Portfolio	0.58%	\$ 46
Index U.S. Equity Portfolio	4.27%	\$ 339	Passive Moderate Growth Portfolio	0.52%	\$ 41
Active Diversified Equity Portfolio	2.81%	\$ 223	Passive Conservative Portfolio	0.45%	\$ 36
Social Choice Portfolio	2.01%	\$ 160	Active Conservative Portfolio	0.41%	\$ 33
Active Growth Portfolio	1.78%	\$ 142	Active International Equity Portfolio	0.33%	\$ 26
Index International Equity Portfolio	1.50%	\$ 119	Active Diversified Fixed Income Portfolio	0.26%	\$ 21
Passive Growth Portfolio	1.39%	\$ 110	Passive Diversified Fixed Income Portfolio	0.19%	\$ 15
Index Bond Portfolio	0.66%	\$ 52			

- Years of Quantitative Easing has left the Fed with \$4.5 trillion of Treasuries and MBS on its balance sheet. It is gradually shrinking this by allowing securities to expire as they mature, which will reduce total debt by more than 25% by 2020.
- After years of a zero interest rate policy, the Fed now seeks a more neutral, long-term level for borrowing rates, and we are perhaps in the midst of an interest rate regime shift
- The combination of low yields and a patient but goal-driven Fed creates unique challenges that fixed income investors have not experienced

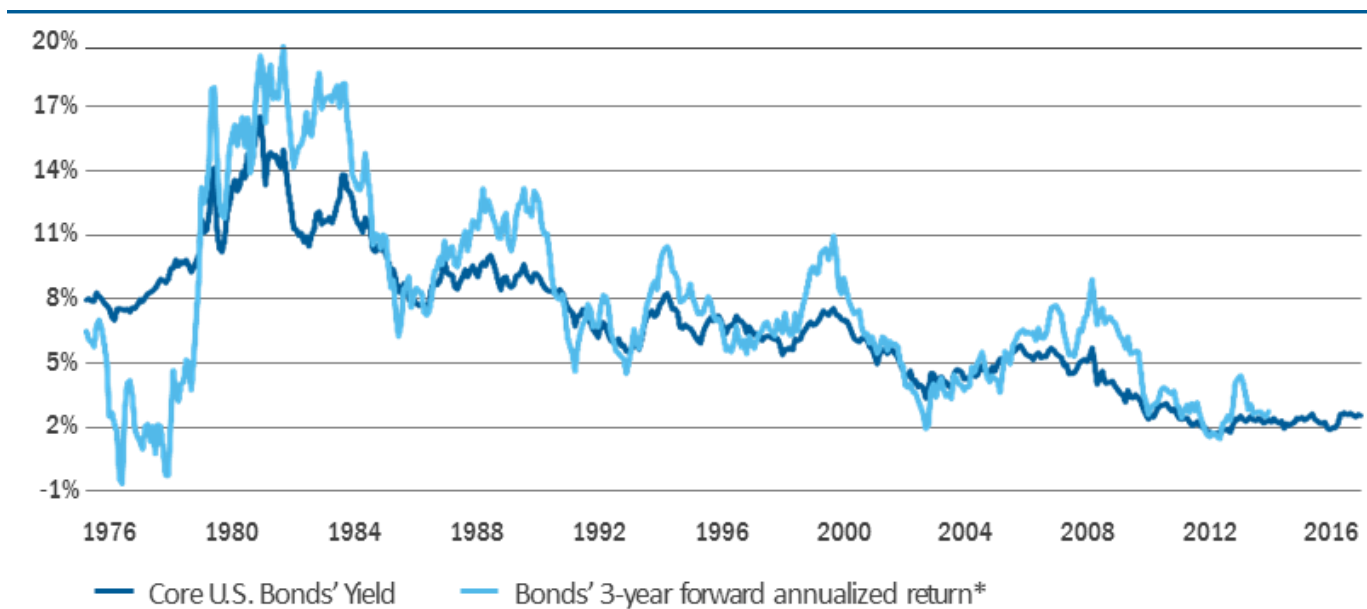


- Recently, credit spreads have tightened modestly and the yield curve flattened in response to Fed hikes in previous quarters
- Over the past couple years, the 10-Year U.S. Treasury Yield has moved higher from the 2016 low of 1.37% to 2.33% as of 11/15/17, near recent highs
- As the Fed continues to gradually raise its Fed Funds Target range, rates across the curve are expected to continue normalizing higher

## 10-Year U.S. Treasury Yield: 2016-2017



- While idiosyncratic risk always exists, the primary determinant of 3-year returns on the Bloomberg Barclays U.S. Aggregate Bond Index is its current yield
- With a low current yield, bond returns are expected to be muted going forward



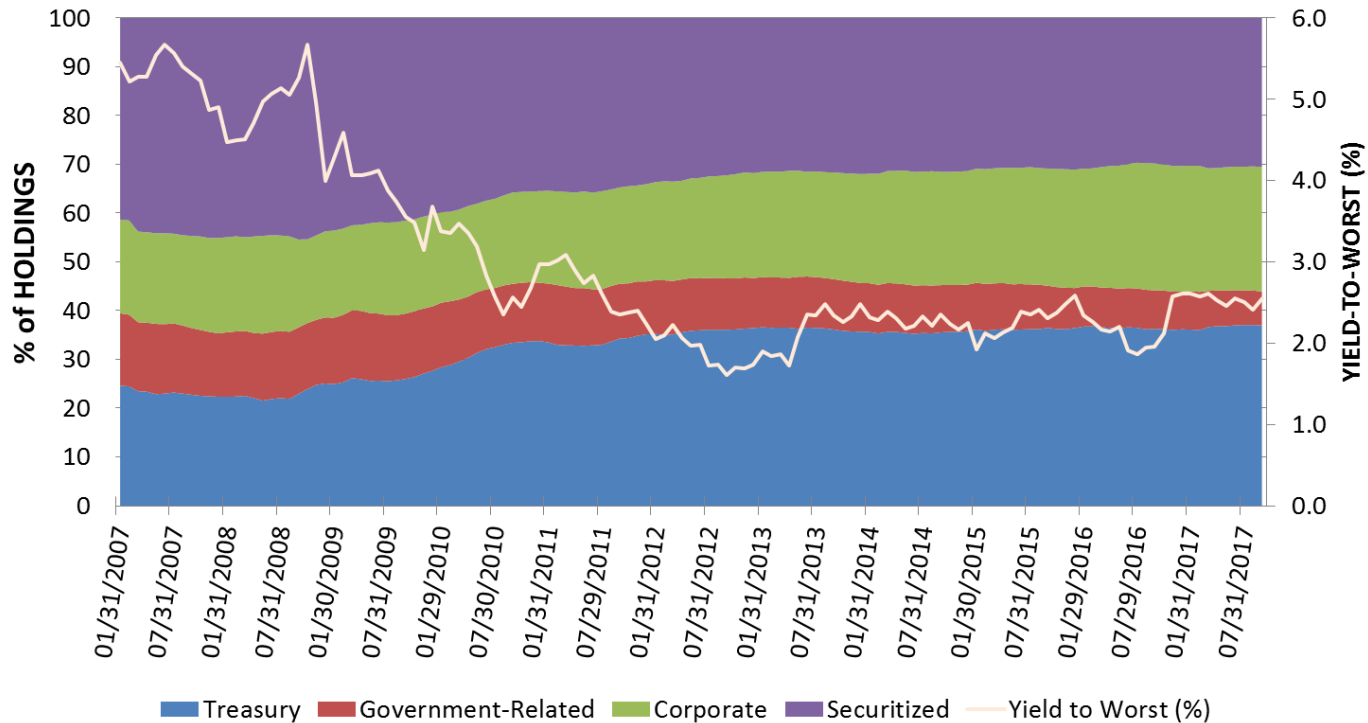
\* Each point on the graph represents the annualized return for the three-year period looking forward.

Source: Bloomberg, as of July 2017. "Core U.S. Bonds" refers to the Bloomberg Barclays U.S. Aggregate Bond Index.

It is not possible to invest in an index. Performance for indices does not reflect investment fees or transactions costs.



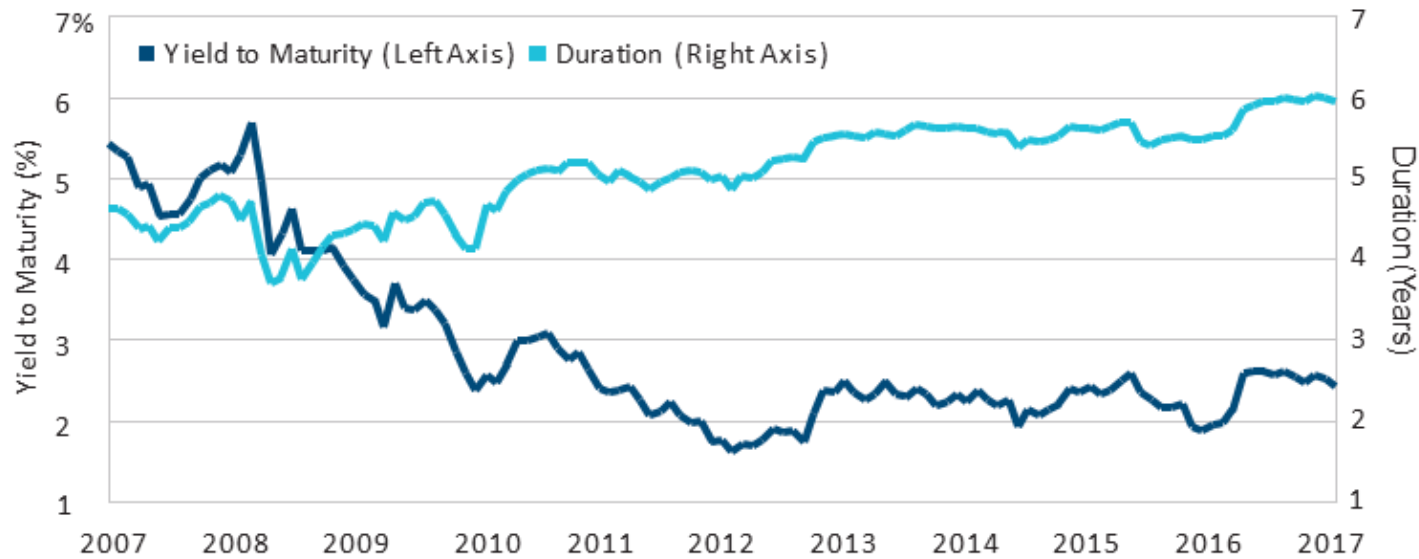
**Bloomberg Barclays U.S. Agg Bond Index Sector Weightings**



- Given the size of the U.S. Treasury market, the Bloomberg Barclays U.S. Aggregate Index of investment grade fixed income has always had a sizeable allocation to Treasuries. However, this tilt has become amplified since the financial crisis.
- Yield has remained below 3% for several years, about half of pre-crisis levels.

## Yields Lower, Interest Rate Risk Higher Since the Global Financial Crisis

August 2007 to August 2017

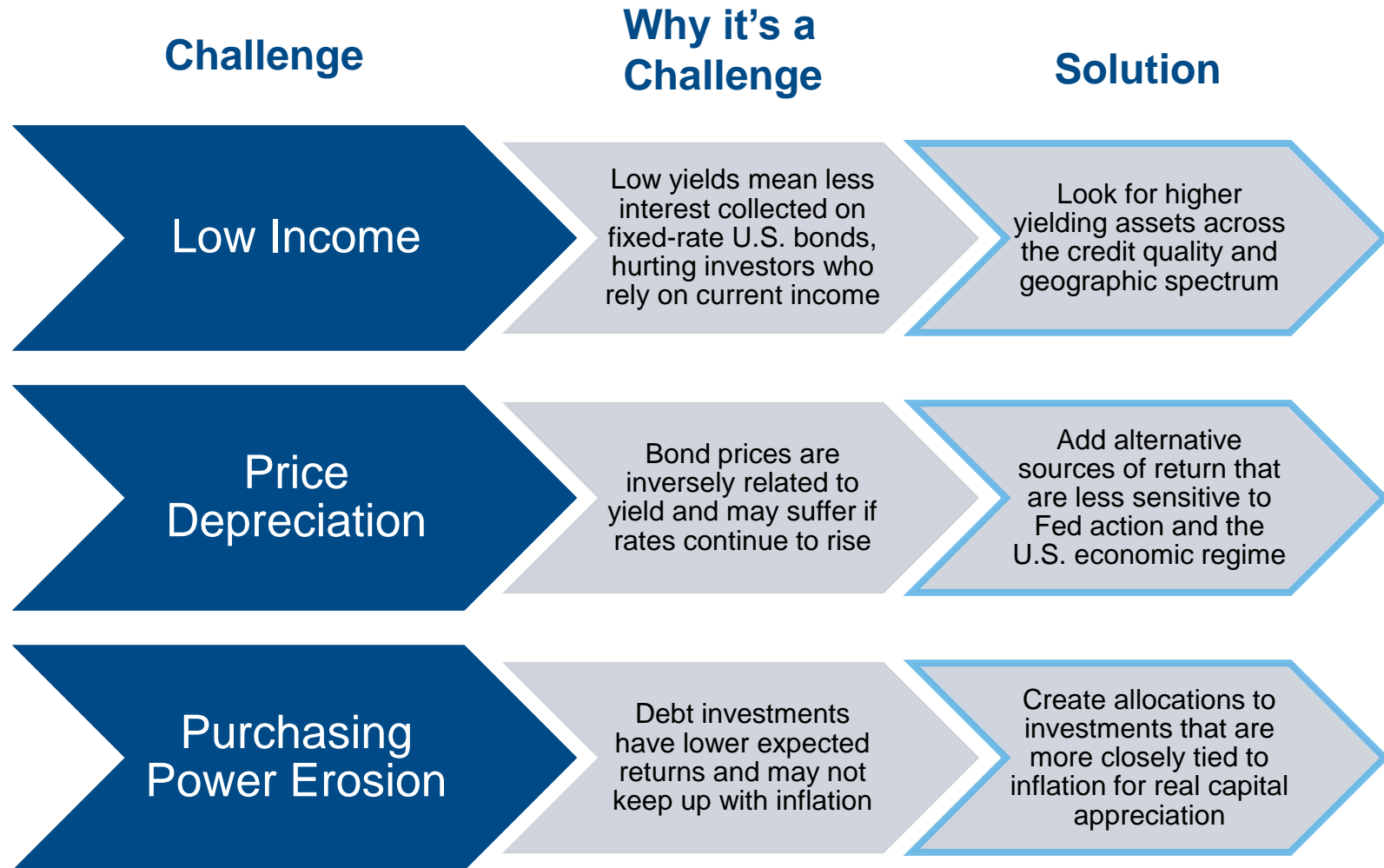


Lines represent yield and duration of the Bloomberg Barclays U.S. Aggregate Bond Index.

Sources: Bloomberg Barclays and T. Rowe Price.

- Duration of the Agg recently surpassed six years for the first time in history, increasing interest rate risk more than ever
- **The bottom line:** Years of accommodative monetary policy has altered the investment characteristics of the core bond universe, making it more difficult for index fixed income investors to reap the same rewards they did in the past

# Summary: Fixed Income Portfolios in a Low Yield and Rising Interest Rate Environment

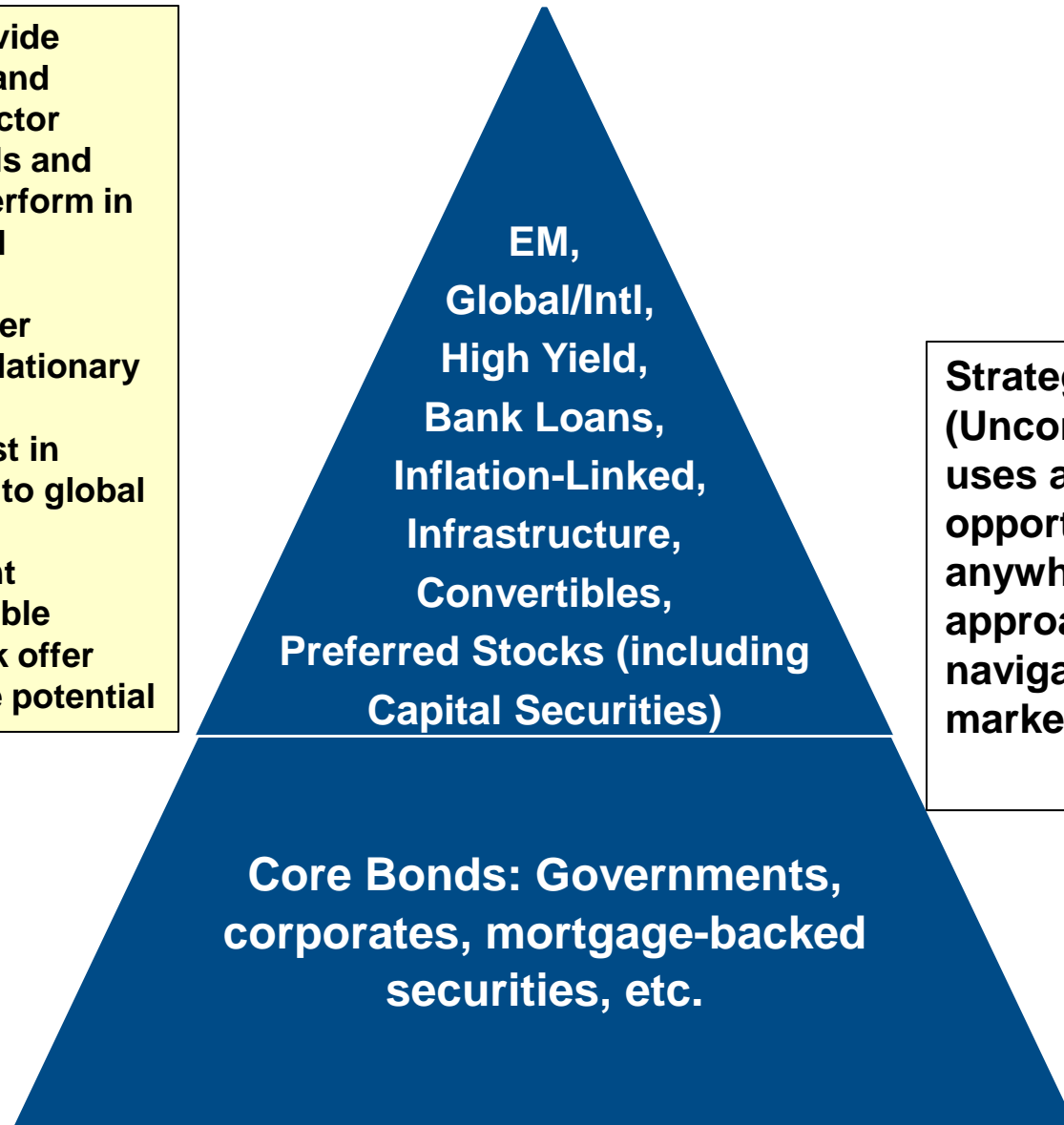


# Fixed Income Diversification: Building Strong Fixed Income Portfolios



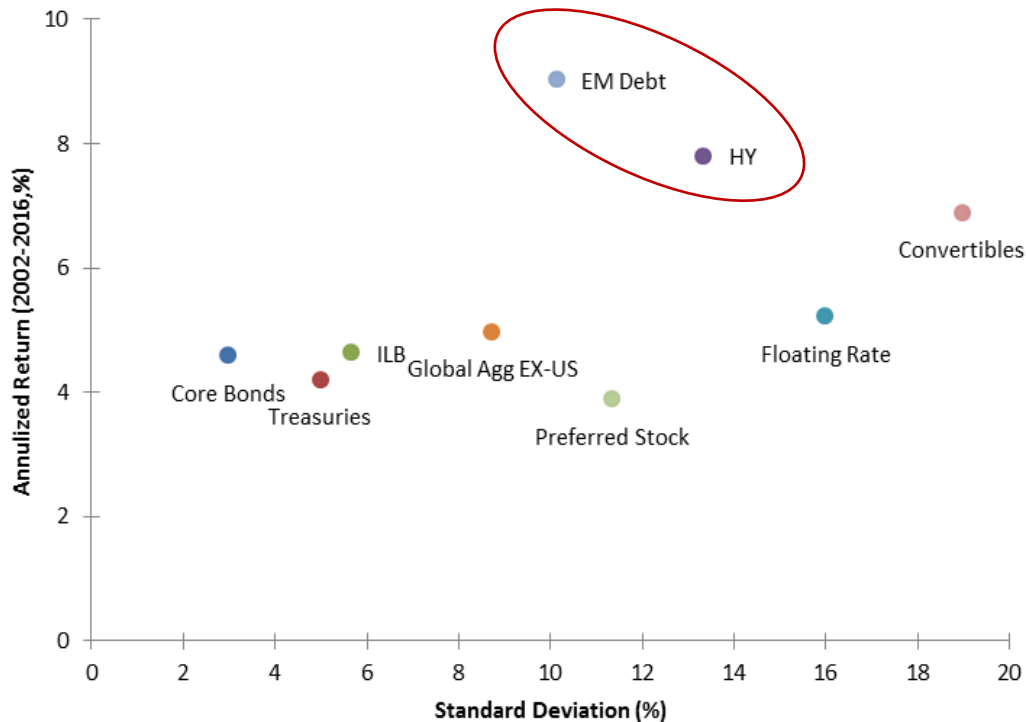
- Global and EM bonds provide additional diversification and access to the currency sector
- Corporate high yield bonds and bank loans typically outperform in periods of rising rates and economic growth
- Inflation Linked Bonds offer attractive returns in an inflationary environment
- Infrastructure bonds invest in financing projects related to global infrastructure
- Inherent hybrid investment characteristics in convertible bonds and preferred stock offer stable income with upside potential

**Invests in a diversified portfolio of intermediate-term, high quality bonds**



**Strategic Income (Unconstrained) uses an opportunistic, go-anywhere approach to navigate changing market conditions**

## Historical Risk/Return Characteristics (2002-2016)



Asset Class	Annualized Return (2002-2016)	Std Dev (2002-2016)	Duration
Core Bonds	4.58	2.99	6.17
Treasuries	4.19	4.99	6.24
ILB	4.63	5.66	5.39
HY	7.79	13.34	4.06
Floating Rate	5.21	15.99	0.40
Global Agg EX-US	4.96	8.74	7.56
EM Debt	9.02	10.14	6.66
Convertibles	6.88	18.98	2.50
Preferred Stock	3.88	11.35	4.17

- EM debt and High Yield offer the most compelling risk adjusted returns across various bond asset classes

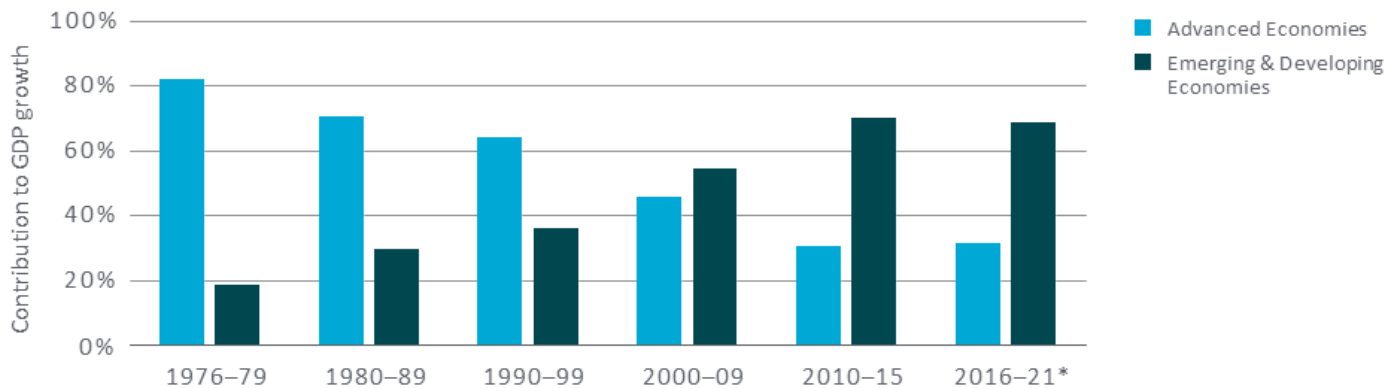
# Emerging Markets Debt: A Nascent, Yet Large and Diverse Asset Class



\$ Trillions	Local	External	Total
<b>Corporate</b>	8.6	3.0	11.6
<b>Sovereign</b>	7.9	0.9	8.8
<b>Total</b>	16.5	3.9	20.4

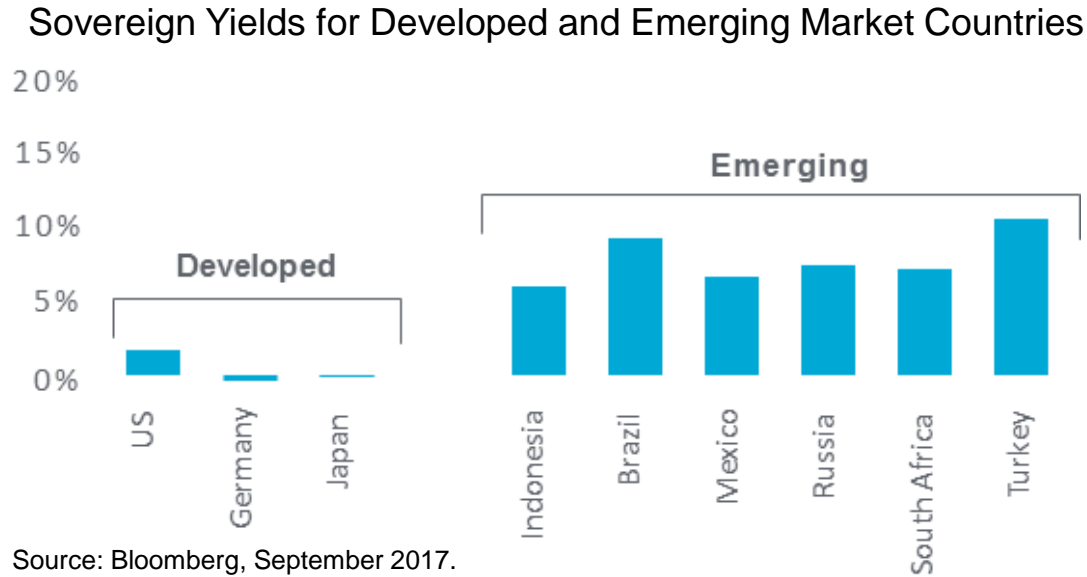
Source: Bank for International Settlements, December 2017.

- Emerging markets debt (EMD) has been an investable asset class only since the late 1990s, and in many respects, remains untapped, despite being a \$20 trillion market
- More recently, various local reforms have helped strengthen EM balance sheets, lower inflation, as well as expand the investor base
- EM economies are driving global growth more than ever before, and based on demographics, this is expected to continue



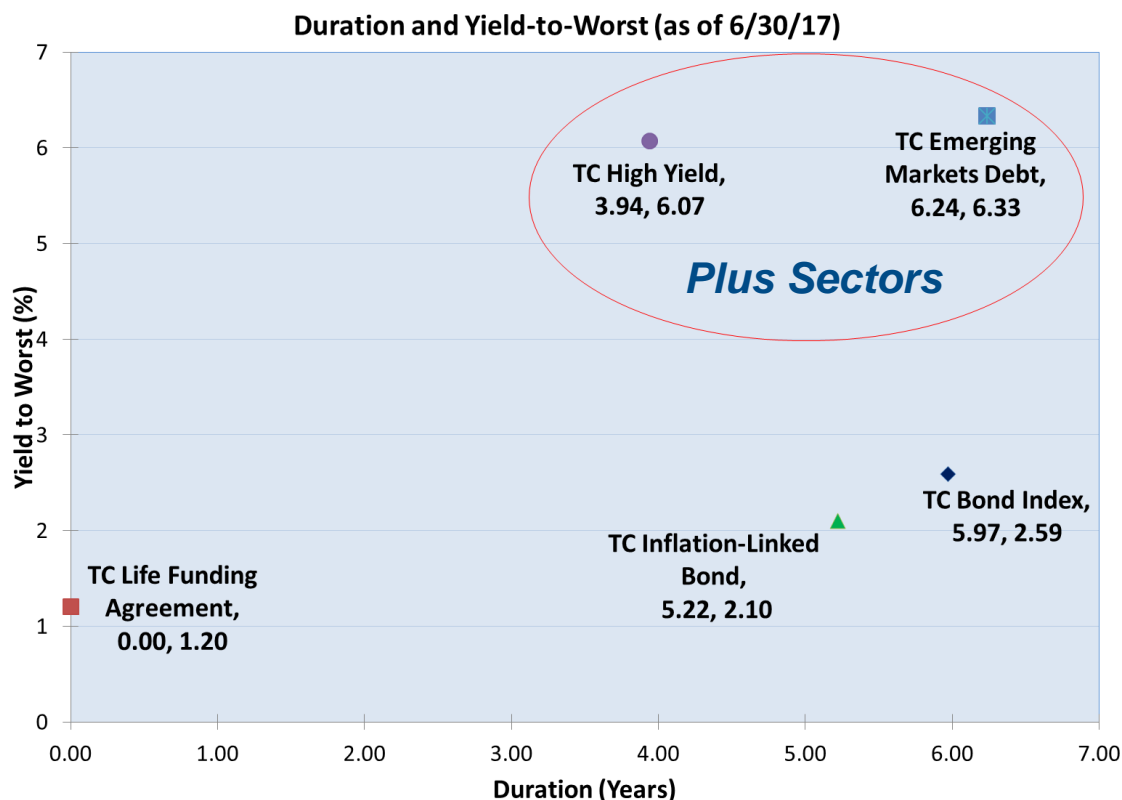
Source: IMF, "World Economic Outlook," April 2017.

\* IMF Forecast.

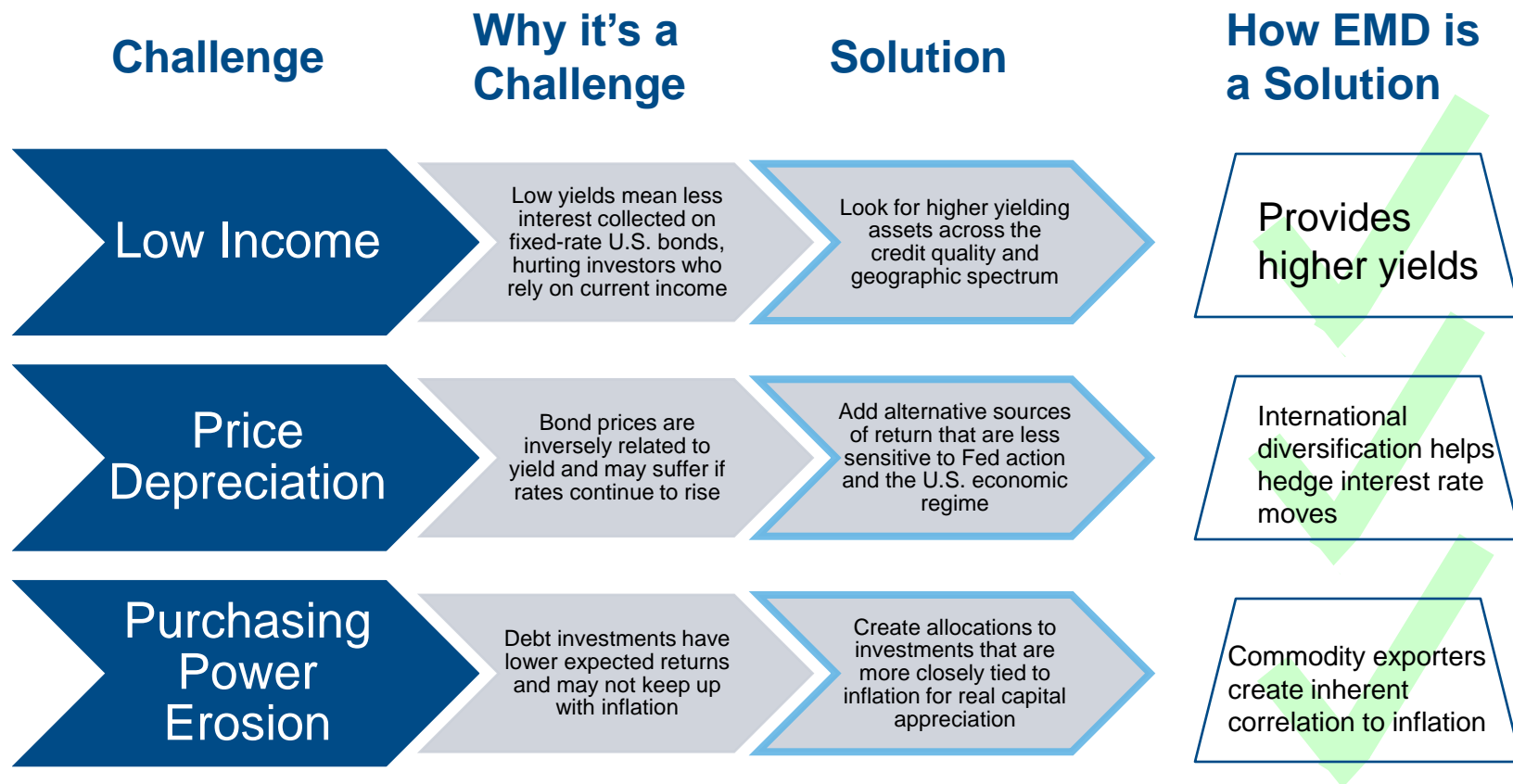


- EMD generally has
  - Higher volatility if issues are denominated in local currencies
  - Lower credit quality compared to comparable issues in the U.S.
- To compensate investors for these risks, EMD tends to have higher yield
- However, most securities in the Bloomberg Barclays EM Aggregate Index are actually investment grade, and a diversified portfolio of EMD with exposure to multiple currencies can serve as a built-in diversification benefit

- ScholarShare's Passive Portfolios currently combine core fixed income, TIPS, high yield, and the Funding Agreement, all of which have different characteristics
- Emerging market debt has a unique profile, offering competitive yields and one of the highest yield to duration ratios.







- All underlying funds currently in the program are achieving their objective of either delivering high return potential, mitigating market risk, or providing diversification or other favorable investment characteristics, at reasonable cost levels
- No underlying funds are currently on watch list due to performance

Underlying Fund	Ticker	Morningstar Analyst Rating	Morningstar Rating Overall	Prospectus Net Expense Ratio
DFA Emerging Markets Core Equity I	DFCEX	Silver	4	0.53
DFA Large Cap International I	DFALX		3	0.23
Metropolitan West Total Return Bd Plan	MWTSX	Gold	4	0.38
PIMCO Income Instl	PIMIX	Silver	5	0.50
PIMCO Real Return Instl	PRRIX	Silver	4	0.45
T. Rowe Price Instl Floating Rate	RPIFX		4	0.57
T. Rowe Price Instl Large Cap Growth	TRLGX	Bronze	5	0.56
T. Rowe Price Instl Large Cap Value	TILCX		4	0.57
TIAA-CREF Bond Index Institutional	TBIIX		3	0.12
TIAA-CREF Emerging Markets Eq Idx Instl	TEQLX		3	0.23
TIAA-CREF Equity Index Instl	TIEIX		4	0.05
TIAA-CREF High-Yield Inst	TIHYX		4	0.36
TIAA-CREF Inflation Link Bd Instl	TIILX		3	0.26
TIAA-CREF International Eq Idx Instl	TCIEX		3	0.06
TIAA-CREF Real Estate Sec Instl	TIREX		4	0.51
TIAA-CREF S&P 500 Index Instl	TISPX		4	0.05
TIAA-CREF Small-Cap Equity Instl	TISEX		4	0.42
TIAA-CREF Social Choice Eq Instl	TISCX	Bronze	3	0.19

- U.S. core fixed income faces headwinds during an unprecedented interest rate environment and may have difficulty achieving investment objectives
- An allocation to emerging markets debt can provide higher income, international diversification, and attractive prospective risk and return characteristics
- Results from the stochastic Monte Carlo simulation model validate adding emerging markets debt to the Passive Age-Based Portfolios
- Domestic equity maintains market cap and style neutrality relative to benchmark (see Appendix)
- All underlying funds currently in the program are achieving their intended objectives
- ***Emerging markets debt is a compelling asset class for a low-yield world and may be worth considering for upcoming asset allocation recommendation***

# Appendix

## EMD Returns have been efficient and uncorrelated to U.S. interest rates (January 2006-August 2017)

	EMBI GD	CEMBI Div	GBI-EM GD	U.S. Agg	Russell 3000
<b>Annual Return</b>	7.52%	6.97%	6.02%	4.41%	8.35%
<b>Standard Deviation</b>	8.45%	9.51%	12.43%	3.17%	14.79%
<b>Sharpe</b>	0.73	0.59	0.38	0.97	0.47
<b>Correlation to 10-year U.S. Treasury yield</b>	-0.23	-0.18	-0.08	-0.86	0.32
<b>Correlation to Russell 3000 Index</b>	0.58	0.59	0.62	0.02	1

It is not possible to invest in an index. Performance for indexes does not reflect investment fees or transaction costs. Results may be significantly different for other time periods. Source: Bloomberg, JPMorgan. Indexes used include JPMorgan EMBI Global Diversified, JPMorgan CEMBI Diversified, JPMorgan GBI-EM Global Diversified, Bloomberg Barclays U.S. Aggregate, and Russell 3000.

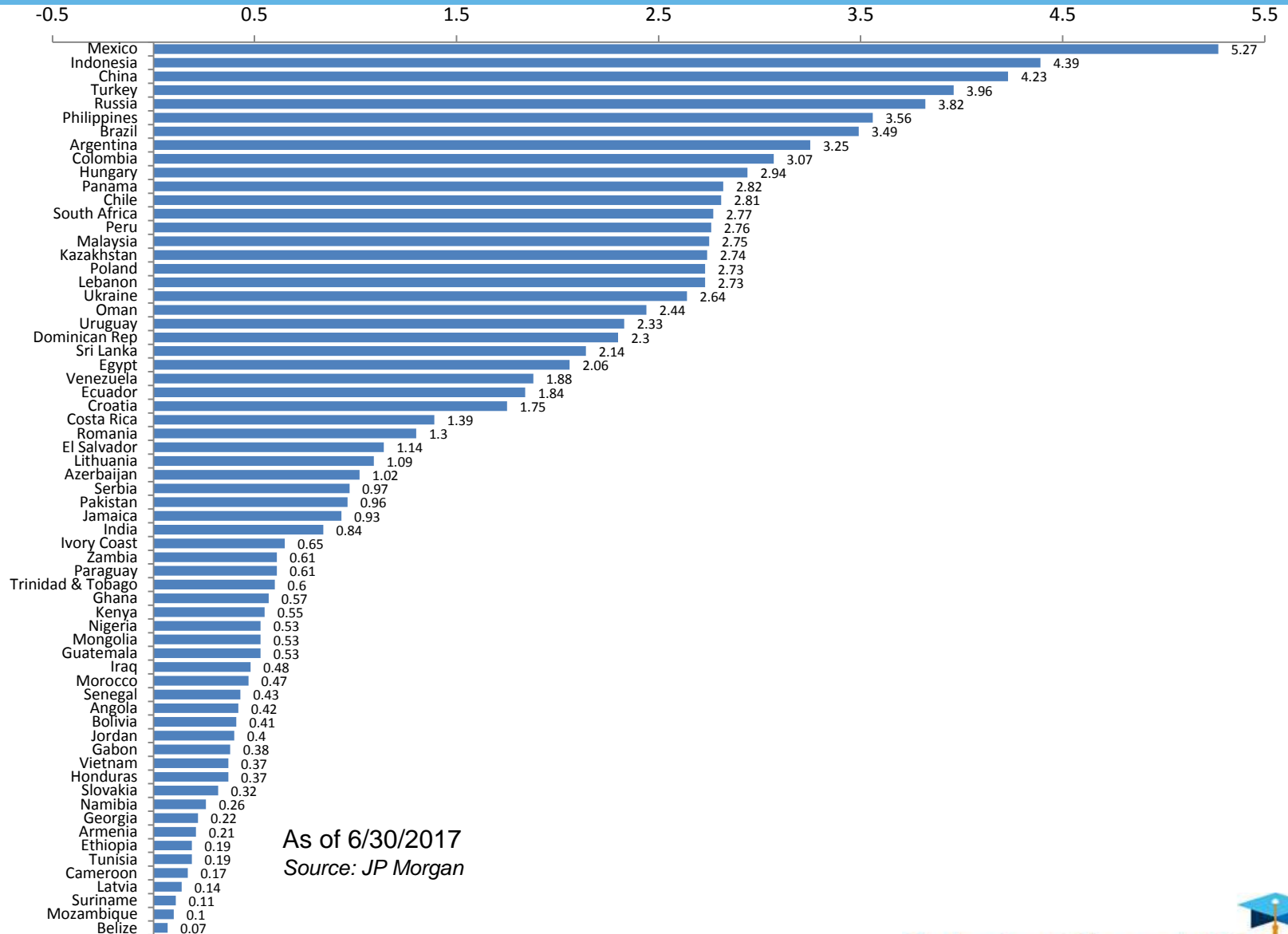
## 5-Year Correlations of Fixed Income Sectors (2012-2016)

<b>Core Bonds</b>	100%								
<b>Treasuries</b>	95%	100%							
<b>ILB</b>	75%	62%	100%						
<b>HY</b>	40%	12%	68%	100%					
<b>Floating Rate</b>	11%	-18%	53%	95%	100%				
<b>Global Agg EX-US</b>	41%	13%	72%	97%	92%	100%			
<b>EM Debt</b>	79%	62%	96%	74%	57%	81%	100%		
<b>Convertibles</b>	-27%	-47%	-33%	44%	51%	39%	-14%	100%	
<b>Preferred Stock</b>	88%	91%	61%	8%	-19%	19%	68%	-44%	100%
	<b>Core Bonds</b>	<b>Treasuries</b>	<b>ILB</b>	<b>HY</b>	<b>Floating Rate</b>	<b>Global Agg EX-US</b>	<b>EM Debt</b>	<b>Convertibles</b>	<b>Preferred Stock</b>

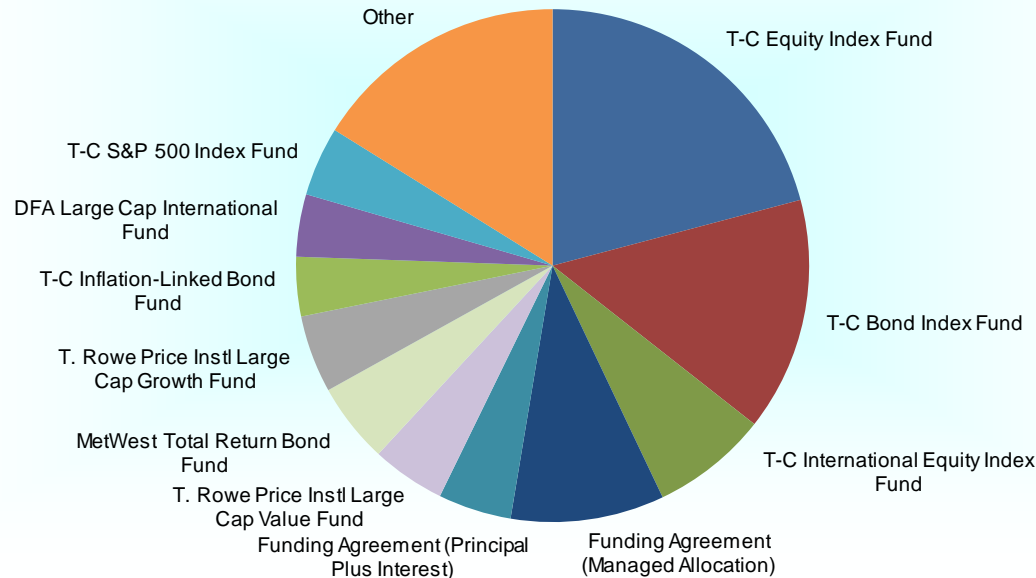
## 15-Year Correlations of Fixed Income Sectors (2002-2016)

<b>Core Bonds</b>	100%								
<b>Treasuries</b>	69%	100%							
<b>ILB</b>	78%	25%	100%						
<b>HY</b>	7%	-65%	47%	100%					
<b>Floating Rate</b>	2%	-69%	45%	97%	100%				
<b>Global Agg EX-US</b>	62%	35%	71%	21%	10%	100%			
<b>EM Debt</b>	34%	-39%	69%	88%	83%	42%	100%		
<b>Convertibles</b>	-21%	-81%	20%	91%	89%	8%	71%	100%	
<b>Preferred Stock</b>	13%	-52%	33%	74%	73%	7%	78%	69%	100%
	<b>Core Bonds</b>	<b>Treasuries</b>	<b>ILB</b>	<b>HY</b>	<b>Floating Rate</b>	<b>Global Agg EX-US</b>	<b>EM Debt</b>	<b>Convertibles</b>	<b>Preferred Stock</b>

# Emerging Markets Bond Index Global Diversified (EMBI Global Diversified) Country Weights (%)



# Assets by Underlying Fund as of 09/30/17



Fund	% of Assets	\$ Millions	Fund	% of Assets	\$ Millions
T-C Equity Index Fund	20.87%	\$ 1,656	Funding Agreement (Principal Plus Interest)	4.61%	\$ 366
T-C Bond Index Fund	14.73%	\$ 1,168	T. Rowe Price Instl Large Cap Value Fund	4.64%	\$ 368
Funding Agreement (Managed Allocation)	9.68%	\$ 768	T-C S&P 500 Index Fund	4.37%	\$ 347
T-C International Equity Index Fund	7.34%	\$ 583	T-C Inflation-Linked Bond Fund	3.74%	\$ 297
Metropolitan West Total Return Bond Fund	5.06%	\$ 401	DFA Large Cap International Fund	3.93%	\$ 312
T. Rowe Price Instl Large Cap Growth Fund	4.88%	\$ 387	Other	16.14%	\$ 1,280

Other Funds					
Fund	% of Assets	\$ Millions	Fund	% of Assets	\$ Millions
T-C Real Estate Securities Fund	3.03%	\$ 239	T-C Emerging Markets Equity Index Fund	1.81%	\$ 134
PIMCO Income Fund	2.22%	\$ 169	T-C Small Cap Equity Fund	1.17%	\$ 87
T-C High Yield Bond Fund	2.12%	\$ 167	T. Rowe Price Instl Floating Rate Fund	0.96%	\$ 74
T-C Social Choice Equity Fund	2.01%	\$ 154	DFA Emerging Markets Core Equity Portfolio	0.87%	\$ 64
PIMCO Real Return Fund	1.95%	\$ 150			



# Current Passive Age-Based Portfolio



Underlying Fund Fee	0.05%	0.06%	0.23%	0.51%	0.12%	0.26%	0.36%	N/A*	
Passive Age-Based Portfolio Age of Beneficiary	TIAA-CREF Equity Index Fund	TIAA-CREF International Equity Index Fund	TIAA-CREF Emerging Markets Equity Index Fund	TIAA-CREF Real Estate Securities Fund	TIAA-CREF Bond Index Fund	TIAA-CREF Inflation- Linked Bond Fund	TIAA-CREF High Yield Fund	T-C Life Funding Agreement	Weighted Average Fund Fee**
0 - 4	50.40%	19.20%	4.80%	5.60%	14.00%	4.00%	2.00%	0.00%	0.11%
5 - 8	44.10%	16.80%	4.20%	4.90%	21.00%	6.00%	3.00%	0.00%	0.12%
9 - 10	37.80%	14.40%	3.60%	4.20%	28.00%	8.00%	4.00%	0.00%	0.13%
11 - 12	31.50%	12.00%	3.00%	3.50%	35.00%	10.00%	5.00%	0.00%	0.13%
13 - 14	25.20%	9.60%	2.40%	2.80%	42.00%	12.00%	6.00%	0.00%	0.14%
15	18.90%	7.20%	1.80%	2.10%	42.00%	12.00%	6.00%	10.00%	0.13%
16	15.75%	6.00%	1.50%	1.75%	38.50%	11.00%	5.50%	20.00%	0.12%
17	12.60%	4.80%	1.20%	1.40%	31.50%	9.00%	4.50%	35.00%	0.10%
18 +	9.45%	3.60%	0.90%	1.05%	24.50%	7.00%	3.50%	50.00%	0.07%

\*The T-C Life Funding Agreement is not a retail mutual fund, and as such, has no explicit fee.

\*\*Includes a 0.00% underlying fund fee for the T-C Life Funding Agreement.

- Current Passive Age-Based option offers a cost-effective solution to access diversified portfolios

# Current Passive Multi-Fund and Single Fund Investment Portfolios



## Passive Multi-Fund Investment Portfolios

Underlying Fund Fee	0.05%	0.06%	0.23%	0.51%	0.12%	0.26%	0.36%	N/A*	
Passive Age-Based Portfolio Age of Beneficiary	TIAA-CREF Equity Index Fund	TIAA-CREF International Equity Index Fund	TIAA-CREF Emerging Markets Equity Index Fund	TIAA-CREF Real Estate Securities Fund	TIAA-CREF Bond Index Fund	TIAA-CREF Inflation- Linked Bond Fund	TIAA-CREF High Yield Fund	T-C Life Funding Agreement	Weighted Average Fund Fee**
Passive Diversified Equity Portfolio	63.00%	24.00%	6.00%	7.00%					0.10%
Passive Growth Portfolio	44.10%	16.80%	4.20%	4.90%	21.00%	6.00%	3.00%		0.12%
Passive Moderate Growth Portfolio	25.20%	9.60%	2.40%	2.80%	42.00%	12.00%	6.00%		0.14%
Passive Diversified Fixed Income Portfolio					70.00%	20.00%	10.00%		0.17%
Passive Conservative Portfolio					35.00%	10.00%	5.00%	50.00%	0.09%
Index International Equity Portfolio		80.00%	20.00%						0.09%

## Passive Single Fund Investment Portfolios

Investment Portfolios	Percent Allocation	Underlying Mutual Fund	Fund Fee
Index Bond Portfolio	100.00%	TIAA-CREF Bond Index Fund	0.12%
Index U.S. Large Cap Equity Portfolio	100.00%	TIAA-CREF S&P 500 Index Fund	0.05%
Index U.S. Equity Portfolio	100.00%	TIAA-CREF Equity Index Fund	0.05%

\*The T-C Life Funding Agreement is not a retail mutual fund, and as such, has no explicit fee.

\*\*Includes a 0.00% underlying fund fee for the T-C Life Funding Agreement.

# Current Active Age-Based Portfolio



Underlying Fund Fee	0.56%	0.57%	0.42%	0.51%	0.23%	0.53%	0.38%	0.45%	0.50%	0.56%	N/A*	
Active Age-Based Portfolio Age of Beneficiary	T. Rowe Price Instl Large Cap Growth Fund	T. Rowe Price Instl Large Cap Value Fund	TIAA-CREF Small Cap Equity Fund	TIAA- CREF Real Estate Securities Fund	DFA Large Cap International Portfolio	DFA Emerging Markets Core Equity I Portfolio	MetWest Total Return Bond Fund	PIMCO Real Return Instl Fund	PIMCO Income Instl Fund	T. Rowe Price Instl Floating Rate Fund	T-C Life Funding Agreement	Weighted Average Fund Fee**
0 - 4	22.68%	22.68%	5.04%	5.60%	19.20%	4.80%	10.00%	4.00%	4.00%	2.00%	0.00%	0.46%
5 - 8	19.85%	19.85%	4.40%	4.90%	16.80%	4.20%	15.00%	6.00%	6.00%	3.00%	0.00%	0.46%
9 - 10	17.01%	17.01%	3.78%	4.20%	14.40%	3.60%	20.00%	8.00%	8.00%	4.00%	0.00%	0.46%
11 - 12	14.18%	14.18%	3.14%	3.50%	12.00%	3.00%	25.00%	10.00%	10.00%	5.00%	0.00%	0.45%
13 - 14	11.34%	11.34%	2.52%	2.80%	9.60%	2.40%	30.00%	12.00%	12.00%	6.00%	0.00%	0.45%
15	8.51%	8.51%	1.88%	2.10%	7.20%	1.80%	30.00%	12.00%	12.00%	6.00%	10.00%	0.40%
16	7.09%	7.09%	1.57%	1.75%	6.00%	1.50%	27.50%	11.00%	11.00%	5.50%	20.00%	0.36%
17	5.67%	5.67%	1.26%	1.40%	4.80%	1.20%	22.50%	9.00%	9.00%	4.50%	35.00%	0.29%
18 +	4.25%	4.25%	0.95%	1.05%	3.60%	0.90%	17.50%	7.00%	7.00%	3.50%	50.00%	0.22%

\*The T-C Life Funding Agreement is not a retail mutual fund, and as such, has no explicit fee.

\*\*Includes a 0.00% underlying fund fee for the T-C Life Funding Agreement.

# Current Active Multi-Fund and Single Fund Investment Portfolios



## Active Multi-Fund Investment Portfolios

Underlying Fund Fee	0.56%	0.57%	0.42%	0.51%	0.23%	0.53%	0.38%	0.45%	0.50%	0.56%	N/A*	
Active Age-Based Portfolio Age of Beneficiary	T. Rowe Price Instl Large Cap Growth Fund	T. Rowe Price Instl Large Cap Value Fund	TIAA-CREF Small Cap Equity Fund	TIAA-CREF Real Estate Securities Fund	DFA Large Cap International Portfolio	DFA Emerging Markets Core Equity I Portfolio	MetWest Total Return Bond Fund	PIMCO Real Return Instl Fund	PIMCO Income Instl Fund	T. Rowe Price Instl Floating Rate Fund	T-C Life Funding Agreement	Weighted Average Fund Fee**
Active Diversified Equity Portfolio	28.35%	28.35%	6.30%	7.00%	24.00%	6.00%						0.47%
Active Growth Portfolio	19.85%	19.85%	4.40%	4.90%	16.80%	4.20%	15.00%	6.00%	6.00%	3.00%		0.46%
Active Moderate Growth Portfolio	11.34%	11.34%	2.52%	2.80%	9.60%	2.40%	30.00%	12.00%	12.00%	6.00%		0.45%
Active Diversified Fixed Income Portfolio							50.00%	20.00%	20.00%	10.00%		0.44%
Active Conservative Portfolio							25.00%	10.00%	10.00%	5.00%	50.00%	0.22%
Active International Equity Portfolio					80.00%	20.00%						0.29%

## Active Single Fund Investment Portfolios

Investment Portfolios	Percent Allocation	Underlying Mutual Fund	Fund Fee
Social Choice Portfolio	100.00%	TIAA-CREF Social Choice Equity Fund	0.19%
Principal Plus Interest Portfolio	100.00%	TIAA-CREF Life Co. Funding Agreement	N/A*

\*The T-C Life Funding Agreement is not a retail mutual fund, and as such, has no explicit fee.

\*\*Includes a 0.00% underlying fund fee for the T-C Life Funding Agreement.

# The Importance of Diversification: Annual Returns (%)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Highest ↑	39.4 EM Stocks	10.9 Global Bond	78.5 EM Stocks	27.9 Real Estate	13.6 TIPS	19.7 Real Estate	33.6 US Stocks	28.0 Real Estate	2.8 Real Estate	14.8 HY Bond
	11.6 TIPS	5.2 Bond	52.5 Bank Loan	18.9 EM Stocks	8.3 Real Estate	18.2 EM Stocks	22.8 Intl Stocks	12.6 US Stocks	0.7 ST Bond	12.7 US Stocks
	11.2 Intl Stocks	5.0 ST Bond	46.0 HY Bond	16.9 US Stocks	7.8 Bond	17.3 Intl Stocks	6.3 HY Bond	6.0 Bond	0.6 Bond	11.2 EM Stocks
	10.9 Global Bond	2.0 MM	31.8 Intl Stocks	14.3 HY Bond	6.4 Global Bond	16.4 US Stocks	5.4 Bank Loan	3.6 TIPS	0.5 US Stocks	10.4 Bank Loan
	7.0 Bond	-2.4 TIPS	28.3 US Stocks	10.4 Bank Loan	5.4 HY Bond	14.6 HY Bond	2.9 Real Estate	3.5 HY Bond	0.1 Bank Loan	8.6 Real Estate
	6.8 ST Bond	-23.2 HY Bond	28.0 Real Estate	7.8 Intl Stocks	1.6 ST Bond	9.8 Bank Loan	0.6 ST Bond	1.8 Bank Loan	0.0 MM	4.7 TIPS
	5.1 US Stocks	-29.3 Bank Loan	11.4 TIPS	6.5 Bond	1.5 Bank Loan	7.0 TIPS	0.0 MM	0.8 ST Bond	-0.8 Intl Stocks	2.7 Bond
	4.7 MM	-37.3 US Stocks	5.9 Bond	6.3 TIPS	1.0 US Stocks	4.2 Bond	-2.0 Bond	0.0 MM	-1.4 TIPS	1.6 Global Bond
	3.2 HY Bond	-37.7 Real Estate	3.8 ST Bond	5.2 Global Bond	0.0 MM	1.6 Global Bond	-2.6 EM Stocks	-0.5 Global Bond	-2.8 HY Bond	1.3 ST Bond
	2.0 Bank Loan	-43.4 Intl Stocks	2.6 Global Bond	2.8 ST Bond	-12.1 Intl Stocks	1.3 ST Bond	-4.0 Global Bond	-2.2 EM Stocks	-3.6 Global Bond	1.0 Intl Stocks
↓ Lowest	-15.7 Real Estate	-53.3 EM Stocks	0.2 MM	0.0 MM	-18.4 EM Stocks	0.0 MM	-8.6 TIPS	-4.9 Intl Stocks	-14.9 EM Stocks	0.1 MM

# The Importance of Diversification: Notes



Bond	uses the Bloomberg Barclays US Aggregate Bond Index, which measures the performance of the U.S. investment-grade, fixed-rate bond market, including government and credit securities, agency mortgage pass through securities, asset-backed securities and commercial mortgage-backed securities.
TIPS	uses the Bloomberg Barclays US TIPS Index, which measures the performance of fixed-income securities with fixed-rate coupon payments that adjust for inflation as measured by the Consumer Priced Index for All Urban Consumers.
HY Bond	uses the Bank of America US HY C Pay BB-B Constrained Index, which measures the performance of securities that pay interest in cash and have a credit rating of BB or B.
Real Estate	uses the FTSE NAREIT All Equity REITs Index, which is an unmanaged, market capitalization weighted index of all publicly-traded REITs that invest predominantly in the equity ownership of real estate. The index is designed to reflect the performance of all publicly-traded equity REITs as whole.
Intl Stocks	uses the MSCI EAFE Index, which is a free-float-adjusted market capitalization index designed to measure developed market equity performance, excluding the United States and Canada.
EM Stocks	uses the MSCI Emerging Markets Index, which tracks the performance of the leading stocks in 23 MSCI emerging countries in the following areas: Europe, Asia, Africa, Latin America and the Middle East.
US Stocks	uses Russell 3000 Index, which measures the performance of 3,000 of the largest publicly traded U.S. companies, based on market capitalization, and it measures the performance of about 98% of the total market capitalization of the publicly traded U.S. equity market.
Bank Loan	uses the S&P/LSTA Performing Loan Index, which is a subset of the S&P/LSTA Leveraged Loan Index, and comprises non-investment-grade and non-rated loans. Tracking only performing loans, unlike its parent index, it removes defaulted issues at the price they reach directly following the default.
Global Bond	uses the Citigroup World Government Bond Index, which comprises sovereign debt from over 20 countries, denominated in a variety of currencies.
ST Bond	uses the Bloomberg Barclays US Govt/Credit 1-3 Yr Index, which measures all medium and larger issues of U.S. government, investment-grade corporate, and investment-grade international dollar-denominated bonds that have maturities of between 1 and 3 years and are publicly issued.
MM	uses the iMoneyNet Fund Averages - All Government, which is the average of all major government money market mutual fund yields published weekly for 7- and 30-day simple and compound yields.

# Recent Changes in Underlying Fund Fees



Fund	Investment Portfolios	Change Description	Date	Old Fee	New Fee	Change
DFA Emerging Markets Core Equity Portfolio	Active Age-Based and Multi-Fund	Annual Prospectus Update	2/28/2017	0.62%	0.53%	-0.09%
MetWest Total Return Bond Fund	Active Age-Based and Multi-Fund	Share class change: Inst'l to Plan	7/26/2017	0.44%	0.38%	-0.06%
DFA Large Cap International Portfolio	Active Age-Based and Multi-Fund	Annual Prospectus Update	2/28/2017	0.29%	0.23%	-0.06%
TIAA-CREF Inflation-Linked Bond Fund	Passive Age-Based and Multi-Fund	Annual Prospectus Update	8/1/2017	0.27%	0.26%	-0.01%
TIAA-CREF S&P 500 Index Fund	Passive Single Fund	Annual Prospectus Update	3/1/2017	0.06%	0.05%	-0.01%
TIAA-CREF Social Choice Equity Fund	Active Single Fund	Annual Prospectus Update	3/1/2017	0.18%	0.19%	0.01%
PIMCO Income Fund	Active Age-Based and Multi-Fund	Prospectus Supplement	10/2/2017	0.45%	0.50%	0.05%

- The following asset allocation study uses Ibbotson’s most recent capital market assumptions to reaffirm the reasonableness and soundness of the approved glide path for the Active Age-Based Portfolio and Passive Age-Based Portfolio.
- The Age-Based Portfolios seek to achieve a reasonable rate of expected return and high probability of outperforming tuition inflation while minimizing the potential “shortfalls” between expected returns and tuition inflation over the expected investment horizons.



# 2016 Asset Allocation Assumptions



		Capital Market Assumptions (source: Ibbotson Associates)	
Variables	Benchmarks	Long-Term Returns (Geometric Mean)	Volatility (Standard Deviation)
<b>U.S. Equity</b>	Russell 3000 Index	5.67%	15.63%
<b>Large Cap Growth Equity</b>	Russell 1000 Growth Index	5.88%	17.49%
<b>Large Cap Value Equity</b>	Russell 1000 Value Index	5.38%	15.15%
<b>Small Cap Equity</b>	Russell 2000 Index	6.07%	20.38%
<b>Developed International Equity</b>	MSCI EAFE Index	7.05%	17.26%
<b>Emerging Markets Equity</b>	MSCI Emerging Markets Index	8.14%	24.13%
<b>Core Fixed Income</b>	Bloomberg Barclays U.S. Aggregate Bond Index	3.45%	5.20%
<b>Core Plus Fixed Income</b>	Bloomberg Barclays U.S. Universal Index	3.75%	5.25%
<b>Floating Rate Fixed Income</b>	Credit Suisse Leveraged Loan Index	4.63%	6.76%
<b>Global Fixed Income</b>	Citigroup World Government Bond Index	3.02%	7.53%
<b>International Fixed Income</b>	Bloomberg Barclays Global Aggregate ex-US Index	2.66%	4.92%
<b>Emerging Markets Debt</b>	JPM EMBI Global Diversified Index	5.24%	12.89%
<b>High Yield Fixed Income</b>	BofAML US HY BB/B Cash Pay Index	4.99%	8.33%
<b>TIPS</b>	Bloomberg Barclays Inflation-Linked U.S. TIPS Index	3.71%	8.01%
<b>Intermediate-Term TIPS</b>	Bloomberg Barclays Inflation-Linked 1-10 Year U.S. TIPS Index	3.40%	7.17%
<b>Short-Term TIPS</b>	Bloomberg Barclays U.S. 0-5 Year TIPS Index	2.80%	4.80%
<b>Short-Term Fixed Income</b>	Bloomberg Barclays U.S. 1-3 Year Government/Credit Bond Index	3.08%	2.12%
<b>Commodities</b>	Bloomberg Commodity Index	2.64%	17.88%
<b>Real Estate Securities</b>	FTSE NAREIT All Equity REITs Index	6.03%	22.10%
<b>CPI</b>	Consumer Price Index - All Urban Consumers	2.27%	1.88%
<b>3 Month T-Bill</b>	BofAML US Treasury Bill 3 Mon Index	1.99%	1.98%
<b>Money Market</b>	iMoneyNet Money Fund Report Averages All Taxable	1.50%	1.98%
<b>TIAA Life Funding Agreement</b>	Funding Agreement	2.90%	3.00%
<b>Additional Variables (sources: The College Board and TIAA-CREF Tuition Financing, Inc.)</b>			
<b>National Private Tuition Inflation</b>		4.33%	2.66%
<b>National Public Tuition Inflation</b>		4.88%	2.91%

# 2016 Asset Allocation Assumptions



Return/Risk Profile for Capital Market Assumptions



Tuition data are sourced from the 2016 College Board Trends in Tuition Pricing.

**Private 4-year Tuition Inflation:**

$$T(t) = 0.02377 + i(t) + 0.01302 * S(t-1) + 0.16823 * B(t) + 0.22266 * R(t-1) - 0.20483 * GDP + e1(t)$$

Expected Value = 4.33%

**Public Tuition Inflation:**

$$T(t) = 0.04510 + i(t) - 0.00547 * S(t-1) + 0.24540 * B(t) + 0.13658 * R(t-1) - 0.93896 * GDP + e2(t)$$

Expected Value = 4.88%

where T(t) is the tuition inflation rate in year t,

i(t) is the CPI inflation rate in year t,

S(t) is the real stock total return (Russell 3000 Index) in year t,

B(t) is the real core fixed income total return (Barclays Capital U.S. Aggregate Bond Index) in year t,

R(t) is the 3 Month T-Bill real return in year t,

GDP is the expected real GDP percent change (2.2%) for the next 10 years (source: Federal Reserve Bank of Philadelphia),

e1(t) is the random error term following a logistic distribution (0%, 0.01%) with a zero mean and standard deviation of 2.02%,

e2(t) is the random error term following a lognormal distribution (-0.01%, 0.01%) with a zero mean and standard deviation of 2.27%

Regression is based on data from 1977-2016.

For 2016-2017 school year, average tuition and fees were: \$9,650 for all in-state public colleges and \$33,480 for private 4-year colleges; based on most recent data 70% enrolled in public colleges and 30% enrolled in private colleges. The enrollment-weighted average tuition and fees for all colleges were \$16,799 = \$9,650\* 70% + \$33,480 \* 30%. The forecasted enrollment-weighted average tuition and fees for year 1 are \$17,563.80 = \$9,650 \* (1+4.88%) \* 70% + \$33,480\* (1 + 4.33%) \* 30%. Therefore, the public / private enrollment weighted tuition inflation rate for year 1 is: 4.55% = \$17,563.80 / \$16,799.00 - 1

## Expected Relationship Between Pairs of Asset Classes

	TC Life Funding Agreement	BofAML U.S. 3-Month Treasury Bill / iMoneyNet	Citigroup World Gov't Bond Index	JPM EMBI Global Diversified Index	BBarclays U.S. Aggregate Bond Index	BBarclays U.S. Universal Index	BBarclays U.S. TIPS Year Index	BBarclays U.S. TIPS 1-10 Year Index	BBarclays U.S. 1-3 Year Gov't / Credit Bond Index	BBofAML US HY BB/B Cash Pay Index	Credit Suisse Leveraged Loan Index	BBarclays U.S. 0-5 Year TIPS Index	FTSE NAREIT All Equity REITs Index	Russell 3000 Index	Russell 1000 Value Index	Russell 1000 Growth Index	Russell 2000 Index	Bloomberg Commodity Index	MSCI EAFE Index	MSCI Emerging Markets Index
TC Life Funding Agreement	1.00																			
BofAML U.S. 3-Month Treasury Bill / iMoneyNet	0.38	1.00																		
Citigroup World Gov't Bond Index	0.55	0.14	1.00																	
JPM EMBI Global Diversified Index	0.52	0.10	0.52	1.00																
BBarclays U.S. Aggregate Bond Index	0.88	0.25	0.55	0.46	1.00															
BBarclays U.S. Universal Index	0.88	0.37	0.61	0.36	0.98	1.00														
BBarclays U.S. TIPS Year Index	0.66	0.09	0.45	0.56	0.63	0.89	1.00													
BBarclays U.S. TIPS 1-10 Year Index	0.66	0.28	0.52	0.39	0.78	0.89	0.97	1.00												
BBarclays U.S. 1-3 Year Gov't / Credit Bond Index	0.78	0.54	0.59	0.39	0.77	0.80	0.55	0.54	1.00											
BBofAML US HY BB/B Cash Pay Index	0.41	0.05	0.36	0.64	0.44	0.29	0.35	0.37	0.33	1.00										
Credit Suisse Leveraged Loan Index	-0.16	-0.16	-0.10	0.72	0.02	0.31	0.42	0.42	-0.10	0.34	1.00									
BBarclays U.S. 0-5 Year TIPS Index	0.25	0.25	0.44	0.71	0.51	0.73	0.94	0.94	0.50	0.44	0.66	1.00								
FTSE NAREIT All Equity REITs Index	0.20	0.02	0.30	0.44	0.21	0.35	0.19	0.23	0.13	0.43	0.56	0.27	1.00							
Russell 3000 Index	0.12	0.12	0.17	0.47	0.09	0.24	-0.12	-0.12	-0.02	0.49	0.24	0.35	0.50	1.00						
Russell 1000 Value Index	0.18	0.02	0.28	0.48	0.11	0.33	0.07	-0.09	0.02	0.49	0.58	0.24	0.65	0.94	1.00					
Russell 1000 Growth Index	0.05	-0.05	0.16	0.42	0.04	0.15	0.02	-0.14	-0.06	0.45	0.57	0.44	0.53	0.95	0.82	1.00				
Russell 2000 Index	0.14	-0.03	0.16	0.47	0.10	0.23	0.09	-0.11	0.01	0.49	0.24	0.29	0.60	0.88	0.80	0.81	1.00			
Bloomberg Commodity Index	0.21	0.21	0.09	0.74	-0.01	0.10	0.64	0.64	-0.06	0.28	0.26	0.70	0.41	0.28	0.26	0.12	0.25	1.00		
MSCI EAFE Index	0.10	-0.01	0.49	0.58	0.11	-0.04	0.09	0.02	0.01	0.54	0.62	0.51	0.58	0.84	0.82	0.78	0.75	0.36	1.00	
MSCI Emerging Markets Index	-0.12	-0.07	0.20	0.48	-0.05	-0.03	0.00	0.31	-0.12	0.42	0.70	0.77	0.51	0.69	0.65	0.66	0.65	0.59	0.74	1.00

# Simulation Results: Current Active Age-Based Portfolio



Bene's Age	Asset Allocations									
	Large Cap Growth	Large Cap Value	Small Cap Equity	Real Estate Securities	Int'l Equities	Emerging Market Equities	Core Fixed Income	Inflation-Linked Bond	Floating Rate	Funding Agreement
0	22.68%	22.68%	5.04%	5.60%	19.20%	4.80%	14.00%	4.00%	2.00%	0.00%
1	22.68%	22.68%	5.04%	5.60%	19.20%	4.80%	14.00%	4.00%	2.00%	0.00%
2	22.68%	22.68%	5.04%	5.60%	19.20%	4.80%	14.00%	4.00%	2.00%	0.00%
3	22.68%	22.68%	5.04%	5.60%	19.20%	4.80%	14.00%	4.00%	2.00%	0.00%
4	22.68%	22.68%	5.04%	5.60%	19.20%	4.80%	14.00%	4.00%	2.00%	0.00%
5	19.85%	19.85%	4.40%	4.90%	16.80%	4.20%	21.00%	6.00%	3.00%	0.00%
6	19.85%	19.85%	4.40%	4.90%	16.80%	4.20%	21.00%	6.00%	3.00%	0.00%
7	19.85%	19.85%	4.40%	4.90%	16.80%	4.20%	21.00%	6.00%	3.00%	0.00%
8	19.85%	19.85%	4.40%	4.90%	16.80%	4.20%	21.00%	6.00%	3.00%	0.00%
9	17.01%	17.01%	3.78%	4.20%	14.40%	3.60%	28.00%	8.00%	4.00%	0.00%
10	17.01%	17.01%	3.78%	4.20%	14.40%	3.60%	28.00%	8.00%	4.00%	0.00%
11	14.18%	14.18%	3.14%	3.50%	12.00%	3.00%	35.00%	10.00%	5.00%	0.00%
12	14.18%	14.18%	3.14%	3.50%	12.00%	3.00%	35.00%	10.00%	5.00%	0.00%
13	11.34%	11.34%	2.52%	2.80%	9.60%	2.40%	42.00%	12.00%	6.00%	0.00%
14	11.34%	11.34%	2.52%	2.80%	9.60%	2.40%	42.00%	12.00%	6.00%	0.00%
15	8.51%	8.51%	1.88%	2.10%	7.20%	1.80%	42.00%	12.00%	6.00%	10.00%
16	7.09%	7.09%	1.57%	1.75%	6.00%	1.50%	38.50%	11.00%	5.50%	20.00%
17	5.67%	5.67%	1.26%	1.40%	4.80%	1.20%	31.50%	9.00%	4.50%	35.00%
18	4.25%	4.25%	0.95%	1.05%	3.60%	0.90%	24.50%	7.00%	3.50%	50.00%
19	4.25%	4.25%	0.95%	1.05%	3.60%	0.90%	24.50%	7.00%	3.50%	50.00%
20+	4.25%	4.25%	0.95%	1.05%	3.60%	0.90%	24.50%	7.00%	3.50%	50.00%

Investment Horizon (in years)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Average Annual Return over Investment Horizon	Standard Deviation of Returns over Investment Horizon	Average Annual Tuition Inflation over Investment Horizon	Probability of Exceeding Tuition Inflation	Probability of Achieving 90 cents per Dollar of Future Tuition	Probability of Non-Negative Return	Annualized Shortfall
21	4.50%	2.06%	4.55%	50.08%	60.72%	98.42%	-2.35%
20	4.48%	2.05%	4.55%	48.22%	59.42%	98.22%	-2.29%
19	4.46%	2.07%	4.55%	48.48%	60.10%	98.08%	-2.27%
18	4.44%	2.09%	4.55%	47.82%	60.36%	98.18%	-2.22%
17	4.38%	2.10%	4.55%	46.28%	59.40%	98.14%	-2.22%
16	4.43%	2.05%	4.55%	47.94%	61.56%	98.48%	-2.16%
15	4.43%	2.04%	4.55%	47.32%	61.80%	98.54%	-2.11%
14	4.23%	2.05%	4.55%	44.06%	59.46%	97.90%	-2.17%
13	4.25%	2.00%	4.55%	44.60%	61.28%	98.18%	-2.11%
12	4.25%	1.98%	4.55%	43.54%	63.42%	98.20%	-2.01%
11	4.27%	1.96%	4.55%	44.34%	64.32%	98.26%	-2.00%
10	4.16%	1.93%	4.55%	42.18%	64.86%	98.72%	-1.96%
9	4.11%	1.95%	4.55%	41.44%	67.00%	98.12%	-1.95%
8	4.11%	1.92%	4.55%	41.26%	69.72%	98.50%	-1.89%
7	3.97%	1.93%	4.55%	37.44%	70.80%	98.00%	-1.89%
6	3.95%	1.85%	4.55%	36.46%	75.82%	98.26%	-1.82%
5	3.91%	1.90%	4.55%	35.90%	81.02%	98.20%	-1.84%
4	3.82%	1.95%	4.55%	35.22%	85.68%	97.58%	-1.92%
3	3.81%	2.20%	4.55%	35.74%	91.48%	96.16%	-2.03%
2	3.82%	2.64%	4.55%	38.24%	96.80%	93.38%	-2.36%
1	3.83%	3.79%	4.55%	41.44%	99.52%	84.80%	-3.28%

\*Annualized Shortfall is the expected annual percentage difference between tuition inflation and returns among all scenarios that fail to exceed tuition inflation.

# Simulation Results: Current Passive Age-Based Portfolio



Bene's Age	Asset Allocations							
	Domestic Equities	Int'l Equities	Emerging Market Equities	Real Estate Securities	Core Fixed Income	Inflation-Linked Bond	High Yield Fund	Funding Agreement
0	50.40%	19.20%	4.80%	5.60%	14.00%	4.00%	2.00%	0.00%
1	50.40%	19.20%	4.80%	5.60%	14.00%	4.00%	2.00%	0.00%
2	50.40%	19.20%	4.80%	5.60%	14.00%	4.00%	2.00%	0.00%
3	50.40%	19.20%	4.80%	5.60%	14.00%	4.00%	2.00%	0.00%
4	50.40%	19.20%	4.80%	5.60%	14.00%	4.00%	2.00%	0.00%
5	44.10%	16.80%	4.20%	4.90%	21.00%	6.00%	3.00%	0.00%
6	44.10%	16.80%	4.20%	4.90%	21.00%	6.00%	3.00%	0.00%
7	44.10%	16.80%	4.20%	4.90%	21.00%	6.00%	3.00%	0.00%
8	44.10%	16.80%	4.20%	4.90%	21.00%	6.00%	3.00%	0.00%
9	37.80%	14.40%	3.60%	4.20%	28.00%	8.00%	4.00%	0.00%
10	37.80%	14.40%	3.60%	4.20%	28.00%	8.00%	4.00%	0.00%
11	31.50%	12.00%	3.00%	3.50%	35.00%	10.00%	5.00%	0.00%
12	31.50%	12.00%	3.00%	3.50%	35.00%	10.00%	5.00%	0.00%
13	25.20%	9.60%	2.40%	2.80%	42.00%	12.00%	6.00%	0.00%
14	25.20%	9.60%	2.40%	2.80%	42.00%	12.00%	6.00%	0.00%
15	18.90%	7.20%	1.80%	2.10%	42.00%	12.00%	6.00%	10.00%
16	15.75%	6.00%	1.50%	1.75%	38.50%	11.00%	5.50%	20.00%
17	12.60%	4.80%	1.20%	1.40%	31.50%	9.00%	4.50%	35.00%
18	9.45%	3.60%	0.90%	1.05%	24.50%	7.00%	3.50%	50.00%
19	9.45%	3.60%	0.90%	1.05%	24.50%	7.00%	3.50%	50.00%
20+	9.45%	3.60%	0.90%	1.05%	24.50%	7.00%	3.50%	50.00%

Investment Horizon (in years)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Average Annual Return over Investment Horizon	Standard Deviation of Returns over Investment Horizon	Average Annual Tuition Inflation over Investment Horizon	Probability of Exceeding Tuition Inflation	Probability of Achieving 90 cents per Dollar of Future Tuition	Probability of Non-Negative Return	Annualized Shortfall
21	4.55%	2.00%	4.55%	50.48%	60.74%	98.62%	-2.30%
20	4.50%	2.04%	4.55%	48.90%	59.38%	98.74%	-2.30%
19	4.48%	2.04%	4.55%	49.34%	60.30%	98.50%	-2.26%
18	4.42%	2.01%	4.55%	47.72%	60.02%	98.36%	-2.22%
17	4.45%	2.06%	4.55%	48.78%	61.78%	98.20%	-2.18%
16	4.38%	2.03%	4.55%	47.28%	60.54%	98.44%	-2.19%
15	4.31%	2.02%	4.55%	45.20%	59.84%	98.26%	-2.14%
14	4.33%	2.02%	4.55%	46.08%	61.76%	98.46%	-2.10%
13	4.28%	1.98%	4.55%	44.36%	62.04%	98.32%	-2.03%
12	4.24%	1.94%	4.55%	43.44%	63.20%	98.50%	-1.98%
11	4.22%	1.97%	4.55%	43.22%	63.80%	98.32%	-2.00%
10	4.19%	1.88%	4.55%	42.74%	66.14%	98.44%	-1.91%
9	4.14%	1.90%	4.55%	40.46%	66.84%	98.70%	-1.89%
8	4.00%	1.90%	4.55%	38.56%	67.20%	98.50%	-1.92%
7	4.03%	1.93%	4.55%	39.02%	72.42%	97.86%	-1.87%
6	3.96%	1.87%	4.55%	36.84%	76.02%	98.40%	-1.81%
5	3.82%	1.89%	4.55%	34.44%	79.30%	97.92%	-1.89%
4	3.84%	2.00%	4.55%	35.00%	86.34%	97.16%	-1.88%
3	3.76%	2.20%	4.55%	34.86%	91.66%	96.42%	-2.03%
2	3.71%	2.68%	4.55%	37.38%	96.28%	91.90%	-2.43%
1	3.83%	3.79%	4.55%	40.92%	99.78%	84.70%	-3.17%

\*Annualized Shortfall is the expected annual percentage difference between tuition inflation and returns among all scenarios that fail to exceed tuition inflation.

- **(1) Expected Return.** The average of a distribution of possible annualized investment returns over an investment horizon of n years generated by Monte Carlo simulation. The returns are based on the assumption that each year money will be invested according to the asset class allocation assigned to the beneficiary's age.
- **(2) Standard Deviation of Returns.** A statistic used as a measure of the dispersion or variation in the distribution of annualized investment returns over an investment horizon of n years generated by Monte Carlo simulation, equal to the square root of the arithmetic mean of the squares of the deviations from the expected return. A higher standard deviation indicates a higher volatility.
- **(3) Average Annual Tuition Inflation.** The average of a distribution of possible annualized tuition inflation rates over an investment horizon of n years generated by the Monte Carlo simulation.
- **(4) Probability of Exceeding Tuition Inflation.** The likelihood that the annualized investment return exceeds the average tuition inflation rate over an investment horizon of n years, out of all the possible trials simulated by the Monte Carlo simulation.
- **(5) Probability of Achieving 90 Cents per Dollar of Future Tuition.** The likelihood that each dollar of investment today will grow to cover at least 90% of future tuition based on one dollar of today's tuition rising with tuition inflation over an investment horizon of n years.
- **(6) Probability of Non-negative Return.** The likelihood that the investment will achieve at least 0% of annualized return (preserving principal) over an investment horizon of n years.
- **(7) Annualized Shortfall.** The average of a distribution of the differences (shortfalls) between annualized investment returns and annualized tuition inflation rates over an investment horizon of n years among those scenarios that have annualized investment return failing to keep pace with tuition inflation.

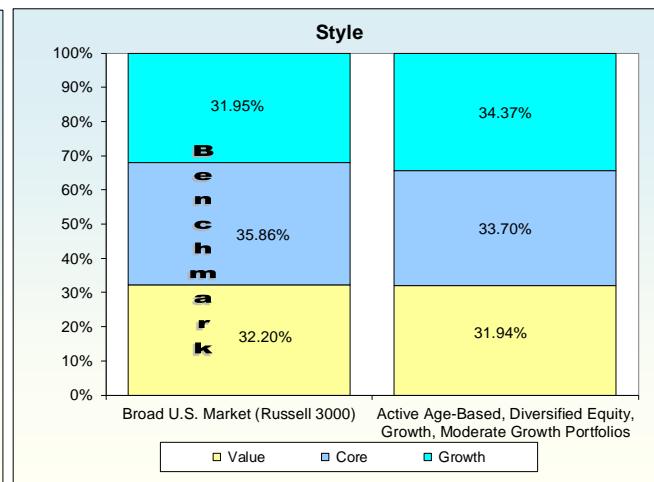
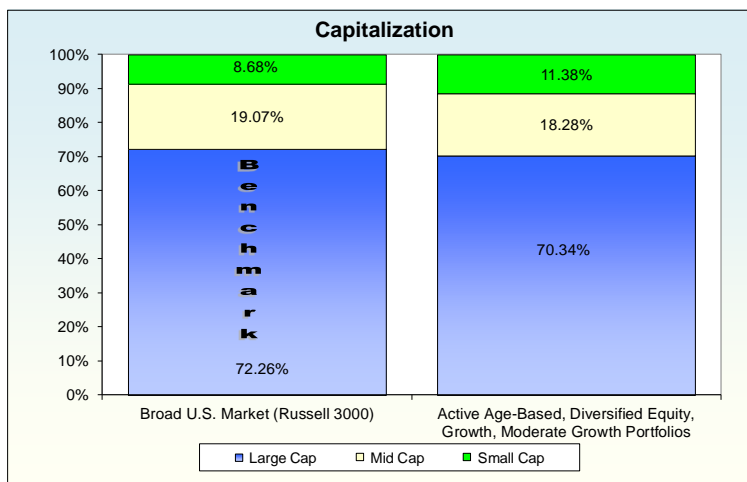
- TFI reviewed the current domestic equity allocation in the Active Age-Based, Active Diversified Equity, Active Growth, and Active Moderate Growth Portfolios compared to each of the Morningstar 9 Style categories in relation to the broad domestic equity index (Russell 3000 Index).
- TFI's philosophy in developing a domestic equity strategy is to maintain a neutral and balanced position in both style (growth vs. value) and capitalization (large cap, mid cap and small cap) to the Russell 3000 Index.
- The style and capitalization weightings for the domestic equity component of these portfolios are in line with those of the Russell 3000 Index.



# Domestic Equity Composition: Market Cap and Style



Benchmarks	Asset Allocation	Capitalization Analysis				Style Analysis			
	Active Age-Based, Diversified Equity, Growth, Moderate Growth Portfolios	Large Cap	Mid Cap	Small Cap	Total	Value	Core	Growth	Total
Russell 1000 Value Index	45.00%	76.04%	21.23%	2.73%	100.00%	52.93%	37.59%	9.48%	100.00%
Russell 1000 Growth Index	45.00%	80.28%	18.67%	1.06%	100.00%	11.46%	29.78%	58.76%	100.00%
Russell Mid Cap Value Index	0.00%	23.49%	67.75%	8.76%	100.00%	47.80%	34.72%	17.48%	100.00%
Russell Mid Cap Growth Index	0.00%	25.19%	70.79%	4.02%	100.00%	9.70%	27.72%	62.58%	100.00%
Russell 2000 Index	10.00%	0.00%	3.28%	96.72%	100.00%	29.67%	33.84%	36.50%	100.00%
S&P 500 Index	0.00%	86.73%	13.12%	0.15%	100.00%	33.06%	33.91%	33.03%	100.00%
Russell 3000 Index	0.00%	72.52%	18.73%	8.75%	100.00%	31.88%	33.67%	34.45%	100.00%
<b>Total Blended Portfolio</b>	<b>100.00%</b>								
<b>Broad U.S. Market (Russell 3000)</b>		<b>72.26%</b>	<b>19.07%</b>	<b>8.68%</b>	<b>100.00%</b>	<b>32.20%</b>	<b>35.86%</b>	<b>31.95%</b>	<b>100.00%</b>
<b>Active Age-Based, Diversified Equity, Growth, Moderate Growth Portfolios</b>		<b>70.34%</b>	<b>18.28%</b>	<b>11.38%</b>	<b>100.00%</b>	<b>31.94%</b>	<b>33.70%</b>	<b>34.37%</b>	<b>100.00%</b>



# Domestic Equity Composition: Style Box Comparison



Benchmarks	Asset Allocation	Morningstar 9 Style Categories									
	Active Age-Based, Diversified Equity, Growth, Moderate Growth Portfolios	Large Value	Large Core	Large Growth	Mid Value	Mid Core	Mid Growth	Small Value	Small Core	Small Growth	Total
Russell 1000 Value Index	45.00%	40.62%	29.19%	6.23%	10.73%	7.54%	2.96%	1.58%	0.86%	0.30%	100.00%
Russell 1000 Growth Index	45.00%	9.08%	23.58%	47.62%	2.19%	5.75%	10.73%	0.19%	0.45%	0.41%	100.00%
Russell Mid Cap Value Index	0.00%	8.32%	8.12%	7.05%	34.42%	23.85%	9.48%	5.06%	2.76%	0.95%	100.00%
Russell Mid Cap Growth Index	0.00%	0.64%	4.30%	20.25%	8.32%	21.71%	40.76%	0.74%	1.71%	1.58%	100.00%
Russell 2000 Index	10.00%	0.00%	0.00%	0.00%	0.97%	1.28%	1.03%	28.70%	32.56%	35.47%	100.00%
S&P 500 Index	0.00%	27.82%	29.26%	29.64%	5.14%	4.60%	3.39%	0.10%	0.05%	0.00%	100.00%
Russell 3000 Index	0.00%	22.95%	24.46%	25.11%	6.04%	6.25%	6.44%	2.89%	2.96%	2.90%	100.00%
<b>Total Blended Portfolio</b>	<b>100.00%</b>										

Broad Market (Russell 3000)	22.95%	24.46%	25.11%	6.04%	6.25%	6.44%	2.89%	2.96%	2.90%	100.00%
Active Age-Based, Diversified Equity, Growth, Moderate Growth Portfolios	<b>22.37%</b>	<b>23.75%</b>	<b>24.23%</b>	<b>5.91%</b>	<b>6.11%</b>	<b>6.26%</b>	<b>3.67%</b>	<b>3.85%</b>	<b>3.87%</b>	<b>100.00%</b>

Difference in Portfolios vs. Broad Market			
Active Age-Based, Diversified Equity, Growth, Moderate Growth Portfolios	Value	Core	Growth
Large Cap	-0.58%	-0.71%	-0.88%
Mid Cap	-0.13%	-0.14%	-0.18%
Small Cap	0.78%	0.89%	0.97%