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**DECEMBER 14, 2022**

**AGENDA ITEM 5  
INFORMATION ITEM**

**SCHOLARSHARE INVESTMENT BOARD**

*Review of 2023 Asset Allocation Recommendation for ScholarShare 529*

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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 ScholarShare 529 (Plan) to determine if any changes are necessary to continue to meet its investment objectives.

TFI has provided its “Asset Allocation Recommendation for 2023” (Exhibit A), which highlights the analysis completed for their recommendation for no changes for 2023 and includes an update on some operational items for 2023. Their asset allocation study for the Plan was completed with a primary focus on:

- a review of the Enrollment Year Investment Portfolios and all static portfolios for the Plan;
- the simulated probability of outpacing tuition inflation in the Enrollment Year Investment Portfolios; and
- a fresh look at the investment menu compared with the industry trends.

The Board’s investment consultant, Meketa Investment Group (Meketa), reviewed and analyzed TFI’s recommendation and provided a memo (Exhibit B) concurring with TFI’s recommendation for no changes for 2023. SIB staff have reviewed and concur with TFI’s recommendation for no changes in 2023 to the Plan’s asset allocation.

***Presenters***

Jeremy Thiessen, Senior Director, Institutional Investment Strategist,

TIAA-CREF Tuition Financing, Inc.

Eric White, Principal, Meketa Investment Group



# Asset Allocation Recommendation for 2023

Prepared by TIAA-CREF Tuition Financing, Inc.

December 14, 2022

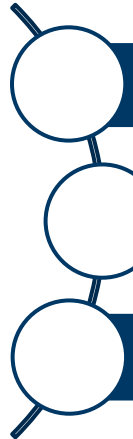


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# Executive Summary

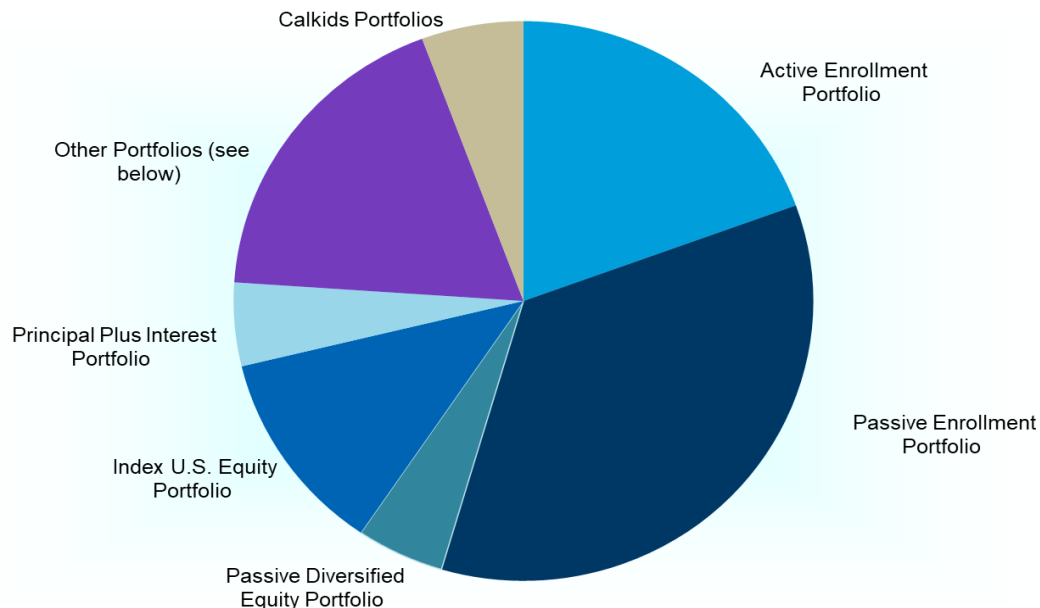
TFI has completed this year's asset allocation study to evaluate the overall investment strategy for ScholarShare 529 with a primary focus on:

- 
- A review of the Enrollment Year Portfolios and all Static Portfolios for the plan
  - The simulated probability of outpacing tuition inflation in the Enrollment Year Portfolios
  - A fresh look at the investment menu compared with the industry trends

Based on this review, TFI recommends:

- No changes in asset allocations for all the portfolios

# Asset Overview by Portfolio as of Q3 2022 - Total Assets: \$11.6 Billion



Portfolio	% of Assets	\$ Millions	Portfolio	% of Assets	\$ Millions
Passive Enrollment Portfolio	37.23%	\$4,332	Passive Diversified Equity Portfolio	5.21%	\$606
Active Enrollment Portfolio	20.63%	\$2,400	Principal Plus Interest Portfolio	5.10%	\$594
Index U.S. Equity Portfolio	12.48%	\$1,452	Other Portfolios (see below)	18.26%	\$2,252

## Other Portfolios

Active Diversified Equity Portfolio	2.97%	\$345	Index Bond Portfolio	0.68%	\$79
Active Growth Portfolio	2.71%	\$315	Active Conservative Portfolio	0.67%	\$78
Passive Growth Portfolio	2.24%	\$260	Active International Equity Portfolio	0.28%	\$33
Social Choice Equity Portfolio	1.91%	\$222	ESG Enrollment Portfolio	0.05%	\$6
Index International Equity Portfolio	1.02%	\$118	ESG Bond Portfolio	0.01%	\$1.3
Passive Conservative Portfolio	0.79%	\$92	ESG International Equity Portfolio	0.00%	\$0.5

## CalKIDS Portfolios

Passive Enrollment Portfolio	5.90%	\$687	Principal Plus Interest Portfolio	0.12%	\$14
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\* CalKIDS AUM are included in the total assets of \$11.6 billion

# Brief Market Perspectives

## U.S. Equity

Entering into 2022, U.S. economy encountered several headwinds:

- Federal Reserve's hawkish monetary policy
- Increase in interest rates
- Rising inflation
- Slowing economic growth

These headwinds led to widespread selloff across all styles and capitalization in the equity market.

## Fixed Income

With interest rates rising, bond yields experienced upward pressure across the board. The 10 year U.S Treasury Yield reached 4% in October; levels not seen since June 2008.

## Global Market

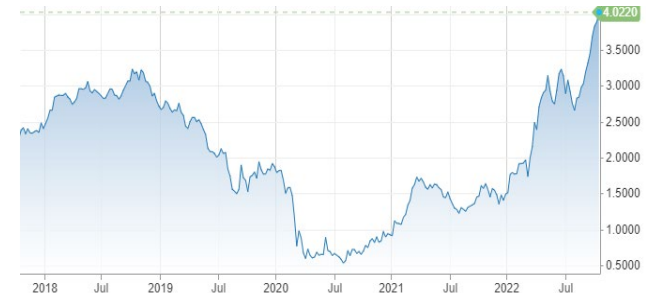
The global markets experienced strong appreciation of the U.S dollar and slow economic growth. European markets were hit by high energy cost and slow economy. China continued with its zero COVID policy which made its economic outlook uncertain.

TFI continues to recommend a diversified approach to the equity and fixed income markets to mitigate the investment risk, interest rate risk and credit risk.

Morningstar Equity Research Coverage Price/Fair Value, U.S. Equity Style Box

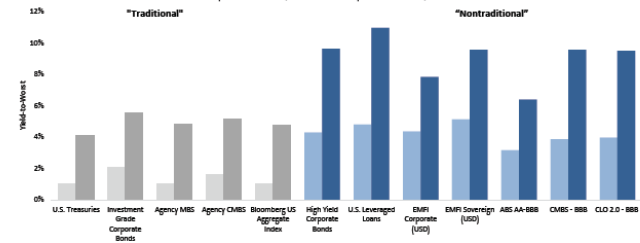


Source: Morningstar Equity Research. Data as of Sept. 26, 2022.



1-Year Fixed Income Index Yields Change

September 30, 2021 vs. September 30, 2022



Source: Bloomberg, DoubleLine  
Lighter bars represent September 30, 2021. Darker bars represent September 30, 2022.

## Enhancement completed in February 2022

- Expanded the ESG offering to include an all-new ESG glide path, and added additional single-fund ESG investment options for the international equity and U.S. core bond markets
- Reduced participant fees in both the Active and Passive portfolios by introducing allocations to low-cost Vanguard and TIAA-CREF funds
- Streamlined the five diversified Multi-Fund Portfolios from five to three in both the Active and Passive lineups, and merged the Index U.S. Large Cap Equity Portfolio into the Index U.S. Equity Portfolio

# Operational Items for 2023

- Add a 2040/2041 Enrollment Portfolio in Enrollment Year Portfolios
- Merge the existing 2022/2023 Enrollment Portfolio into the Enrollment Year Portfolio
- Using Dreyfus Government Cash Management Fund (DGCXX) in the ETF cash requirement sleeve. The implementation can take place in 1st quarter 2023



# Liquidity in ETFs

## Background:

- ETFs have a two-day settlement cycle, while our portfolios have a one-day settlement cycle. ETF portfolios maintain a specified percentage of total portfolio assets in a cash account or money market fund to ensure portfolio trading on a T+1 basis and allow for timely disbursement of funds.
- The rise in interest rates throughout the year has made investing in money market funds an attractive option
  - The allocation to cash in the ScholarShares' ETF account is roughly 2%
- The three money market funds supported by the BNYM platform are listed below:

Fund Name	Ticker	Assets (in Billion)	Ratings (M/S&P)	Fee	1 Month	3 Month	YTD	Average Annual Total Return As of 10/31/2022			
								1 Year	3 Year	5 Year	10 Year
Dreyfus Government Cash Mgmt*	DGCXX	\$101	Aaa-mf/AAAm	0.18	0.24	0.50	0.67	0.92	0.52	1.06	0.59
JPMorgan US Gov't MMkt Capital	OGVXX	\$160	Aaa-mf/AAAm	0.18	0.23	0.48	0.67	0.90	0.52	1.05	0.59
Invesco Shrt-Trm Inv Gov&Agcy	AGPXX	\$37	Aaa-mf/AAAm	0.16	0.30	0.47	0.65	0.96	0.54	1.07	0.60

# Changes in Capital Market Assumptions

(2022 assumptions -2021 assumptions)

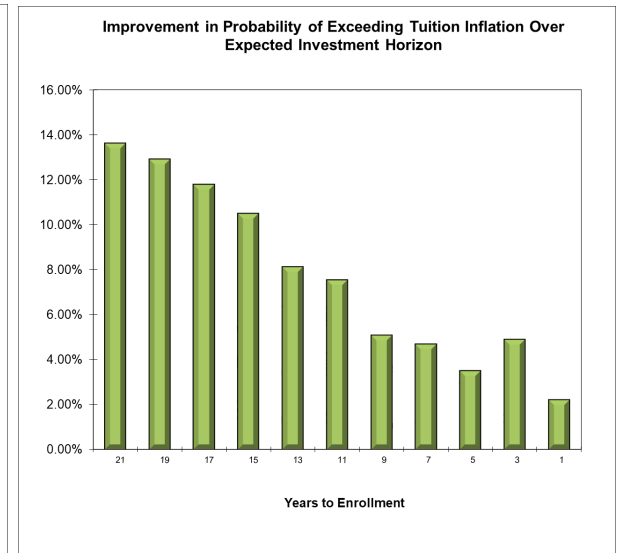
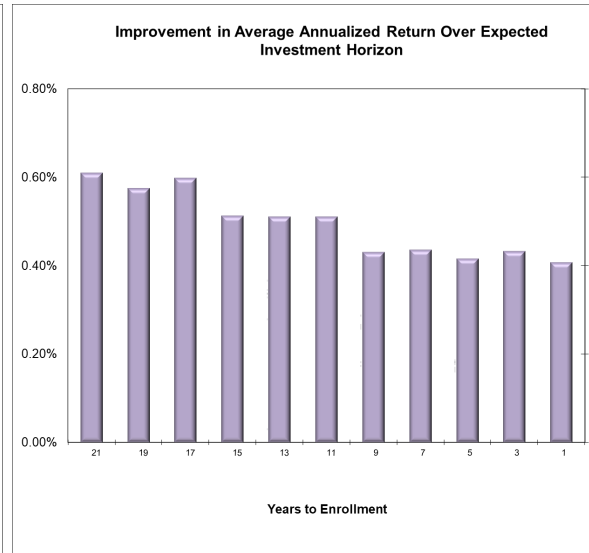
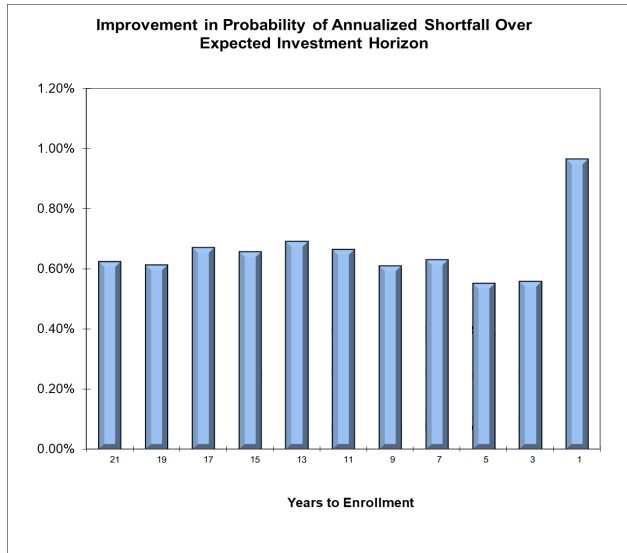
- Comparison of annual capital market assumptions small, but positive changes

Variables	Benchmarks	Change in Capital Market Assumptions (source: Ibbotson)	
		Returns (Long-Term Average)	Volatility (Standard Deviation)
U.S. Equity	Russell 3000 Index	1.28%	0.09%
Large Cap Growth Equity	Russell 1000 Growth Index	2.28%	0.03%
Large Cap Value Equity	Russell 1000 Value Index	0.48%	0.03%
Large Cap Equity	S&P 500 Index	1.46%	0.11%
Small Cap Equity	Russell 2000 Index	0.14%	-0.25%
Developed International Equity	MSCI EAFE Index	0.26%	0.07%
Emerging Markets Equity	MSCI Emerging Markets Index	1.26%	-0.46%
Core Fixed Income	Bloomberg Barclays U.S. Aggregate Bond Index	0.48%	-0.02%
Floating Rate Fixed Income	Credit Suisse Leveraged Loan Index	-1.37%	0.05%
Emerging Markets Debt	JPM EMBI Global Diversified Index	0.26%	-0.20%
High Yield Fixed Income	BofAML US HY BB/B Cash Pay Index	0.04%	-0.02%
TIPS	Bloomberg Inflation-Linked U.S. TIPS Index	0.32%	-0.16%
Intermediate-Term TIPS	Bloomberg Inflation-Linked 1-10 Year U.S. TIPS Index	0.34%	-0.05%
Short-Term TIPS	Bloomberg U.S. 0-5 Year TIPS Index	0.28%	-0.17%
Short-Term Fixed Income	Bloomberg U.S. 1-3 Year Government/Credit Bond Index	0.56%	-0.01%
Real Estate Securities	FTSE NAREIT All Equity REITs Index	-0.89%	0.04%
CPI	Consumer Price Index - All Urban Consumers	0.00%	0.07%
3 Month T-Bill	BofAML US Treasury Bill 3 Month Index	0.18%	0.01%
Money Market	iMoneyNet Money Fund Report Averages All Taxable	0.00%	0.00%
TIAA Life Funding Agreement	Funding Agreement	0.47%	-0.08%
<b>Additional Variables (sources: The College Board and TIAA-CREF Tuition Financing, Inc.)</b>			
	National Private Tuition Inflation	-0.13%	0.17%
	National Public Tuition Inflation	-0.17%	0.28%

\*Comparison includes 2022 assumptions minus 2021 assumptions

# Changes in Simulation Outcomes

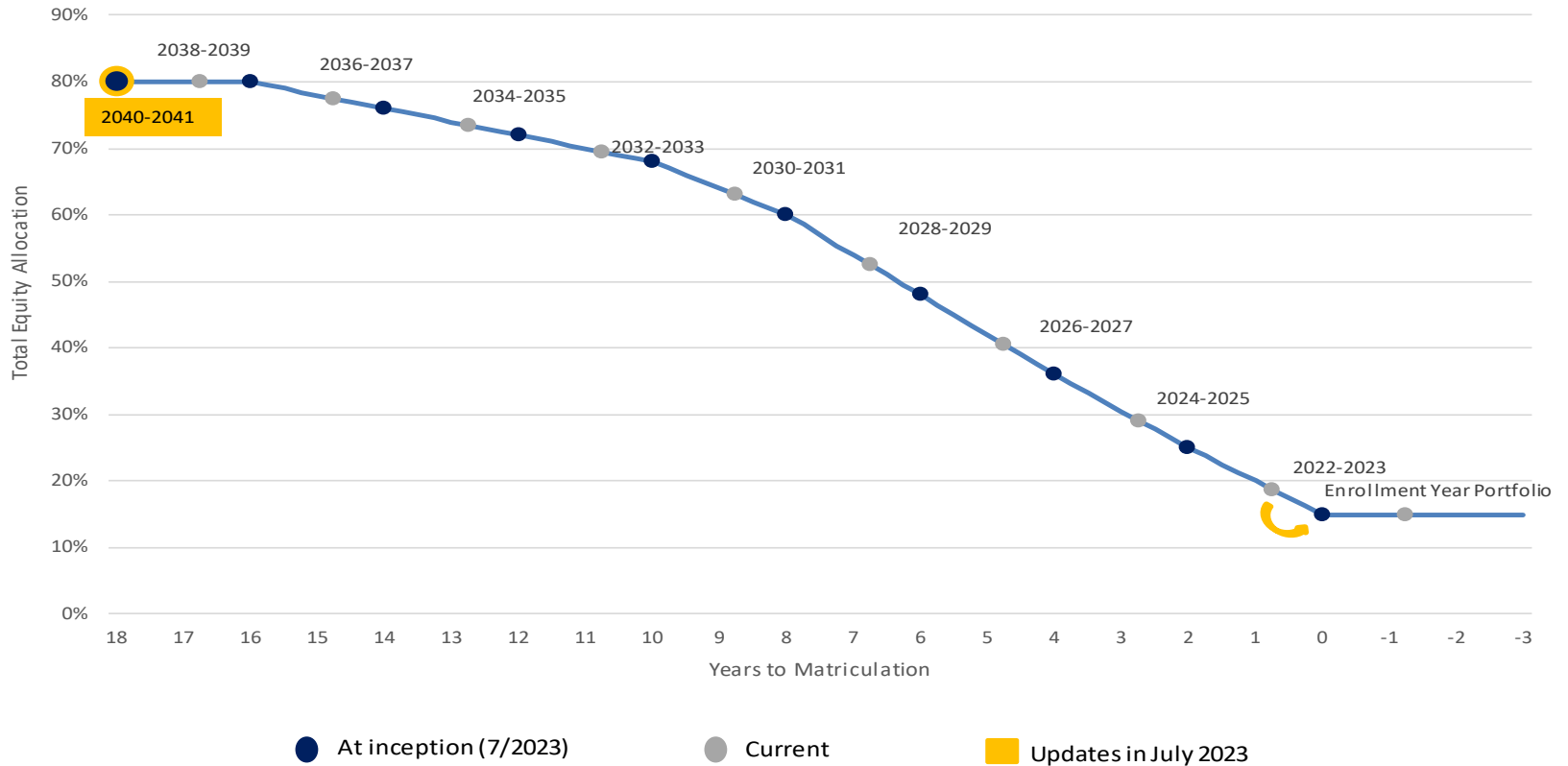
(2022 result -2021 result)



- All expected return metrics improved with new capital market assumptions
- Includes risk measures as well as return

# Enrollment Year Glide Path Maintenance

- In July 2023, the 2040-2041 Portfolio will be created, and the 2022-2023 cohort will be merging into the Enrollment Year Portfolio.



# New Active Enrollment Year Portfolio Investment Menu

	T. Rowe Price Large Cap Growth Fund	T. Rowe Price Large Cap Value Fund	TIAA-CREF Quant Small-Cap Equity	TIAA-CREF S&P 500 Index Fund	DFA Large Cap Intl Portfolio	DFA Emerging Markets Core Equity I Portfolio	Vanguard Real Estate Index Fund	MetWest Total Return Bond Fund	TIAA-CREF Bond Index Fund	PIMCO Real Return Fund	PIMCO Income Fund	T. Rowe Price Floating Rate Fund	TIAA-CREF Life Funding Agreement
Tickers	TRLGX	TILCX	TISEX	TISPX	DFALX	DFCEX	VGSNX	MWTSX	TBIIX	PRRIX	PIMIX	RPIFX	
2040/2041 Enrollment Portfolio Active	14.80%	14.80%	5.00%	15.80%	19.20%	4.80%	5.60%	7.00%	3.00%	4.00%	4.00%	2.00%	0.00%
2038/2039 Enrollment Portfolio Active	14.80%	14.80%	5.00%	15.80%	19.20%	4.80%	5.60%	7.00%	3.00%	4.00%	4.00%	2.00%	0.00%
2036/2037 Enrollment Portfolio Active	14.00%	14.00%	4.80%	15.20%	18.10%	4.60%	5.30%	8.40%	3.60%	4.80%	4.80%	2.40%	0.00%
2034/2035 Enrollment Portfolio Active	13.30%	13.30%	4.50%	14.20%	17.30%	4.30%	5.10%	9.80%	4.20%	5.60%	5.60%	2.80%	0.00%
2032/2033 Enrollment Portfolio Active	12.50%	12.50%	4.30%	13.60%	16.30%	4.00%	4.80%	11.20%	4.80%	6.40%	6.40%	3.20%	0.00%
2030/2031 Enrollment Portfolio Active	11.10%	11.10%	3.80%	11.80%	14.40%	3.60%	4.20%	14.00%	6.00%	8.00%	8.00%	4.00%	0.00%
2028/2029 Enrollment Portfolio Active	8.80%	8.80%	3.00%	9.60%	11.50%	2.90%	3.40%	18.20%	7.80%	10.40%	10.40%	5.20%	0.00%
2026/2027 Enrollment Portfolio Active	6.60%	6.60%	2.30%	7.20%	8.60%	2.20%	2.50%	18.90%	8.10%	10.80%	10.80%	5.40%	10.00%
2024/2025 Enrollment Portfolio Active	4.60%	4.60%	1.50%	5.00%	6.00%	1.50%	1.80%	14.00%	6.00%	8.00%	8.00%	4.00%	35.00%
Enrollment Year Portfolio Active	2.70%	2.70%	1.00%	3.00%	3.60%	0.90%	1.10%	12.25%	5.25%	7.00%	7.00%	3.50%	50.00%

- Enrollment Year Portfolios will include new 2040-2041 cohort
- 2022-2023 Portfolio will be merged into the Enrollment Year Portfolio
- Changes to be completed July 2023

# New Passive Enrollment Year Portfolio Investment Menu

Enrollment Year	TIAA-CREF Equity Index Fund	TIAA-CREF International Equity Index Fund	TIAA-CREF Emerging Markets Equity Index Fund	Vanguard Real Estate Index Fund	TIAA-CREF Bond Index Fund	Vanguard Shrt-Term Infl-Prot Sec Index Fund	Vanguard High-Yield Corporate Fund	TIAA-CREF Life Funding Agreement
Tickers	TIEIX	TCIEX	TEQLX	VGSNX	TBIIX	VTSPX	VWEAX	
2040/2041 Enrollment Portfolio Passive	50.40%	19.20%	4.80%	5.60%	14.00%	4.00%	2.00%	0.00%
2038/2039 Enrollment Portfolio Passive	50.40%	19.20%	4.80%	5.60%	14.00%	4.00%	2.00%	0.00%
2036/2037 Enrollment Portfolio Passive	47.90%	18.20%	4.60%	5.30%	16.80%	4.80%	2.40%	0.00%
2034/2035 Enrollment Portfolio Passive	45.40%	17.30%	4.30%	5.00%	19.60%	5.60%	2.80%	0.00%
2032/2033 Enrollment Portfolio Passive	42.80%	16.30%	4.10%	4.80%	22.40%	6.40%	3.20%	0.00%
2030/2031 Enrollment Portfolio Passive	37.80%	14.40%	3.60%	4.20%	28.00%	8.00%	4.00%	0.00%
2028/2029 Enrollment Portfolio Passive	30.20%	11.50%	2.90%	3.40%	36.40%	10.40%	5.20%	0.00%
2026/2027 Enrollment Portfolio Passive	22.70%	8.60%	2.20%	2.50%	37.80%	10.80%	5.40%	10.00%
2024/2025 Enrollment Portfolio Passive	15.70%	6.00%	1.50%	1.80%	28.00%	8.00%	4.00%	35.00%
Enrollment Year Portfolio Passive	9.40%	3.60%	0.90%	1.10%	24.50%	7.00%	3.50%	50.00%

- Enrollment Year Portfolios will include new 2040-2041 cohort
- 2022-2023 Portfolio will be merged into the Enrollment Year Portfolio
- Changes to be completed July 2023

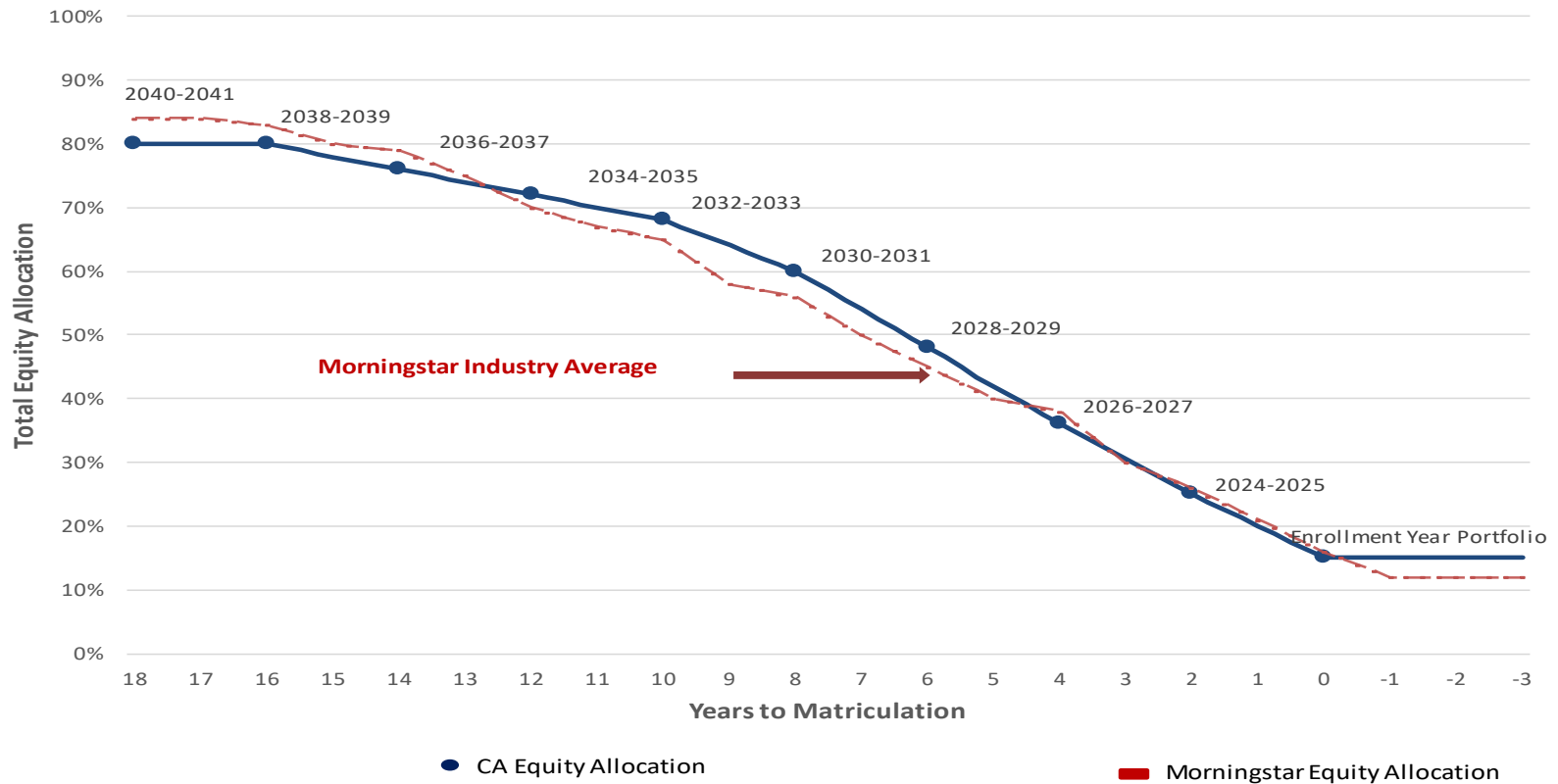
# New ESG Enrollment Year Portfolio Investment Menu

	TIAA-CREF Social Choice Equity Fund	TIAA-CREF Social Choice International Equity Fund	Nuveen ESG Emerging Markets Equity ETF	Nuveen ESG US Aggregate Bond ETF	Nuveen ESG High Yield Corporate Bd ETF	TIAA-CREF Life Funding Agreement
Tickers	TISCX	TSONX	NUEM	NUBD	NUHY	
2040/2041 Enrollment Portfolio ESG	56.00%	19.20%	4.80%	18.00%	2.00%	0.00%
2038/2039 Enrollment Portfolio ESG	56.00%	19.20%	4.80%	18.00%	2.00%	0.00%
2036/2037 Enrollment Portfolio ESG	53.30%	18.10%	4.60%	21.60%	2.40%	0.00%
2034/2035 Enrollment Portfolio ESG	50.40%	17.30%	4.30%	25.20%	2.80%	0.00%
2032/2033 Enrollment Portfolio ESG	47.70%	16.30%	4.00%	28.80%	3.20%	0.00%
2030/2031 Enrollment Portfolio ESG	42.00%	14.40%	3.60%	36.00%	4.00%	0.00%
2028/2029 Enrollment Portfolio ESG	33.60%	11.50%	2.90%	46.80%	5.20%	0.00%
2026/2027 Enrollment Portfolio ESG	25.20%	8.60%	2.20%	48.60%	5.40%	10.00%
2024/2025 Enrollment Portfolio ESG	17.50%	6.00%	1.50%	36.00%	4.00%	35.00%
Enrollment Year Portfolio ESG	10.50%	3.60%	0.90%	31.50%	3.50%	50.00%

- Enrollment Year Portfolios will include new 2040-2041 cohort
- 2022-2023 Portfolio will be merged into the In Enrollment Year Portfolio
- Changes to be completed July 2023

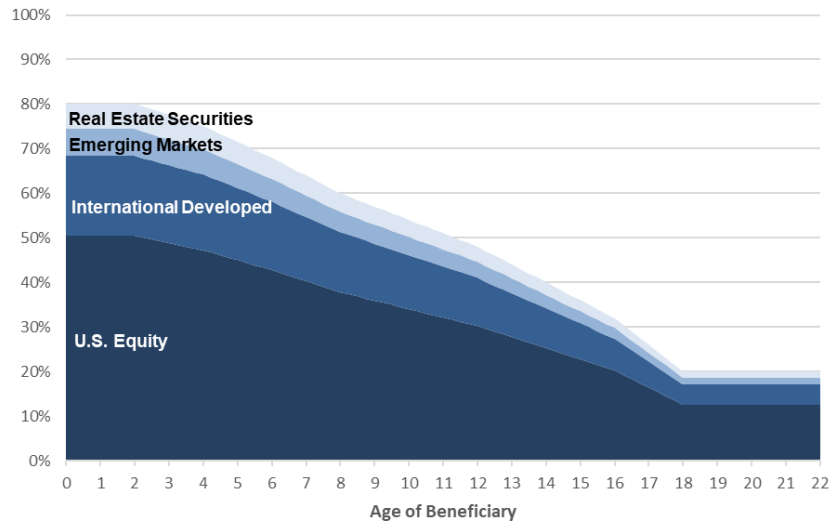
# Equity Allocation vs Median Plan

- Program's equity path stays close to industry average
- Any changes to move closer yield only modest improvements but with increased volatility

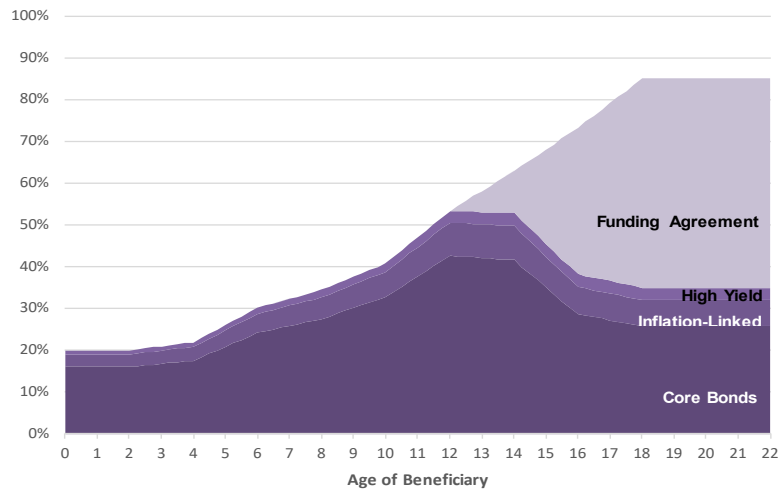




# Glide Path by Asset Class



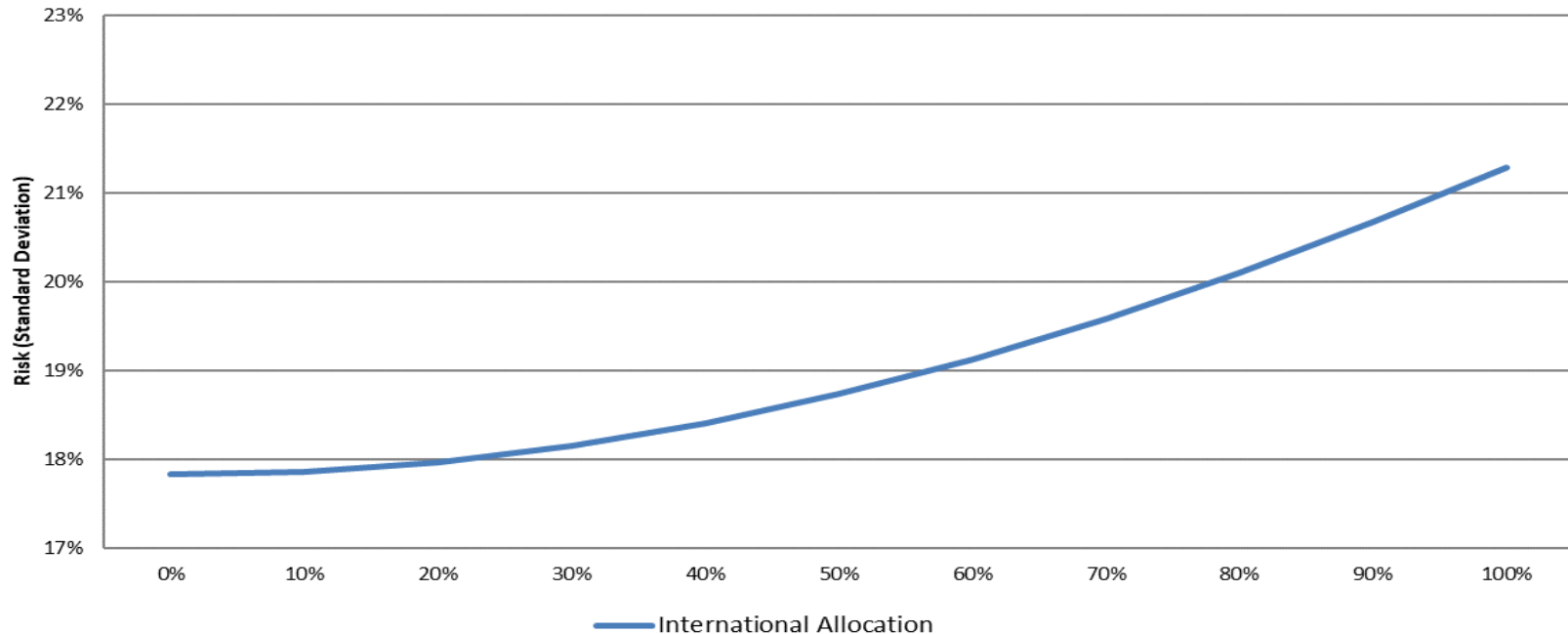
- Total equity allocation is split between U.S. (70%) and International (30%) exposure
- No sector biases
- Similar compositions to broad, cap-weighted domestic and international equity markets



- Total fixed-income exposure starts at 20% and ends at 35% fixed income/50% Funding Agreement(FA)
- Core and satellite approach
- Inflation-linked bonds provide a hedge against inflation risk and enhance diversification
- The FA provides a hedge against interest rate risk, reduces volatility, and provides principal protection

# International Equity Risk

**Portfolio Risk as a Function of International Allocation  
2002 - 2021**



\* Russell 3000 for domestic equity, MSCI EAFE for international developed markets equity, and MSCI EM for emerging markets equity (80% developed markets and 20% emerging markets, in line with the current allocation in ScholarShare).

- An international allocation of 20%-40% is meaningful enough to reap the benefits of global diversification, but not too much to hurt performance if foreign markets temporarily fall out of favor
- An allocation greater than 50% suggests that any potential incremental return is outweighed by taking on a disproportionately large amount of risk

# Duration in Active Enrollment Year Investment Options

	MetWest Total Return Bond Fund	TIAA-CREF Bond Index Fund	PIMCO Real Return Fund	PIMCO Income Fund	T. Rowe Price Floating Rate Fund	TIAA-CREF Life Funding Agreement	Weighted Average Duration (Years)
<b>Portfolio Effective Duration*</b>	<b>6.48</b>	<b>6.42</b>	<b>7.17</b>	<b>2.53</b>	<b>0.55</b>	<b>0.00</b>	
<b>2038/2039 Enrollment Portfolio Active</b>	35%	15%	20%	20%	10%	0%	<b>5.2</b>
<b>2036/2037 Enrollment Portfolio Active</b>	35%	15%	20%	20%	10%	0%	<b>5.2</b>
<b>2034/2035 Enrollment Portfolio Active</b>	35%	15%	20%	20%	10%	0%	<b>5.2</b>
<b>2032/2033 Enrollment Portfolio Active</b>	35%	15%	20%	20%	10%	0%	<b>5.2</b>
<b>2030/2031 Enrollment Portfolio Active</b>	35%	15%	20%	20%	10%	0%	<b>5.2</b>
<b>2028/2029 Enrollment Portfolio Active</b>	35%	15%	20%	20%	10%	0%	<b>5.2</b>
<b>2026/2027 Enrollment Portfolio Active</b>	35%	15%	20%	20%	10%	0%	<b>5.2</b>
<b>2024/2025 Enrollment Portfolio Active</b>	30%	13%	17%	17%	8%	16%	<b>4.4</b>
<b>2022/2023 Enrollment Portfolio Active</b>	19%	8%	11%	11%	5%	47%	<b>2.8</b>
<b>Enrollment Year Portfolio Active</b>	14%	6%	8%	8%	4%	59%	<b>2.2</b>

\*Most recent as of September 2022

- Each portfolio is short duration relative to the Bloomberg Barclays U.S. Aggregate Bond Index (6.42 years), which is a prudent strategy for a low yield environment

# Duration in Passive Enrollment Year Investment Options

	TIAA-CREF Bond Index Fund	Vanguard Short-Term Inflation- Protected Securities Index Fund	Vanguard High Yield Corporate Fund	TC Life Funding Agreement	Weighted Average Duration (Years)
<b>Portfolio Effective Duration*</b>	<b>6.42</b>	<b>2.69</b>	<b>4.27</b>	<b>0.00</b>	
<b>2038/2039 Enrollment Portfolio Passive</b>	70%	20%	10%	0%	<b>5.5</b>
<b>2036/2037 Enrollment Portfolio Passive</b>	70%	20%	10%	0%	<b>5.5</b>
<b>2034/2035 Enrollment Portfolio Passive</b>	70%	20%	10%	0%	<b>5.5</b>
<b>2032/2033 Enrollment Portfolio Passive</b>	70%	20%	10%	0%	<b>5.5</b>
<b>2030/2031 Enrollment Portfolio Passive</b>	70%	20%	10%	0%	<b>5.5</b>
<b>2028/2029 Enrollment Portfolio Passive</b>	70%	20%	10%	0%	<b>5.5</b>
<b>2026/2027 Enrollment Portfolio Passive</b>	70%	20%	10%	0%	<b>5.5</b>
<b>2024/2025 Enrollment Portfolio Passive</b>	59%	17%	8%	16%	<b>4.6</b>
<b>2022/2023 Enrollment Portfolio Passive</b>	37%	11%	5%	47%	<b>2.9</b>
<b>Enrollment Year Portfolio Passive</b>	29%	8%	4%	59%	<b>2.2</b>

\*Most recent as of September 2022

- Each portfolio is short duration relative to the Bloomberg Barclays U.S. Aggregate Bond Index (6.42 years), which is a prudent strategy for a low yield environment

# Duration in ESG Enrollment Year Investment Options

	Nuveen ESG US Aggregate Bond ETF	Nuveen ESG High Yield Corporate Bond ETF	TIAA-CREF Life Funding Agreement	Weighted Average Duration (Years)
<b>Portfolio Effective Duration*</b>	<b>6.35</b>	<b>3.57</b>	<b>0.00</b>	
<b>2038/2039 Enrollment Portfolio ESG</b>	90%	10%	0%	<b>6.1</b>
<b>2036/2037 Enrollment Portfolio ESG</b>	90%	10%	0%	<b>6.1</b>
<b>2034/2035 Enrollment Portfolio ESG</b>	90%	10%	0%	<b>6.1</b>
<b>2032/2033 Enrollment Portfolio ESG</b>	90%	10%	0%	<b>6.1</b>
<b>2030/2031 Enrollment Portfolio ESG</b>	90%	10%	0%	<b>6.1</b>
<b>2028/2029 Enrollment Portfolio ESG</b>	90%	10%	0%	<b>6.1</b>
<b>2026/2027 Enrollment Portfolio ESG</b>	90%	10%	0%	<b>6.1</b>
<b>2024/2025 Enrollment Portfolio ESG</b>	76%	8%	16%	<b>5.1</b>
<b>2022/2023 Enrollment Portfolio ESG</b>	48%	5%	47%	<b>3.2</b>
<b>Enrollment Year Portfolio ESG</b>	<b>37%</b>	<b>4%</b>	<b>59%</b>	<b>2.5</b>

\*Most recent as of September 2022.

- Each portfolio is short duration relative to the Bloomberg Barclays U.S. Aggregate Bond Index (6.42 years), which is a prudent strategy for a low yield environment

# Conclusions

## Enrollment Year Portfolios...

- continue to be the most popular investment options and follow many best practices for strategic asset allocation to help investors save for their education expenses

## Market Volatility...

- and uncertainty over recent periods have only modestly changed our outlook across asset classes

## Portfolio Allocations...

- remain diversified across equity asset classes, along with a diversified bond portfolio that can weather interest rate volatility, duration risk, and real return risk

## Versus Peer Plans...

- the Program's equity allocation is largely similar, keeping in line with industry trends

# Summary of recommendation for 2023

- Using Dreyfus Government Cash Management Fund (DGCXX) in the ETF cash requirement sleeve. The implementation can take place in 1st quarter 2023

## Appendix 1: TFI Asset Allocation Process



# The Importance of Diversification

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Highest	13.6 TIPS	19.7 Real Estate	33.6 US Stocks	28.0 Real Estate	2.8 Real Estate	14.8 HY Bond	37.3 EM Stocks	1.6 ST Bond	31.0 US Stocks	20.9 US Stocks	41.3 Real Estate
	8.3 Real Estate	18.2 EM Stocks	22.8 Intl Stocks	12.6 US Stocks	0.7 ST Bond	12.7 US Stocks	25.0 Intl Stocks	1.4 MM	28.7 Real Estate	18.3 EM Stocks	25.7 US Stocks
	7.8 Bond	17.3 Intl Stocks	6.3 HY Bond	6.0 Bond	0.6 Bond	11.2 EM Stocks	21.1 US Stocks	0.6 Bank Loan	22.0 Intl Stocks	10.1 Global Bond	11.3 Intl Stocks
	6.4 Global Bond	16.4 US Stocks	5.4 Bank Loan	3.6 TIPS	0.5 US Stocks	10.4 Bank Loan	8.7 Real Estate	0.0 Bond	18.4 EM Stocks	8.4 TIPS	5.7 TIPS
	5.4 HY Bond	14.6 HY Bond	2.9 Real Estate	3.5 HY Bond	0.1 Bank Loan	8.6 Real Estate	7.5 Global Bond	-0.8 Global Bond	15.1 HY Bond	7.8 Intl Stocks	5.3 Bank Loan
	1.6 ST Bond	9.8 Bank Loan	0.6 ST Bond	1.8 Bank Loan	0.0 MM	4.7 TIPS	7.0 HY Bond	-1.3 TIPS	8.7 Bond	7.5 Bond	4.6 HY Bond
	1.5 Bank Loan	7.0 TIPS	0.0 MM	0.8 ST Bond	-0.8 Intl Stocks	2.7 Bond	4.3 Bank Loan	-2.0 HY Bond	8.7 Bank Loan	6.3 HY Bond	0.0 MM
	1.0 US Stocks	4.2 Bond	-2.0 Bond	0.0 MM	-1.4 TIPS	1.6 Global Bond	3.5 Bond	-4.0 Real Estate	6.9 TIPS	3.5 Bank Loan	-0.5 ST Bond
	0.0 MM	1.6 Global Bond	-2.6 EM Stocks	-0.5 Global Bond	-2.8 HY Bond	1.3 ST Bond	3.0 TIPS	-5.2 US Stocks	5.9 Global Bond	3.3 ST Bond	-1.4 Global 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	0.8 ST Bond	-13.8 Intl Stocks	4.0 ST Bond	0.7 MM	-1.5 Bond
Lowest	-18.4 EM Stocks	0.0 MM	-8.6 TIPS	-4.9 Intl Stocks	-14.9 EM Stocks	0.1 MM	0.5 MM	-14.6 EM Stocks	1.8 MM	-5.1 Real Estate	-2.5 EM Stocks

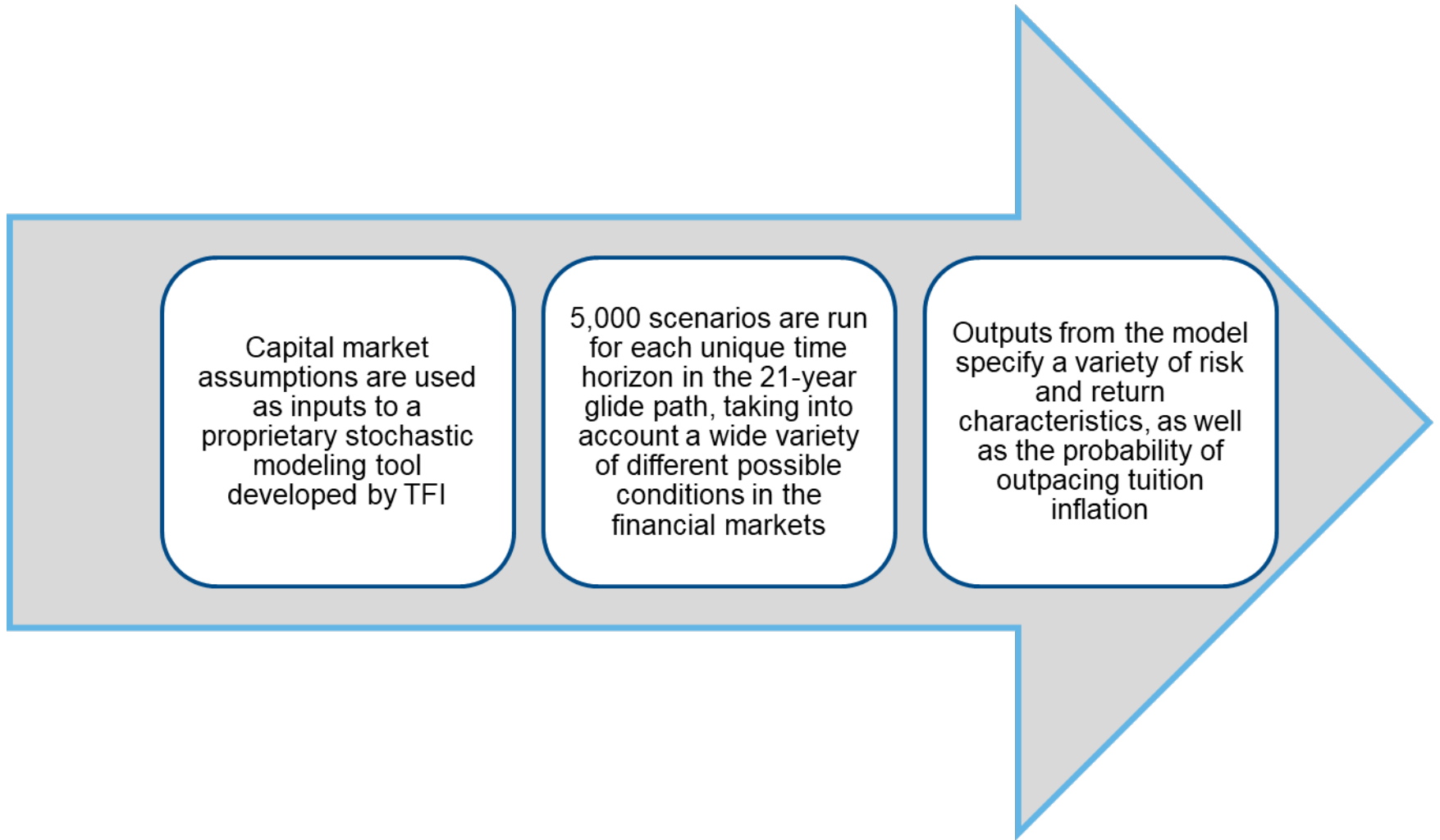
# The Importance of Diversification-Notes

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 ICE BofAML US HY Cash 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.

# Introduction to Monte Carlo Analysis

- The following asset allocation study uses the most recent capital market assumptions to evaluate prospective outcomes for the glide path models
- This year, we modeled the Enrollment Year Investment Portfolios using the appropriate asset allocations for each year along the glide path
- The Enrollment Year Investment 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

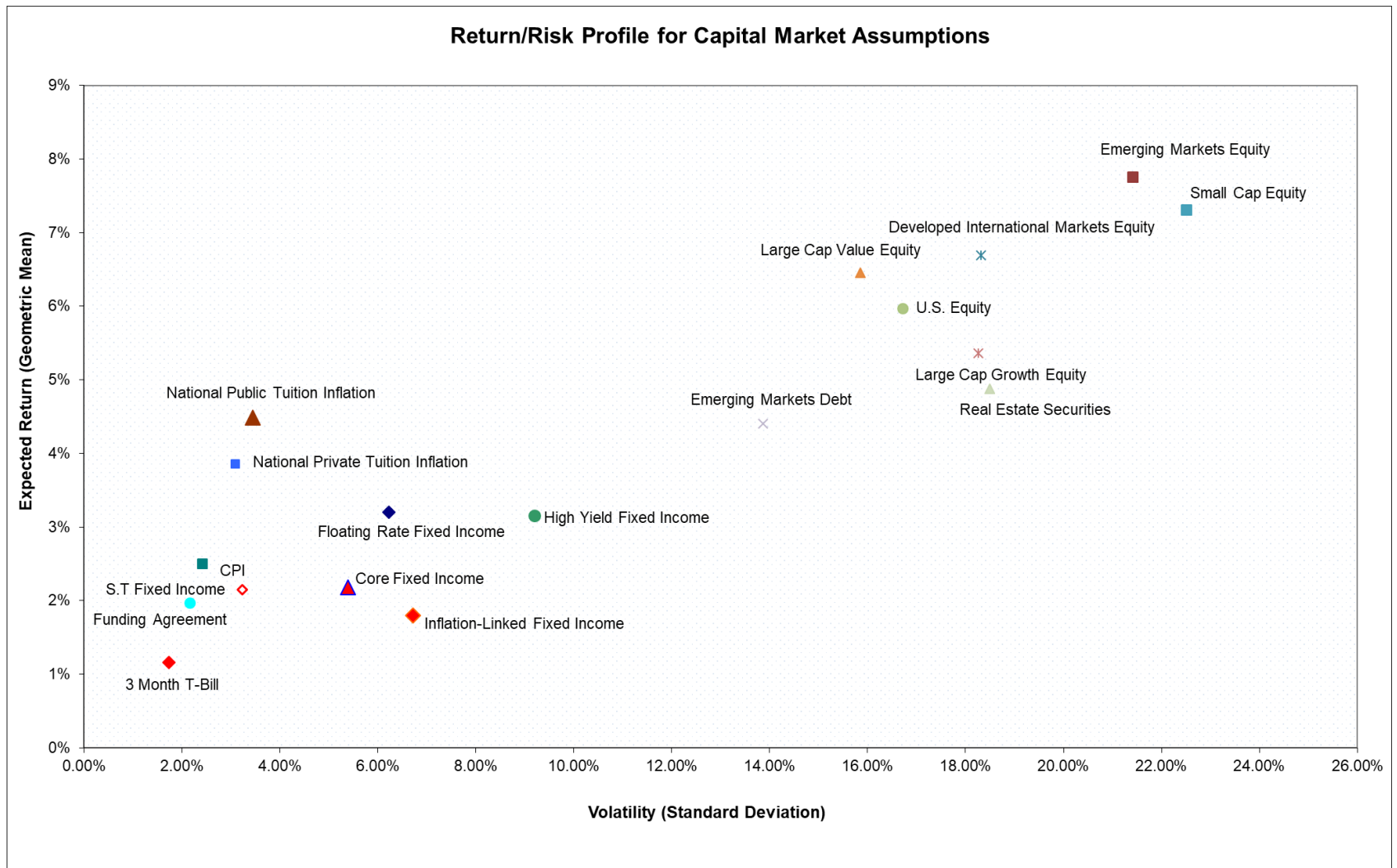
# Glide Path Simulation Process



# Asset Allocation Assumptions

Variables	Benchmarks	Capital Market Assumptions <span style="float: right;">(source: Ibbotson)</span>	
		Returns (Long-Term Average)	Volatility (Standard Deviation)
U.S. Equity	Russell 3000 Index	5.97%	16.72%
Large Cap Growth Equity	Russell 1000 Growth Index	5.36%	18.26%
Large Cap Value Equity	Russell 1000 Value Index	6.45%	15.85%
Large Cap Equity	S&P 500 Index	5.82%	16.44%
Small Cap Equity	Russell 2000 Index	7.31%	22.51%
Developed International Equity	MSCI EAFE Index	6.69%	18.32%
Emerging Markets Equity	MSCI Emerging Markets Index	7.76%	21.41%
Core Fixed Income	Bloomberg Barclays U.S. Aggregate Bond Index	2.18%	5.39%
Floating Rate Fixed Income	Credit Suisse Leveraged Loan Index	3.20%	6.23%
Emerging Markets Debt	JPM EMBI Global Diversified Index	5.87%	9.42%
High Yield Fixed Income	BofAML US HY BB/B Cash Pay Index	3.16%	9.20%
TIPS	Bloomberg Inflation-Linked U.S. TIPS Index	1.80%	6.72%
Intermediate-Term TIPS	Bloomberg Inflation-Linked 1-10 Year U.S. TIPS Index	2.09%	5.27%
Short-Term TIPS	Bloomberg U.S. 0-5 Year TIPS Index	2.01%	3.54%
Short-Term Fixed Income	Bloomberg U.S. 1-3 Year Government/Credit Bond Index	2.15%	3.24%
Real Estate Securities	FTSE NAREIT All Equity REITs Index	4.88%	18.49%
CPI	Consumer Price Index - All Urban Consumers	2.50%	2.42%
3 Month T-Bill	BofAML US Treasury Bill 3 Month Index	1.16%	1.74%
TIAA Life Funding Agreement	Funding Agreement	1.97%	2.16%
<b>Additional Variables (sources: The College Board and TIAA-CREF Tuition Financing, Inc.)</b>			
	National Private Tuition Inflation	3.86%	3.10%
	National Public Tuition Inflation	4.49%	3.45%

# Asset Allocation Assumptions



# Correlations

	TC Life Funding Agreement	JPM EMBI Global Diversified Index	Bloomberg U.S. Aggregate Bond Index	Bloomberg U.S. TIPS Index	Bloomberg U.S. TIPS 10 Year Index	Bloomberg U.S. 1-3 Year Gov't / Credit Bond Index	BBofAML US HY BB/B Cash Pay Index	Credit Suisse Leveraged Loan Index	Bloomberg U.S. 0-5 Year TIPS Index	FTSE NAREIT All Equity REITs Index	Russell 3000 Index	S&P Index	Russell 1000 Value Index	Russell 1000 Growth Index	Russell 2000 Index	MSCI EAFE Index	MSCI Emerging Markets Index	
TC Life Funding Agreement	1.00																	
JPM EMBI Global Diversified Index	0.37	1.00																
Bloomberg U.S. Aggregate Bond Index	0.73	0.35	1.00															
Bloomberg U.S. TIPS Index	0.37	0.36	0.66	1.00														
Bloomberg U.S. TIPS 1-10 Year Index	0.37	0.38	0.61	0.97	1.00													
Bloomberg U.S. 1-3 Year Gov't / Credit Bond Index	0.64	0.31	0.95	0.62	0.61	1.00												
BBofAML US HY BB/B Cash Pay Index	0.49	0.48	0.33	0.32	0.61	0.30	1.00											
Credit Suisse Leveraged Loan Index	-0.19	0.79	0.09	0.53	0.54	0.63	0.95	1.00										
Bloomberg U.S. 0-5 Year TIPS Index	0.20	0.63	0.42	0.94	0.94	0.15	0.66	0.63	1.00									
FTSE NAREIT All Equity REITs Index	0.35	0.44	0.10	0.30	0.26	0.10	0.44	0.57	0.30	1.00								
Russell 3000 Index	0.40	0.59	0.00	0.31	0.30	-0.02	0.50	0.68	0.31	0.67	1.00							
S&P Index	-0.22	0.55	-0.08	0.30	0.29	-0.64	0.72	0.66	0.30	0.73	1.00	1.00						
Russell 1000 Value Index	0.39	0.58	0.07	0.20	0.19	0.05	0.50	0.61	0.20	0.66	0.94	0.94	1.00					
Russell 1000 Growth Index	0.30	0.57	0.02	0.38	0.37	0.00	0.43	0.67	0.38	0.61	0.94	0.94	0.94	1.00				
Russell 2000 Index	0.34	0.53	-0.04	0.25	0.25	-0.05	0.46	0.62	0.25	0.72	0.90	0.90	0.90	0.83	1.00			
MSCI EAFE Index	0.26	0.62	-0.09	0.35	0.35	-0.09	0.50	0.68	0.35	0.55	0.86	0.86	0.86	0.77	0.74	1.00		
MSCI Emerging Markets Index	0.13	0.60	-0.14	0.59	0.61	-0.14	0.29	0.78	0.59	0.41	0.63	0.63	0.63	0.59	0.59	0.62	1.00	

# Tuition Inflation

**Tuition data are sourced from the 2021 College Board Trends in Tuition Pricing.**

**Private 4-year Tuition Inflation:**

$$T(t) = 0.0178 + i(t) + 0.0055 * S(t-1) + 0.1845 * B(t) + 0.2529 * R(t-1) - 0.020 * GDP + e1(t)$$

Expected Value = 3.86%

**Public Tuition Inflation:**

$$T(t) = 0.0373 + i(t) - 0.0137 * S(t-1) + 0.2722 * B(t) + 0.1791 * R(t-1) - 0.6495 * GDP + e2(t)$$

Expected Value =4.49%

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 (Bloomberg Barclays 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 (2.21%) for the next 10 years (source: Federal Reserve Bank of Philadelphia),

e1(t) is the random error term following a logistic distribution (0%, 1.20%) with a zero mean and standard deviation of 2.18%,

e2(t) is the random error term following a logistic distribution (0%, 0.01%) with a zero mean and standard deviation of 2.61%

Regression is based on data from 1977-2021.

For 2020-2021 school year, average tuition and fees were: \$10,740 for all in-state public colleges and \$38,070 for private 4-year colleges; based on most recent data 66% enrolled in public colleges and 34% enrolled in private colleges. The enrollment-weighted average tuition and fees for all colleges were \$20,032 = \$10,740\* 66% + \$38,070 \* 34%. The forecasted enrollment-weighted average tuition and fees for year 1 are \$20,850 = \$10740 \* (1+4.49%) \* 66% + \$38070 \* (1+3.86%) \* 34%. Therefore, the public / private enrollment weighted tuition inflation rate for year 1 is: 4.08% = \$20,850 / \$20,032 - 1



# Active Enrollment Year Portfolio Simulation Results

Enrollment Year	Asset Allocations											Investment Horizon (in years)	(1) Average Annual Return over Investment Horizon	(2) Standard Deviation of Returns over Investment Horizon	(3) Average Annual Tuition Inflation over Investment Horizon	(4) Probability of Exceeding Tuition Inflation	(5) Probability of Achieving 90 cents per Dollar of Future Tuition	(6) Probability of Non-Negative Return	(7) Annualized Shortfall
	Large Cap Growth	Large Cap Value	Large Cap Core	Small Cap Equity	Real Estate Securities	Int'l Equities	Emerging Market Equities	Core Fixed Income	Inflation-Linked Bond	Floating Rate	Funding Agreement								
2038/2039	14.80%	14.80%	15.80%	5.00%	5.60%	19.20%	4.80%	14.00%	4.00%	2.00%	0.00%	21	3.99%	1.79%	4.08%	47.94%	59.12%	98.70%	-2.03%
2036/2037	14.80%	14.80%	15.80%	5.00%	5.60%	19.20%	4.80%	14.00%	4.00%	2.00%	0.00%	19	3.90%	1.88%	4.08%	45.56%	58.04%	98.02%	-2.04%
2034/2035	14.00%	14.00%	15.20%	4.80%	5.30%	18.10%	4.60%	16.80%	4.80%	2.40%	0.00%	17	3.83%	1.88%	4.08%	44.52%	59.18%	97.76%	-2.00%
2032/2033	13.30%	13.30%	14.20%	4.50%	5.10%	17.30%	4.30%	19.60%	5.60%	2.80%	0.00%	15	3.70%	1.89%	4.08%	41.46%	57.74%	97.42%	-1.97%
2030/2031	12.50%	12.50%	13.60%	4.30%	4.80%	16.30%	4.00%	22.40%	6.40%	3.20%	0.00%	13	3.55%	1.87%	4.08%	38.80%	56.36%	96.82%	-2.02%
2028/2029	11.10%	11.10%	11.80%	3.80%	4.20%	14.40%	3.60%	28.00%	8.00%	4.00%	0.00%	11	3.40%	1.88%	4.08%	35.84%	57.36%	96.22%	-2.02%
2026/2027	8.80%	8.80%	9.60%	3.00%	3.40%	11.50%	2.90%	36.40%	10.40%	5.20%	0.00%	9	3.20%	1.81%	4.08%	30.28%	56.62%	96.18%	-2.02%
2024/2025	6.60%	6.60%	7.20%	2.30%	2.50%	8.60%	2.20%	37.80%	10.80%	5.40%	10.00%	7	3.02%	1.70%	4.08%	26.38%	62.40%	95.80%	-1.97%
2022/2023	4.60%	4.60%	5.00%	1.50%	1.80%	6.00%	1.50%	28.00%	8.00%	4.00%	35.00%	5	2.97%	1.72%	4.08%	26.54%	73.46%	95.74%	-1.98%
In School	2.70%	2.70%	3.00%	1.00%	1.10%	3.60%	0.90%	24.50%	7.00%	3.50%	50.00%	3	2.83%	2.03%	4.08%	27.64%	87.22%	92.12%	-2.25%
	2.70%	2.70%	3.00%	1.00%	1.10%	3.60%	0.90%	24.50%	7.00%	3.50%	50.00%	1	2.93%	3.46%	4.08%	37.72%	99.40%	80.48%	-3.40%

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

# Passive Enrollment Year Portfolio Simulation Results

Enrollment Year	Asset Allocations								Investment Horizon (in years)	(1) Average Annual Return over Investment Horizon	(2) Standard Deviation of Returns over Investment Horizon	(3) Average Annual Tuition Inflation over Investment Horizon	(4) Probability of Exceeding Tuition Inflation	(5) Probability of Achieving 90 cents per Dollar of Future Tuition	(6) Probability of Non-Negative Return	(7) Annualized Shortfall
	Domestic Equities	Int'l Equities	Emerging Market Equities	Real Estate Securities	Core Fixed Income	Short-Term Inflation-Linked Bond	High Yield Fund	Funding Agreement								
2038/2039	50.40%	19.20%	4.80%	5.60%	14.00%	4.00%	2.00%	0.00%	21	3.93%	1.58%	4.08%	45.56%	59.60%	99.48%	-1.87%
2036/2037	50.40%	19.20%	4.80%	5.60%	14.00%	4.00%	2.00%	0.00%	19	3.83%	1.58%	4.08%	43.60%	57.86%	99.38%	-1.86%
2034/2035	47.90%	18.20%	4.60%	5.30%	16.80%	4.80%	2.40%	0.00%	17	3.74%	1.57%	4.08%	40.72%	58.16%	99.14%	-1.84%
2032/2033	45.40%	17.30%	4.30%	5.00%	19.60%	5.60%	2.80%	0.00%	15	3.59%	1.54%	4.08%	38.24%	57.54%	98.82%	-1.82%
2030/2031	42.80%	16.30%	4.10%	4.80%	22.40%	6.40%	3.20%	0.00%	13	3.46%	1.53%	4.08%	34.32%	55.78%	98.86%	-1.81%
2028/2029	37.80%	14.40%	3.60%	4.20%	28.00%	8.00%	4.00%	0.00%	11	3.30%	1.49%	4.08%	30.44%	55.92%	98.70%	-1.82%
2026/2027	30.20%	11.50%	2.90%	3.40%	36.40%	10.40%	5.20%	0.00%	9	3.14%	1.46%	4.08%	25.86%	57.38%	98.50%	-1.82%
2024/2025	22.70%	8.60%	2.20%	2.50%	37.80%	10.80%	5.40%	10.00%	7	3.06%	1.42%	4.08%	23.36%	65.16%	98.54%	-1.76%
2022/2023	15.70%	6.00%	1.50%	1.80%	28.00%	8.00%	4.00%	35.00%	5	2.93%	1.45%	4.08%	21.88%	74.04%	98.24%	-1.88%
In School	9.40%	3.60%	0.90%	1.10%	24.50%	7.00%	3.50%	50.00%	3	2.87%	1.81%	4.08%	25.96%	89.80%	94.72%	-2.10%
	9.40%	3.60%	0.90%	1.10%	24.50%	7.00%	3.50%	50.00%	1	2.91%	3.09%	4.08%	36.20%	99.72%	83.24%	-3.23%

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

# ESG Enrollment Year Portfolio Simulation Results

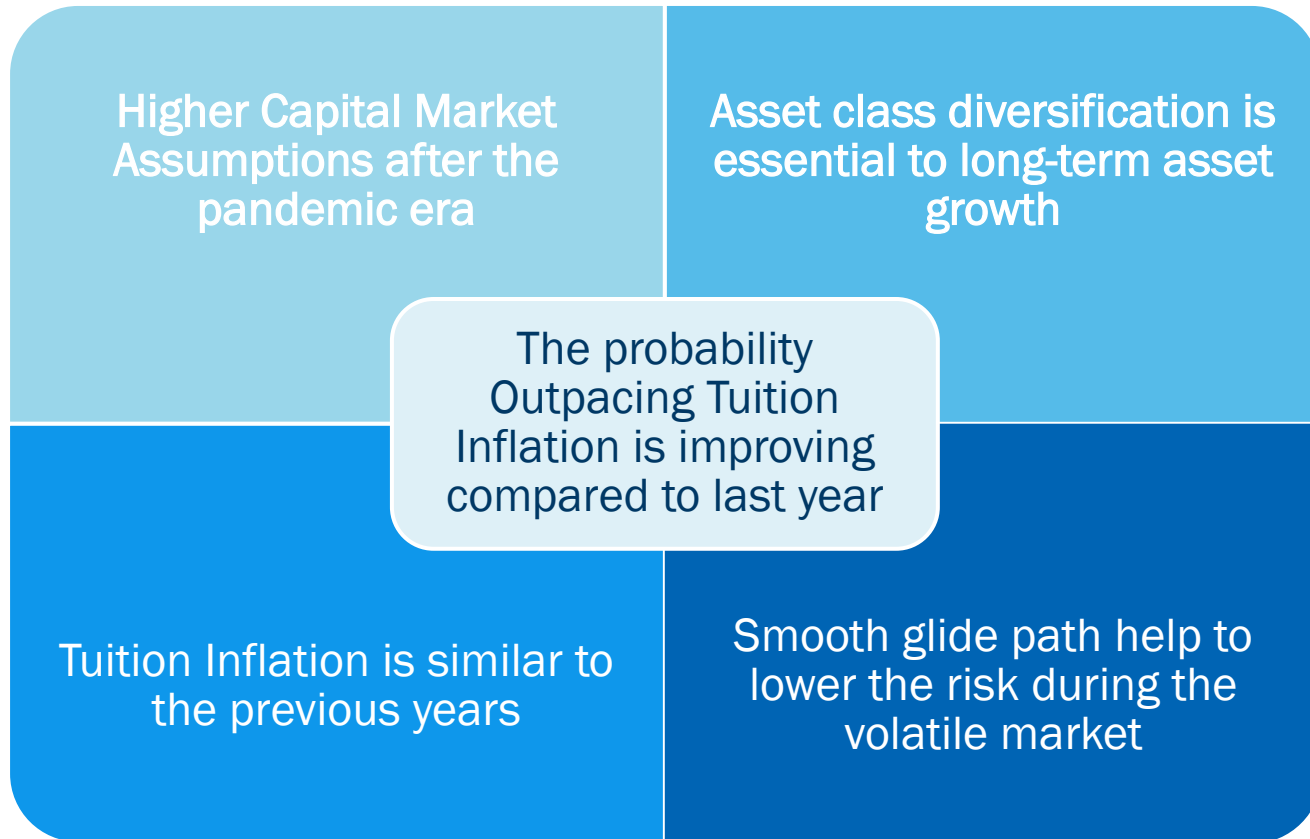
Enrollment Year	Asset Allocations						Investment Horizon (in years)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Domestic Equities	Int'l Equities	Emerging Market Equities	Core Fixed Income	High Yield Fund	Funding Agreement		Average Annual Return over Investment Horizon	Standard Deviation of Returns over Investment 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
2038/2039	56.00%	19.20%	4.80%	18.00%	2.00%	0.00%	21	4.09%	1.79%	4.08%	50.74%	61.60%	98.86%	-1.99%
2036/2037	56.00%	19.20%	4.80%	18.00%	2.00%	0.00%	19	4.01%	1.78%	4.08%	47.82%	61.20%	98.74%	-1.93%
2034/2035	53.30%	18.10%	4.60%	21.60%	2.40%	0.00%	17	3.89%	1.79%	4.08%	45.78%	60.08%	98.34%	-1.92%
2032/2033	50.40%	17.30%	4.30%	25.20%	2.80%	0.00%	15	3.75%	1.81%	4.08%	42.58%	58.62%	97.96%	-1.93%
2030/2031	47.70%	16.30%	4.00%	28.80%	3.20%	0.00%	13	3.62%	1.81%	4.08%	39.76%	57.52%	97.58%	-1.95%
2028/2029	42.00%	14.40%	3.60%	36.00%	4.00%	0.00%	11	3.45%	1.78%	4.08%	34.90%	58.12%	97.38%	-1.90%
2026/2027	33.60%	11.50%	2.90%	46.80%	5.20%	0.00%	9	3.30%	1.74%	4.08%	31.80%	59.82%	97.32%	-1.91%
2024/2025	25.20%	8.60%	2.20%	48.60%	5.40%	10.00%	7	3.09%	1.67%	4.08%	26.96%	63.54%	97.00%	-1.92%
2022/2023	17.50%	6.00%	1.50%	36.00%	4.00%	35.00%	5	2.99%	1.72%	4.08%	25.54%	73.00%	95.98%	-1.96%
In School	10.50%	3.60%	0.90%	31.50%	3.50%	50.00%	3	2.93%	1.95%	4.08%	27.22%	89.38%	93.94%	-2.14%
	10.50%	3.60%	0.90%	31.50%	3.50%	50.00%	1	2.95%	3.42%	4.08%	37.52%	99.60%	80.52%	-3.37%

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

# Definitions

- **(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.

# Glide Path Simulation Summary



# CMA Comparisons

Variables	Benchmarks	2023		2022		Difference	
		Returns (Long-Term Average)	Volatility (Standard Deviation)	Returns (Long-Term Average)	Volatility (Standard Deviation)	Returns (Long-Term Average)	Volatility (Standard Deviation)
U.S. Equity	Russell 3000 Index	5.97%	16.72%	4.69%	16.63%	1.28%	0.09%
Large Cap Growth Equity	Russell 1000 Growth Index	5.36%	18.26%	3.08%	18.23%	2.28%	0.03%
Large Cap Value Equity	Russell 1000 Value Index	6.45%	15.85%	5.97%	15.82%	0.48%	0.03%
Large Cap Equity	S&P 500 Index	5.82%	16.44%	4.36%	16.33%	1.46%	0.11%
Small Cap Equity	Russell 2000 Index	7.31%	22.51%	7.17%	22.76%	0.14%	-0.25%
Developed International Equity	MSCI EAFE Index	6.69%	18.32%	6.43%	18.25%	0.26%	0.07%
Emerging Markets Equity	MSCI Emerging Markets Index	7.76%	21.41%	6.50%	21.87%	1.26%	-0.46%
Core Fixed Income	Bloomberg Barclays U.S. Aggregate Bond Index	2.18%	5.39%	1.70%	5.41%	0.48%	-0.02%
Floating Rate Fixed Income	Credit Suisse Leveraged Loan Index	3.20%	6.23%	4.57%	6.18%	-1.37%	0.05%
Emerging Markets Debt	JPM EMBI Global Diversified Index	5.87%	9.42%	4.43%	9.62%	1.44%	-0.20%
High Yield Fixed Income	BofAML US HY BB/B Cash Pay Index	3.16%	9.20%	3.12%	9.22%	0.04%	-0.02%
TIPS	Bloomberg Inflation-Linked U.S. TIPS Index	1.80%	6.72%	1.48%	6.88%	0.32%	-0.16%
Intermediate-Term TIPS	Bloomberg Inflation-Linked 1-10 Year U.S. TIPS Index	2.09%	5.27%	1.75%	5.32%	0.34%	-0.05%
Short-Term TIPS	Bloomberg U.S. 0-5 Year TIPS Index	2.01%	3.54%	1.73%	3.71%	0.28%	-0.17%
Short-Term Fixed Income	Bloomberg U.S. 1-3 Year Government/Credit Bond Index	2.15%	3.24%	1.59%	3.25%	0.56%	-0.01%
Real Estate Securities	FTSE NAREIT All Equity REITs Index	4.88%	18.49%	5.77%	18.45%	-0.89%	0.04%
CPI	Consumer Price Index - All Urban Consumers	2.50%	2.42%	2.50%	2.35%	0.00%	0.07%
3 Month T-Bill	BofAML US Treasury Bill 3 Month Index	1.16%	1.74%	0.98%	1.73%	0.18%	0.01%
TIAA Life Funding Agreement	Funding Agreement	1.97%	2.16%	1.50%	2.24%	0.47%	-0.08%
<b>Additional Variables (sources: The College Board and TIAA-CREF Tuition Financing, Inc.)</b>							
	National Private Tuition Inflation	3.86%	3.10%	3.99%	2.93%	-0.13%	0.17%
	National Public Tuition Inflation	4.49%	3.45%	4.66%	3.17%	-0.17%	0.28%

## Appendix 2: Investment Menu and Underlying Funds

# Investment Menu

## Active Enrollment Year Investment Portfolios

Enrollment Year	T. Rowe Price Large Cap Growth Fund	T. Rowe Price Large Cap Value Fund	TIAA-CREF Quant Small-Cap Equity	TIAA-CREF S&P 500 Index Fund	DFA Large Cap Intl Portfolio	DFA Emerging Markets Core Equity I Portfolio	Vanguard Real Estate Index Fund	MetWest Total Return Bond Fund	TIAA-CREF Bond Index Fund	PIMCO Real Return Fund	PIMCO Income Fund	T. Rowe Price Floating Rate Fund	TIAA-CREF Life Funding Agreement
Tickers	TRLGX	TILCX	TISEX	TISPX	DFALX	DFCEX	VGSNX	MWTSX	TBIX	PRRIX	PIMIX	RPIFX	
2038/2039 Enrollment Portfolio Active	14.80%	14.80%	5.00%	15.80%	19.20%	4.80%	5.60%	7.00%	3.00%	4.00%	4.00%	2.00%	0.00%
2036/2037 Enrollment Portfolio Active	14.50%	14.50%	4.90%	15.60%	18.80%	4.70%	5.50%	7.50%	3.20%	4.30%	4.30%	2.20%	0.00%
2034/2035 Enrollment Portfolio Active	13.70%	13.70%	4.70%	14.80%	17.80%	4.50%	5.20%	9.10%	3.80%	5.10%	5.10%	2.50%	0.00%
2032/2033 Enrollment Portfolio Active	13.00%	13.00%	4.40%	14.00%	16.90%	4.20%	5.00%	10.30%	4.40%	5.90%	5.90%	3.00%	0.00%
2030/2031 Enrollment Portfolio Active	11.90%	11.90%	4.10%	12.90%	15.60%	3.90%	4.60%	12.30%	5.30%	7.00%	7.00%	3.50%	0.00%
2028/2029 Enrollment Portfolio Active	10.20%	10.20%	3.50%	11.00%	13.30%	3.30%	3.90%	15.60%	6.70%	8.90%	8.90%	4.50%	0.00%
2026/2027 Enrollment Portfolio Active	8.00%	8.00%	2.70%	8.70%	10.40%	2.60%	3.10%	18.30%	7.90%	10.60%	10.60%	5.30%	3.80%
2024/2025 Enrollment Portfolio Active	5.80%	5.80%	2.00%	6.40%	7.60%	1.90%	2.20%	17.10%	7.30%	9.80%	9.80%	4.90%	19.40%
2022/2023 Enrollment Portfolio Active	3.90%	3.90%	1.30%	4.30%	5.10%	1.30%	1.50%	13.40%	5.70%	7.60%	7.60%	3.80%	40.60%
Enrollment Year Portfolio Active	2.70%	2.70%	1.00%	3.00%	3.60%	0.90%	1.10%	12.25%	5.25%	7.00%	7.00%	3.50%	50.00%

## Active Multi-Fund Investment Portfolios

Active Diversified Equity Portfolio	18.40%	18.40%	6.30%	19.90%	24.00%	6.00%	7.00%						
Active Growth Portfolio	12.50%	12.50%	4.30%	13.60%	16.30%	4.00%	4.80%	11.20%	4.80%	6.40%	6.40%	3.20%	
Active Conservative Portfolio								17.50%	7.50%	10.00%	10.00%	5.00%	50.00%
Active International Equity Portfolio					80.00%	20.00%							

## Active Single Fund Investment Portfolios

Principal Plus Interest Portfolio													100.00%
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# Investment Menu

## Passive Enrollment Year Investment Portfolios

Enrollment Year	TIAA-CREF Equity Index Fund	TIAA-CREF International Equity Index Fund	TIAA-CREF Emerging Markets Equity Index Fund	Vanguard Real Estate Index Fund	TIAA-CREF Bond Index Fund	Vanguard Short-Term Intl-Prot Sec Index Fund	Vanguard High-Yield Corporate Fund	TIAA-CREF Life Funding Agreement
Tickers	TIEIX	TCIE X	TEQLX	VG SN X	TBIIX	VT SPX	WEAX	
2038/2039 Enrollment Portfolio Passive	50.40%	19.20%	4.80%	5.60%	14.00%	4.00%	2.00%	0.00%
2036/2037 Enrollment Portfolio Passive	49.40%	18.80%	4.70%	5.50%	15.10%	4.30%	2.20%	0.00%
2034/2035 Enrollment Portfolio Passive	47.00%	17.80%	4.50%	5.20%	17.80%	5.10%	2.60%	0.00%
2032/2033 Enrollment Portfolio Passive	44.40%	16.90%	4.20%	4.90%	20.70%	5.90%	3.00%	0.00%
2030/2031 Enrollment Portfolio Passive	40.90%	15.60%	3.90%	4.60%	24.50%	7.00%	3.50%	0.00%
2028/2029 Enrollment Portfolio Passive	35.00%	13.20%	3.30%	3.90%	31.20%	8.90%	4.50%	0.00%
2026/2027 Enrollment Portfolio Passive	27.30%	10.40%	2.60%	3.10%	36.90%	10.60%	5.30%	3.80%
2024/2025 Enrollment Portfolio Passive	20.10%	7.60%	1.90%	2.20%	34.10%	9.80%	4.90%	19.40%
2022/2023 Enrollment Portfolio Passive	13.30%	5.20%	1.30%	1.50%	26.70%	7.60%	3.80%	40.60%
Enrollment Year Portfolio Passive	9.40%	3.60%	0.90%	1.10%	24.50%	7.00%	3.50%	50.00%

## Passive Multi-Fund Investment Portfolios

Passive Diversified Equity Portfolio	63.00%	24.00%	6.00%	7.00%				
Passive Growth Portfolio	44.10%	16.80%	4.20%	4.90%	21.00%	6.00%	3.00%	
Passive Conservative Portfolio					35.00%	10.00%	5.00%	50.00%
Index International Equity Portfolio		80.00%	20.00%					

## Passive Single-Fund Investment Portfolios

Index Bond Portfolio					100.00%			
Index U. S. Equity Portfolio	100.00%							

# Investment Menu

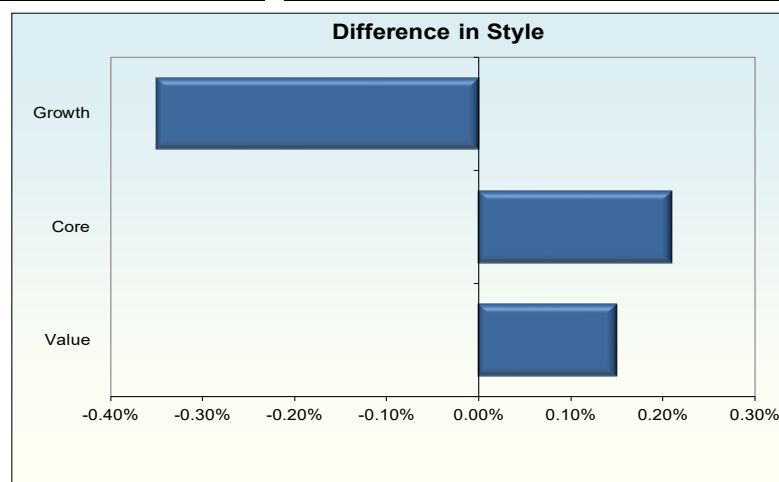
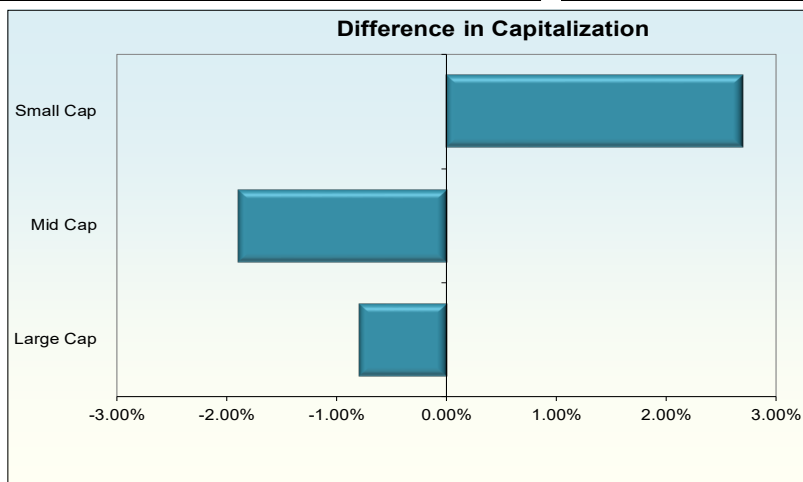
ESG Enrollment Year Investment Portfolios						
Enrollment Year	TIAA-CREF Social Choice Equity Fund	TIAA-CREF Social Choice International Equity Fund	Nuveen ESG Emerging Markets Equity ETF	Nuveen ESG US Aggregate Bond ETF	Nuveen ESG High Yield Corporate Bd ETF	TIAA-CREF Life Funding Agreement
Tickers	TISCX	TSONX	NUEM	NUBD	NUHY	
2038/2039 Enrollment Portfolio ESG	56.00%	19.20%	4.80%	18.00%	2.00%	0.00%
2036/2037 Enrollment Portfolio ESG	55.00%	18.80%	4.70%	19.30%	2.20%	0.00%
2034/2035 Enrollment Portfolio ESG	52.20%	17.80%	4.50%	22.90%	2.60%	0.00%
2032/2033 Enrollment Portfolio ESG	49.40%	16.90%	4.20%	26.50%	3.00%	0.00%
2030/2031 Enrollment Portfolio ESG	45.60%	15.60%	3.90%	31.50%	3.40%	0.00%
2028/2029 Enrollment Portfolio ESG	38.90%	13.30%	3.30%	40.10%	4.40%	0.00%
2026/2027 Enrollment Portfolio ESG	30.50%	10.40%	2.60%	47.50%	5.20%	3.80%
2024/2025 Enrollment Portfolio ESG	22.30%	7.60%	1.90%	43.90%	4.90%	19.40%
2022/2023 Enrollment Portfolio ESG	14.90%	5.10%	1.30%	34.30%	3.80%	40.60%
Enrollment Year Portfolio ESG	10.50%	3.60%	0.90%	31.50%	3.50%	50.00%
ESG Single fund Investment Portfolios						
Social Choice Equity Portfolio	100.00%					
ESG International Equity Portfolio		100.00%				
ESG Bond Portfolio				100.00%		

# Domestic Equity Composition

- TFI reviewed the recommended domestic equity allocation 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 recommended domestic equity component of the Active Enrollment Year Portfolio and Active Multi-Fund Portfolios with U.S. equity exposure 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 Enrollment Year, Diversified Equity and Growth Portfolios	Large Cap	Mid Cap	Small Cap	Total	Value	Core	Growth	Total
Russell 1000 Value Index	29.37%	69.00%	26.94%	4.06%	100.00%	39.60%	49.82%	10.58%	100.00%
Russell 1000 Growth Index	29.37%	85.83%	12.92%	1.25%	100.00%	5.62%	37.54%	56.84%	100.00%
Russell Mid Cap Value Index	0.00%	11.00%	76.81%	12.19%	100.00%	36.19%	51.76%	12.05%	100.00%
Russell Mid Cap Growth Index	0.00%	24.19%	69.13%	6.68%	100.00%	6.73%	37.69%	55.57%	99.99%
Russell 2000 Index	9.92%	0.18%	6.68%	93.14%	100.00%	29.56%	43.89%	26.55%	100.00%
S&P 500 Index	31.34%	84.27%	15.66%	0.07%	100.00%	22.58%	44.47%	32.95%	100.00%
Russell 3000 Index	0.00%	72.69%	19.18%	8.13%	100.00%	23.15%	43.74%	33.12%	100.00%
<b>Total Blended Portfolio</b>	<b>100.00%</b>								
<b>Broad U.S. Market (Russell 3000)</b>		<b>72.69%</b>	<b>19.18%</b>	<b>8.13%</b>	<b>100.00%</b>	<b>23.14%</b>	<b>43.74%</b>	<b>33.12%</b>	<b>100.00%</b>
Active Enrollment Year, Diversified Equity and Growth Portfolios		71.90%	17.28%	10.82%	100.00%	23.29%	43.95%	32.77%	100.00%
<b>Difference</b>		<b>-0.79%</b>	<b>-1.90%</b>	<b>2.69%</b>	<b>0.00%</b>	<b>0.15%</b>	<b>0.21%</b>	<b>-0.35%</b>	<b>0.00%</b>



# Domestic Equity Composition: Market Cap and Style

Benchmarks	Asset Allocation		Morningstar 9 Style Categories									
	Active Enrollment Year, Diversified Equity and 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	29.37%		28.38%	33.65%	6.98%	9.66%	14.04%	3.23%	1.56%	2.13%	0.37%	100.00%
Russell 1000 Growth Index	29.37%		4.36%	31.62%	49.85%	1.03%	5.47%	6.42%	0.23%	0.45%	0.57%	100.00%
Russell Mid Cap Value Index	0.00%		4.04%	4.63%	2.32%	27.45%	40.75%	8.62%	4.69%	6.38%	1.12%	100.00%
Russell Mid Cap Growth Index	0.00%		0.00%	6.08%	18.11%	5.52%	29.20%	34.41%	1.22%	2.40%	3.06%	100.00%
Russell 2000 Index	9.92%		0.18%	0.00%	0.00%	1.01%	2.52%	3.15%	28.37%	41.37%	23.40%	100.00%
S&P 500 Index	31.34%		17.93%	36.02%	30.32%	4.58%	8.46%	2.62%	0.07%	0.00%	0.00%	100.00%
Russell 3000 Index	0.00%		15.47%	30.68%	26.55%	5.11%	9.35%	4.71%	2.56%	3.71%	1.86%	100.00%
<b>Total Blended Portfolio</b>	<b>100.00%</b>											

Broad Market (Russell 3000)	15.47%	30.68%	26.55%	5.11%	9.35%	4.71%	2.56%	3.71%	1.86%	100.00%
Active Enrollment Year, Diversified Equity and Growth Portfolios	<b>15.23%</b>	<b>30.46%</b>	<b>26.19%</b>	<b>4.68%</b>	<b>8.63%</b>	<b>3.97%</b>	<b>3.36%</b>	<b>4.86%</b>	<b>2.60%</b>	<b>100.00%</b>

Difference in Portfolios vs. Broad Market			
Active Enrollment Year, Diversified Equity and Growth Portfolios	Value	Core	Growth
Large Cap	-0.24%	-0.22%	-0.36%
Mid Cap	-0.43%	-0.72%	-0.74%
Small Cap	0.80%	1.15%	0.74%

# Underlying Fund by Strategy

U. S. Equities	International and Emerging Markets Equities	Fixed Income	Short-Term and Cash Equivalents	Alternative Assets
<b>Index Funds</b>				
T-C Equity Index	T-C International Equity Index	T-C Bond Index		Vanguard Real Estate Index
T-C S&P 500 Index	T-C Emerging Markets Equity Index	Vanguard Short-Term Inflation-Protected Securities Index		
	Nuveen ESG Emerging Markets Equity ETF	Nuveen ESG U.S. Aggregate Bond ETF Nuveen ESG High Yield Corporate Bond ETF		
<b>Active Funds</b>				
T. Rowe Price Large-Cap Growth	DFA Large-Cap International	MetWest Total Return Bond		T-C Life Funding Agreement
T. Rowe Price Large-Cap Value	DFA Emerging Markets Core Equity 1	PIMCO Real Return		
T-C Quant Small-Cap Equity	T-C Social Choice International Equity	PIMCO Income		
T-C Social Choice Equity		Vanguard High Yield Corporate		
		T. Rowe Price Floating Rate		



TIAA-CREF Tuition Financing, Inc.

## MEMORANDUM

**TO:** ScholarShare Investment Board (SIB)  
**FROM:** Meketa Investment Group (“Meketa”)  
**DATE:** December 14, 2022  
**RE:** 2022 Annual Review

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### Summary

Meketa reviewed TIAA-CREF Tuition Financing, Inc.’s (TFI) annual review and recommendation for the ScholarShare 529 (Plan) 2023 asset allocation, which highlights their analysis behind the recommendation for no changes given the recently approved Plan lineup changes associated with the Program Manager RFP. Meketa concurs with TFI’s analysis and believes the glidepath approved through the Program Manager RFP process is well optimized. In their review, TFI also highlighted some operational items for 2023. Included in these operational items is the transition to investing the cash reserves held for liquidity purposes, within the ETF portfolios in a money market fund. Meketa believes doing so is in the best interest of participants and believes all three money market funds available represent suitable choices. ***Meketa recommends the SIB accept TFI’s recommendation of no changes to the asset allocation.***

### Background

SIB Staff requested that Meketa review TFI’s annual review and recommendation for the 2023 asset allocation for the ScholarShare 529 (Plan), which highlights TFI’s analysis behind the recommendation for no changes. TFI believes the glidepaths approved as part of the 2021 Program Manager RFP are sound. They believe the glidepaths should meet TFI’s expectation for a reasonable rate of expected return while minimizing the potential “shortfalls” between expected returns and tuition inflation over the investment horizons.

### Glidepath Asset Allocation Review

Meketa has reviewed the asset allocation of the enrollment-based portfolios for validity and soundness. Asset allocation represents the conscious decision to accept and manage risk. Real world risks and objectives faced by investors can be complex and often conflicting as a result they cannot be summarized in a single statistic. Rather, we must use a variety of tools to build a more complete picture. Our analysis takes special consideration for the unique aspects of a 529 plan: short accumulation and depletion periods. We focus on the portfolio’s effectiveness at generating returns relative to the risks incurred while accounting for distinctive risks of 529 plans such as drawdowns/losses in the latter years of the glidepath. Based on our analysis, the approved enrollment-based portfolios are efficient (return for risk incurred) and sound (protective against 529s unique risks).



	Active	Passive	ESG
5 Percentile Return	11.23%	11.18%	11.07%
25 Percentile Return	8.49%	8.45%	8.40%
Expected Return	6.62%	6.60%	6.58%
75 Percentile Return	4.79%	4.77%	4.79%
95 Percentile Return	2.20%	2.21%	2.27%
Expected Standard Deviation	11.50%	11.43%	11.23%
Probability of Exceeding 5% Tuition Inflation	72.45%	72.25%	72.40%
Probability of Exceeding 3% Tuition Inflation	91.05%	91.03%	91.32%
Median Sharpe Ratio	0.46	0.46	0.47
Expected Worst Year	-38.54%	-38.23%	-37.76%
Expected Worst Year (Last 8 years)	-26.41%	-26.38%	-25.84%
Expected Worst Year (Last 4 years)	-15.74%	-15.76%	-15.41%

### Operational Item – ETF Cash Reserve

Approximately 2% of funds in the different ScholarShare ETF accounts are held in cash. This cash is held for liquidity purpose to ensure the portfolio can trade on a T+1 settlement basis. While this cash allocation can be seen as creating a “cash-drag” (a small diminishing in returns in a positive market environment resulting from the market performance of the ETF relative to cash), it is an essential component to the smooth functioning of ETFs held within 529 accounts. With the Federal Reserve aggressively raising interest rates in an effort to combat decades high inflation, this year has seen increasing upwards pressure on interest rates. With interest rates now materially higher than zero, money market funds now offer relatively attractive yields which can help mitigate the “cash-drag”. TFI highlights three money market funds available on the BNYM platform:

Fund Name	Ticker	Assets (\$B)	Ratings (M/S&P)	Fee	7-Day Yield a/o 11/15/22
Dreyfus Government Cash Mgmt	DGCXX	\$101	Aaa-mf/AAAm	0.18%	3.57%
JPMorgan US Gov't MMkt Capital	OGVXX	\$160	Aaa-mf/AAAm	0.18%	3.49%
Invesco Shrt-Trm Inv Gov & Agcy	AGPXX	\$37	Aaa-mf/AAAm	0.16%	3.70%

### Conclusion

Meketa finds TFI's analysis to be comprehensive and insightful and uses consistent and reasonable inputs in developing their conclusions. Meketa agrees that the current glidepaths are sound and should meet TFI's expectation for a reasonable rate of expected return while being cognizant of the risks incurred to achieve those returns. Meketa, therefore, concurs with TFI's analysis and recommendation.

EDW/KRC/IH/mp