Wilshire

Quarterly Market Review

March 31, 2022

Market Commentary

U.S. Equity

The U.S. stock market was down -4.9% for the first quarter of 2022. Sector performance was mixed as Energy (+39.0%) and Utilities (+4.8%) were up, supported by surging commodities prices. The worst performing sectors this quarter were Communication Services (-11.9%), Consumer Discretionary (-9.0%) and Technology (-8.4%). From a size perspective, large-cap outperformed small-cap while growth stocks underperformed value.

Geopolitical events shook the globe during the quarter as Russia invaded neighboring Ukraine. While the humanitarian fallout is of greatest importance, it is also necessary to understand the economic and market impacts that stem from these destabilizing events. Perhaps the most important tensions came from accelerating inflationary pressures the conflict imposed on the Federal Reserve. The Fed had already signaled it would soon raise the Fed Funds Rate and inflation for the first two months of the year had already climbed 1.4% (not annualized). The 10-year breakeven inflation rate pushed toward 3% and fed fund futures pricing implied an overnight rate of 2.25% by the end of the year.

Non-U.S. Equity

The UK economy surged in January and is now back above the level that existed before the COVID pandemic. An escalating COVID outbreak in China has led to some local lockdowns and is cutting into economic growth forecasts. Russia's invasion of Ukraine led MSCI to reclassify the Russian equity market from Emerging to a Standalone Market since Russian equities are currently uninvestable.

Fixed Income

The U.S. Treasury yield curve was up across all maturities during the quarter but most sharply in the intermediate range, with pronounced flattening further out the curve. The 2-year Treasury was up 160 basis points to 2.34% while the 10-year Treasury yield also ended the quarter at 2.34%, up 83 basis points. The now nonexistent spread is as low as it has been since August 2019. The Fed raised the overnight rate off zero by 0.25% at their March meeting. Through the Fed's "dot plot," it is messaging that the current intent is for additional increases totaling 150 basis points before the end of 2022.

Secure Act 2.0

The House of Representatives passed The Securing a Strong Retirement Act of 2022 on March 29, 2022 with strong bipartisan support. The bill would meaningfully increase access to workplace retirement savings and provide further opportunities for enhanced retirement savings. It heads to the Senate next.

Headline proposals include:

- Expanding automatic enrollment in 401(k) and 403(b)retirement plans, by requiring new plans to enroll participants at initial 3% of pay and increasing it by 1% annually until 10%, unless the participant opts out — all current 401(k) and 403(b) plans are grandfathered
- Allowing 403(b) plans to participate in multiple employer plans and invest in Collective Investment Trusts
- Raising the age for required minimum distributions to 75 from 72 over the next decade
- Raising catch-up contribution limits and requiring them to be treated as Roth contributions starting in 2023
- Permitting plan sponsors to make matching contributions to a 401(k) and 403(b) plan on qualified student loan payments
- Removing the 25% cap on qualified longevity annuity contracts, or QLACs — currently retirement savers can spend up to 25% of their account on a QLAC
- Creating a national online database of lost retirement accounts to reduce the number of missing participants

Source: https://waysandmeans.house.gov/sites/democrats.waysandmeans.house.gov/files/documents/SECURE2.0_SxS_032822.pdf

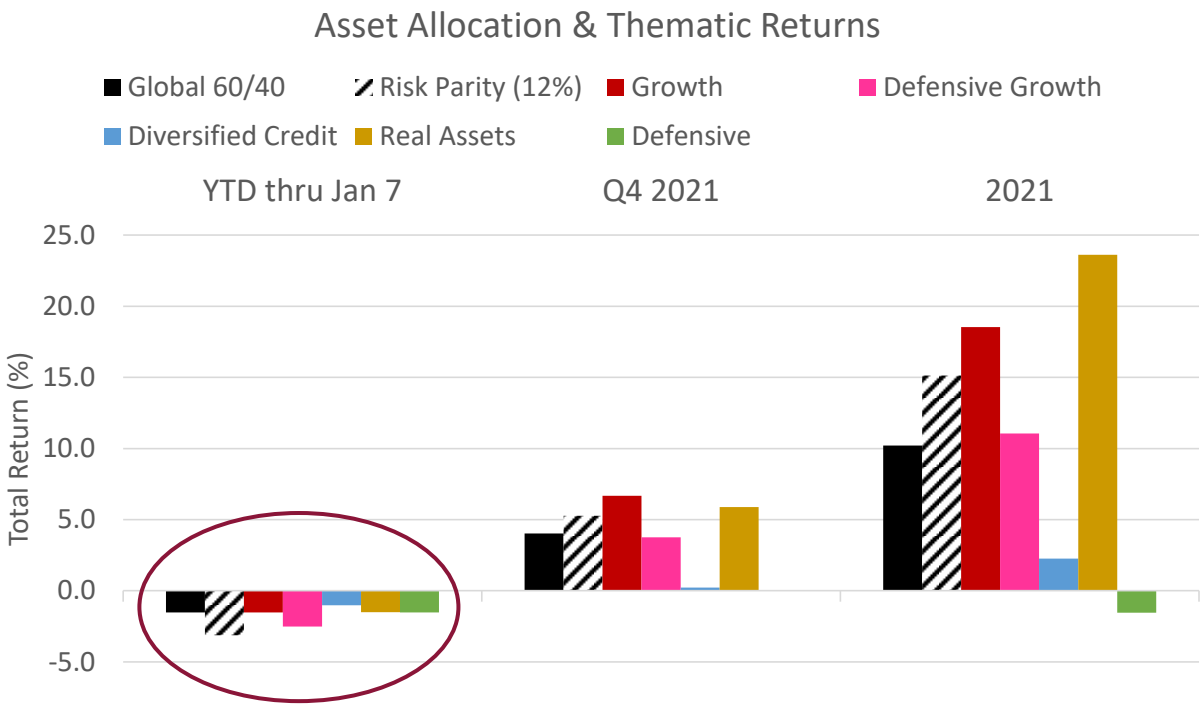
March 2022 Asset Class Assumptions

	Equity						Fixed Income						Real Assets					
	US Stock	Dev ex-US Stock	Emg Stock	Global ex-US Stock	Global Stock	Private Equity	Cash	Core Bond	LT Core Bond	TIPS	High Yield	Dev ex-US Bond (Hdg)	US RES	Real Estate Global RES	Real Estate Private RE	Cmdty	Real Assets	US CPI
Compound Return (%)	5.25	6.25	6.25	6.50	5.85	9.10	1.95	3.05	3.30	2.45	4.65	1.50	5.00	5.15	6.55	4.80	6.40	2.85
Expected Risk (%)	17.00	18.00	26.00	19.10	17.10	28.00	0.75	4.25	8.90	6.00	10.00	4.25	17.50	16.45	14.00	16.00	10.35	1.75
Cash Yield (%)	1.35	2.90	2.35	2.75	1.90	0.00	1.95	3.40	3.80	3.00	8.05	2.10	2.85	2.85	2.30	1.95	2.15	0.00
Growth Exposure	8.00	8.00	8.00	8.00	8.00	13.50	0.00	-0.85	-2.25	-3.00	4.00	-1.00	6.00	6.00	3.50	0.00	1.80	0.00
Inflation Exposure	-3.00	0.00	5.00	1.50	-1.25	-3.80	0.00	-2.50	-6.70	2.50	-1.00	-3.00	1.00	1.80	1.00	12.00	4.85	1.00
Correlations																		
US Stock	1.00																	
Dev ex-US Stock (USD)	0.81	1.00																
Emerging Mkt Stock	0.74	0.74	1.00															
Global ex-US Stock	0.83	0.96	0.87	1.00														
Global Stock	0.95	0.92	0.83	0.94	1.00													
Private Equity	0.74	0.64	0.62	0.67	0.74	1.00												
Cash Equivalents	-0.05	-0.09	-0.05	-0.08	-0.07	0.00	1.00											
Core Bond	0.28	0.13	0.00	0.09	0.20	0.31	0.19	1.00										
LT Core Bond	0.31	0.16	0.01	0.12	0.23	0.32	0.11	0.92	1.00									
TIPS	-0.05	0.00	0.15	0.05	0.00	-0.03	0.20	0.59	0.47	1.00								
High Yield Bond	0.54	0.39	0.49	0.45	0.51	0.34	-0.10	0.25	0.32	0.05	1.00							
Dev ex-US Bond (Hdg)	0.16	0.25	-0.01	0.17	0.18	0.26	0.10	0.66	0.65	0.39	0.26	1.00						
US RE Securities	0.58	0.47	0.44	0.49	0.56	0.50	-0.05	0.17	0.23	0.10	0.56	0.05	1.00					
Global RE Securities	0.64	0.58	0.56	0.61	0.65	0.58	-0.05	0.17	0.22	0.11	0.61	0.03	0.96	1.00				
Private Real Estate	0.54	0.44	0.44	0.47	0.52	0.51	-0.05	0.19	0.25	0.09	0.57	0.05	0.77	0.75	1.00			
Commodities	0.25	0.34	0.39	0.38	0.32	0.27	0.00	-0.02	-0.02	0.25	0.29	-0.10	0.25	0.28	0.25	1.00		
Real Assets	0.48	0.51	0.58	0.57	0.54	0.47	-0.02	0.23	0.25	0.39	0.56	0.05	0.70	0.75	0.70	0.65	1.00	
Inflation (CPI)	-0.10	-0.15	-0.13	-0.15	-0.13	-0.10	0.10	-0.12	-0.12	0.15	-0.08	-0.08	0.05	0.03	0.05	0.44	0.26	1.00

2022 Environmental Risk: A Year of Payback?

If some/much of COVID market returns have been liquidity fueled, can we expect to hang on to these gains when support is withdrawn?

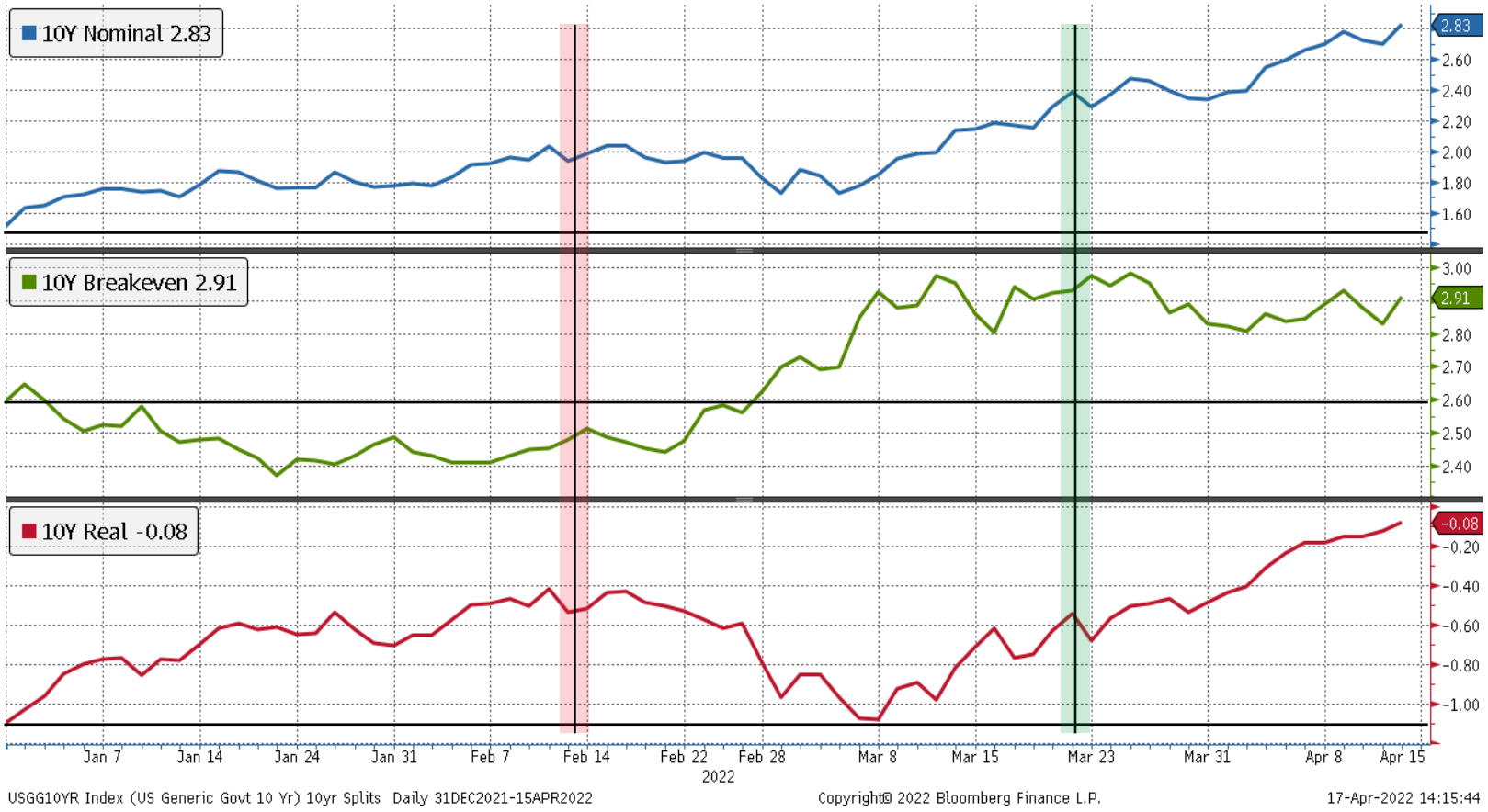
Revisiting the environmental risk we noted in early 2022



	YTD thru Jan 7	Q4 2021	2021
Global 60/40	(1.52)	4.02	10.20
Risk Parity (12%)	(3.13)	5.26	15.12
Growth	(1.52)	6.68	18.54
Defensive Growth	(2.52)	3.76	11.05
Diversified Credit	(1.02)	0.22	2.26
Real Assets	(1.51)	5.88	23.61
Defensive	(1.53)	0.01	(1.54)

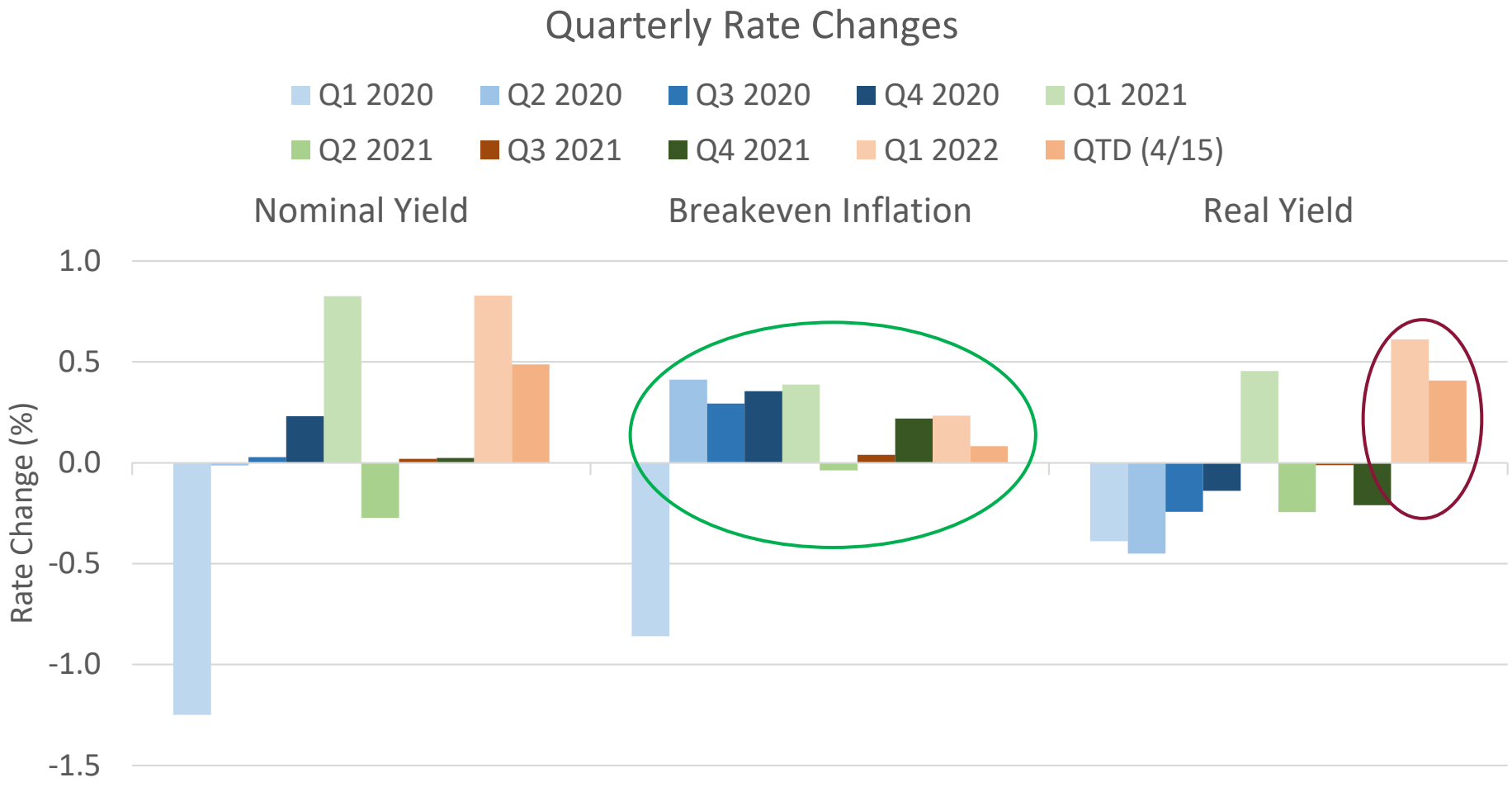
Data Source: Bloomberg, Wilshire

Q1 Rate Moves (10Y Nominal, Real & BEI)



Data Source: Bloomberg

Rate Changes (2020 – YTD 2022)



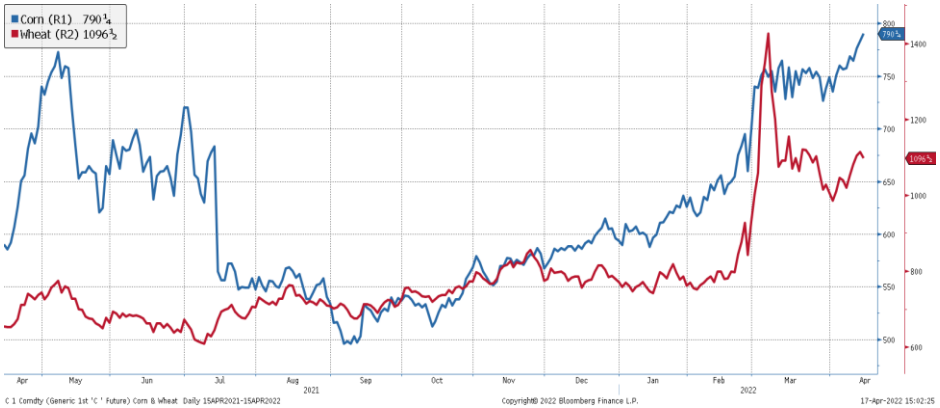
Data Source: Bloomberg

Inflation Impact

Oil prices (WTI & Brent)…

Data Source: Bloomberg

Corn & Wheat prices…

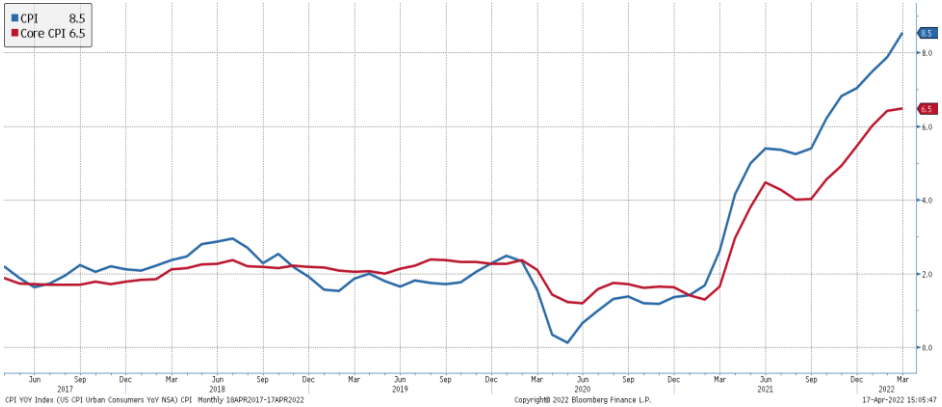


Data Source: Bloomberg

Fertilizer prices…

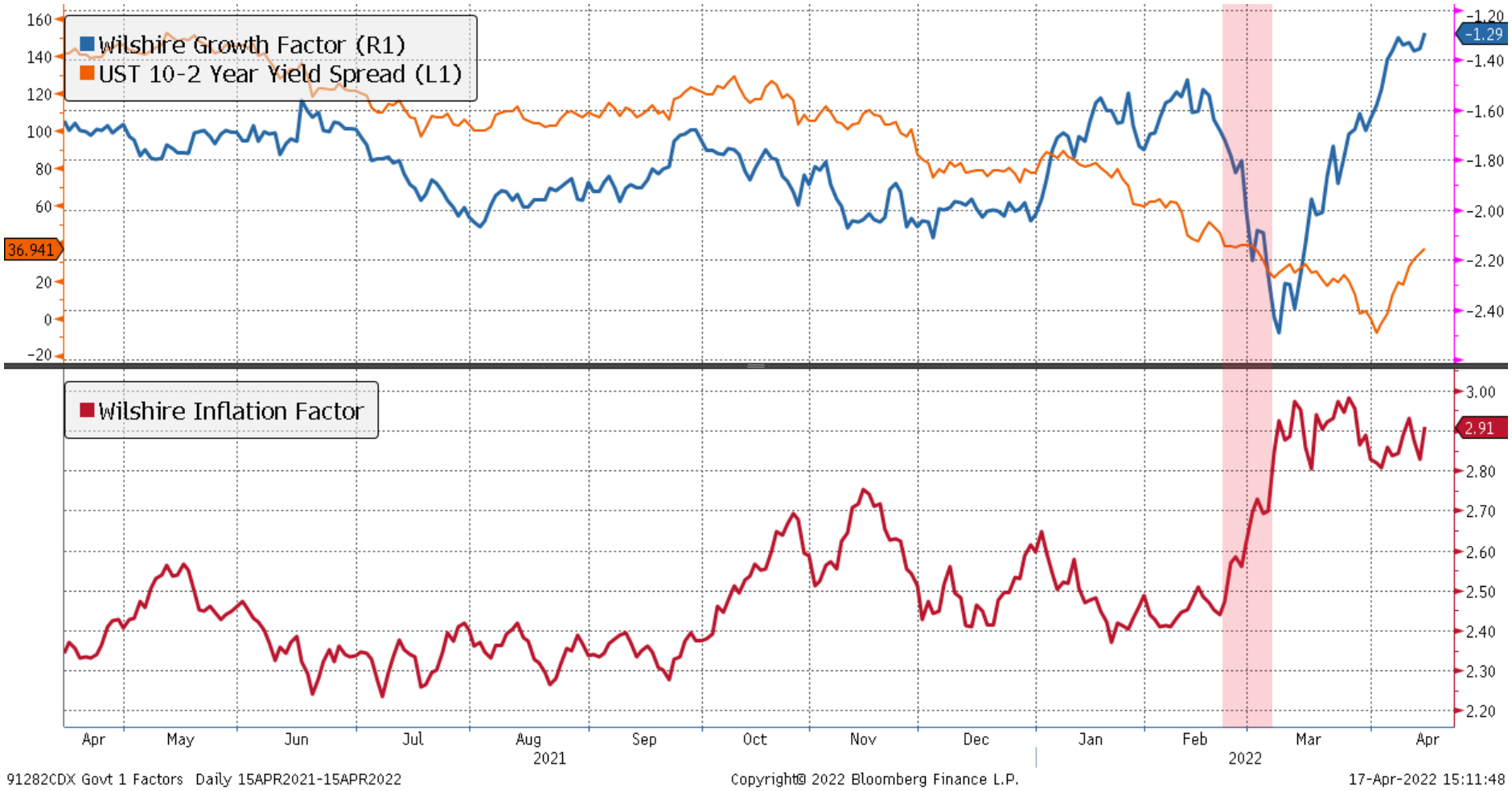
Data Source: Bloomberg

Headline & Core CPI (YoY)…



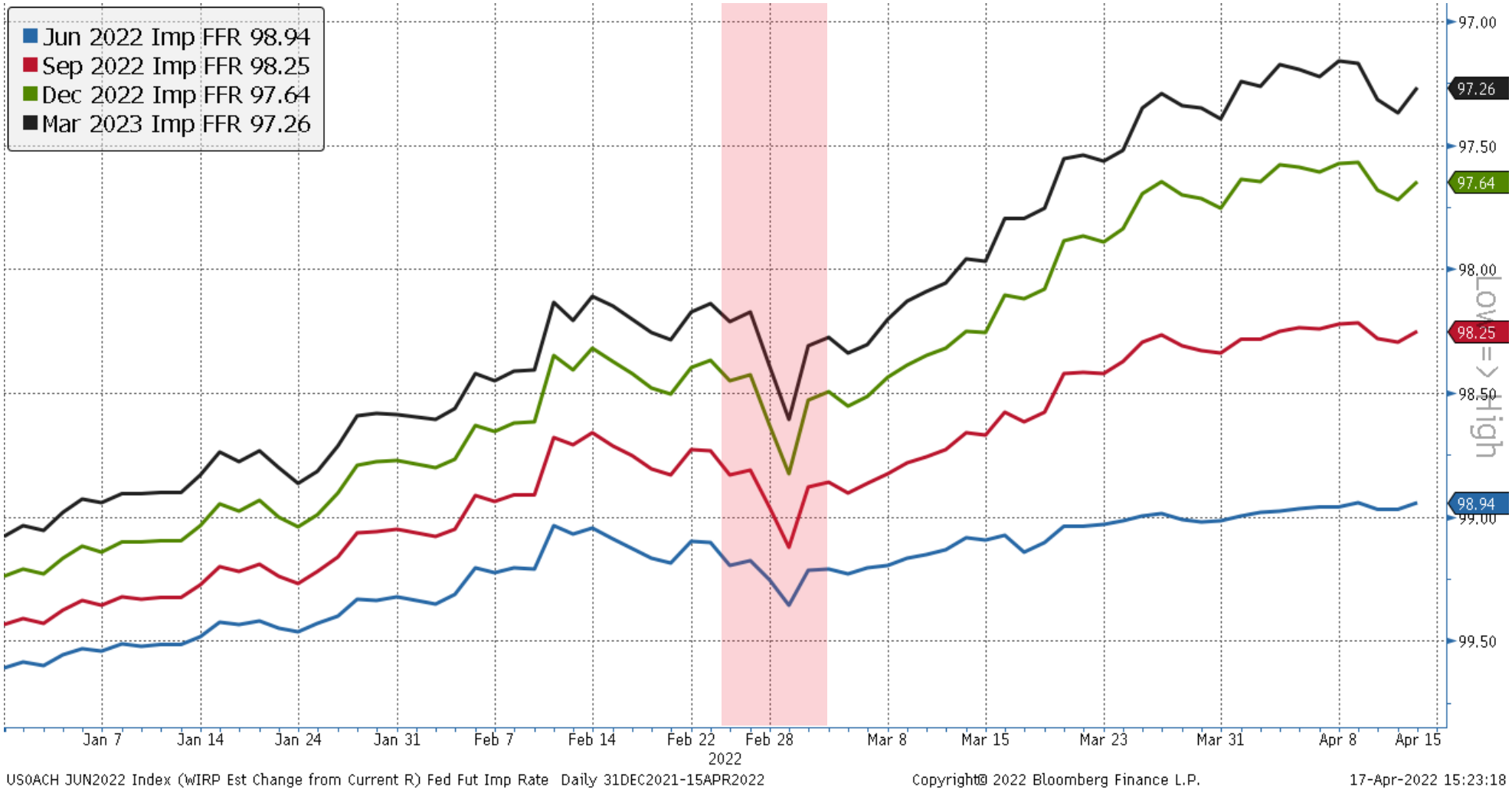
Data Source: Bloomberg

Economic Factors Proxies



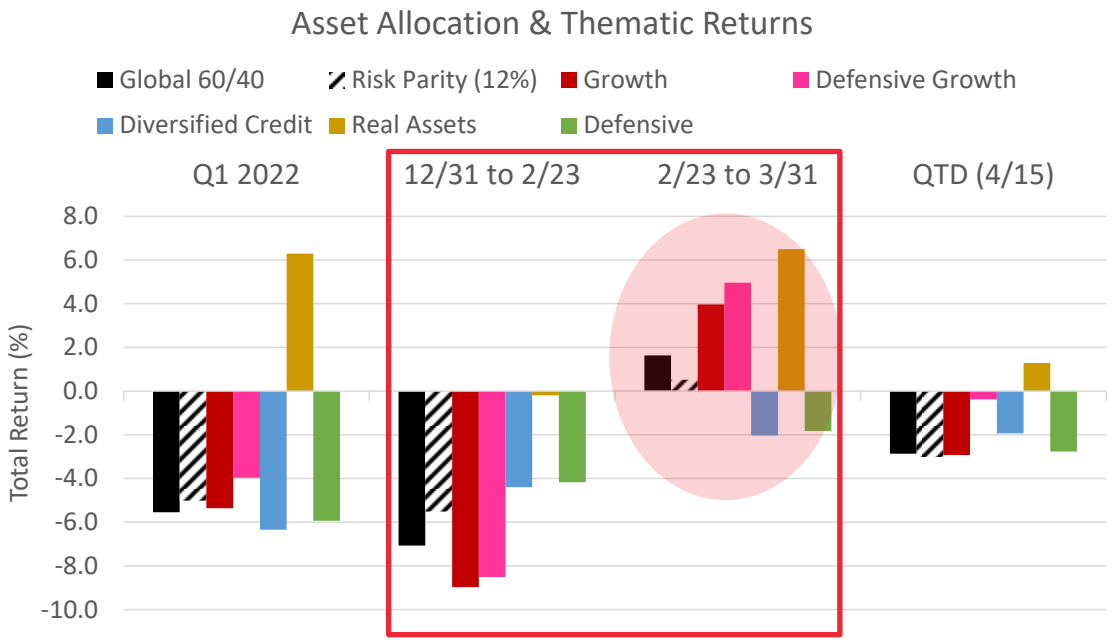
Data Source: Bloomberg

Fed Funds Discounting



Data Source: Bloomberg

Market Environment (YTD thru 4/15)

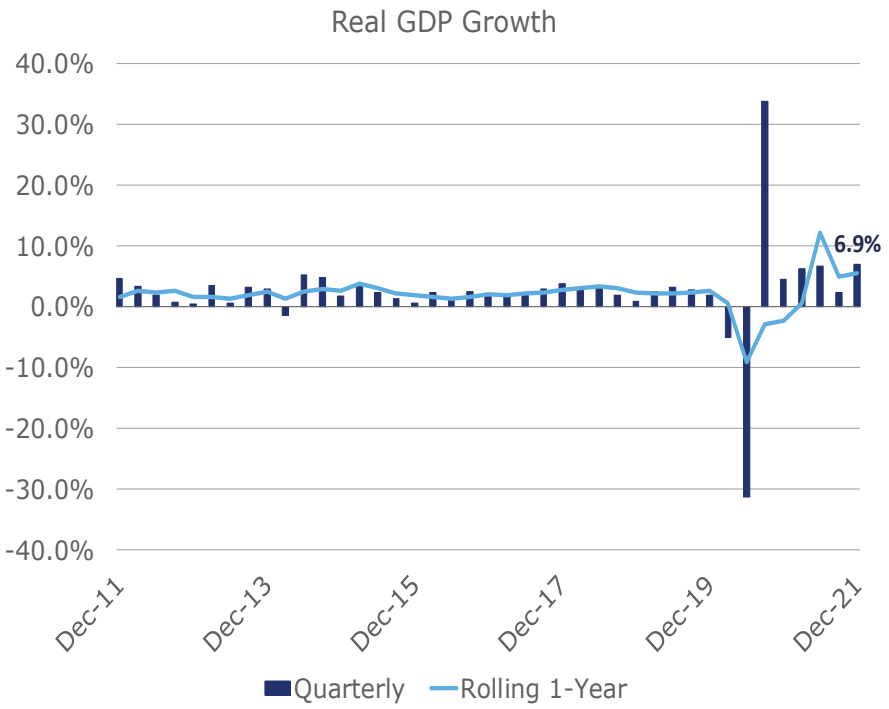


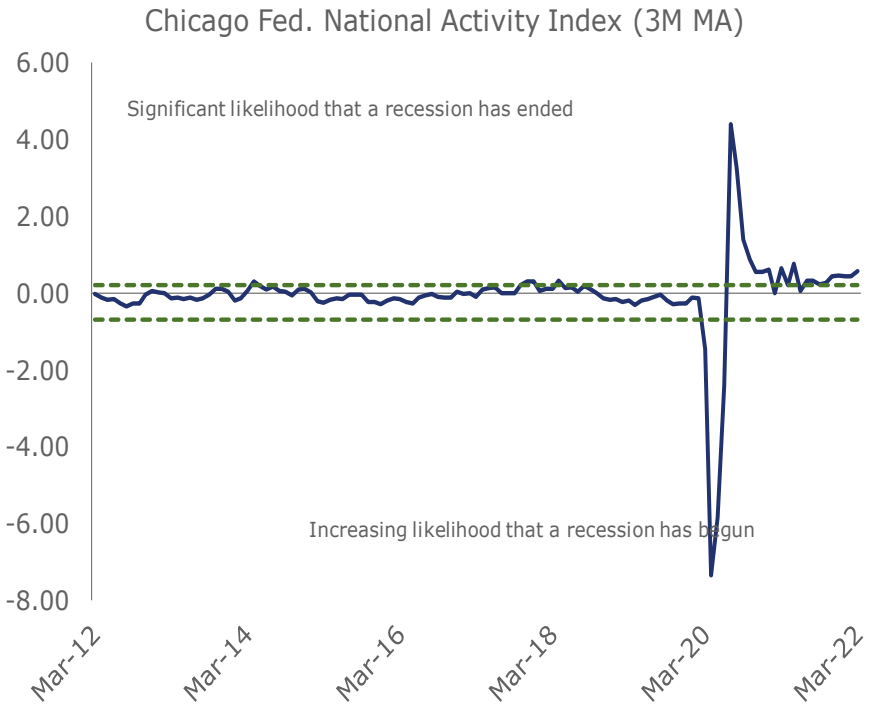
	Q1 2022	12/31 to 2/23	2/23 to 3/31	QTD (4/15)
Global 60/40	(5.55)	(7.07)	1.63	(2.87)
Risk Parity (12%)	(5.02)	(5.52)	0.53	(3.01)
Growth	(5.36)	(8.97)	3.97	(2.93)
Defensive Growth	(3.97)	(8.51)	4.97	(0.38)
Diversified Credit	(6.35)	(4.40)	(2.03)	(1.94)
Real Assets	6.30	(0.19)	6.50	1.29
Defensive	(5.93)	(4.18)	(1.83)	(2.77)

Data Source: Bloomberg

Economic/Market Activity

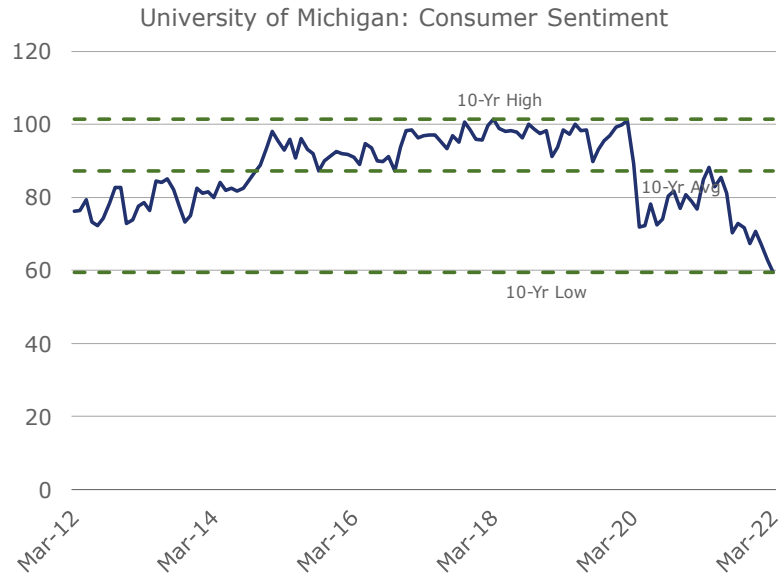
Economic Growth

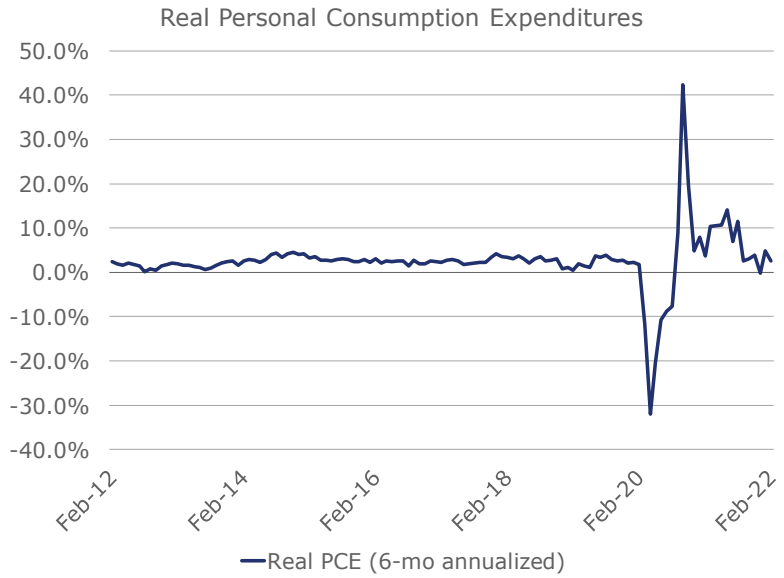


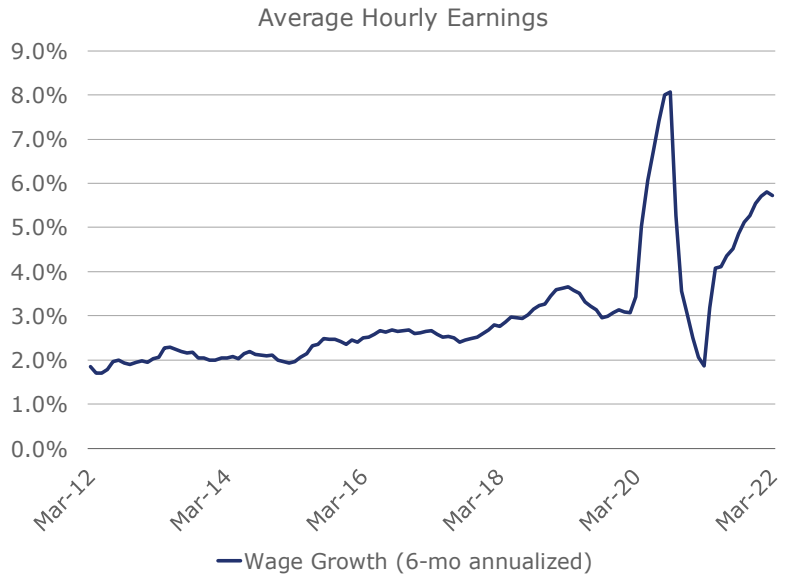


Data Sources: Bloomberg

Consumer Activity

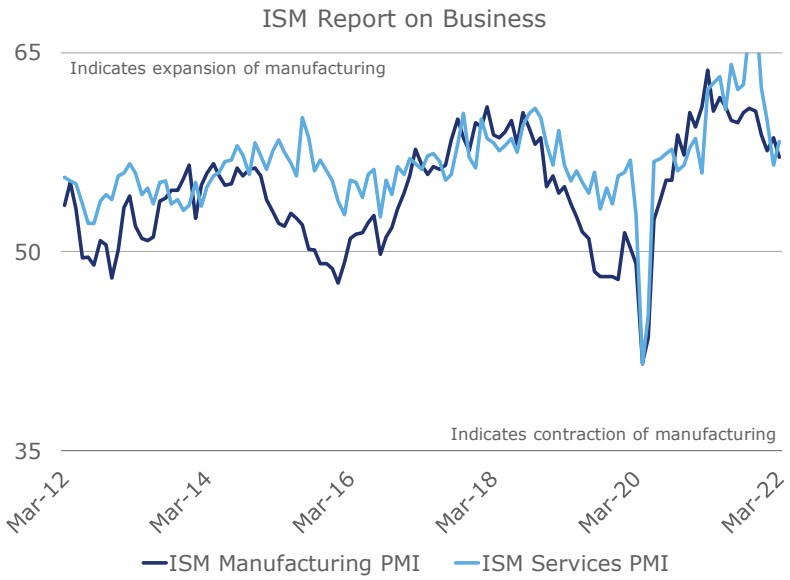


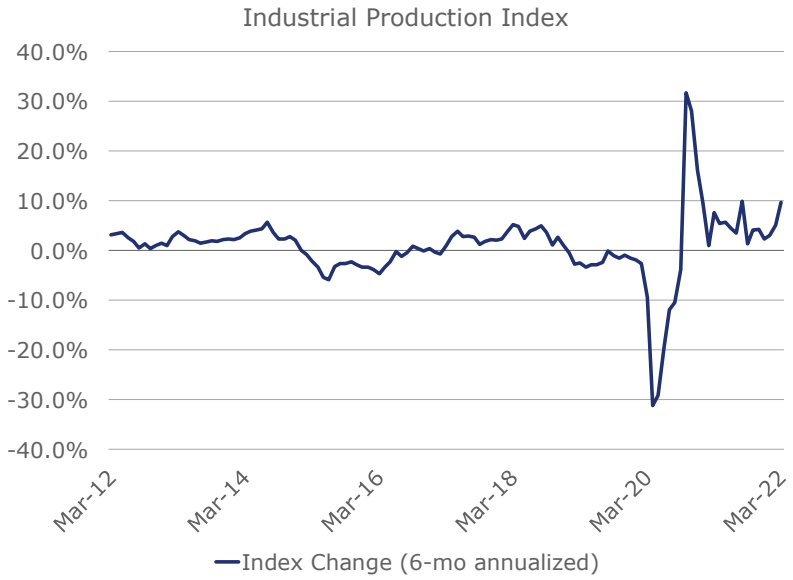




Data Sources: Bloomberg

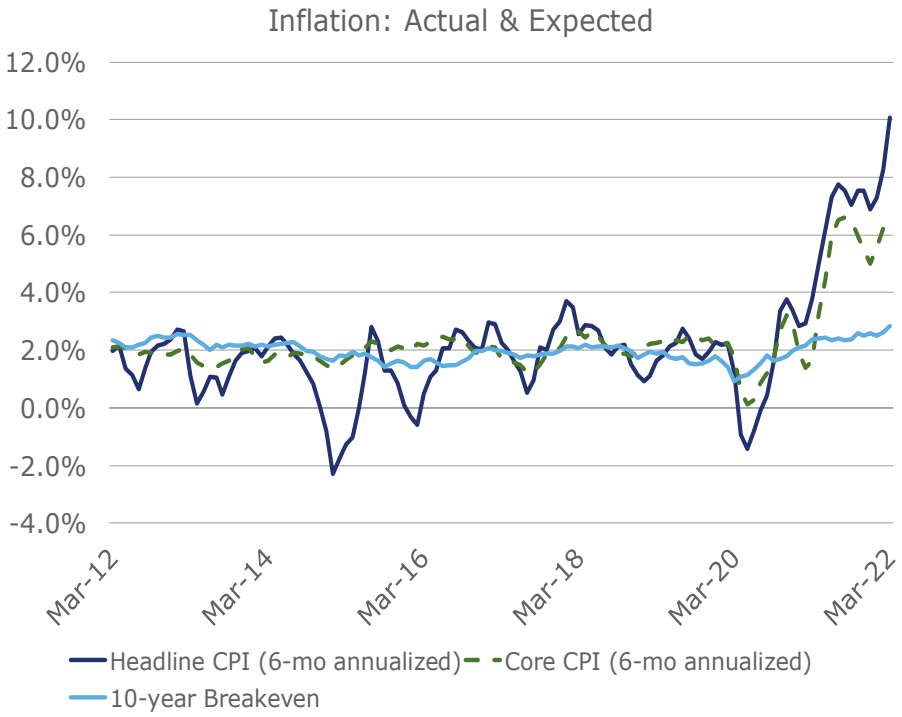
Business Activity

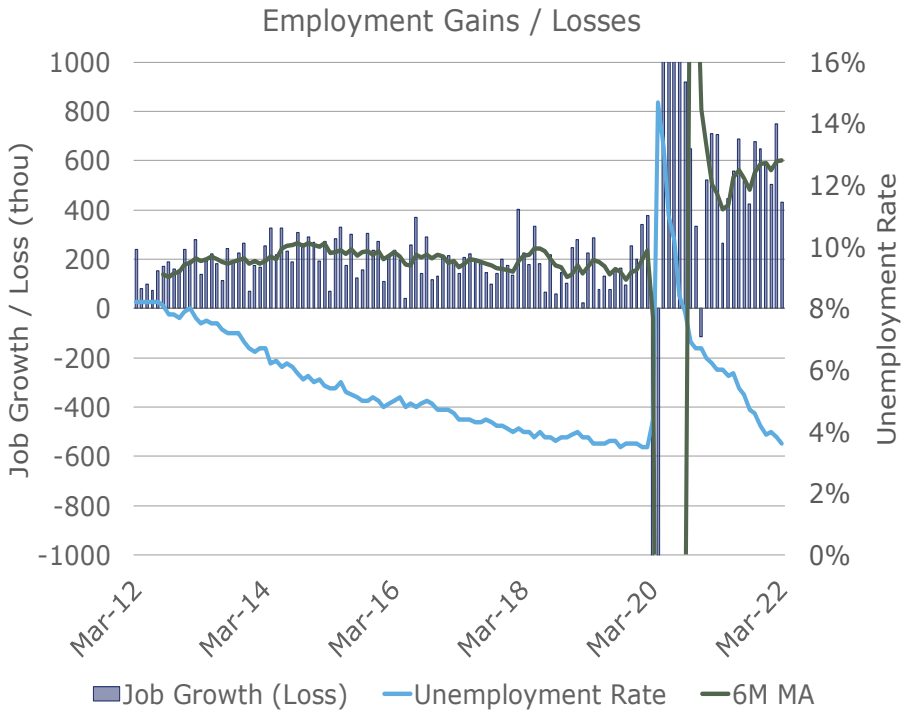




Data Sources: Bloomberg

Inflation and Employment

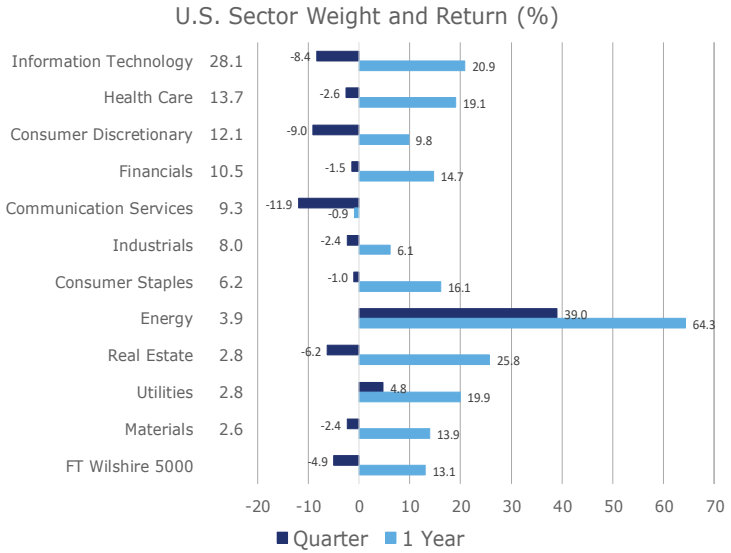


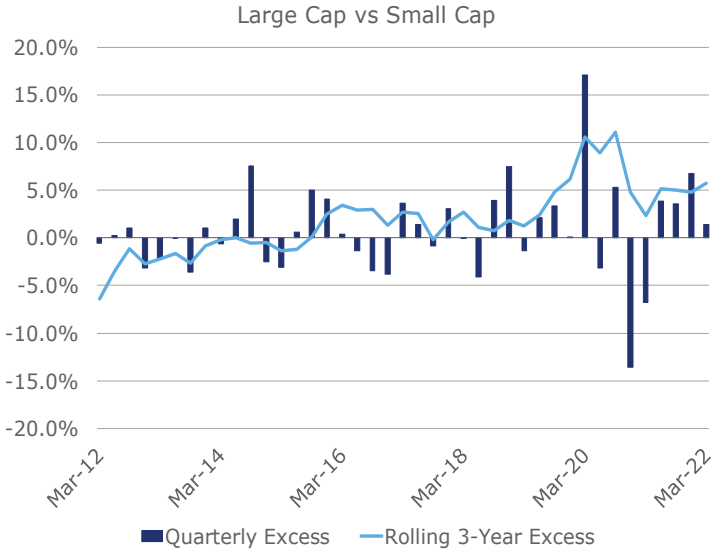


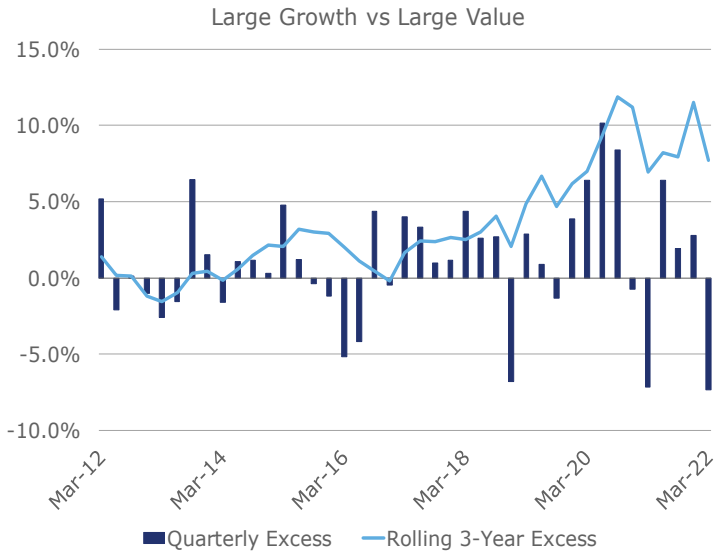
Data Sources: Bloomberg

U.S. Equity Market

As of 3/31/2022	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
FT Wilshire 5000	-4.9	-4.9	13.1	18.7	15.7	14.4
Wilshire U.S. Large Cap	-4.8	-4.8	14.6	19.3	16.2	14.7
Wilshire U.S. Small Cap	-6.1	-6.1	-1.4	12.8	10.4	11.8
Wilshire U.S. Large Growth	-8.0	-8.0	16.3	23.5	19.9	16.8
Wilshire U.S. Large Value	-0.7	-0.7	12.6	14.7	12.3	12.5
Wilshire U.S. Small Growth	-10.3	-10.3	-9.4	12.5	11.5	11.9
Wilshire U.S. Small Value	-1.8	-1.8	7.3	13.1	9.2	11.5
Wilshire REIT Index	-3.9	-3.9	29.1	11.9	10.0	9.9
MSCI USA Min. Vol. Index	-3.8	-3.8	13.8	11.8	12.5	13.0
FTSE RAFI U.S. 1000 Index	0.1	0.1	15.1	17.5	13.5	13.6



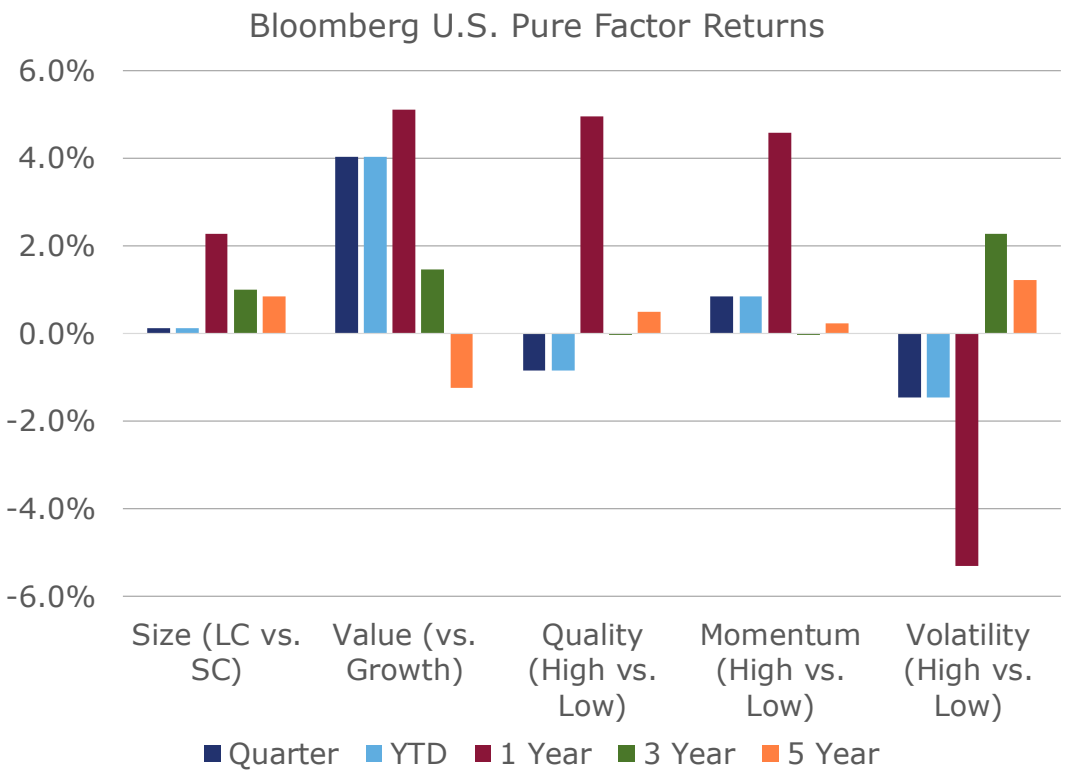




Data Sources: Bloomberg, Wilshire Atlas

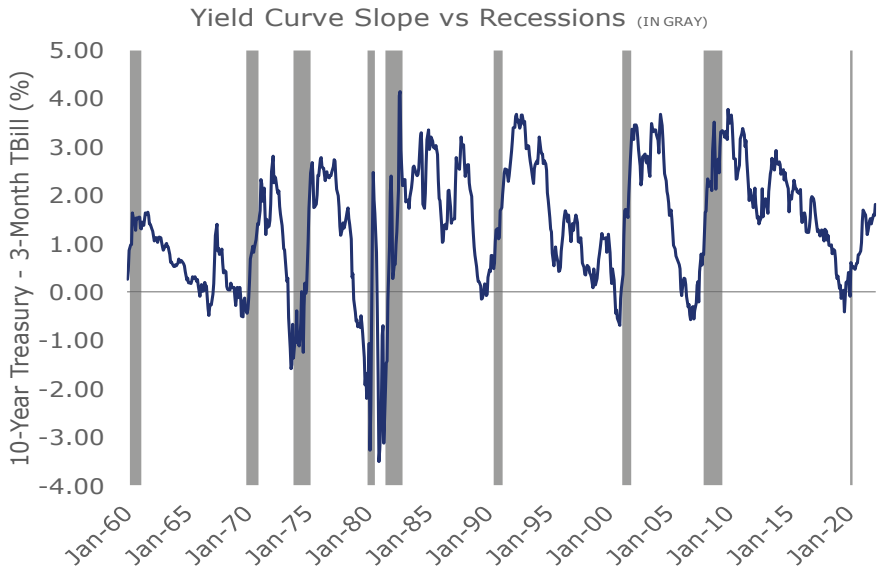
U.S. Factor Returns

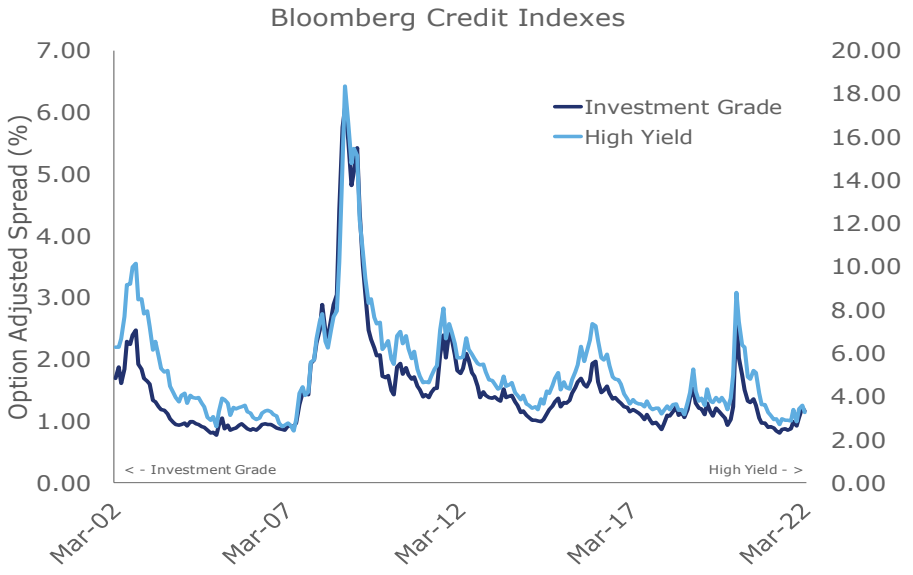
- Factor returns represent the contribution from large cap, value, etc. stocks within Bloomberg's Portfolio & Risk Analytics module
- Value stocks have rebounded during the past year

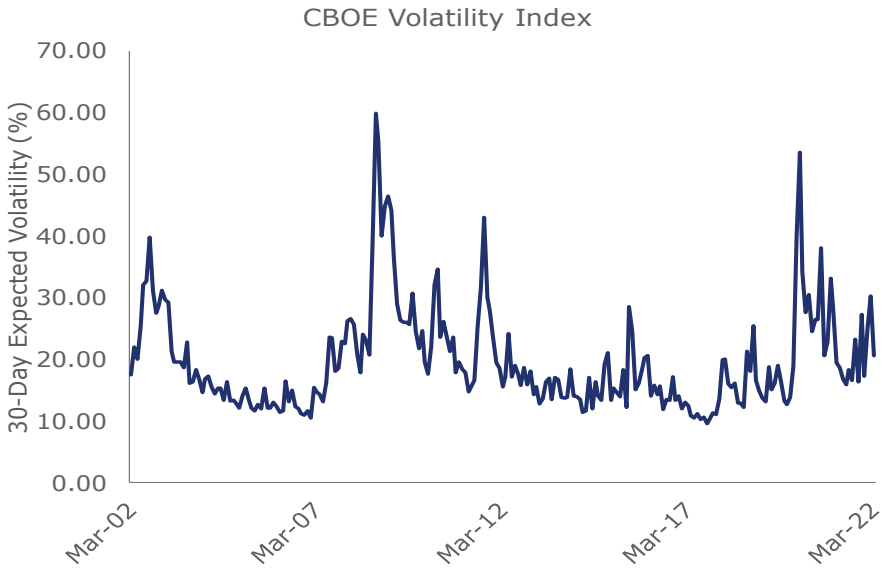


Data Sources: Bloomberg

Risk Monitor

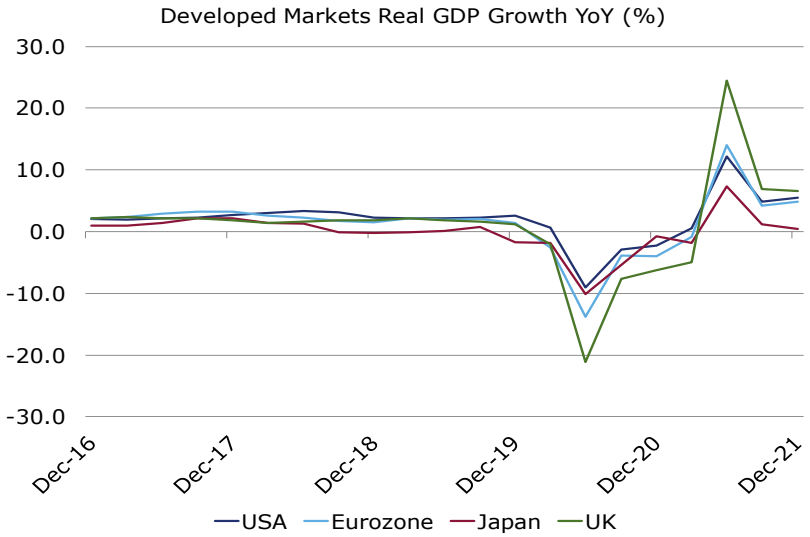


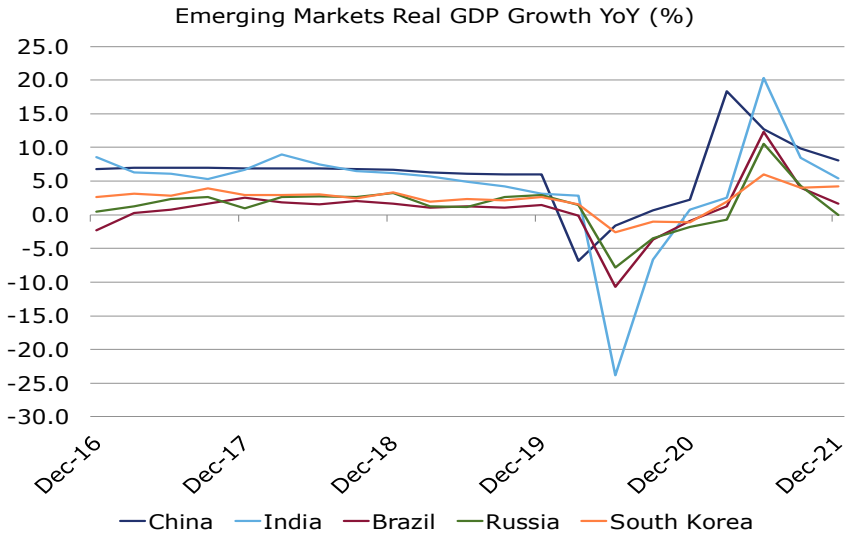


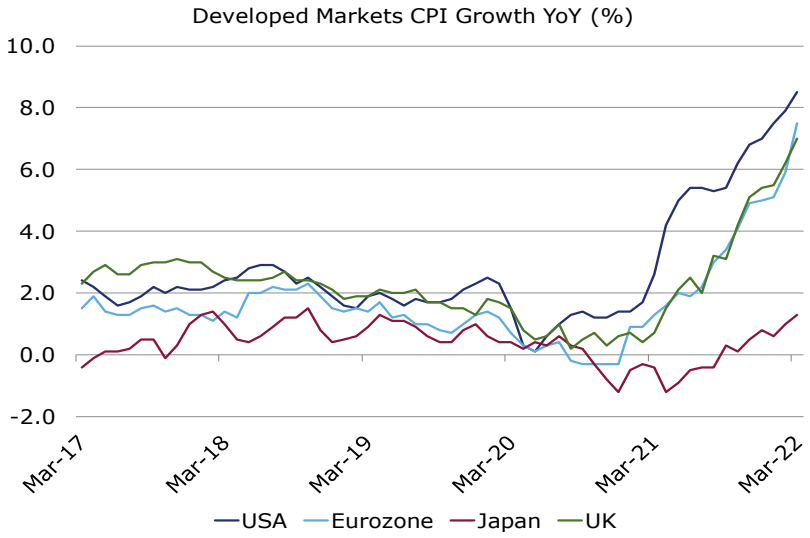


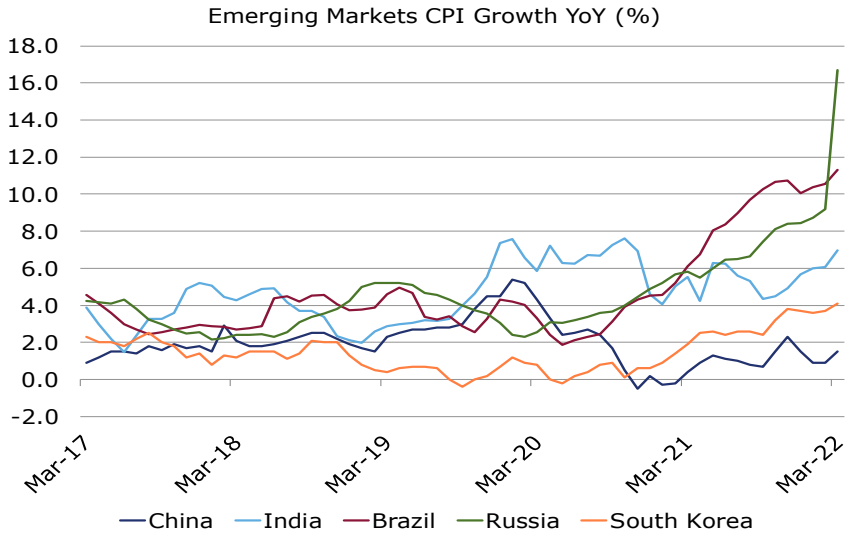
Data Sources: Bloomberg

Non-U.S. Growth and Inflation





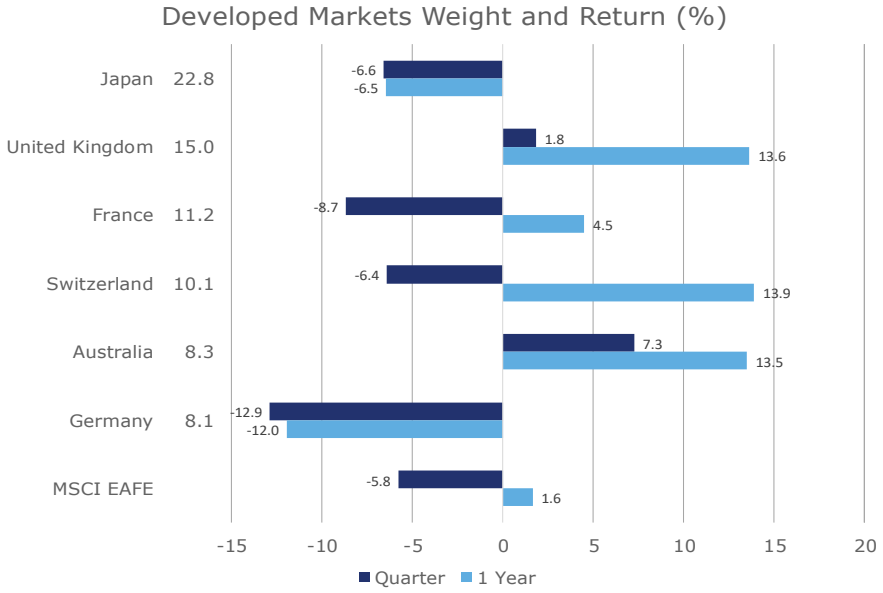


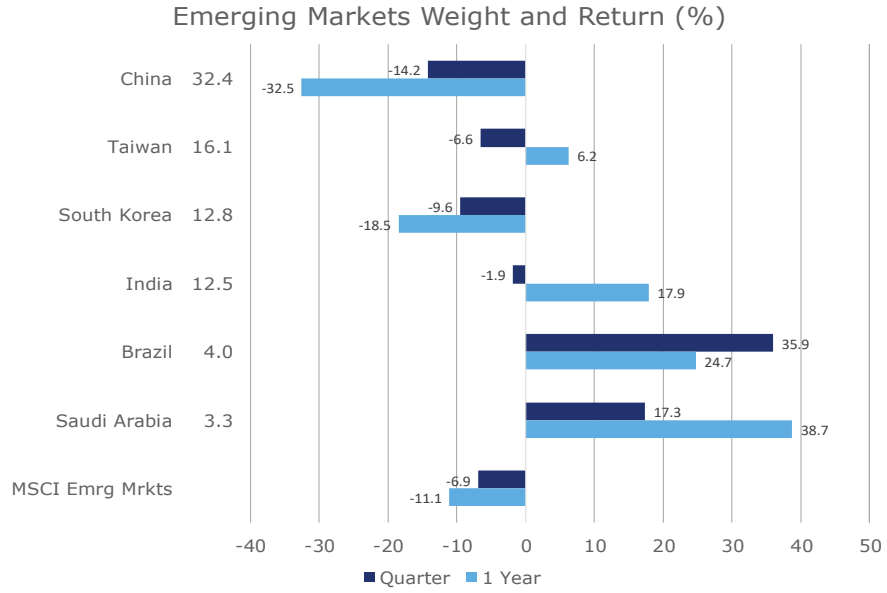


Data Sources: Bloomberg

Non-U.S. Equity Market

As of 3/31/2022	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
MSCI ACWI ex-US ($G)	-5.3	-5.3	-1.0	8.0	7.3	6.0
MSCI EAFE ($G)	-5.8	-5.8	1.6	8.3	7.2	6.8
MSCI Emerging Markets ($G)	-6.9	-6.9	-11.1	5.3	6.4	3.7
MSCI Frontier Markets ($G)	0.6	0.6	11.9	2.4	3.6	3.0
MSCI ACWI ex-US Growth ($G)	-10.7	-10.7	-5.9	9.5	9.0	7.1
MSCI ACWI ex-US Value ($G)	-0.1	-0.1	3.9	6.5	5.5	5.2
MSCI ACWI ex-US Small ($G)	-6.4	-6.4	0.4	10.7	8.3	7.7
MSCI ACWI Minimum Volatility	-2.9	-2.9	9.2	8.3	9.2	9.7
MSCI EAFE Minimum Volatility	-5.3	-5.3	2.4	3.6	5.4	6.8
FTSE RAFI Developed ex-US	-1.3	-1.3	5.0	8.5	6.7	6.3
MSCI EAFE LC (G)	-3.6	-3.6	6.7	8.7	7.1	9.1
MSCI Emerging Markets LC (G)	-6.1	-6.1	-9.6	6.6	7.9	6.7



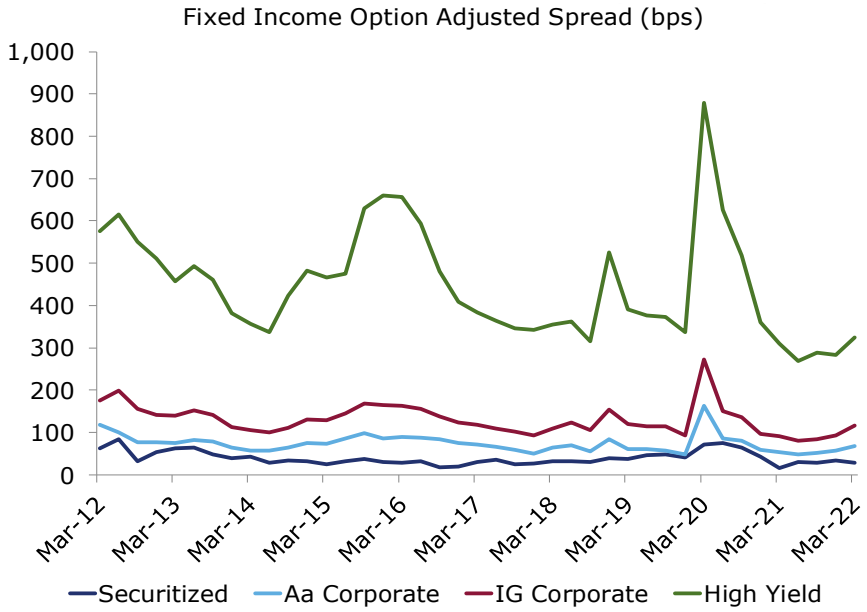


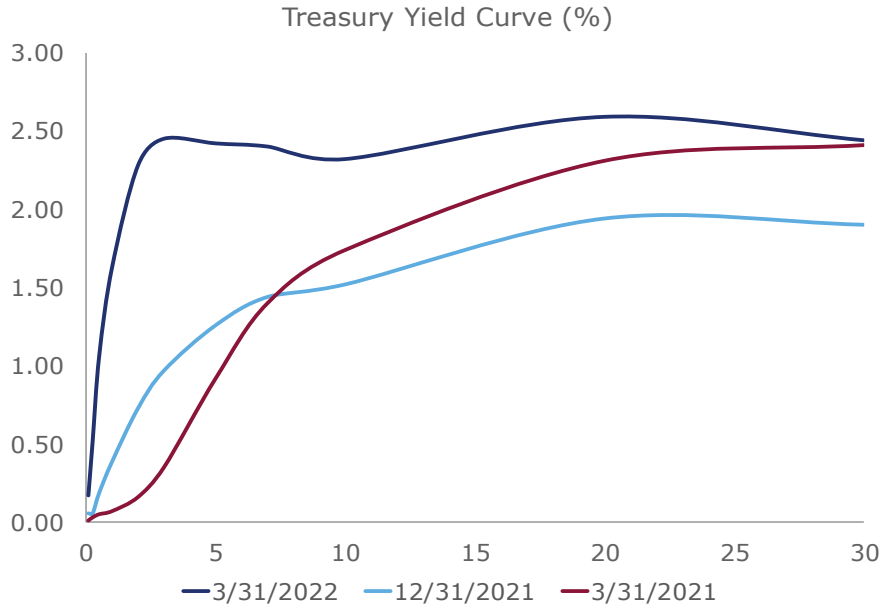
Data Sources: Bloomberg

U.S. Fixed Income

As of 3/31/2022	YTW	DUR.	QTR	YTD	1 YR	3 YR	5 YR	10 YR
Bloomberg Aggregate	2.9	6.6	-5.9	-5.9	-4.2	1.7	2.1	2.2
Bloomberg Treasury	2.4	6.8	-5.6	-5.6	-3.7	1.4	1.8	1.7
Bloomberg Gov't-Rel.	2.9	5.9	-5.4	-5.4	-3.9	1.5	2.1	2.2
Bloomberg Securitized	3.0	5.1	-5.0	-5.0	-4.9	0.7	1.4	1.8
Bloomberg Corporate	3.6	8.1	-7.7	-7.7	-4.2	3.0	3.3	3.6
Bloomberg LT Gov't/Credit	3.4	15.7	-11.0	-11.0	-3.1	4.2	4.6	4.7
Bloomberg LT Treasury	2.6	17.8	-10.6	-10.6	-1.4	3.3	3.9	4.0
Bloomberg LT Gov't-Rel.	3.9	12.9	-9.7	-9.7	-4.0	2.7	4.0	4.3
Bloomberg LT Corporate	4.0	14.4	-11.4	-11.4	-4.3	4.6	4.9	5.2
Bloomberg U.S. TIPS *	2.4	8.1	-3.0	-3.0	4.3	6.2	4.4	2.7
Bloomberg High Yield	6.0	3.9	-4.8	-4.8	-0.7	4.6	4.7	5.7
S&P/LSTA Leveraged Loan	4.4	0.3	-0.1	-0.1	3.3	4.2	4.0	4.3
Treasury Bills	0.6	0.3	0.0	0.0	0.0	0.8	1.1	0.6

* Yield and Duration statistics are for a proxy index based on similar maturity, the Bloomberg Barclays U.S. Treasury 7-10 Year Index



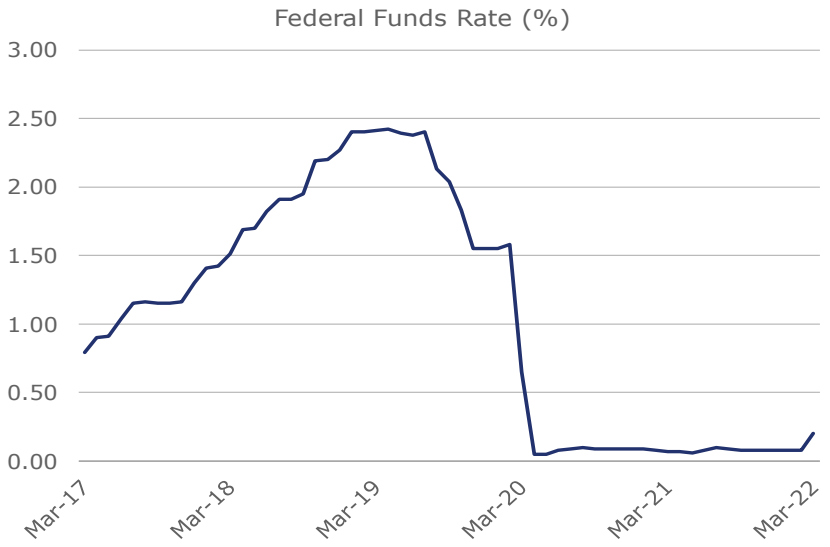


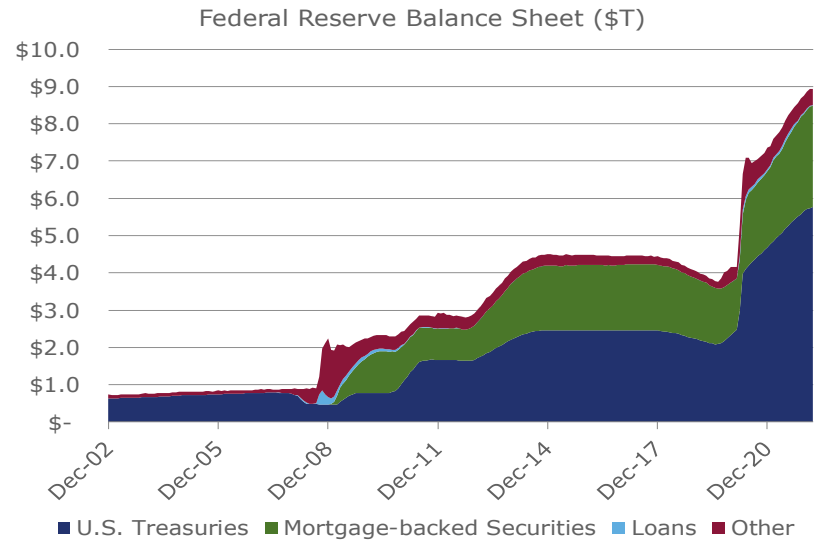
Data Sources: Bloomberg

Federal Reserve

- Current FOMC expectation is for three 25 basis point increases (or 0.75%) in the Fed-funds rate during 2022
- Federal Reserve has added more than $4.5 trillion in assets to their balance sheet during the past 21 months
- QE4 is now larger than the 3 phases of quantitative easing – combined – following the global financial crisis

	Announced	Closed	Amount (bil)
QE1	11/25/2008	3/31/2010	$1,403
QE2	11/3/2010	6/29/2012	$568
QE3	9/13/2012	10/29/2014	$1,674
QE4	3/23/2020	3/15/2022	$4,804



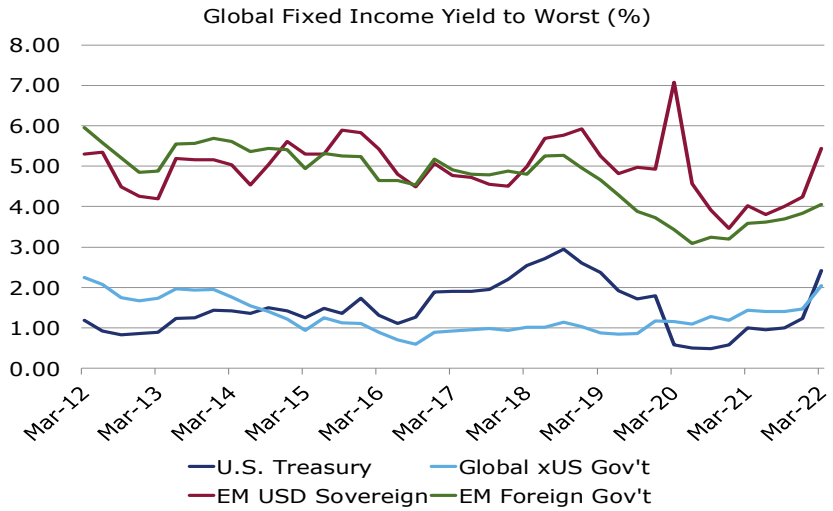


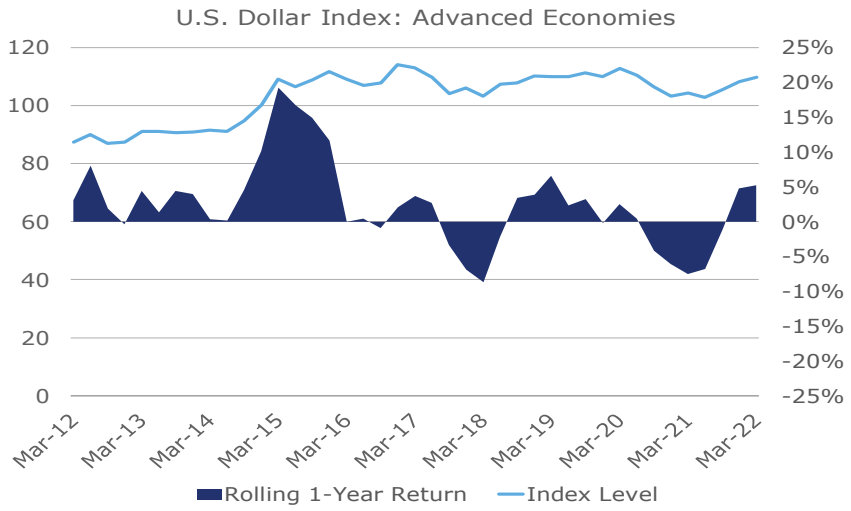
Data Sources: Bloomberg

Non-U.S. Fixed Income

As of 3/31/2022	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
Developed Markets						
Bloomberg Global Aggregate xUS	-6.1	-6.1	-7.9	-0.2	1.3	0.1
Bloomberg Global Aggregate xUS *	-4.1	-4.1	-3.6	0.9	2.3	3.2
Bloomberg Global Inflation Linked xUS	-5.3	-5.3	0.0	3.8	4.1	2.7
Bloomberg Global Inflation Linked xUS *	-2.8	-2.8	5.5	4.6	4.5	5.3
Emerging Markets (Hard Currency)						
Bloomberg EM USD Aggregate	-9.2	-9.2	-7.5	0.7	1.9	3.6
Emerging Markets (Foreign Currency)						
Bloomberg EM Local Currency Gov't	-2.1	-2.1	0.0	2.8	2.8	1.7
Bloomberg EM Local Currency Gov't *	-3.5	-3.5	-2.9	1.4	2.2	2.4
Euro vs. Dollar	-2.7	-2.7	-5.7	-0.5	0.8	-1.9
Yen vs. Dollar	-5.4	-5.4	-9.0	-3.1	-1.8	-3.8
Pound vs. Dollar	-2.9	-2.9	-4.7	0.3	0.9	-2.0

* Returns are reported in terms of local market investors, which removes currency effects.

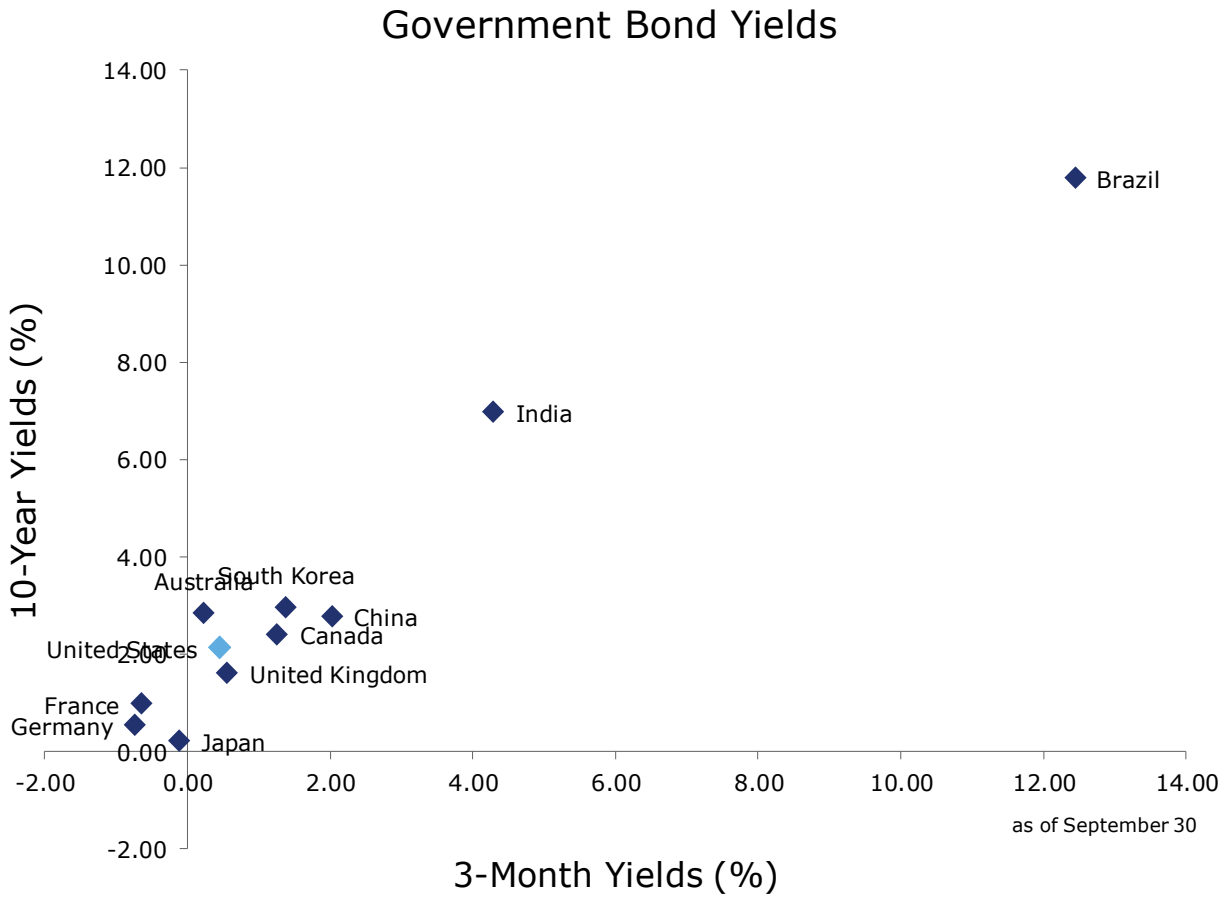




Data Sources: Bloomberg

Global Interest Rates

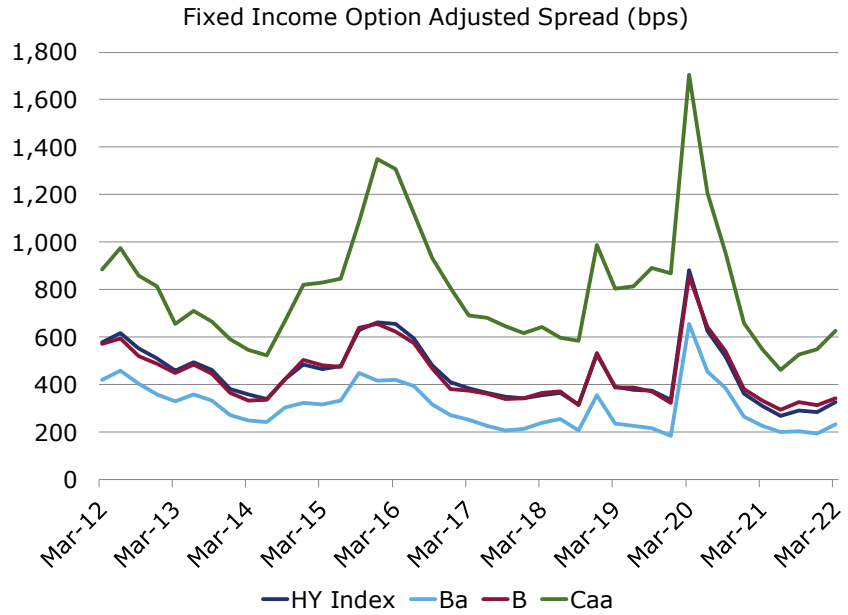
Negative rates found in Germany and France; low but positive rates, and at similar levels, in the U.S., Australia and in the U.K.



Data Sources: Bloomberg

High Yield Bond Market

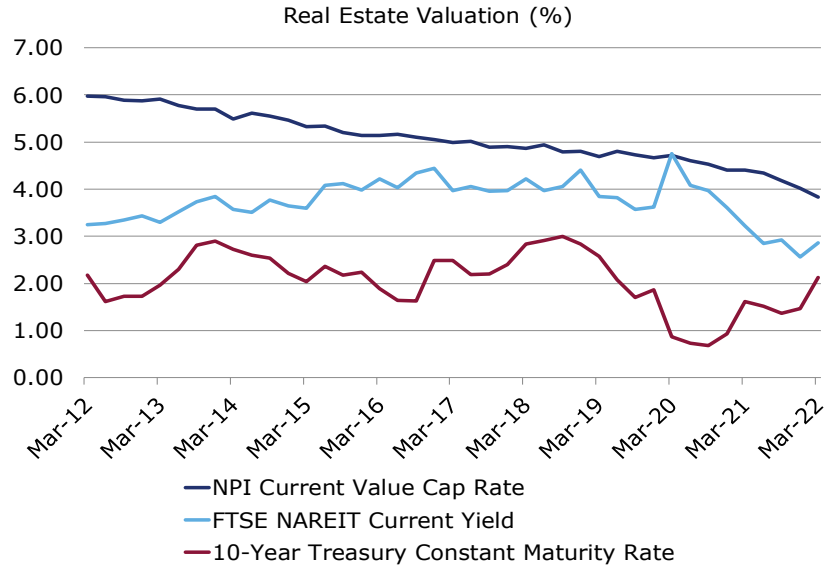
As of 3/31/2022		YTW	QTR	YTD	1 YR	3 YR	5 YR	10 YR
Bloomberg High Yield		6.0	-4.8	-4.8	-0.7	4.6	4.7	5.7
S&P LSTA Leveraged Loan		4.4	-0.2	-0.2	2.3	3.8	3.7	3.9
High Yield Quality Distribution	**Weight**							
Ba U.S. High Yield	51.3%	5.0	-5.9	-5.9	-1.5	5.3	5.1	5.9
B U.S. High Yield	37.0%	6.3	-3.5	-3.5	0.0	4.2	4.5	5.4
Caa U.S. High Yield	11.5%	9.1	-3.9	-3.9	0.8	2.9	3.5	5.8
Ca to D U.S. High Yield	0.3%	30.8	-3.8	-3.8	-5.5	-1.9	2.7	-3.0
Non-Rated U.S. High Yield	0.0%	0.0	0.0	0.0	0.0	-1.4	0.8	1.6

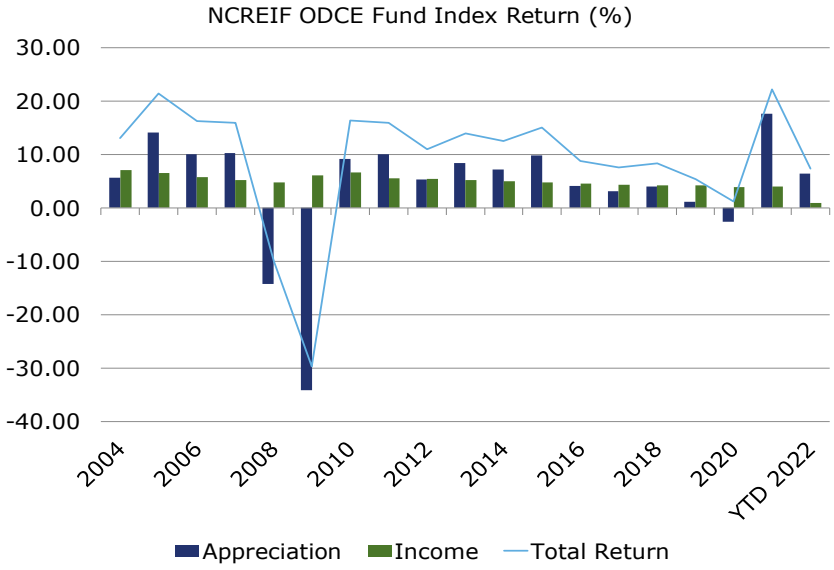


Data Sources: Bloomberg

Real Assets

As of 3/31/2022	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
Bloomberg U.S. TIPS	-3.0	-3.0	4.3	6.2	4.4	2.7
Bloomberg Commodity Index	25.5	25.5	49.3	16.1	9.0	-0.7
Bloomberg Gold Index	6.6	6.6	13.1	13.0	8.1	0.7
Wilshire Global RESI Index	-3.0	-3.0	22.0	8.7	8.5	8.8
NCREIF ODCE Fund Index	7.4	7.4	28.5	11.3	9.9	10.9
NCREIF Timberland Index	3.2	3.2	11.8	4.7	4.1	5.6
FTSE Global Core Infrastructure 50/50	3.9	3.9	15.3	9.0	9.4	9.7
Alerian Midstream Energy	24.0	24.0	41.9	10.1	6.1	n.a.
Bitcoin	-1.2	-1.2	-22.4	123.6	111.8	149.7





Data Sources: Bloomberg, National Council of Real Estate Investment Fiduciaries

Asset Class Performance

Asset Class Returns - Best to Worst

2017	2018	2019	2020	2021	2022 YTD	Annualized 5-Year as of 3/22
Emrg Mrkts 37.7%	T-Bills 1.9%	U.S. Equity 31.0%	U.S. Equity 20.8%	REITs 46.2%	Commodities 25.5%	U.S. Equity 15.7%
Developed 25.6%	Core Bond 0.0%	REITs 25.8%	Emrg Mrkts 18.7%	Commodities 27.1%	T-Bills 0.0%	REITs 10.0%
U.S. Equity 21.0%	U.S. TIPS -1.3%	Developed 22.7%	U.S. TIPS 11.0%	U.S. Equity 26.7%	U.S. TIPS -3.0%	Commodities 9.0%
High Yield 7.5%	High Yield -2.1%	Emrg Mrkts 18.9%	Developed 8.3%	Developed 11.8%	REITs -3.9%	Developed 7.2%
REITs 4.2%	REITs -4.8%	High Yield 14.3%	Core Bond 7.5%	U.S. TIPS 6.0%	High Yield -4.8%	Emrg Mrkts 6.4%
Core Bond 3.6%	U.S. Equity -5.3%	Core Bond 8.7%	High Yield 7.1%	High Yield 5.3%	U.S. Equity -4.9%	High Yield 4.7%
U.S. TIPS 3.0%	Commodities -11.2%	U.S. TIPS 8.4%	T-Bills 0.7%	T-Bills 0.0%	Developed -5.8%	U.S. TIPS 4.4%
Commodities 1.7%	Developed -13.4%	Commodities 7.7%	Commodities -3.1%	Core Bond -1.5%	Core Bond -5.9%	Core Bond 2.1%
T-Bills 0.8%	Emrg Mrkts -14.2%	T-Bills 2.3%	REITs -7.9%	Emrg Mrkts -2.2%	Emrg Mrkts -6.9%	T-Bills 1.1%

Data Sources: Bloomberg

Note: Developed asset class is developed equity markets ex-U.S., ex-Canada

Wilshire

Appendix: Private Market Trends

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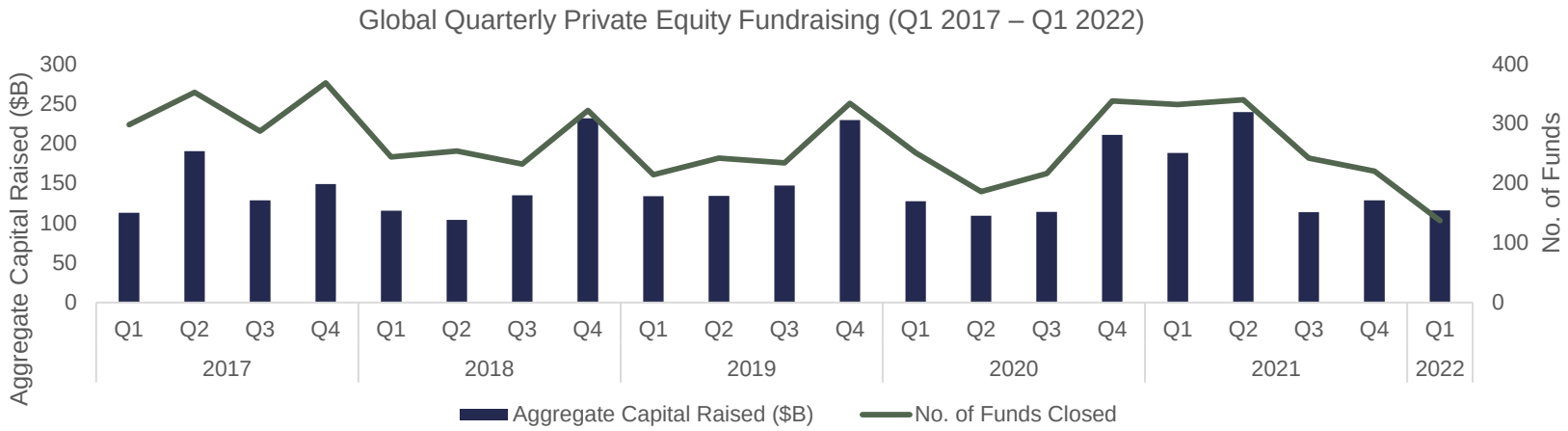
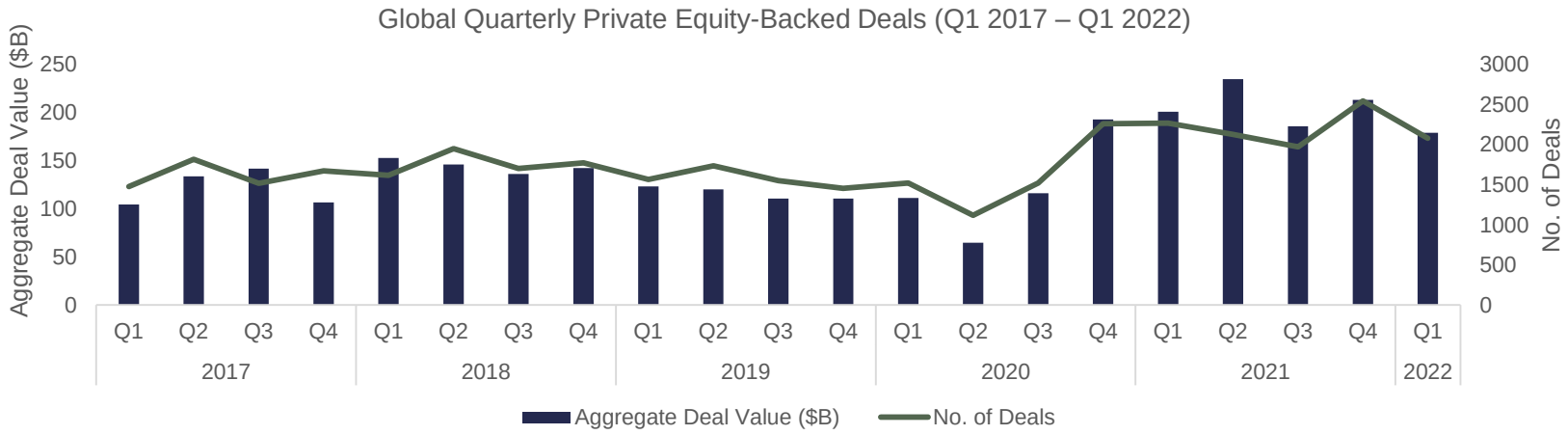
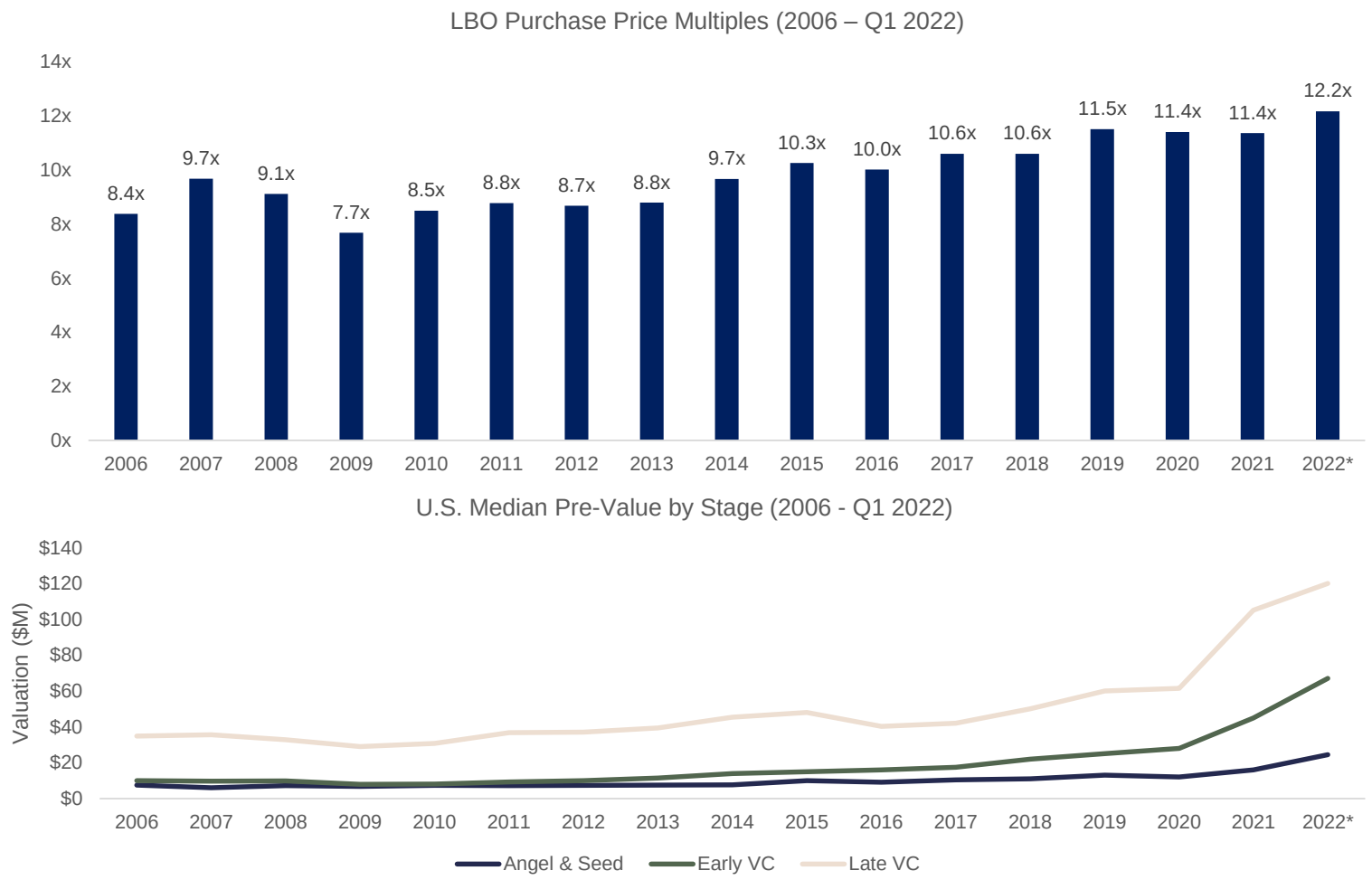
Private Equity – Fundraising & Investment Activity





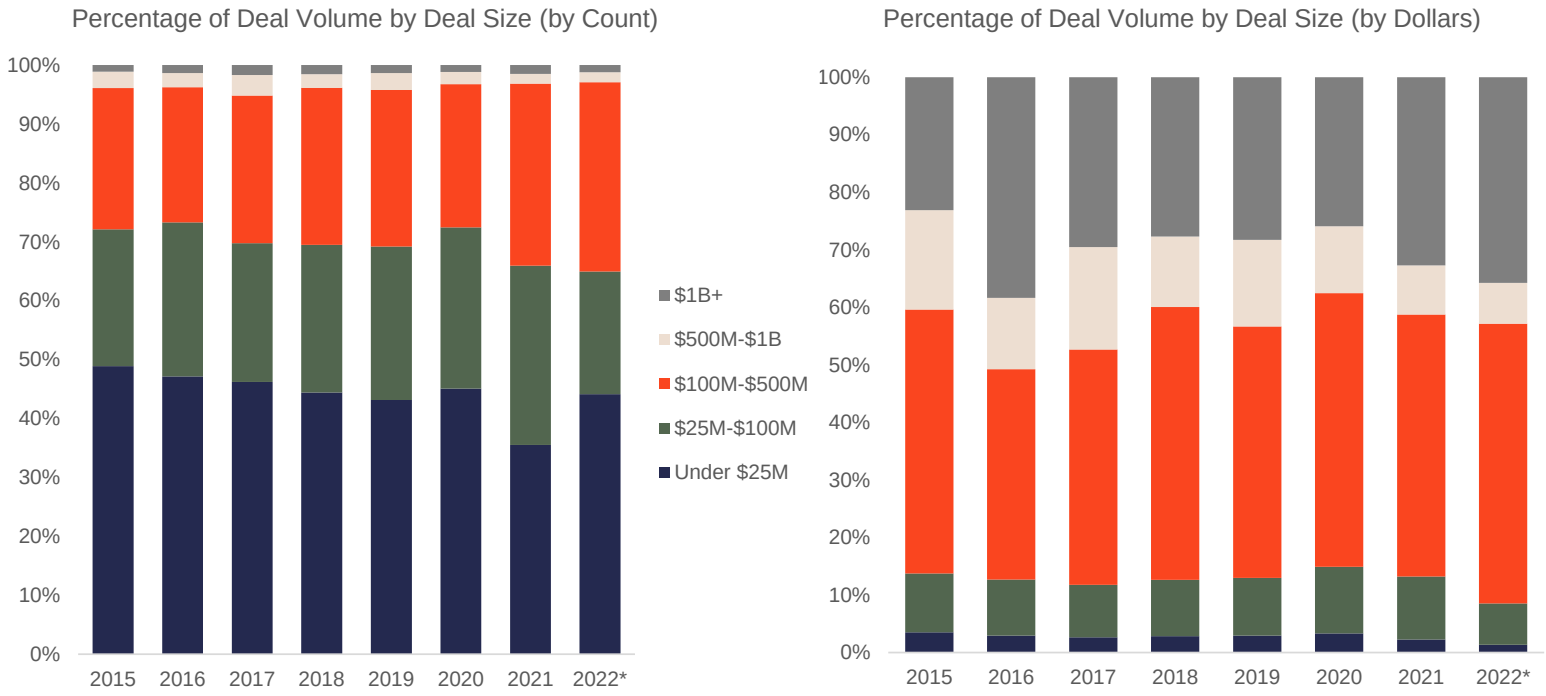
Source: Preqin, as of March 31, 2022.

Private Equity – Pricing & Valuations



Source: S&P LBO; Pitchbook, *as of March 31, 2022.

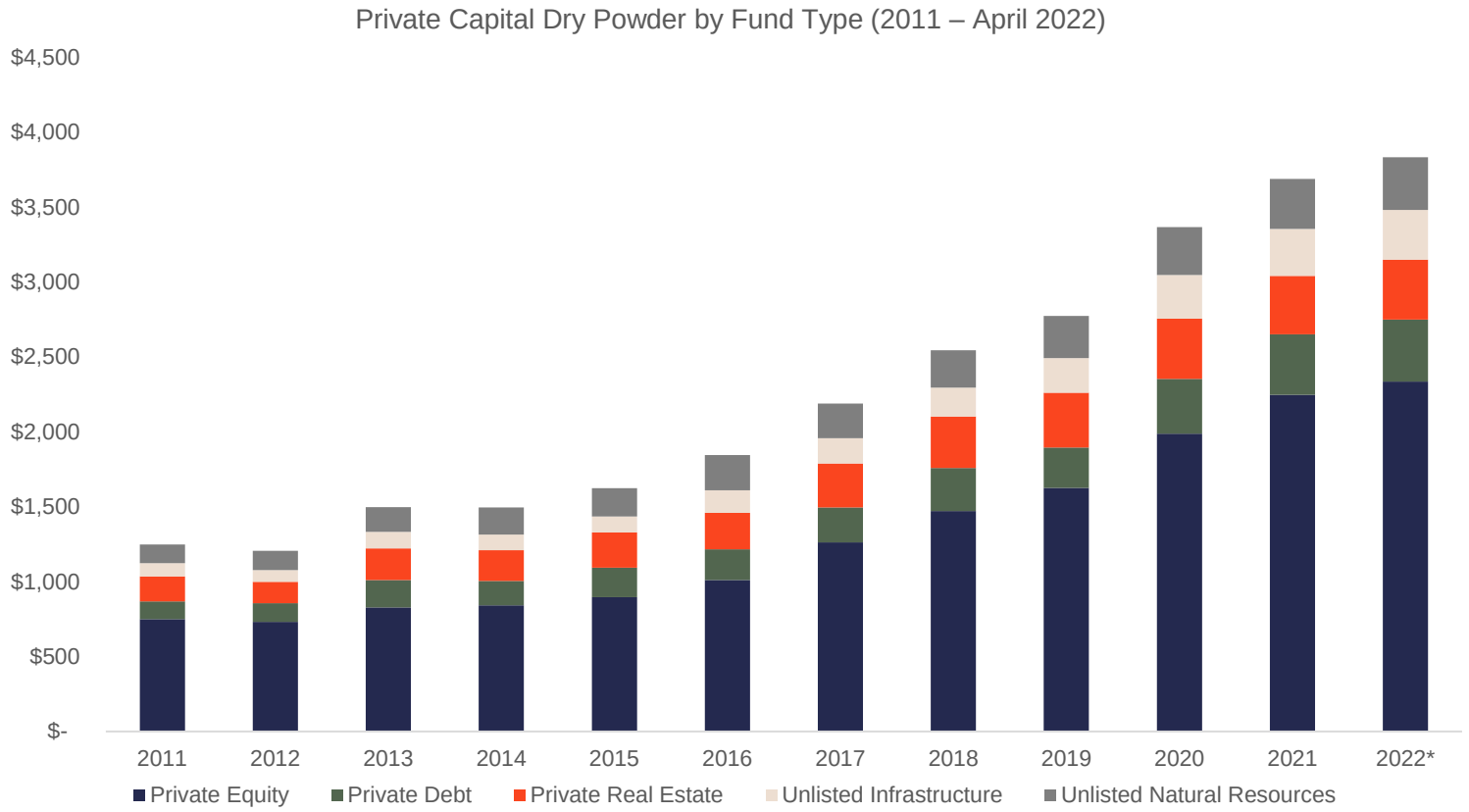
U.S. Investment Activity by Deal Size



- Deal volume continues to be dominated by lower middle market deals with investment sizes below $100 million through the first quarter of 2022
- However, deals with below $100 million check sizes comprised only 9% of all deal volume by amount of capital invested through the first quarter of 2022

Source: Pitchbook, *as of March 31, 2022.

Private Capital Dry Powder

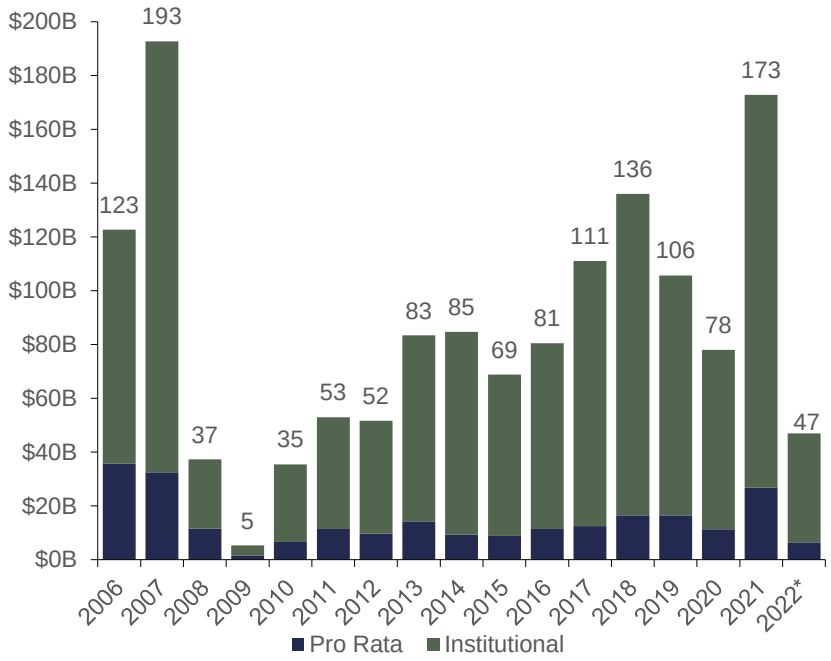


- Global private capital dry power continues to increase, topping $3.8 trillion across all fund types
- Private equity comprises just under 61% of total dry powder in the market as of April 2022

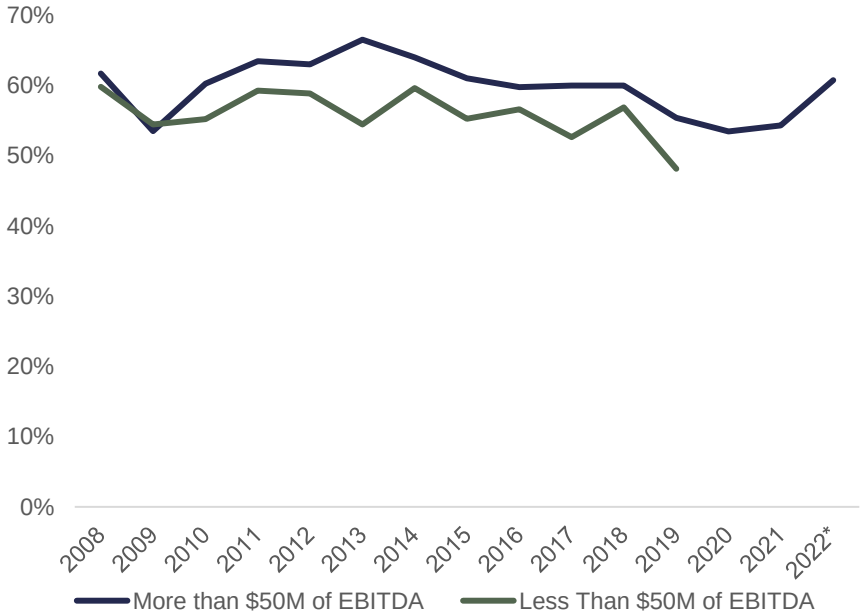
Source: Preqin, *as of April 26, 2022.

Private Equity – U.S. Debt Markets

Total U.S. LBO Loan Volume ($B) (2006 – Q1 2022)



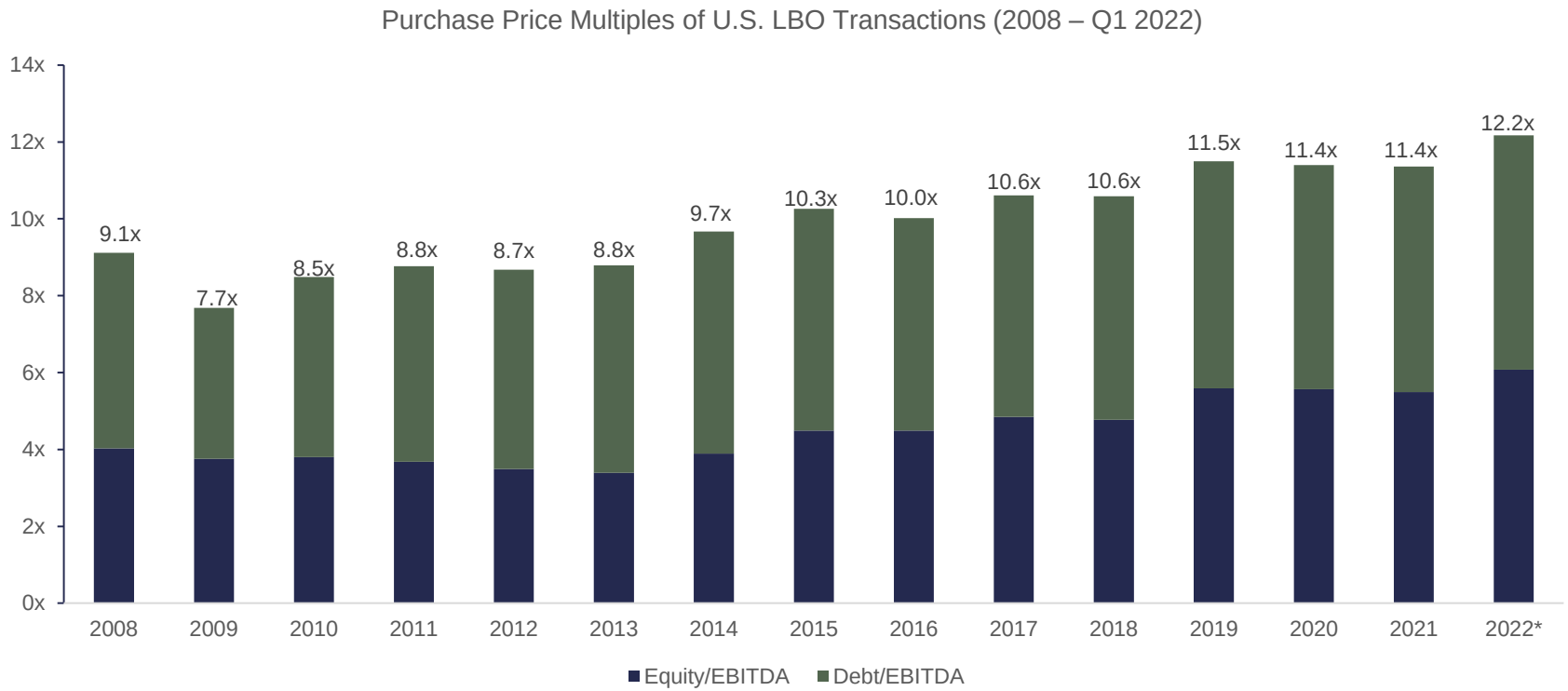
Percentage of Debt Used in LBOs (2008 – Q1 2022)



- 2022 has generated approximately $47 billion in loan volume so far, which is on pace to surpass the loan volume from all prior years since 2008
- As debt multiples have increased, the percentage of debt used to finance leveraged buyouts through Q1 2022 has increased from the 2021 marks

Source: S&P LBO, *as of March 31, 2022. "Less than $50M of EBITDA" data for 2020 and 2021 not yet available.

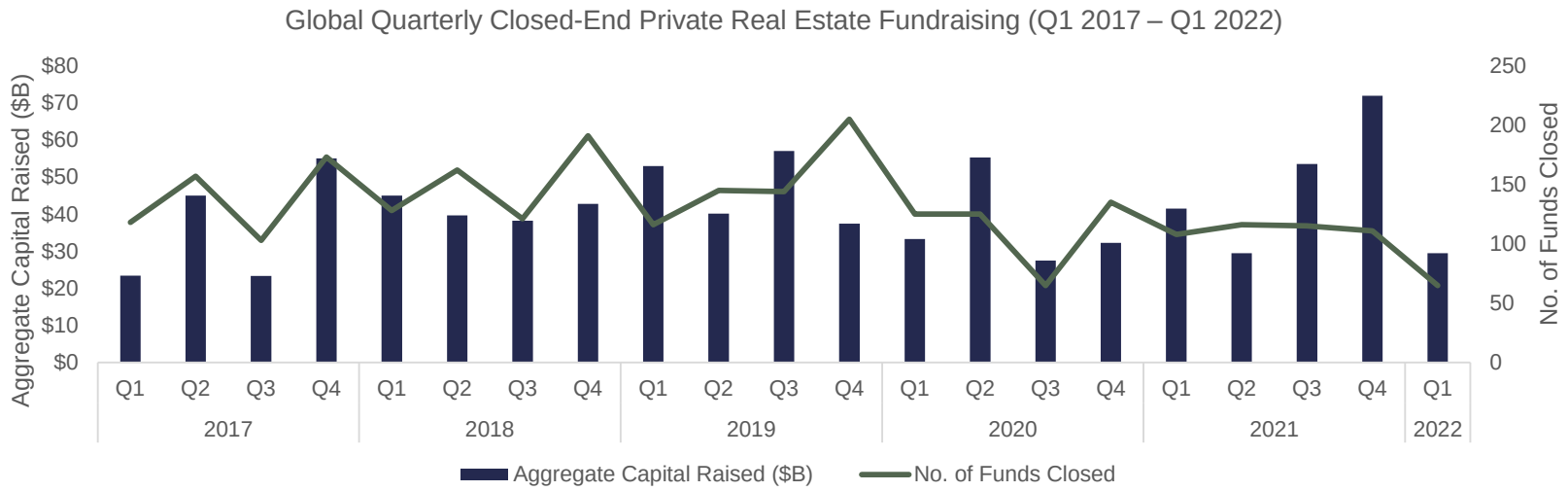
Private Equity – U.S. LBO Purchase Price Multiples

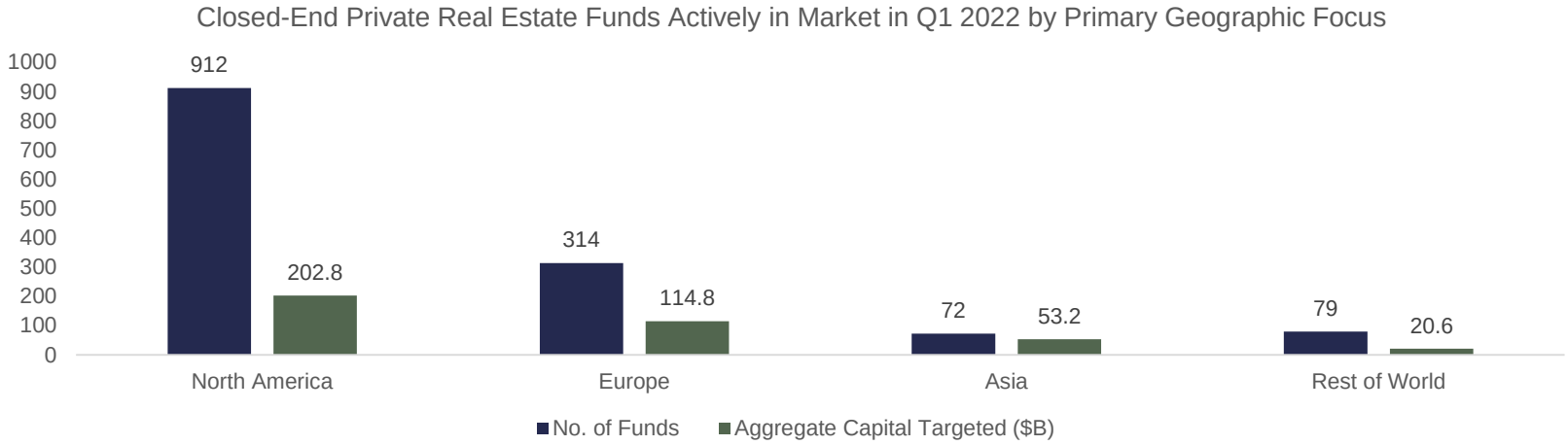


- Purchase price multiples for U.S. LBOs have remained steady from 2019 to 2021 and have increased through Q1 2022 compared to previous years.

Source: S&P LBO, *as of March 31, 2022.

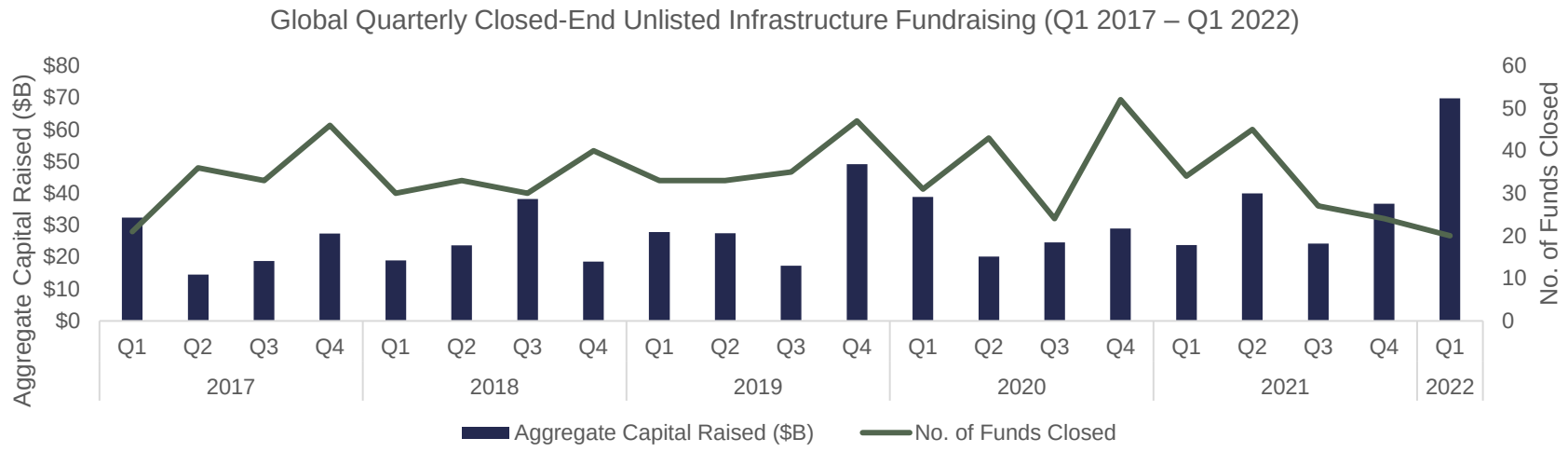
Private Real Estate – Fundraising Activity

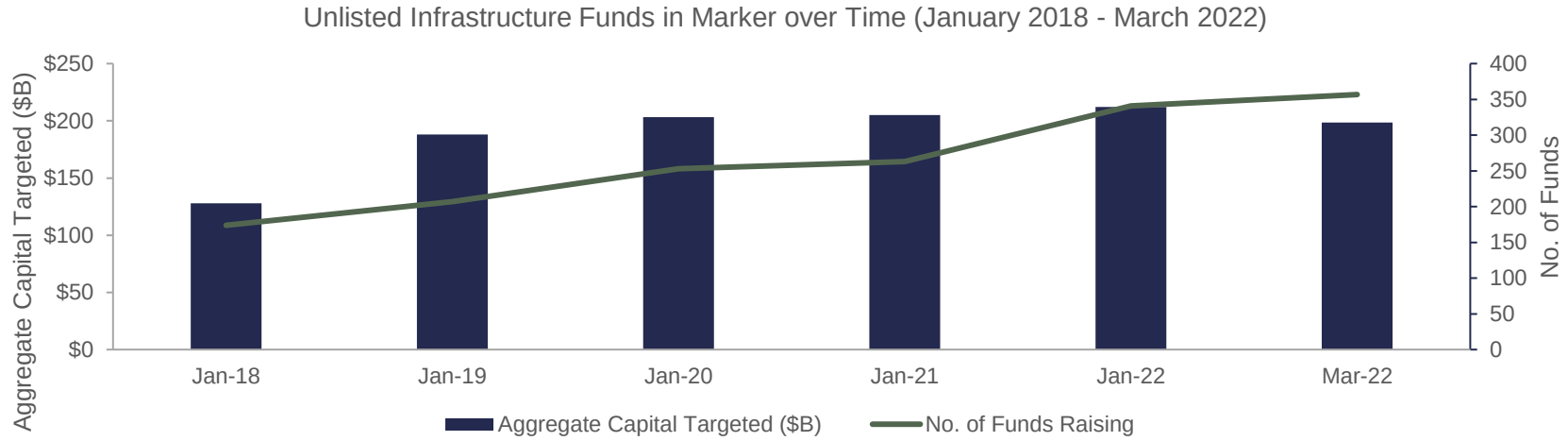




Source: Preqin, as of March 31, 2022.

Unlisted Infrastructure – Fundraising & Investment Activity

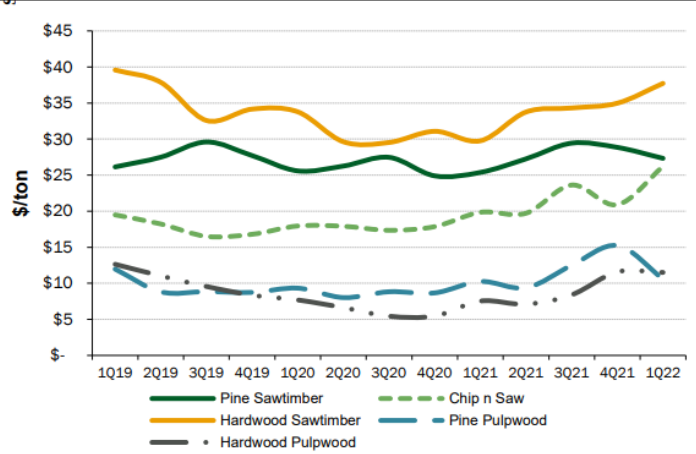




Source: Preqin, as of March 31, 2022.

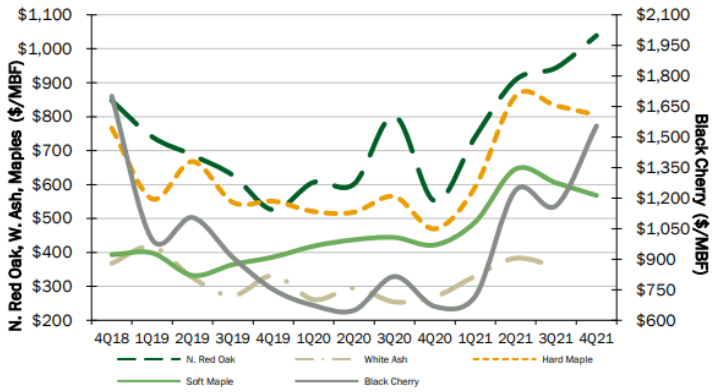
Timber Investments

Southeastern Timber Prices



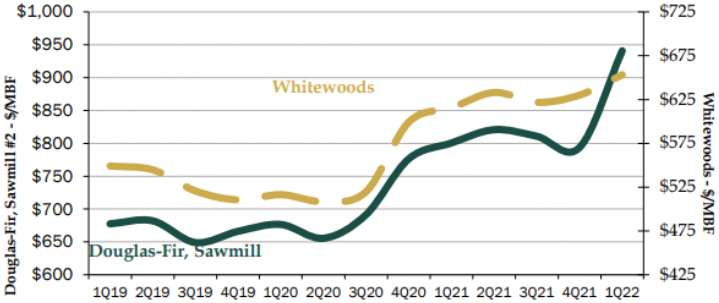
Source: Forest2Market®

Northeastern Hardwood Timber Prices



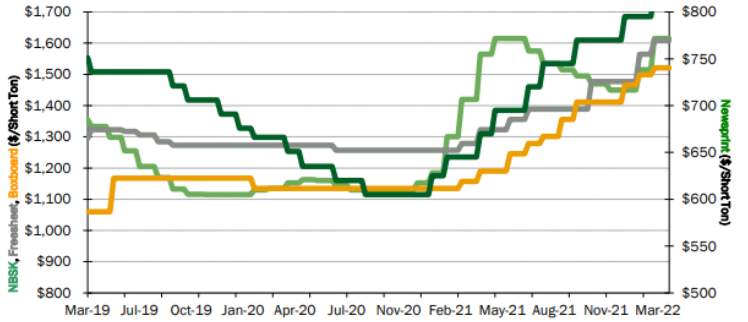
Source: Pennsylvania Woodlands Timber Market Report - Northwest Region

Pacific Northwest Timber Prices



Source: Fastmarkets RISI - Log Lines®

Pulp and Paper

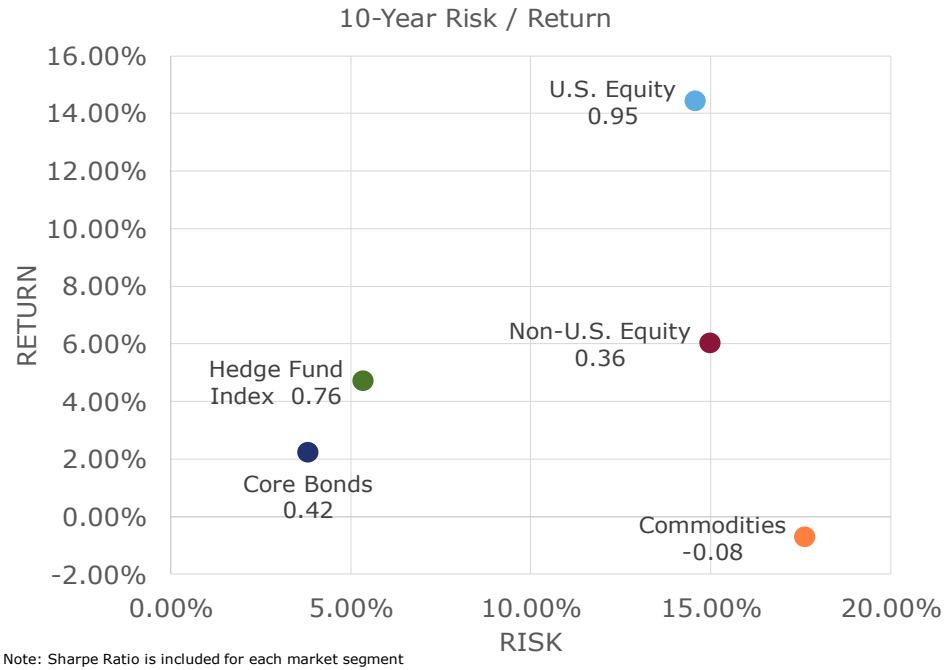


Source: Fastmarkets RISI

Data Sources: Forest Investment Associates

Hedge Fund Performance

As of 3/31/2022	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
Credit Suisse Hedge Fund Index	2.1	2.1	7.5	7.3	5.5	4.7
Event Driven	-2.2	-2.2	3.9	6.8	4.9	4.5
Global Macro	16.2	16.2	23.9	13.4	8.8	5.8
Long/Short Equity	-3.3	-3.3	2.3	6.3	5.8	5.6
Multi-Strategy	3.1	3.1	8.0	6.6	5.1	6.0
FT Wilshire 5000	-4.9	-4.9	13.1	18.7	15.7	14.4
MSCI ACWI ex-US ($G)	-5.3	-5.3	-1.0	8.0	7.3	6.0
Bloomberg Aggregate	-5.9	-5.9	-4.2	1.7	2.1	2.2
Bloomberg Commodity Index	25.5	25.5	49.3	16.1	9.0	-0.7



Note: Sharpe Ratio is included for each market segment

Data Source: Bloomberg

Wilshire

EXECUTIVE SUMMARY OF PERFORMANCE

Employees' Retirement Fund of the City of Dallas

First Quarter 2022

FIRST QUARTER 2022

Quarterly Market Commentary

Market Dashboard

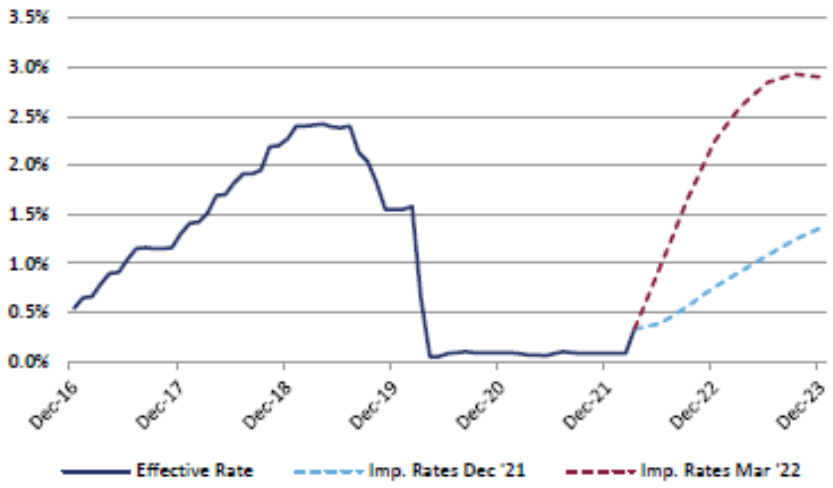
Strategic Allocation Themes	MTD (%)	QTD (%)	YTD (%)	1Y (%)
Growth[1]	2.17	(5.36)	(5.36)	7.28
Defensive Growth[2]	2.65	(3.97)	(3.97)	4.24
Diversified Credit[3]	(0.86)	(6.35)	(6.35)	(2.98)
Real Assets[4]	4.58	6.30	6.30	27.46
Defensive[5]	(2.78)	(5.93)	(5.93)	(4.15)

Source: Bloomberg. Indexes are total return.

Quarterly Insight

Geopolitical events shook the globe during the quarter as Russia invaded neighboring Ukraine on February 24, 2022. While the humanitarian fallout is of greatest importance, it is also necessary to understand the economic and market impacts that stem from these destabilizing events. Perhaps the most important tensions came from accelerating inflationary pressures the Russia/Ukraine conflict imposed on the Federal Reserve. The Fed had already signaled it would soon raise the Fed Funds Rate and inflation for the first two months of the year had already climbed 1.4% (not annualized). The market seemed to quickly understand that the Fed needed to act aggressively throughout 2022 to stave off runaway inflation. The 10-year breakeven inflation rate pushed toward 3% and fed fund futures pricing implied an overnight rate of 2.25% by the end of the year.

Federal Funds Rate: Effective & Futures Implied



Source: Bloomberg

Economic highlights

GDP: Real GDP growth accelerated during the fourth quarter, up an annualized 6.9%. The main drivers of growth were again private investment (up 36.7%) and personal consumption (up 2.5%). Imports continue to rise while exports also increased, the net effect being a slight drag on economic growth of -0.2%. The Atlanta Fed's GDPNow forecast for the first quarter currently stands at 1.3%.

Source: Bureau of Economic Analysis

Interest Rates: The Treasury curve rose across the maturity spectrum during the first quarter, with the short-intermediate section up the most. The 3-year Treasury was up 1.6% while the 10-year closed at 2.34%, up 83 basis points. The 10-year real yield (i.e., net of inflation) rose 61 basis points to -0.49%. The Federal Open Market Committee increased the Fed Funds Rate by 0.25% at its March meeting while increasing the median outlook to 1.875% for year-end 2022.

Source: U.S. Treasury

Inflation: Consumer price changes have accelerated rapidly as the Consumer Price Index jumped 2.0% for the three months ending February. For the one-year period, the CPI is up 7.9%. The 10-year breakeven inflation rate increased to 2.83% in March versus 2.59% in December.

Source: Dept. of Labor (BLS), U.S. Treasury

Employment: Jobs growth continues to be quite strong, with an average of 562k jobs/month added during the three months ending March. The unemployment rate continued to fall, dropping to 3.6%. Reported job openings remain elevated with a record 1.8 jobs available for every person unemployed.

Source: Dept. of Labor (BLS)

Housing: Low borrowing rates and a shortage of properties have driven home prices to record highs. The S&P Case-Shiller 20-city Home Price Index was up 4.6% and 19.1%, respectively, for the three- and 12-months ending January.

Source: Standard & Poor's

U.S. Economy and Markets

The U.S. stock market, represented by the FT Wilshire 5000 Index℠, was down -4.95% for the first quarter of 2022. Sector performance was mixed as Energy (+39.0%) and Utilities (+4.8%) were up, supported by surging commodities prices. The worst performing sectors this quarter were Communication Services (-11.9%), Consumer Discretionary (-9.0%) and Technology (-8.4%). From a size perspective, large-cap outperformed small-cap, although both segments were down. Growth stocks underperformed value in both the large-cap and small-cap segments during the quarter.

U.S. Equity	MTD (%)	QTD (%)	YTD (%)	1Y (%)
FT Wilshire 5000 Index℠	3.35	(4.95)	(4.95)	13.09
Standard & Poor's 500	3.71	(4.60)	(4.60)	15.65
Wilshire 4500 Completion Index℠	1.26	(7.49)	(7.49)	(1.25)
MSCI USA Minimum Volatility	5.49	(3.76)	(3.76)	13.82

Source: Bloomberg. Indexes are total return.

U.S. Equity by Size/Style	MTD (%)	QTD (%)	YTD (%)	1Y (%)
Wilshire US Large-Cap Index℠	3.53	(4.83)	(4.83)	14.65
Wilshire US Large-Cap Growth Index℠	4.17	(7.96)	(7.96)	16.32
Wilshire US Large-Cap Value Index℠	2.78	(0.69)	(0.69)	12.63
Wilshire US Small-Cap Index℠	1.32	(6.11)	(6.11)	(1.44)
Wilshire US Small-Cap Growth Index℠	0.05	(10.35)	(10.35)	(9.42)
Wilshire US Small-Cap Value Index℠	2.51	(1.84)	(1.84)	7.32
Wilshire US Micro-Cap Index℠	1.23	(9.07)	(9.07)	(18.15)

Source: Bloomberg. Indexes are total return.

GICS sector returns	MTD (%)	QTD (%)	YTD (%)	1Y (%)
Communication Services	1.0	(11.9)	(11.9)	(0.9)
Consumer Discretionary	4.9	(9.0)	(9.0)	9.8
Consumer Staples	1.8	(1.0)	(1.0)	16.1
Energy	9.0	39.0	39.0	64.3
Financials	(0.2)	(1.5)	(1.5)	14.7
Health Care	5.6	(2.6)	(2.6)	19.1
Industrials	3.4	(2.4)	(2.4)	6.1
Information Technology	3.5	(8.4)	(8.4)	20.9
Materials	6.1	(2.4)	(2.4)	13.9
Real Estate	7.8	(6.2)	(6.2)	25.8
Utilities	10.4	4.8	4.8	19.9

Source: Bloomberg. Indexes are total return.

Energy sector was up 39.0% this quarter as commodity prices surged

International Economy and Markets

Performance results within international equity markets were mostly negative for the first quarter of 2022, with both developed and emerging markets producing losses. The MSCI EAFE Index was down -5.9% while the MSCI Emerging Markets Index was down -7.0%. Within developed markets, however, there were some bright spots as the Australian and UK equity markets were positive. The UK economy surged in January and is now back above the level that existed before the COVID pandemic. The largest emerging equity markets were down for the quarter, with China suffering a double-digit loss. An esclating COVID outbreak in China has led to some local lockdowns and is cutting into economic growth forecasts. Russia's invasion of Ukraine led MSCI to reclassify the Russian equity market from Emerging to a Standalone Market since Russian equities are currently uninvestable. The decision was implemented across all MSCI indexes as of March 9, 2022 at a price that is effectively zero.

MSCI reclassified Russia as a Standalone Market, removing those equities from all indexes

Non-U.S. Equity	MTD (%)	QTD (%)	YTD (%)	1Y (%)
MSCI ACWI	2.17	(5.36)	(5.36)	7.28
MSCI ACWI ex USA	0.16	(5.44)	(5.44)	(1.48)
MSCI ACWI ex USA Minimum Volatility	0.90	(2.05)	(2.05)	6.69
MSCI EAFE	0.64	(5.91)	(5.91)	1.16
MSCI Emerging Markets	(2.26)	(6.97)	(6.97)	(11.37)
MSCI ACWI ex USA Small Cap	1.02	(6.52)	(6.52)	0.03

Source: Bloomberg. Indexes are total return.

Non-U.S. Equity (local currency)	MTD (%)	QTD (%)	YTD (%)	1Y (%)
MSCI ACWI	2.51	(4.75)	(4.75)	8.79
MSCI ACWI ex USA	1.02	(3.90)	(3.90)	2.02
MSCI ACWI ex USA Minimum Volatility	2.35	(0.06)	(0.06)	9.86
MSCI EAFE	2.14	(3.73)	(3.73)	6.21
MSCI Emerging Markets	(2.06)	(6.11)	(6.11)	(9.86)
MSCI ACWI ex USA Small Cap	1.95	(4.99)	(4.99)	4.00

Source: Bloomberg. Indexes are total return.

Fixed Income Markets

The U.S. Treasury yield curve was up across all maturities during the quarter but most sharply in the intermediate range, with pronounced flattening further out the curve. The 2-year Treasury was up 160 basis points to 2.34% while the 10-year Treasury yield also ended the quarter at 2.34%, up 83 basis points. The now nonexistant spread is as low as it has been since August 2019, a time of slowing economic growth. Investment-grade credit spreads widened during the quarter as did the spread on the broad high yield market, closing the quarter at 3.25%. The Federal Open Market Committee met twice during the quarter as scheduled, raising the overnight rate off zero by 0.25% at their March meeting. Through the Fed's "dot plot," it is messaging that the current intent is for additional increases totaling 150 basis points before the end of

2022. Their median forecast for year-end 2023 is for a Fed Funds Rate of 2.75%. During the January meeting, the committee announced that it will continue to reduce (i.e., taper) the monthly pace of its asset purchases and likely end them completely "in early March." As the quarter ended, however, the Fed was still adding assets, moving its balance sheet toward $9 trillion.

U.S. Fixed Income	MTD (%)	QTD (%)	YTD (%)	1Y (%)
Bloomberg U.S. Aggregate	(2.78)	(5.93)	(5.93)	(4.15)
Bloomberg Long Term Treasury	(5.34)	(10.58)	(10.58)	(1.42)
Bloomberg Long Term Corporate	(2.78)	(11.41)	(11.41)	(4.26)
Bloomberg U.S. TIPS	(1.86)	(3.02)	(3.02)	4.29
Bloomberg U.S. Credit	(2.51)	(7.42)	(7.42)	(4.16)
Bloomberg U.S. Corporate High Yield	(1.15)	(4.84)	(4.84)	(0.66)
S&P/LSTA Leveraged Loan	0.05	(0.10)	(0.10)	3.25

Source: Bloomberg. Indexes are total return.

Long-term Treasuries suffered their second-worst quarter in five years, down -10.6%

Market Rates	Mar 31	Dec 31	Sept 30	June 30
10-Year Treasury	2.34	1.51	1.49	1.47
10-Year Breakeven Inflation	2.83	2.59	2.38	2.34

Source: Bloomberg. Indexes are total return.

Global Fixed Income	MTD (%)	QTD (%)	YTD (%)	1Y (%)
Bloomberg Global Aggregate	(3.05)	(6.16)	(6.16)	(6.40)
Bloomberg Global Aggregate (Hdg)	(2.16)	(4.97)	(4.97)	(3.92)
Bloomberg EM LC Gov't Universal	(1.66)	(2.33)	(2.33)	(0.12)
Bloomberg EM LC Gov't Universal (Hdg)	(1.99)	(2.95)	(2.95)	(2.45)

Source: Bloomberg. Indexes are total return.

Real Asset Markets

Real estate securities were down during the first quarter in both the U.S. and abroad. Most other real assets, however, enjoyed a strong start to the new year. Commodity prices rallied, fueled in part by the geopolitical risks from the Ukraine crisis, as crude oil was up 33.3% to $100.28 per barrel. This is the first time oil has been above $100 since mid-2014, when a boom in shale oil in the U.S. started driving prices considerably lower. Natural gas prices also rose dramatically after a drop during the fourth quarter, increasing by 51.3% and ending March at $5.64 per million BTUs. Natural gas is up more than 100% for the past 12 months. Finally, gold prices enjoyed another strong quarter and were up 6.6%, finishing at approximately $1,949 per troy ounce.

Oil is above $100/barrel for the first time since mid-2014

Real Assets	MTD (%)	QTD (%)	YTD (%)	1Y (%)
Wilshire US Real Estate Securities Index℠	6.84	(3.85)	(3.85)	29.09
Wilshire Global Real Estate Securities Index℠	5.51	(2.98)	(2.98)	21.98
FTSE Global Core Infrastructure 50/50	7.51	3.90	3.90	15.30
Alerian Midstream Energy	7.02	23.95	23.95	41.93
Bloomberg Commodity	8.65	25.55	25.55	49.25
Gold	1.49	5.92	5.92	13.45
Bitcoin	9.87	(1.22)	(1.22)	(22.45)

Source: Bloomberg. Indexes are total return.

Alternatives

Liquid alternative managers posted a negative quarter, with all sub-strategies ending the quarter down except for global macro. Global macro managers led the way for the Index, posting strong returns for the quarter that were driven by short rates and long commodity positioning. The upward price action in commodities was further intensified by the onset of the Russian invasion of Ukraine. Relative value managers struggled as risk-off appetite created weakness throughout the quarter and yields continued to tick up. Equity hedge and multi-strategy managers had a difficult time navigating the broad-based equity selloffs on the back of rising yields and rising geopolitical risks. Event driven strategy performance was negative but muted with most losses coming from equity market weakness and volatility early in the quarter but remained flat for the remainder as deals continued to go through despite market uncertainty.

Global macro managers performed well, driven by short rates and long commodity positioning

Alternatives	MTD (%)	QTD (%)	YTD (%)	1Y (%)
Wilshire Liquid Alternative Index℠	0.16	(1.85)	(1.85)	0.60
Wilshire Liquid Alternative Equity Hedge Index℠	0.85	(2.38)	(2.38)	4.63
Wilshire Liquid Alternative Event Driven Index℠	0.01	(0.74)	(0.74)	(0.49)
Wilshire Liquid Alternative Global Macro Index℠	3.79	5.35	5.35	6.19
Wilshire Liquid Alternative Multi-Strategy Index℠	0.33	(1.93)	(1.93)	0.86
Wilshire Liquid Alternative Relative Value Index℠	(1.09)	(3.11)	(3.11)	(2.90)

Source: Bloomberg. Indexes are total return.

[1] 100% Global Equity
[2] 60% Low Vol Global Equity, 40% US Convertibles
[3] 42.5% U.S. High Yield, 42.5% EMD, 15% Banks Loans
[4] 43% Global REITS/GLI, 33% Commodities, 48% TIPS, 9% Gold, -31% Cash
[5] 100% US Core Bonds

Total Fund Overview

Asset Class Performance

	Assets		Performance (%)					
	($Mil)	(%)	QTR	YTD	1-year	3-year	5-year	10-year
U.S. Equity	585.5	15.0	-5.04	-5.04	10.30	17.67	14.24	13.49
International Equity	479.9	12.3	-5.51	-5.51	-1.49	9.74	7.78	7.16
Global Equity	282.2	7.2	-4.58	-4.58	5.24	11.44	10.31	
Global Low Volatility	497.4	12.7	-2.82	-2.82	9.59	7.86	8.22	
Real Estate	421.6	10.8	-0.75	-0.75	23.50	10.52	9.11	9.46
Global Fixed Income	482.2	12.3	-5.69	-5.69	-3.83	2.31	2.60	2.83
High Yield	364.2	9.3	-3.78	-3.78	0.31	4.71	4.42	5.30
Credit Opportunities	176.7	4.5	-4.21	-4.21	-1.34	3.03	3.85	
Global Listed Infra.	212.5	5.4	16.30	16.30	35.74	1.94	0.45	4.45
Private Equity	338.6	8.7	4.36	4.36	36.70	18.75	16.83	13.83
Cash Equivalents	68.6	1.8	0.04	0.04	0.06	0.81	1.13	0.63
Total Fund	**3,909.3**	**100.0**	**-2.22**	**-2.22**	**9.07**	**8.89**	**7.85**	**7.94**
Asset Allocation Policy			**-2.62**	**-2.62**	**8.37**	**9.46**	**8.06**	**7.84**
Value Added vs Policy			*0.40*	*0.40*	*0.70*	*-0.57*	*-0.21*	*0.11*
Actuarial Rate			1.77	1.77	7.25	7.25	7.42	7.77
Wilshire 5000 Index			-4.95	-4.95	13.09	18.66	15.65	14.43
S&P 500 Index			-4.60	-4.60	15.65	18.92	15.99	14.64
MSCI ACWI x-U.S. IMI Index			-5.60	-5.60	-1.27	7.87	6.92	5.78
MSCI EAFE Index			-5.91	-5.91	1.16	7.78	6.72	6.27
Bloomberg Aggregate Bond Index			-5.93	-5.93	-4.15	1.69	2.14	2.24
Citigroup High Yield Cash Pay			-4.37	-4.37	-0.15	4.37	4.53	5.43
Wilshire RE Securities Index			-3.85	-3.85	29.09	11.93	10.07	10.06
91-Day Treasury Bill			0.04	0.04	0.06	0.81	1.13	0.62

Total Fund Asset Growth

($Millions)	Beg. Mkt Value	Net Contrib.	Net Distrib.	Investment Fees	Investment Gain/Loss	End Mkt Value	Total Return
1Q18	3,607.8	31.9	74.7	3.1	(37.9)	3,524.0	-1.09%
2Q18	3,524.0	27.2	71.0	3.6	68.0	3,544.4	1.83%
3Q18	3,544.4	31.6	75.1	3.3	101.0	3,598.8	2.74%
4Q18	3,598.8	27.5	73.9	3.5	(274.6)	3,274.3	-7.66%
1Q19	3,274.3	32.4	71.8	3.2	292.5	3,524.2	8.90%
2Q19	3,524.2	27.7	76.6	3.4	108.0	3,579.9	3.04%
3Q19	3,579.9	32.8	76.2	3.2	20.4	3,553.7	0.49%
4Q19	3,553.7	27.7	79.8	3.6	154.3	3,653.6	4.31%
1Q20	3,653.6	32.7	75.8	3.8	(570.4)	3,036.3	-15.91%
2Q20	3,036.3	28.3	76.4	3.2	337.8	3,322.8	11.03%
3Q20	3,322.8	31.5	77.0	3.1	115.4	3,389.6	3.46%
4Q20	3,389.6	33.0	76.5	3.4	321.1	3,663.7	9.46%
1Q21	3,663.7	27.3	81.3	3.7	156.8	3,762.9	4.11%
2Q21	3,762.9	27.8	79.6	4.3	201.7	3,908.6	5.16%
3Q21	3,908.6	32.4	82.0	4.3	60.1	3,914.7	1.37%
4Q21	3,914.7	33.8	80.5	3.9	185.9	4,050.4	4.65%
1Q22	4,050.4	30.9	83.6	4.5	(83.9)	3,909.3	-2.22%

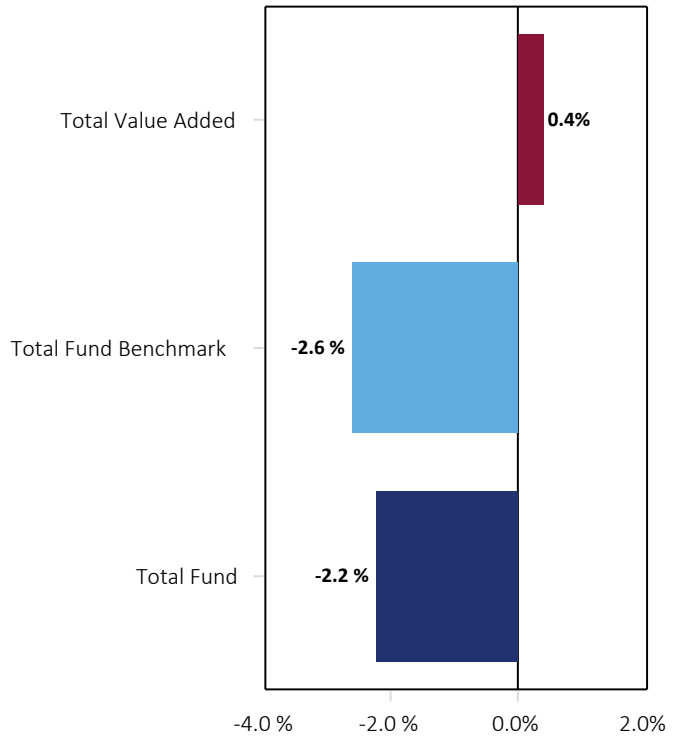
- At the end of the first quarter of 2022, the Fund's market value was $3,909.3 million, which represented a decrease of $141 million in total net asset value over the previous quarter. The change in the Fund's value was driven by $30.9 million in net contributions, a $83.9 million investment loss, $83.6 million in net distributions and $4.5 million in investment management fees.

Total Fund Attribution

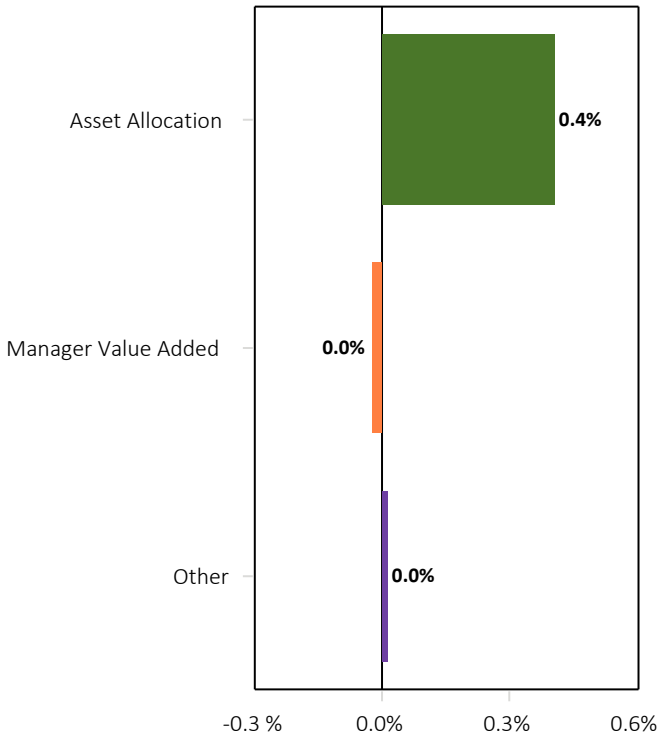
Dallas Total Fund

Periods Ended 1 Quarter Ending March 31, 2022

Total Fund Performance



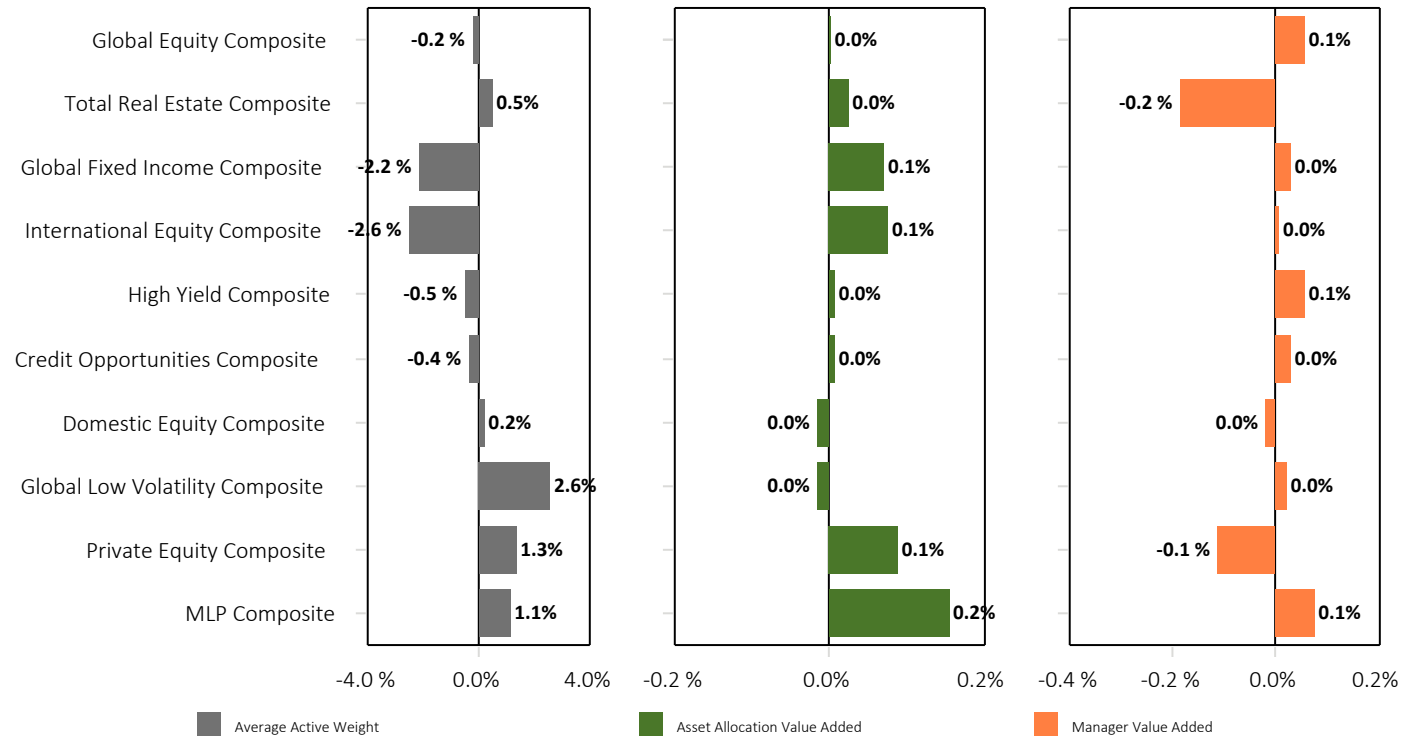
Total Value Added:0.4%



Total Asset Allocation:0.4%

Asset Allocation Value: 0.4%

Total Manager Value: 0.0%

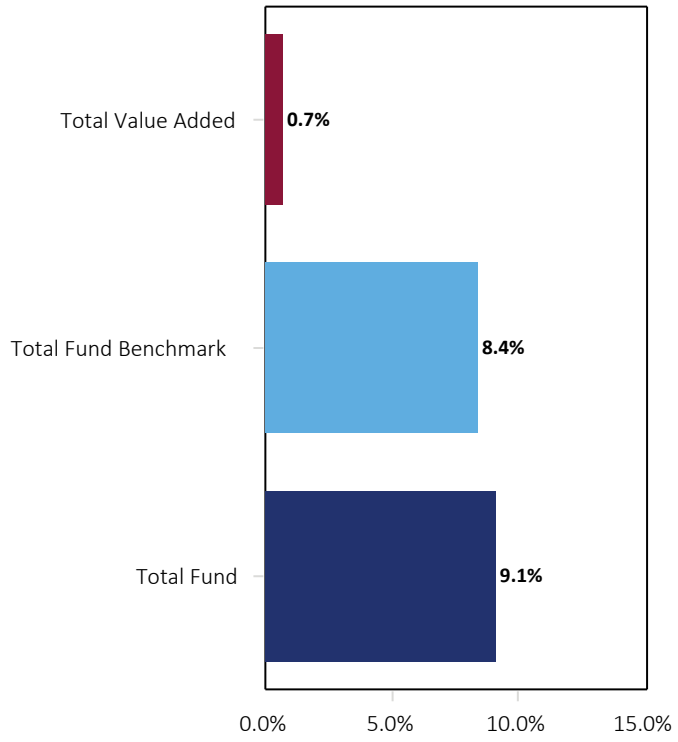


Total Fund Attribution

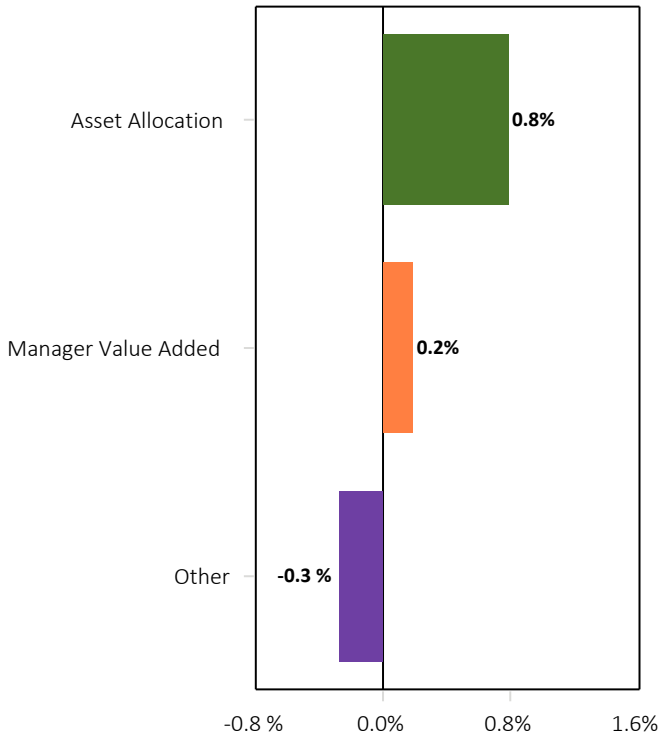
Dallas Total Fund

Periods Ended 1 Year Ending March 31, 2022

Total Fund Performance



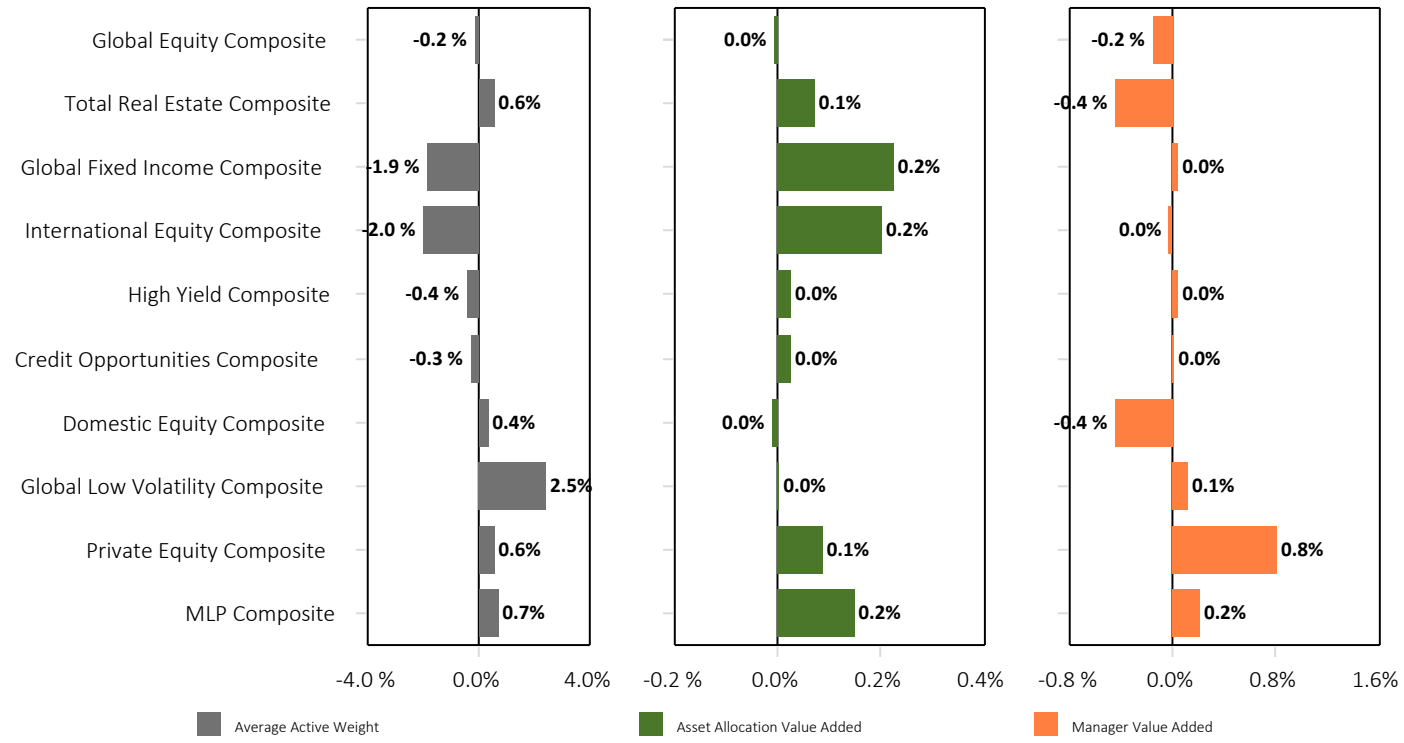
Total Value Added:0.7%



Total Asset Allocation:0.8%

Asset Allocation Value: 0.8%

Total Manager Value: 0.2%

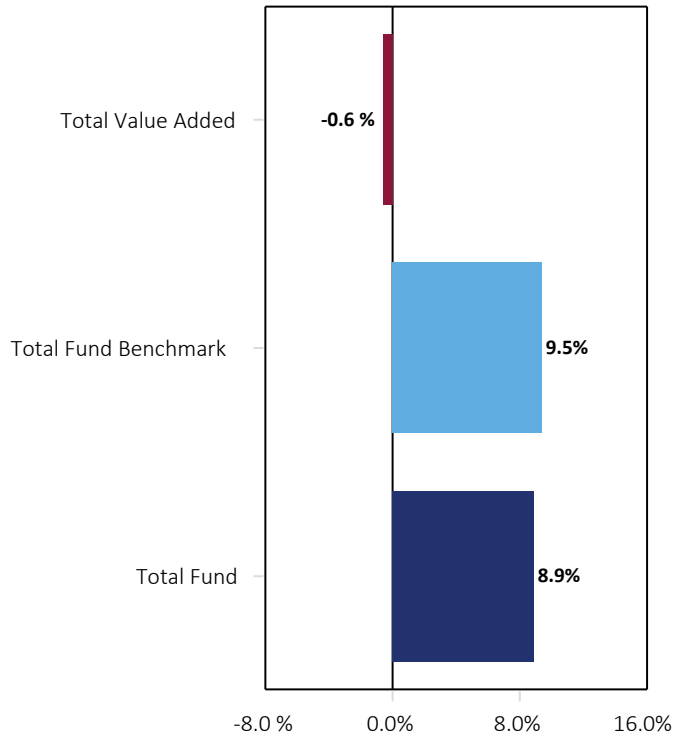


Total Fund Attribution

Dallas Total Fund

Periods Ended 3 Years Ending March 31, 2022

Total Fund Performance

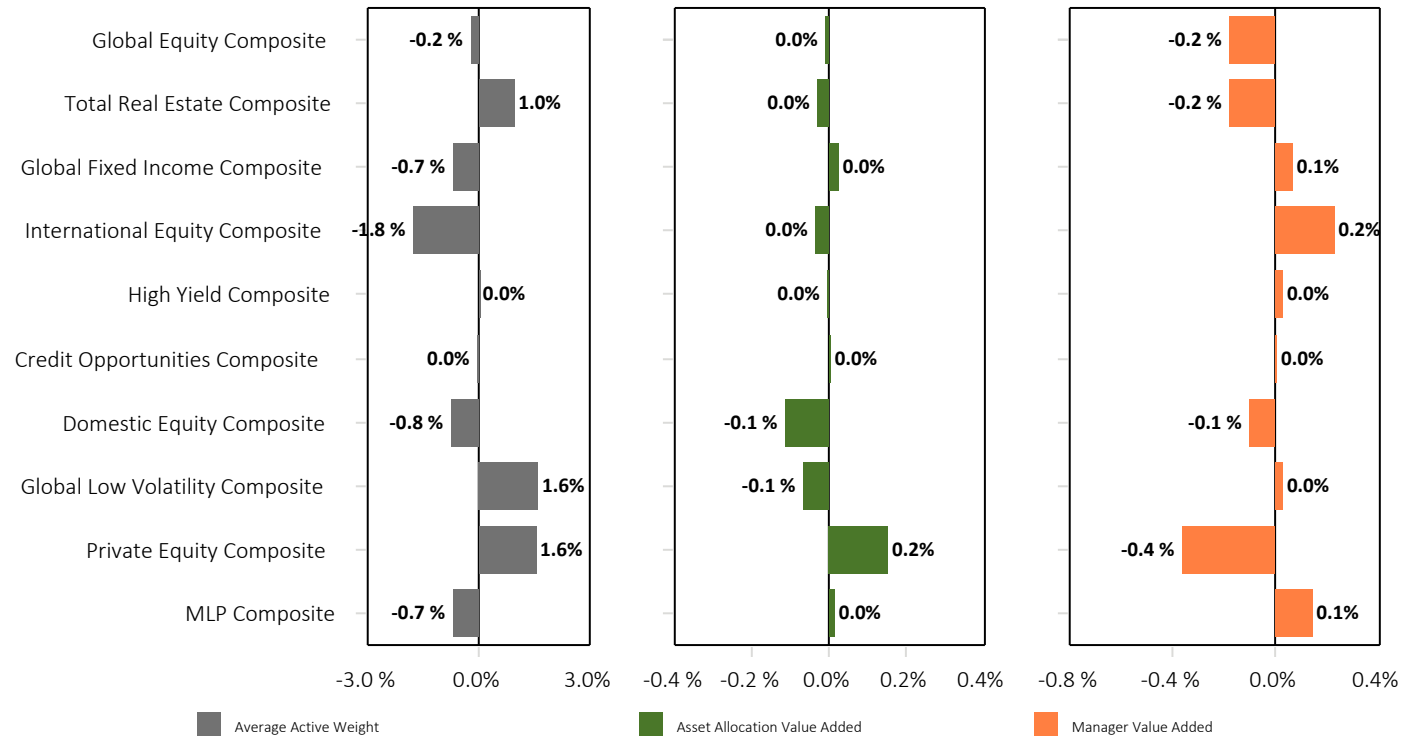


Total Value Added:-0.6 %

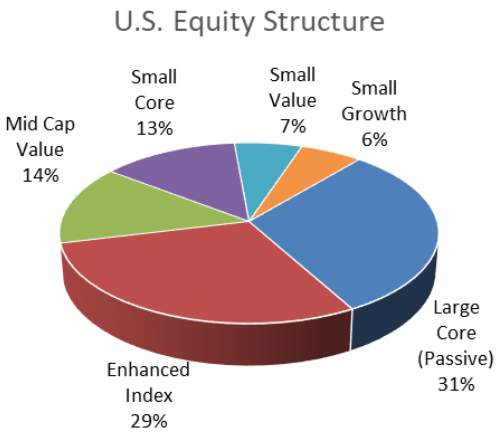
Total Asset Allocation:-0.1 %

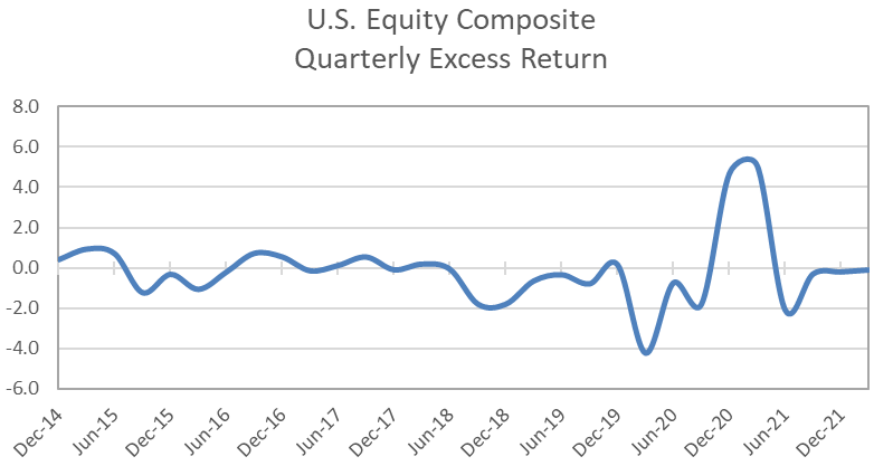
Asset Allocation Value: -0.1 %

Total Manager Value: -0.3 %



U.S. Equity Overview





Composite

	Assets (Millions)	Performance QTR	YTD	1-year	3-year	5-year	10-year
Total U.S. Equity (Gross)	**$ 585.5**	**-4.94**	**-4.94**	**10.76**	**18.16**	**14.69**	**13.91**
Total U.S. Equity (Net)		**-5.04**	**-5.04**	**10.30**	**17.67**	**14.24**	**13.49**
Custom Benchmark [1]		-4.95	-4.95	13.09	18.66	15.65	14.43
Net of Fee Value Added vs Benchmark		*-0.09*	*-0.09*	*-2.79*	*-0.99*	*-1.41*	*-0.94*
Small Cap Composite	**$ 150.5**	-7.59	-7.59	0.01	13.63	10.07	11.23
Wilshire 5000 Index		-4.95	-4.95	13.09	18.66	15.65	14.43
S&P 500 Index		-4.60	-4.60	15.65	18.92	15.99	14.64
Russell 2000 Index		-7.53	-7.53	-5.79	11.74	9.74	11.04

U.S. Equity Managers

	Assets (Millions)	Performance (%) QTR	YTD	1-year	3-year	5-year	Since Inception	Inception Date
Large Core - Passive								
Northern Trust S&P 500 (Gross)	**$ 180.3**	**-4.52**	**-4.52**	**15.73**	**18.90**	**15.99**	**10.92**	**Dec-94**
Northern Trust S&P 500 (Net)		**-4.52**	**-4.52**	**15.73**	**18.90**	**15.98**	**10.89**	**Dec-94**
S&P 500 Index		-4.60	-4.60	15.65	18.92	15.99	10.85	Dec-94
Net of Fee Value Added vs Benchmark		*0.07*	*0.07*	*0.08*	*-0.02*	*0.00*	*0.04*	
Enhanced Index								
T. Rowe Price (Gross)	**$ 171.4**	**-4.59**	**-4.59**	**16.00**	**19.67**	**17.04**	**11.23**	**Mar-06**
T. Rowe Price (Net)		**-4.66**	**-4.66**	**15.67**	**19.32**	**16.69**	**10.90**	**Mar-06**
S&P 500 Index		-4.60	-4.60	15.65	18.92	15.99	10.36	Mar-06
Net of Fee Value Added vs Benchmark		*-0.06*	*-0.06*	*0.02*	*0.39*	*0.70*	*0.54*	
Information Ratio				**-0.01**	**0.37**	**0.61**		
Sharpe Ratio				**1.20**	**1.04**	**0.98**		

[1] Domestic Equity Custom Benchmark: Wilshire 5000 Index (3q99 – Present); S&P 500 Index (1q90 – 2q99).

U.S. Equity Overview (Continued)

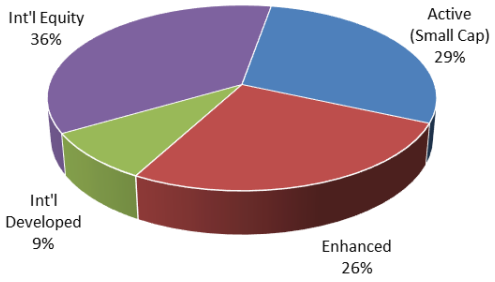
U.S. Equity Managers

	Assets (Millions)	QTR	YTD	1-year	3-year	5-year	Since Inception	Inception Date
Small Core - Active								
Systematic Financial (Gross)	$ 77.2	-4.90	-4.90	3.26	13.94	11.07	11.88	Jun-03
Systematic Financial (Net)		-5.10	-5.10	2.40	13.00	10.15	11.04	Jun-03
Russell 2000 Index		-7.53	-7.53	-5.79	11.74	9.74	9.62	Jun-03
Net of Fee Value Added vs Benchmark		*2.42*	*2.42*	*8.19*	*1.25*	*0.40*	*1.41*	
Information Ratio				1.06	0.11	0.02		
Sharpe Ratio				0.28	0.63	0.53		
Small Value - Active								
Channing Capital Management (Gross) *	$ 38.1	-1.21	-1.21	3.62	15.24	9.58	9.38	Oct-13
Channing Capital Management (Net) *		-1.44	-1.44	2.63	14.15	8.53	8.36	Oct-13
Russell 2000 Value Index		-2.40	-2.40	3.32	12.73	8.57	8.34	Oct-13
Net of Fee Value Added vs Benchmark		*0.96*	*0.96*	*-0.69*	*1.42*	*-0.04*	*0.02*	
Information Ratio				-0.08	0.18	0.02		
Sharpe Ratio				0.27	0.62	0.43		
Small Growth - Active								
Redwood Investments (Gross) *	$ 35.2	-17.73	-17.73	-6.49	14.19	11.52	11.54	Sep-16
Redwood Investments (Net) *		-17.90	-17.90	-7.16	13.40	10.74	10.84	Sep-16
Russell 2000 Growth Index		-12.63	-12.63	-14.33	9.88	10.33	11.09	
Net of Fee Value Added vs Benchmark		*-5.27*	*-5.27*	*7.16*	*3.52*	*0.41*	*-0.26*	
Information Ratio				1.20	0.24	-0.01		
Sharpe Ratio				-0.28	0.68	0.57		
Mid Cap Value - Active								
Smith Graham Mid Cap Value (Gross) *	$ 83.2	-1.94	-1.94	10.89	18.85		11.79	Dec-17
Smith Graham Mid Cap Value (Net) *		-2.12	-2.12	10.06	17.97		10.99	Dec-17
Russell Midcap Index		-5.68	-5.68	6.92	14.89		11.81	
Net of Fee Value Added vs Benchmark		*3.56*	*3.56*	*3.14*	*3.07*		*-0.83*	
Information Ratio				0.31	0.40	-.-		
Sharpe Ratio				0.92	0.73	-.-		

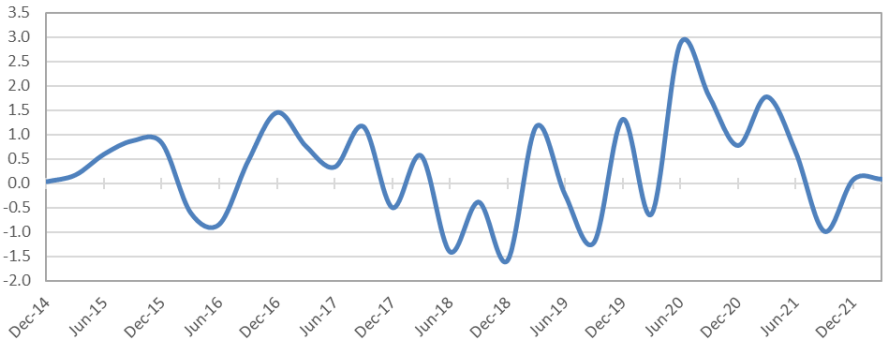
- The Fund's domestic equity composite generated a return of -5.04% (net of fees) during the first quarter of 2022, lagging the Wilshire 5000 Total Market Index, which returned -4.95%. Relative performance was positive during the quarter for all active managers except Redwood Investments. Following this quarter's results, the domestic equity composite is trailing its benchmark over all time periods.

International Equity Overview

International Equity Structure



International Equity Composite
Quarterly Excess Return



International Equity Composite

	Assets (Millions)	Performance QTR	YTD	1-year	3-year	5-year	10-year
Total International Equity (Gross)	**$ 479.9**	**-5.37**	**-5.37**	**-0.94**	**10.33**	**8.32**	**7.65**
Total International Equity (Net)		**-5.51**	**-5.51**	**-1.49**	**9.74**	**7.78**	**7.16**
Custom Benchmark [1]		-5.60	-5.60	-1.27	7.87	6.92	5.78
Net of Fee Value Added vs Benchmark		*0.09*	*0.09*	*-0.22*	*1.87*	*0.87*	*1.38*
MSCI ACWI x-US IMI (Net)		-5.60	-5.60	-1.27	7.87	6.92	5.78
MSCI ACWI x-US (Net)		-5.44	-5.44	-1.48	7.51	6.76	5.55
MSCI EAFE (Net)		-5.91	-5.91	1.16	7.78	6.72	6.27
MSCI Emerging Markets		-6.97	-6.97	-11.37	4.94	5.98	3.36

International Equity Managers

	Assets (Millions)	Performance (%) QTR	YTD	1-year	3-year	5-year	Since Inception	Inception Date
Int'l Small Cap - Active								
Acadian International (Gross)	**$ 138.3**	**-2.39**	**-2.39**	**6.61**	**13.26**	**10.28**	**9.15**	**Mar-89**
Acadian International (Net)		**-2.53**	**-2.53**	**6.07**	**12.65**	**9.65**	**8.69**	**Mar-89**
Custom Benchmark		-6.52	-6.52	0.03	10.22	7.89		Mar-89
Net of Fee Value Added vs Benchmark		*3.99*	*3.99*	*6.03*	*2.43*	*1.77*		
Information Ratio				**1.32**	**0.45**	**0.39**		
Sharpe Ratio				**0.49**	**0.67**	**0.55**		

[2] International Equity Custom Benchmark: MSCI ACWI x-US IMI (2q10 – Present); MSCI ACWI x-US (1q99 – 1q10); Wilshire Non-US/Non-SA (2q96 – 4q98); MSCI EAFE (4q89 – 1q96)

[3] Acadian Custom Benchmark: MSCI ACWI x-US Small Cap (3q09 – Present); MSCI EAFE Small Cap (4q99 – 2q09); S&P/Citigroup Eur/Pac EMI Index (2q96 – 3q99); MSCI EAFE (2q89 – 1q96). Performance Objective: Custom Benchmark +2% (1q05 – Present); +1% (2q89 – 4q04).

International Equity Overview (Continued)

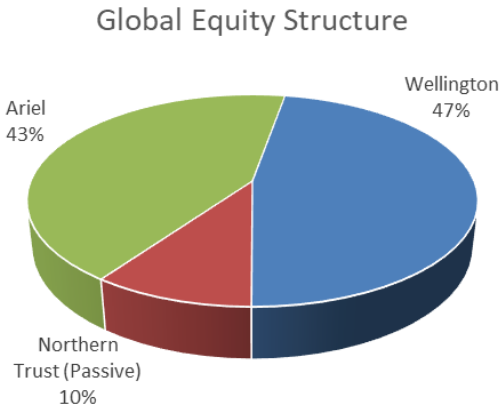
International Equity Managers

	Assets (Millions)	Performance (%) QTR	YTD	1-year	3-year	5-year	Since Inception	Inception Date
Int'l Enhanced Index								
AQR Capital Management (Gross)	**$ 126.6**	**-3.89**	**-3.89**	**-4.42**	**6.36**	**5.61**	**4.15**	**Mar-06**
AQR Capital Management (Net)		**-4.01**	**-4.01**	**-4.95**	**5.78**	**5.02**	**3.61**	**Mar-06**
Custom Benchmark		-5.44	-5.44	-1.48	7.51	6.76	3.53	Mar-06
Net of Fee Value Added vs Benchmark		*1.43*	*1.43*	*-3.47*	*-1.74*	*-1.75*	*0.08*	
Information Ratio				**-1.24**	**-0.48**	**-0.52**		
Sharpe Ratio				**-0.49**	**0.36**	**0.32**		
Int'l Developed								
Ativo International Developed (Gross) *	**$ 41.6**	**-7.17**	**-7.17**	**3.29**	**7.52**		**4.44**	**Dec-17**
Ativo International Developed (Net) *		**-7.32**	**-7.32**	**2.68**	**6.89**		**3.84**	**Dec-17**
MSCI EAFE Index		-5.91	-5.91	1.16	7.78		4.12	
Net of Fee Value Added vs Benchmark		*-1.40*	*-1.40*	*1.52*	*-0.89*		*-0.28*	
Information Ratio				**0.61**	**-0.14**	**-.-**		
Sharpe Ratio				**0.27**	**0.42**	**-.-**		
Int'l Equity (Active)								
Baillie Gifford (Gross)	**$ 75.1**	**-14.82**	**-14.82**	**-16.18**	**8.48**		**8.48**	**Mar-19**
Baillie Gifford (Net)		**-14.94**	**-14.94**	**-16.64**	**7.99**		**7.99**	**Mar-19**
MSCI ACWI x-US (Net)		-5.44	-5.44	-1.48	7.51		7.51	
Net of Fee Value Added vs Benchmark		*-9.50*	*-9.50*	*-15.15*	*0.48*		*0.48*	
Information Ratio				**-2.58**	**-.-**	**-.-**		
Sharpe Ratio				**-1.20**	**-.-**	**-.-**		
Int'l Equity (Active)								
Earnest Partners (Gross) *	**$ 98.2**	**-2.44**	**-2.44**	**6.36**	**11.66**		**11.66**	**Mar-19**
Earnest Partners (Net) *		**-2.59**	**-2.59**	**5.74**	**11.04**		**11.04**	**Mar-19**
MSCI ACWI x-US (Net)		-5.44	-5.44	-1.48	7.51		7.51	
Net of Fee Value Added vs Benchmark		*2.85*	*2.85*	*7.23*	*3.53*		*3.53*	
Information Ratio				**1.75**	**-.-**	**-.-**		
Sharpe Ratio				**0.64**	**-.-**	**-.-**		

- The Fund's international equity composite returned -5.51% (net of fees) during the first quarter of 2022, outperforming the MSCI ACWI x-US Investable Market Index (IMI) which returned -5.60%. Active management was inconsistent for the Fund's international equity program with two of the managers trailing their respective benchmarks and three outperforming. The program's long-standing small cap international equity mandate managed by Acadian outperformed its benchmark significantly. The program's negative performance was mainly fueled by Baillie Gifford and Ativo International, which both lagged their benchmarks by a significant margin. The recently funded Earnest Partners portfolio is outperforming its benchmark over all time periods back through inception. The international equity composite continues to outperform its benchmark for all time periods except the one-year.

[5] AQR Custom Benchmark: MSCI ACWI x-US (2q10 – Present); MSCI EAFE (1q06 – 1q10); Performance Objective: Custom Benchmark + 1.5%.

Global Equity Overview



Global Equity Composite

	Assets (Millions)	Performance QTR	YTD	1-year	3-year	5-year	10-year
Total Global Equity (Gross)	**$ 282.2**	**-4.45**	**-4.45**	**5.80**	**12.05**	**10.87**	
Total Global Equity (Net)		**-4.58**	**-4.58**	**5.24**	**11.44**	**10.31**	
MSCI ACWI (Net)		-5.36	-5.36	7.28	13.75	11.64	
Net of Fee Value Added vs Index		*0.78*	*0.78*	*-2.04*	*-2.31*	*-1.33*	
MSCI ACWI IMI (Net)		-5.47	-5.47	6.30	13.49	11.37	9.95
MSCI ACWI (Net)		-5.36	-5.36	7.28	13.75	11.64	10.00
MSCI World (Net)		-5.15	-5.15	10.12	14.98	12.42	10.88

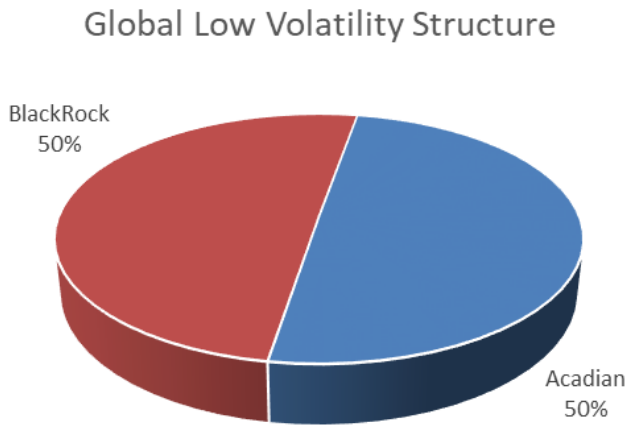
Global Equity Managers

	Assets (Millions)	Performance (%) QTR	YTD	1-year	3-year	5-year	Since Inception	Inception Date
Global Equity - Active								
Wellington (Gross)	**$ 133.4**	**-8.47**	**-8.47**	**2.39**	**13.06**	**11.20**	**12.42**	**Aug-12**
Wellington (Net)		**-8.61**	**-8.61**	**1.79**	**12.40**	**10.56**	**11.79**	**Aug-12**
MSCI ACWI (Net)		-5.36	-5.36	7.28	13.75	11.64	10.71	Aug-12
Net of Fee Value Added vs Benchmark		*-3.25*	*-3.25*	*-5.49*	*-1.35*	*-1.09*	*1.08*	
Information Ratio				**-1.63**	**-0.32**	**-0.24**		
Sharpe Ratio				**0.20**	**0.71**	**0.64**		
Global Equity - Active								
Ariel (Gross) *	**$ 121.2**	**0.71**	**0.71**	**9.71**	**10.32**		**8.21**	**Dec-17**
Ariel (Net) *		**0.56**	**0.56**	**9.05**	**9.65**		**7.57**	**Dec-17**
MSCI ACWI (Net)		-5.36	-5.36	7.28	13.75		9.93	
Net of Fee Value Added vs Benchmark		*5.92*	*5.92*	*1.77*	*-4.10*		*-2.36*	
Information Ratio				**0.21**	**-0.58**	**-.-**		
Sharpe Ratio				**0.97**	**0.71**	**-.-**		
Global Equity - Passive								
Northern Trust (Gross)	**$ 27.6**	**-5.65**	**-5.65**	**6.33**	**13.90**	**11.80**	**12.37**	**Oct-15**
Northern Trust (Net)		**-5.65**	**-5.65**	**6.33**	**13.90**	**11.77**	**12.34**	**Oct-15**
MSCI ACWI IMI (Net)		-5.47	-5.47	6.30	13.49	11.37	11.93	Oct-15
Net of Fee Value Added vs Benchmark		*-0.18*	*-0.18*	*0.03*	*0.40*	*0.40*	*0.42*	

Global Equity Overview (Continued)

- The global equity composite is comprised of an actively managed strategy (with a U.S. bias relative to the benchmark) managed by Wellington and is complemented by a passively managed strategy provided by Northern Trust. The composite also added an exposure to the Ariel Global Product strategy four years ago. The current structure favors active management (currently 90% active/10% passive) versus the previous 50%/50% allocation between active and passively managed funds within the composite. During the first quarter, actively managed mandates were split with one outperforming and the other lagging their benchmarks. The global equity composite is currently outperforming its benchmark for the quarter but lagging for all trailing time-periods.

Global Low Volatility Equity Overview



Global Low Volatility Composite

	Assets (Millions)	Performance QTR	YTD	1-year	3-year	5-year	10-year
Total Global Low Volatility (Gross)	**$ 497.4**	**-2.78**	**-2.78**	**9.79**	**8.07**	**8.42**	
Total Global Low Volatility (Net)		**-2.82**	**-2.82**	**9.59**	**7.86**	**8.22**	
MSCI ACWI Minimum Volatility (Net)		-3.02	-3.02	8.63	7.70	8.55	
Net of Fee Value Added vs Index		*0.20*	*0.20*	*0.96*	*0.16*	*-0.33*	
MSCI ACWI Minimum Volatility (Net)		-3.02	-3.02	8.63	7.70	8.55	9.06
MSCI World x-US Minimum Volatility (Net)		-3.94	-3.94	4.46	4.31	5.60	6.63
MSCI ACWI (Net)		-5.36	-5.36	7.28	13.75	11.64	10.00

Global Equity Managers

	Assets (Millions)	Performance (%) QTR	YTD	1-year	3-year	5-year	Since Inception	Inception Date
Global Low Volatility - Active								
Acadian Global Low Vol (Gross)	**$ 249.3**	**-2.64**	**-2.64**	**10.64**	**8.46**	**8.08**	**8.32**	**Jun-15**
Acadian Global Low Vol (Net)		**-2.72**	**-2.72**	**10.28**	**8.08**	**7.72**	**7.97**	**Jun-15**
MSCI ACWI (Net)		-5.36	-5.36	7.28	13.75	11.64	9.99	Jun-15
Net of Fee Value Added vs MSCI ACWI		*2.64*	*2.64*	*3.01*	*-5.67*	*-3.92*	*-2.02*	
MSCI ACWI Min Vol (Net)		0.08	7.20	14.08	7.55	8.48	8.56	Jun-15
Net of Fee Value Added vs MSCI ACWI Min Vol		*-2.80*	*-9.92*	*-3.79*	*0.52*	*-0.76*	*-0.59*	
Information Ratio				**0.45**	**-0.80**	**-0.67**		
Sharpe Ratio				**1.02**	**0.57**	**0.58**		
Global Low Volatility - Passive								
BlackRock Global Low Vol (Gross)	**$ 248.1**	**-2.92**	**-2.92**	**8.94**	**7.69**	**8.76**	**8.69**	**Jun-15**
BlackRock Global Low Vol (Net)		**-2.93**	**-2.93**	**8.90**	**7.65**	**8.72**	**8.66**	**Jun-15**
MSCI ACWI Min Vol (Net)		-3.02	-3.02	8.63	7.70	8.55	8.39	Jun-15
Net of Fee Value Added vs Benchmark		*0.09*	*0.09*	*0.27*	*-0.05*	*0.17*	*0.28*	

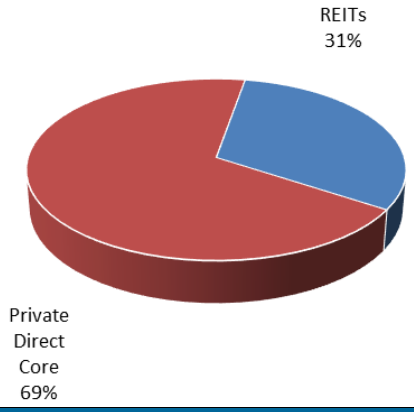
***Acadian Info Ratio/Sharpe Ratio statistics based on MSCI ACWI Min Vol benchmark.**

Global Low Volatility Equity Overview (Continued)

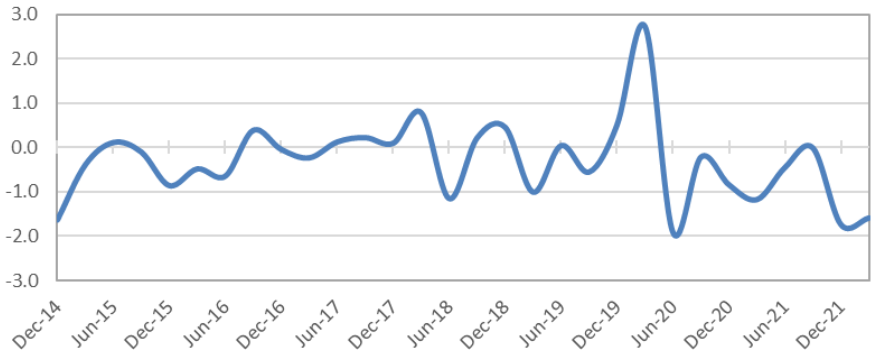
- In 2015, the Board elected to transfer assets from existing strategies elsewhere in the Fund into two new global low volatility equity portfolios. The first portfolio is actively-managed and run by Acadian. Its primary mandate is to provide the Fund with a better risk/return profile relative to the broad MSCI ACWI, its primary benchmark (the Acadian portfolio's performance is also measured against the MSCI ACWI Minimum Volatility as a secondary benchmark). The second portfolio is a passively-managed index fund provided through BlackRock. Taken together, both funds will add diversification benefits to the existing suite of public equity managers. The global low volatility equity composite currently outperforms the MSCI ACWI Minimum Volatility Index for the quarter, one- , and three-year periods.

Real Estate Overview

Real Estate Structure



Total Real Estate Composite
Quarterly Excess Return



Real Estate Composite

	Assets (Millions)	Performance QTR	YTD	1-year	3-year	5-year	10-year
Total Real Estate (Gross)	**$ 421.6**	**-0.61**	**-0.61**	**24.21**	**11.16**	**9.74**	**10.17**
Total Real Estate (Net)		**-0.75**	**-0.75**	**23.50**	**10.52**	**9.11**	**9.46**
Custom Benchmark [1]		0.83	0.83	27.97	12.17	10.09	9.90
Net of Fee Value Added vs Benchmark		*-1.59*	*-1.59*	*-4.46*	*-1.65*	*-0.98*	*-0.45*
REIT Strategies	$ 119.8	-3.41	-3.41	28.58	13.20	11.11	10.14
Private Core Real Estate	$ 301.9	0.13	0.13	19.41	8.68	7.70	8.97
Wilshire Real Estate Securities Index		-3.85	-3.85	29.09	11.93	10.07	10.06
NCREIF Open Diversified Core Equity (Net)		7.17	7.17	27.29	10.31	8.91	9.92

Real Estate Managers

	Assets (Millions)	Performance (%) QTR	YTD	1-year	3-year	5-year	Since Inception	Inception Date
Real Estate Securities - Public								
Adelante Capital Management (Gross)	**$ 60.5**	**-3.54**	**-3.54**	**30.83**	**14.18**	**12.20**	**11.20**	**Sep-01**
Adelante Capital Management (Net)		**-3.70**	**-3.70**	**30.08**	**13.51**	**11.56**	**10.61**	**Sep-01**
Wilshire Real Estate Securities		-3.85	-3.85	29.09	11.93	10.07	10.69	Sep-01
Net of Fee Value Added vs Index		*0.15*	*0.15*	*0.99*	*1.58*	*1.49*	*-0.08*	
Information Ratio				**0.58**	**0.74**	**0.71**		
Sharpe Ratio				**1.61**	**0.75**	**0.68**		
CenterSquare (Gross)	**$ 59.3**	**-2.97**	**-2.97**	**27.72**	**13.45**		**14.42**	**May-18**
CenterSquare (Net)		**-3.11**	**-3.11**	**27.11**	**12.89**		**13.89**	**May-18**
Wilshire Real Estate Securities		-3.85	-3.85	29.09	11.93		12.89	May-18
Net of Fee Value Added vs Index		*0.74*	*0.74*	*-1.99*	*0.96*		*1.00*	
Information Ratio				**-1.00**	**0.45**	**-.-**		
Sharpe Ratio				**1.47**	**0.70**	**-.-**		

[6] Real Estate Custom Benchmark: 50% Wilshire RESI / 39% NCREIF ODCE NOF/11% Invesco Custom Benchmark (4q13 – Present); Wilshire RESI (4q89 – 4q10).

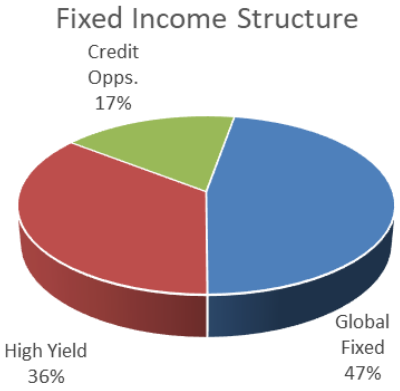
Real Estate Overview (Continued)

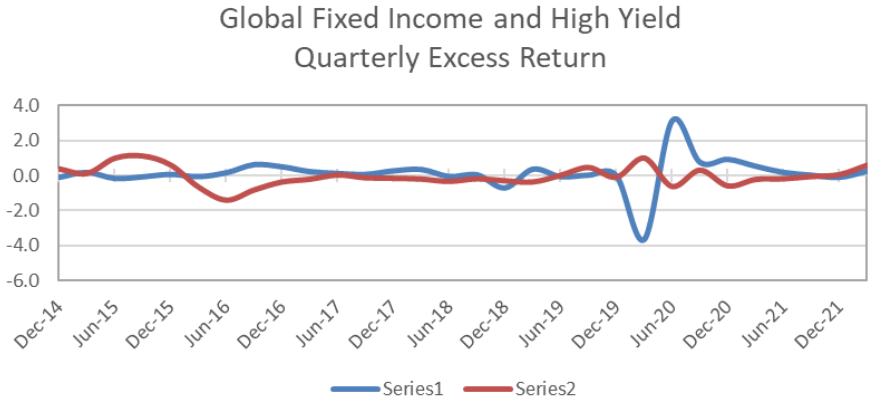
Real Estate Managers

	Assets (Millions)	QTR	YTD	1-year	3-year	5-year	Since Inception	Inception Date
Direct Core Real Estate - Private								
Heitman America Real Estate Trust (Gross)	**$ 99.1**	**0.46**	**0.46**	**22.24**	**7.74**	**7.58**	**11.08**	**Aug-10**
Heitman America Real Estate Trust (Net)		**0.22**	**0.22**	**21.11**	**6.77**	**6.62**	**10.05**	**Aug-10**
NCREIF Open-End Diversified Core (Net)		7.17	7.17	27.29	10.31	8.91	10.74	Aug-10
Net of Fee Value Added vs Index		*-6.95*	*-6.95*	*-6.18*	*-3.54*	*-2.29*	*-0.69*	
Invesco Core Real Estate USA (Gross)	**$ 81.3**	**0.44**	**0.44**	**20.75**	**8.98**	**9.02**	**11.47**	**Aug-10**
Invesco Core Real Estate USA (Net)		**0.21**	**0.21**	**19.68**	**8.04**	**8.08**	**10.50**	**Aug-10**
NCREIF Open-End Diversified Core (Net)		7.17	7.17	27.29	10.31	8.91	10.74	Aug-10
Net of Fee Value Added vs Index		*-6.96*	*-6.96*	*-7.61*	*-2.28*	*-0.83*	*-0.24*	
AEW Partners Real Estate Fund IX (Gross)	**$ 24.6**	**0.00**					**-27.32**	**Apr-21**
AEW Partners Real Estate Fund IX (Net)		**0.00**					**-27.32**	**Apr-21**
NCREIF Open-End Diversified Core (Net)		7.17					27.12	**Apr-21**
Net of Fee Value Added vs Index		*-7.17*					*-54.44*	
Virtus Real Estate Capital III (Gross)	**$ 15.5**	**0.00**					**2.61**	**Feb-21**
Virtus Real Estate Capital III (Net)		**0.00**					**2.61**	**Feb-21**
NCREIF Open-End Diversified Core (Net)		7.17					23.12	**Feb-21**
Net of Fee Value Added vs Index		*-7.17*					*-20.51*	
Invesco II	**$ 81.4**	**0.00**	**0.00**	**20.13**	**13.94**	**9.84**	**4.59**	**Oct-13**

- The Fund's total real estate composite is comprised of both public market real estate securities (REITs) and private investment in direct core real estate. The total segment returned -0.75% (net of fees) during the first quarter, lagging its benchmark (split 50% Wilshire Real Estate Securities Index, 39% NCREIF Open-End Diversified Core Index and 11% Invesco II Custom Benchmark) which returned 0.83%. On the public side, both REIT's outperformed the Wilshire Real Estate Securities Index. On the private side, all mandates trailed the NCREIF ODCE Index. Currently, the Fund's total real estate composite is underperforming over all time periods.

Fixed Income Overview





Fixed Income Composites

	Assets (Millions)	Performance QTR	YTD	1-year	3-year	5-year	10-year
Global Fixed Income (Gross)	**$ 482.2**	**-5.66**	**-5.66**	**-3.68**	**2.51**	**2.81**	**3.02**
Global Fixed Income (Net)		**-5.69**	**-5.69**	**-3.83**	**2.31**	**2.60**	**2.83**
Bloomberg Aggregate Bond Index		-5.93	-5.93	-4.15	1.69	2.14	2.24
Net of Fee Value Added vs Benchmark		*0.24*	*0.24*	*0.32*	*0.63*	*0.46*	*0.59*
High Yield (Gross)	**$ 364.2**	**-3.66**	**-3.66**	**0.78**	**5.21**	**4.93**	**5.80**
High Yield (Net)		**-3.78**	**-3.78**	**0.31**	**4.71**	**4.42**	**5.30**
Custom Benchmark [1]		-4.37	-4.37	-0.15	4.37	4.53	5.43
Net of Fee Value Added vs Benchmark		*0.59*	*0.59*	*0.46*	*0.35*	*-0.11*	*-0.13*
Bloomberg Aggregate		-5.93	-5.93	-4.15	1.69	2.14	2.24
Citigroup High Yield Cash Pay		-4.37	-4.37	-0.15	4.37	4.53	5.43
BofA ML High Yield Master II		-4.51	-4.51	-0.31	4.39	4.56	5.70

Global Fixed Income Managers

	Assets (Millions)	Performance (%) QTR	YTD	1-year	3-year	5-year	Since Inception	Inception Date
Global Fixed Income								
Securian Asset Mgmt. (Gross)	**$ 210.3**	**-5.76**	**-5.76**	**-3.50**	**2.17**	**2.73**	**4.22**	**May-07**
Securian Asset Mgmt. (Net)		**-5.80**	**-5.80**	**-3.67**	**1.99**	**2.55**	**4.04**	**May-07**
Bloomberg Aggregate		-5.93	-5.93	-4.15	1.69	2.14	3.66	May-07
Net of Fee Value Added vs Benchmark		*0.13*	*0.13*	*0.48*	*0.31*	*0.41*	*0.39*	
Information Ratio				**1.19**	**0.11**	**0.17**		
Sharpe Ratio				**-0.93**	**0.24**	**0.33**		

[7] High Yield Custom Benchmark: Citigroup High Yield Cash Pay (4q99 – Present); Citigroup High Yield Composite Index (1q97 – 3q99).

Fixed Income Overview (Continued)

Global Fixed Income Managers

	Assets (Millions)	QTR	YTD	1-year	3-year	5-year	Since Inception	Inception Date
NT Collective Agg. Bond Index (Gross)	**$ 208.3**	**-5.94**					**-5.51**	**Jul-21**
NT Collective Agg. Bond Index (Net)		**-5.95**					**-5.51**	**Jul-21**
Bloomberg Aggregate		-5.93					-5.21	Jul-21
Net of Fee Value Added vs Benchmark		*-0.01*					*-0.30*	
Information Ratio				-.-	-.-	-.-		
Sharpe Ratio				-.-	-.-	-.-		
Global Fixed Income								
Garcia Hamilton (Gross)	**$ 63.6**	**-4.42**	**-4.42**	**-3.30**	**1.93**	**2.41**	**2.93**	**Oct-13**
Garcia Hamilton (Net)		**-4.48**	**-4.48**	**-3.55**	**1.67**	**2.14**	**2.68**	**Oct-13**
Bloomberg Aggregate		-5.93	-5.93	-4.15	1.69	2.14	2.34	Oct-13
Net of Fee Value Added vs Benchmark		*1.45*	*1.45*	*0.60*	*-0.02*	*0.00*	*0.34*	
Information Ratio				**0.53**	**-0.02**	**-0.01**		
Sharpe Ratio				**-1.23**	**0.25**	**0.34**		

- The Fund's global fixed income segment returned -5.69% (net of fees) during the first quarter of 2022, outperforming the Bloomberg Aggregate Bond Index, which returned -5.93%. The segment has historically been comprised of three actively managed strategies: (1) Securian Asset Management (previously Advantus Capital Management), (2) Aberdeen Asset Management, and (3) Garcia Hamilton. Last year, Aberdeen Asset Management was defunded while the passive Collective Aggregate Bond Index managed by Northern Trust was funded as its replacement. The remaining actively managed portfolios had similar performance, with both managers outperforming the Bloomberg Aggregate Index. Securian and Northern Trust manage roughly the same level of assets for the Fund while the Garcia Hamilton portfolio has a smaller mandate. Therefore, quarter to quarter performance will largely be driven by the results of the Securian and Northern Trust while the Garcia Hamilton account does not have the ability to move the needle as much. Following this period's results, the global fixed income composite continues to outperform the Bloomberg Aggregate over all periods.

Fixed Income Overview (Continued)

High Yield/Credit Opportunities Managers

	Assets (Millions)	Performance (%) QTR	YTD	1-year	3-year	5-year	Since Inception	Inception Date
High Yield								
Oaktree Capital Management (Gross)	**$ 183.7**	**-3.53**	**-3.53**	**0.98**	**5.08**	**4.65**	**6.95**	**Dec-96**
Oaktree Capital Management (Net)		**-3.64**	**-3.64**	**0.49**	**4.57**	**4.14**	**6.26**	**Dec-96**
Citigroup High Yield Cash Pay		-4.37	-4.37	-0.15	4.37	4.53		Dec-96
Net of Fee Value Added vs Benchmark		*0.73*	*0.73*	*0.65*	*0.20*	*-0.38*		
Information Ratio				**1.00**	**0.13**	**-0.45**		
Sharpe Ratio				**0.13**	**0.47**	**0.44**		
BlackRock High Yield (Gross)	**$ 180.5**	**-3.80**	**-3.80**	**0.57**	**5.33**	**5.19**	**6.52**	**Sep-06**
BlackRock High Yield (Net)		**-3.91**	**-3.91**	**0.12**	**4.84**	**4.68**	**6.05**	**Sep-06**
Citigroup High Yield Cash Pay		-4.37	-4.37	-0.15	4.37	4.53	6.45	Sep-06
Net of Fee Value Added vs Benchmark		*0.46*	*0.46*	*0.27*	*0.47*	*0.16*	*-0.41*	
Information Ratio				**0.64**	**0.15**	**0.06**		
Sharpe Ratio				**0.03**	**0.47**	**0.49**		
Credit Opportunities								
Neuberger Berman (Gross)	**$ 176.7**	**-4.14**	**-4.14**	**-1.05**	**3.34**	**4.16**	**5.59**	**Jan-16**
Neuberger Berman (Net)		**-4.21**	**-4.21**	**-1.34**	**3.03**	**3.85**	**5.30**	**Jan-16**
Custom Benchmark		-4.91	-4.91	-1.53	2.89	3.45	5.35	Jan-16
Net of Fee Value Added vs Benchmark		*0.70*	*0.70*	*0.19*	*0.14*	*0.40*	*-0.05*	
Information Ratio				**0.24**	**0.17**	**0.33**		
Sharpe Ratio				**-0.35**	**0.26**	**0.36**		

- The high yield composite returned -3.78% (net of fees) during the first quarter, outperforming the Citigroup High Yield Cash Pay Index, which returned -4.37%. The composite is currently split evenly between the two actively-managed strategies. During the period, performance was consistent with both managers outperforming the benchmark. The high yield composite is currently outperforming its benchmark over the quarter, one-, and three-year periods.

[8] Oaktree Capital Management Performance Objective: Citigroup High Yield Cash Pay + 1% (4q99 – Present); Citigroup High Yield Composite Index + 1% (2q97 – Present).

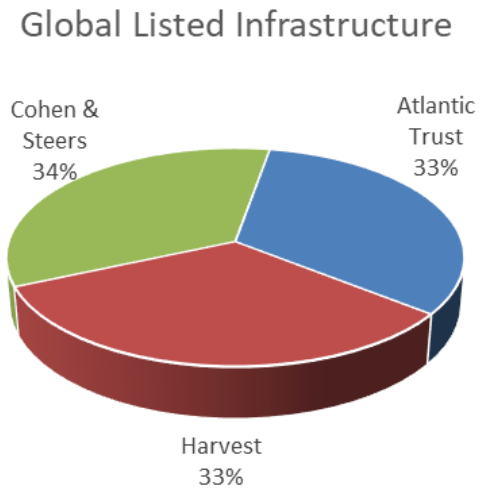
Private Equity Overview

Private Equity Composite

	Total Commitment	Commit. Year	Cumulative Capital Called		Cumulative Distributions	Capital Balance	Multiple	Calculated IRR
Hamilton Lane Fund VII LP (Series A)	30,000,000	2010	27,569,673	91.9%	35,982,062	13,766,529	1.80	12.1%
Hamilton Lane Fund VII LP (Series B)	20,000,000	2010	18,031,161	90.2%	16,239,097	6,017,936	1.23	3.9%
Hamilton Lane Fund VII LP (Total)	*50,000,000*		*45,600,834*	91.2%	*52,221,159*	*19,784,465*	1.58	7.0%
Hamilton Lane Secondary Fund II LP	25,000,000	2009	22,058,532	88.2%	31,103,855	471,844	1.43	13.6%
Hamilton Lane Secondary Fund III LP	30,000,000	2012	23,372,292	77.9%	27,402,929	3,913,599	1.34	10.2%
Hamilton Lane Secondary Fund IV LP	30,000,000	2017	25,907,343	86.4%	21,150,788	21,854,951	1.66	22.8%
Hamilton Lane Secondary Fund V LP	65,000,000	2020	36,826,419	56.7%	4,110,097	46,375,428	1.37	40.2%
Hamilton Lane Fund VIII LP (Global)	30,000,000	2012	22,270,594	74.2%	13,656,569	19,633,722	1.49	7.8%
GCM Grosvenor - Partnership, L.P.	75,000,000	2011	86,428,330	115.2%	117,843,228	29,432,998	1.70	14.3%
GCM Grosvenor - Partnership II, L.P. (2014)	60,000,000	2014	69,943,751	116.6%	62,292,578	47,578,705	1.57	17.7%
GCM Grosvenor - Partnership II, L.P. (2015)	30,000,000	2015	38,278,456	127.6%	10,684,122	47,056,287	1.51	16.5%
GCM Grosvenor - Partnership II, L.P. (2017)	30,000,000	2018	22,871,710	76.2%	5,647,301	23,071,288	1.26	17.6%
GCM Grosvenor - Advance Fund, L.P.	10,000,000	2021	2,538,275	25.4%	53,279	2,428,132	0.98	
Fairview Capital - Lone Star Fund I	40,000,000	2015	35,663,040	89.2%	12,810,873	52,418,006	1.83	18.4%
Fairview Capital - Lone Star Fund II	30,000,000	2018	14,912,991	49.7%	138,948	19,561,393	1.32	11.8%
Fairview Capital - Lone Star Fund III	25,000,000	2021	5,176,777	20.7%		5,063,860	0.98	-8.0%
Total Private Equity Program	**530,000,000**	**2009**	**451,849,343**	**85.3%**	**359,115,727**	**338,644,678**	**1.54**	**14.5%**

- Multiple calculation = (market value + distributions) / capital called
- Internal Rate of Return shown here is calculated by Wilshire based on cumulative cash flows and annualized since inception.

Global Listed Infrastructure Overview



Global Listed Infrastructure Composite

	Assets (Millions)	Performance QTR	YTD	1-year	3-year	5-year	10-year
Global Listed Infra (Gross)	**$ 212.5**	**16.48**	**16.48**	**36.58**	**2.64**	**1.13**	**5.14**
Global Listed Infra (Net)		**16.30**	**16.30**	**35.74**	**1.94**	**0.45**	**4.45**
GLI Custom Benchmark		15.09	15.09	31.26	-1.12	-2.31	0.13
Net of Fee Value Added vs Index		*1.21*	*1.21*	*4.48*	*3.06*	*2.77*	*4.31*
Alerian MLP Index		18.81	18.81	36.56	2.70	-0.07	1.28
S&P MLP Index		18.25	18.25	31.63	-4.95	-6.74	-4.84
Bloomberg Commodities Index		25.55	25.55	49.25	16.12	9.00	-0.70
FTSE Global Core Infra 50/50 Idx Net		3.72	3.72				

Managers

	Assets (Millions)	Performance (%) QTR	YTD	1-year	3-year	5-year	Since Inception	Inception Date
MLPs								
Harvest Fund Advisors (Gross)	**$ 69.8**	**23.59**	**23.59**	**47.37**	**9.79**	**5.43**	**7.22**	
Harvest Fund Advisors (Net)		**23.38**	**23.38**	**46.32**	**8.94**	**4.62**	**6.45**	**Dec-11**
Alerian MLP Index		18.81	18.81	36.56	2.70	-0.07	1.44	Dec-11
Net of Fee Value Added vs Benchmark		*4.57*	*4.57*	*9.76*	*6.24*	*4.69*	*5.01*	
Information Ratio				**1.13**	**0.05**	**0.14**		
Sharpe Ratio				**2.61**	**0.41**	**0.27**		
Atlantic Trust CIBC (Gross)	**$ 69.8**	**21.09**	**21.09**	**44.05**	**6.93**	**3.47**	**7.00**	
Atlantic Trust CIBC (Net)		**20.93**	**20.93**	**43.23**	**6.29**	**2.86**	**6.40**	**Dec-11**
Alerian MLP Index		18.81	18.81	36.56	2.70	-0.07	1.44	Dec-11
Net of Fee Value Added vs Benchmark		*2.12*	*2.12*	*6.68*	*3.59*	*2.93*	*4.96*	
Information Ratio				**0.74**	**-0.02**	**0.11**		
Sharpe Ratio				**2.50**	**0.35**	**0.23**		

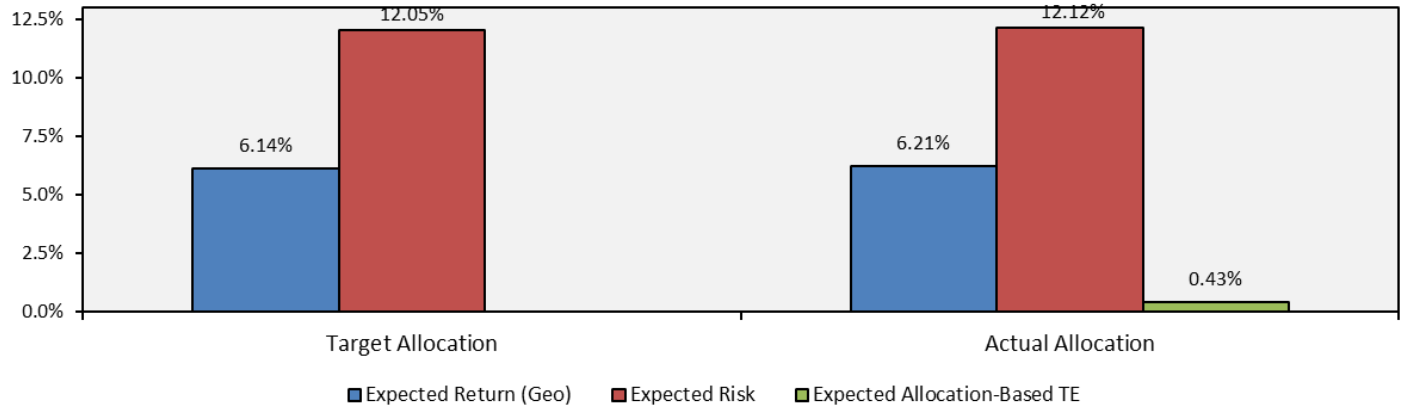
Global Listed Infrastructure Overview (Continued)

	Assets (Millions)	QTR	YTD	1-year	3-year	5-year	Since Inception	Inception Date
Global Listed Infrastructure								
Cohen & Steers GLI (Gross)	**$ 72.9**	**3.40**	**3.40**	**17.21**			**21.10**	
Cohen & Steers GLI (Net)		**3.24**	**3.24**	**16.54**			**20.50**	**Nov-20**
FTSE Global Core Infra 50/50 Index		**3.72**	**3.72**	**14.47**			**20.44**	Nov-20
		-0.48	*-0.48*	*2.06*			*0.06*	
				1.17	**-.-**	**-.-**		
				1.25	**-.-**	**-.-**		

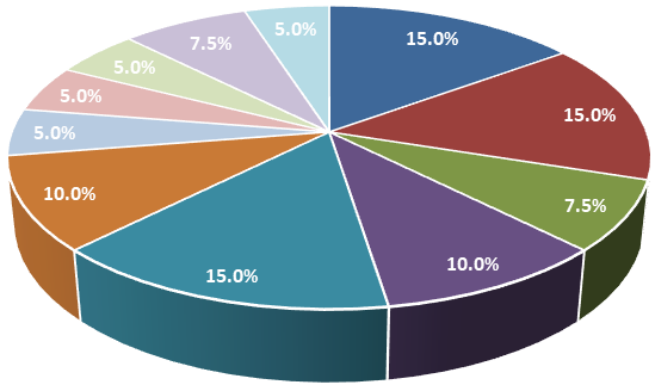
- The Fund's Master Limited Partnership (MLP) program, which is comprised with nearly equal weights of Harvest Fund Advisors and Atlantic Trust, was joined a year ago by a Global Listed Infrastructure strategy managed by Cohen & Steers. The three managers will now make up the Global Listed Infrastructure composite. The Global Listed Infrastructure composite is outperforming across all time-periods.

Appendix: Risk Analysis & Performance Objectives

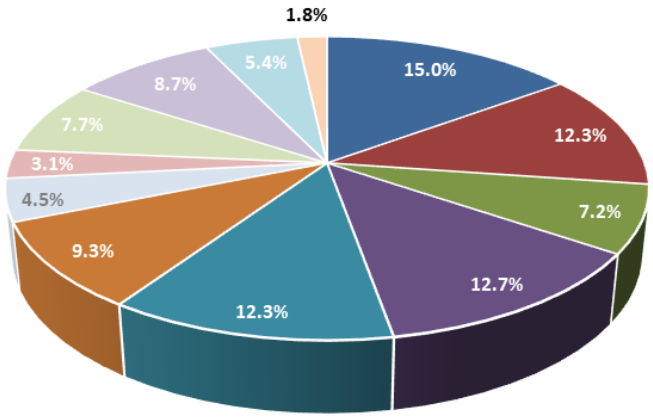
Expected Return and Risk

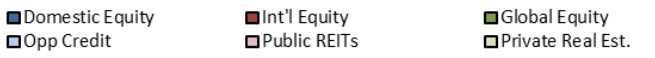


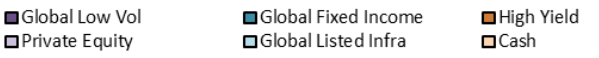
Target Asset Allocation



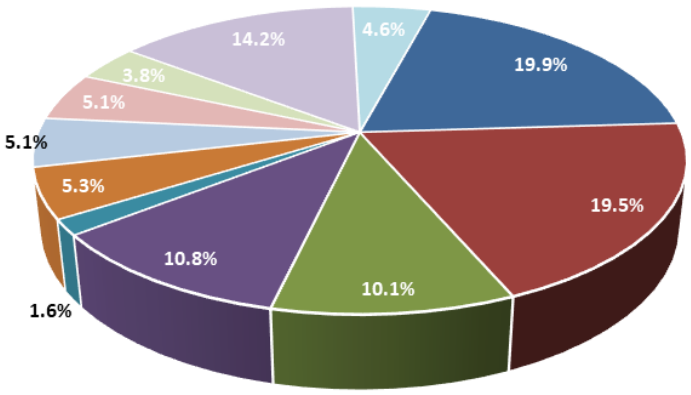
Actual Asset Allocation



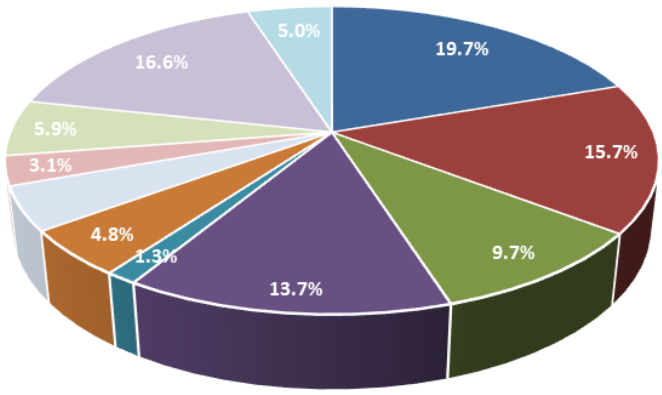


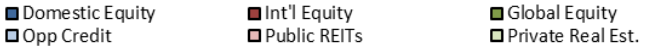


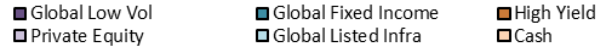
Contribution to Total Risk - Target Allocation



Contribution to Total Risk - Actual Allocation

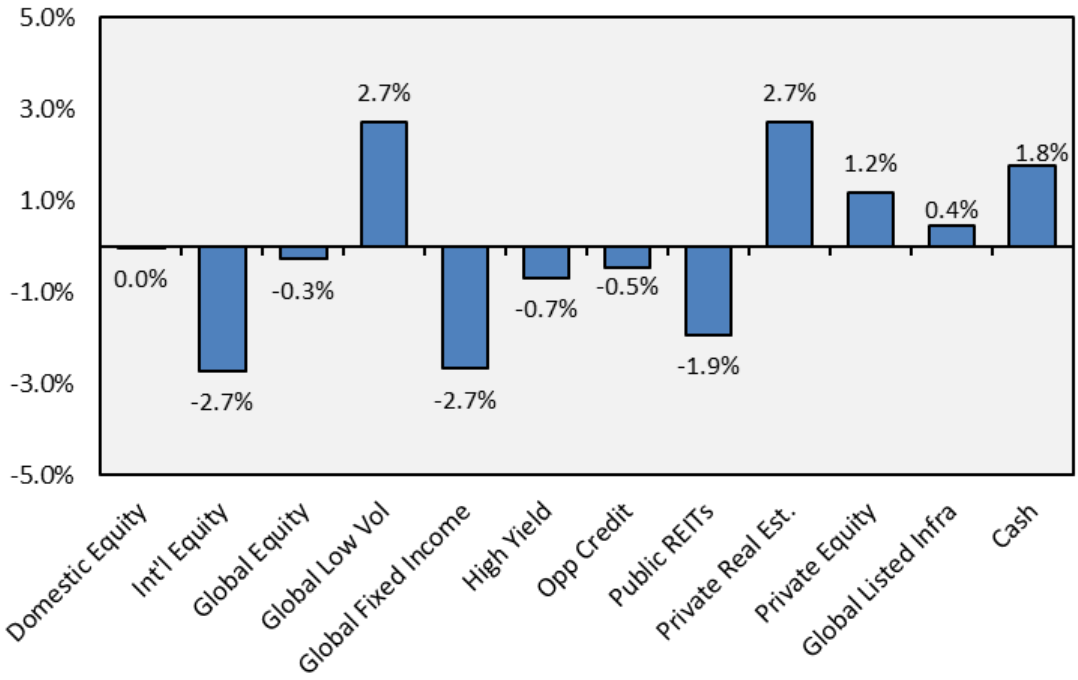




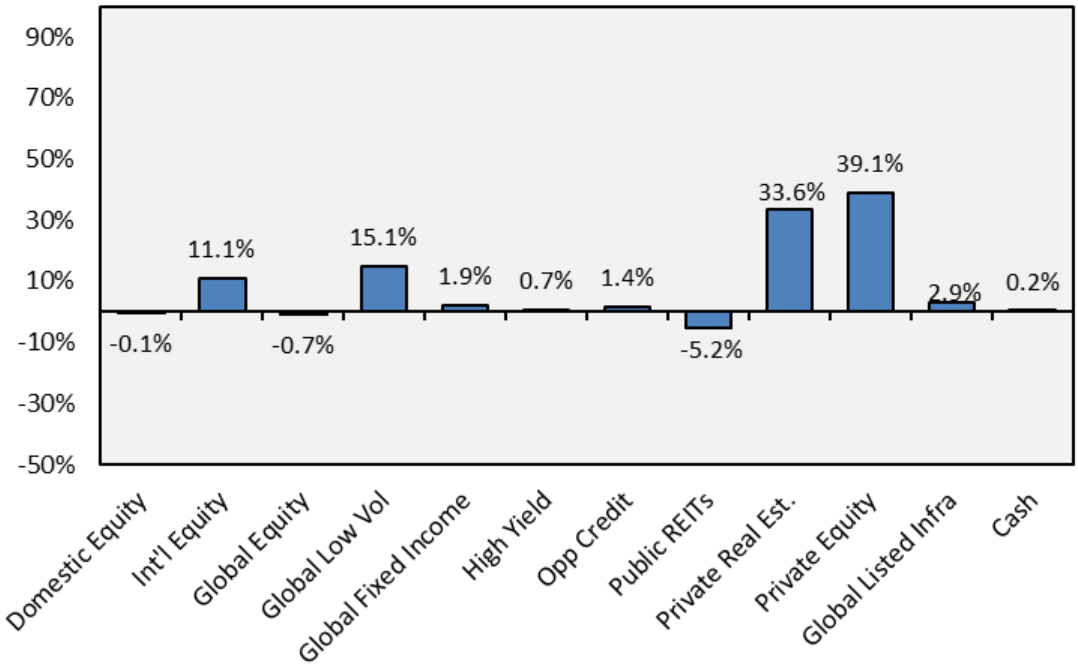


Expected Return and Tracking Error based on Wilshire's Asset Assumptions

Asset Allocation Variance



Contribution to Tracking Error



- The variance between the Fund's actual asset allocation and the target allocation is a source of tracking error for the Fund. This "asset allocation tracking error" is currently forecasted to be 0.43% (for the one-year period) at quarter-end. Private Equity and Private Real Estate provided the largest contributions to tracking error at the total fund level.

Manager Risk Statistics

U.S. Equity				
T. Rowe Price (Enhanced Index)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	12.81	17.82	15.94	13.43
Standard Deviation (Index)	13.04	17.51	15.65	13.18
Sharpe Ratio	1.20	1.04	0.98	1.07
Sharpe Ratio (Index)	1.18	1.03	0.96	1.06
Excess Risk	12.82	17.93	16.02	13.47
Information Ratio	-0.01	0.37	0.61	0.37

Systematic (Small Core)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	10.03	22.14	19.86	16.85
Standard Deviation (Index)	12.99	23.36	21.00	17.94
Sharpe Ratio	0.28	0.63	0.53	0.74
Sharpe Ratio (Index)	-0.40	0.56	0.50	0.64
Excess Risk	10.04	22.27	19.97	16.92
Information Ratio	1.06	0.11	0.02	0.20

Channing Capital (Small Value)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	11.87	25.40	22.77	*n/a*
Standard Deviation (Index)	10.97	24.59	21.74	*n/a*
Sharpe Ratio	0.27	0.62	0.43	*n/a*
Sharpe Ratio (Index)	0.35	0.58	0.44	*n/a*
Excess Risk	11.88	25.54	22.88	*n/a*
Information Ratio	-0.08	0.18	0.02	*n/a*

Redwood (Small Growth)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	19.3	20.35	*19.39*	*n/a*
Standard Deviation (Index)	16.62	23.69	*21.47*	*n/a*
Sharpe Ratio	-0.28	0.68	*0.57*	*n/a*
Sharpe Ratio (Index)	-0.84	0.48	*0.51*	*n/a*
Excess Risk	19.30	20.45	*19.46*	*n/a*
Information Ratio	1.20	0.24	*-0.01*	*n/a*

Smith Graham (Mid-Cap)	1 Yr	3 Yr	*5 Yr*	*10 Yr*
Standard Deviation	11.05	27.11	*n/a*	*n/a*
Standard Deviation (Index)	13.17	20.52	*n/a*	*n/a*
Sharpe Ratio	0.92	0.73	*n/a*	*n/a*
Sharpe Ratio (Index)	0.57	0.74	*n/a*	*n/a*
Excess Risk	11.05	27.25	*n/a*	*n/a*
Information Ratio	0.31	0.40	*n/a*	*n/a*

Real Estate Investment Trusts				
Adelante (REIT)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	17.40	18.05	16.33	14.85
Standard Deviation (Index)	17.76	19.04	17.18	15.64
Sharpe Ratio	1.61	0.75	0.68	0.71
Sharpe Ratio (Index)	1.54	0.65	0.58	0.65
Excess Risk	17.39	18.18	16.41	14.89
Information Ratio	0.58	0.74	0.71	0.15

Real Estate Investment Trusts				
Centersquare (REIT)	1 Yr	*3 Yr*	*5 Yr*	*10 Yr*
Standard Deviation	17.51	*18.84*	*n/a*	*n/a*
Standard Deviation (Index)	17.76	*19.04*	*n/a*	*n/a*
Sharpe Ratio	1.47	*0.70*	*n/a*	*n/a*
Sharpe Ratio (Index)	1.54	*0.65*	*n/a*	*n/a*
Excess Risk	17.51	*18.97*	*n/a*	*n/a*
Information Ratio	-1.00	*0.45*	*n/a*	*n/a*

Non-U.S. Equity				
Acadian (Int'l Small Cap)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	13.82	19.44	17.55	15.55
Standard Deviation (Index)	11.34	19.99	17.28	15.12
Sharpe Ratio	0.49	0.67	0.55	0.63
Sharpe Ratio (Index)	0.05	0.55	0.46	0.50
Excess Risk	13.81	19.57	17.66	15.61
Information Ratio	1.32	0.45	0.39	0.56

AQR (Int'l Equity)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	9.50	17.51	15.91	14.41
Standard Deviation (Index)	9.79	16.64	14.79	13.85
Sharpe Ratio	-0.49	0.36	0.32	0.44
Sharpe Ratio (Index)	-0.11	0.47	0.44	0.42
Excess Risk	9.49	17.63	16.00	14.46
Information Ratio	-1.24	-0.48	-0.52	0.21

Ativo (Int'l Developed)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	12.29	17.53	*n/a*	*n/a*
Standard Deviation (Index)	10.66	16.99	*n/a*	*n/a*
Sharpe Ratio	0.27	0.42	*n/a*	*n/a*
Sharpe Ratio (Index)	0.16	0.48	*n/a*	*n/a*
Excess Risk	12.28	19.65	*n/a*	*n/a*
Information Ratio	0.61	-0.14	*n/a*	*n/a*

Global Equity				
Wellington (Global Equity)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	12.58	17.48	15.96	*n/a*
Standard Deviation (Index)	11.20	16.98	15.02	*n/a*
Sharpe Ratio	0.20	0.71	0.64	*n/a*
Sharpe Ratio (Index)	0.68	0.80	0.73	*n/a*
Excess Risk	12.58	17.59	16.04	*n/a*
Information Ratio	-1.63	-0.32	-0.24	*n/a*

Ariel (Global Equity)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	9.32	12.91	*n/a*	*n/a*
Standard Deviation (Index)	11.20	16.98	*n/a*	*n/a*
Sharpe Ratio	0.97	0.71	*n/a*	*n/a*
Sharpe Ratio (Index)	0.68	0.80	*n/a*	*n/a*
Excess Risk	9.32	13.01	*n/a*	*n/a*
Information Ratio	0.21	-0.58	*n/a*	*n/a*

Global Low Volatility				
Acadian (Global Low Volatility)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	10.06	13.96	12.27	*n/a*
Standard Deviation (Index)	11.20	16.98	15.02	*n/a*
Sharpe Ratio	1.02	0.57	0.58	*n/a*
Sharpe Ratio (Index)	0.68	0.80	0.73	*n/a*
Excess Risk	10.06	14.06	12.35	*n/a*
Information Ratio	0.45	-0.80	-0.67	*n/a*

Fixed Income (Core)				
Securian (Core Fixed Income)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	3.96	5.60	4.61	3.83
Standard Deviation (Index)	3.95	3.98	3.54	3.22
Sharpe Ratio	-0.93	0.24	0.33	0.64
Sharpe Ratio (Index)	-1.06	0.24	0.31	0.52
Excess Risk	3.98	5.64	4.62	3.84
Information Ratio	1.19	0.11	0.17	0.41

Manager Risk Statistics

High Yield Fixed Income				
BlackRock (High Yield)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	3.90	9.10	7.55	6.36
Standard Deviation (Index)	4.15	9.06	7.55	6.62
Sharpe Ratio	0.03	0.47	0.49	0.76
Sharpe Ratio (Index)	-0.03	0.43	0.47	0.73
Excess Risk	3.90	9.21	7.63	6.41
Information Ratio	0.64	0.15	0.06	-0.03

Oaktree (High Yield)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	3.73	8.41	7.12	6.33
Standard Deviation (Index)	4.15	9.06	7.55	6.62
Sharpe Ratio	0.13	0.47	0.44	0.69
Sharpe Ratio (Index)	-0.03	0.43	0.47	0.73
Excess Risk	3.74	8.54	7.22	6.39
Information Ratio	1.00	0.13	-0.45	-0.53

Neuberger Berman (Credit Opps)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	3.82	10.42	*8.45*	*n/a*
Standard Deviation (Index)	4.05	9.19	*7.47*	*n/a*
Sharpe Ratio	-0.35	0.26	*0.36*	*n/a*
Sharpe Ratio (Index)	-0.38	0.27	*0.34*	*n/a*
Excess Risk	3.83	10.55	*8.55*	*n/a*
Information Ratio	0.24	0.17	*0.33*	*n/a*

Fixed Income (Core)				
Garcia Hamilton (Core Fixed Income)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	2.94	3.66	3.1	*n/a*
Standard Deviation (Index)	3.95	3.98	3.54	*n/a*
Sharpe Ratio	-1.23	0.25	0.34	*n/a*
Sharpe Ratio (Index)	-1.06	0.24	0.31	*n/a*
Excess Risk	2.95	3.63	3.06	*n/a*
Information Ratio	0.53	-0.02	-0.01	*n/a*

Master Limited Partnerships				
Harvest (MLP)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	15.25	34.49	29.88	24.52
Standard Deviation (Index)	18.47	46.77	38.26	29.80
Sharpe Ratio	2.61	0.41	0.27	0.35
Sharpe Ratio (Index)	1.80	0.29	0.17	0.18
Excess Risk	15.25	34.65	29.99	24.58
Information Ratio	1.13	0.05	0.14	0.37

Atlantic Trust CIBC (MLP)	1 Yr	3 Yr	5 Yr	10 Yr
Standard Deviation	15.01	38.69	32.61	26.37
Standard Deviation (Index)	18.47	46.77	38.26	29.80
Sharpe Ratio	2.50	0.35	0.23	0.33
Sharpe Ratio (Index)	1.80	0.29	0.17	0.18
Excess Risk	15.02	38.85	32.72	26.43
Information Ratio	0.74	-0.02	0.11	0.56

Manager Performance Objectives

Domestic Equity	3-year	5-year	Since Inception	Inception Date
Enhanced Index				
T. Rowe Price (Net)	**19.32**	**16.69**	**10.90**	**Mar-06**
S&P 500 Index + 1%	20.10	17.14	11.49	Mar-06
Net of Fee Value Added vs Objective	*-0.79*	*-0.45*	*-0.59*	
S&P 500 Index	18.92	15.99	10.36	Mar-06
Net of Fee Value Added vs Benchmark	*0.39*	*0.70*	*0.54*	
Small Core - Active				
Systematic Financial (Net)	**13.00**	**10.15**	**11.04**	**Jun-03**
Russell 2000 Index + 1.25%	13.14	11.12	10.99	Jun-03
Net of Fee Value Added vs Objective	*-0.14*	*-0.97*	*0.04*	
Russell 2000 Index	11.74	9.74	9.62	Jun-03
Net of Fee Value Added vs Benchmark	*1.25*	*0.40*	*1.41*	
Small Value - Active				
Channing Capital Management (Net) *	**14.15**	**8.53**	**8.36**	**Oct-13**
Russell 2000 Value Index + 1.25%	14.13	9.93	9.70	Oct-13
Net of Fee Value Added vs Objective	*0.02*	*-1.39*	*-1.34*	
Russell 2000 Value Index	12.73	8.57	8.34	Oct-13
Net of Fee Value Added vs Benchmark	*1.42*	*-0.04*	*0.02*	
Small Growth - Active				
Redwood Investments (Net) *	**13.40**	**10.74**	**10.84**	**Sep-16**
Russell 2000 Growth Index + 1.50%	11.53	11.98	12.87	Sep-16
Net of Fee Value Added vs Objective	*1.87*	*-1.24*	*-2.03*	
Russell 2000 Growth Index	9.88	10.33	11.09	
Net of Fee Value Added vs Benchmark	*3.52*	*0.41*	*-0.26*	
Mid Cap Value - Active				
Smith Graham Mid Cap Value (Net) *	**17.97**		**10.99**	**Dec-17**
Russell Midcap Index + 2%	17.19		14.05	**Dec-17**
Net of Fee Value Added vs Objective	*0.78*		*-3.07*	
Russell Midcap Index	14.89		11.81	
Net of Fee Value Added vs Benchmark	*3.07*		*-0.83*	

Manager Performance Objectives

International Equity	3-year	5-year	Since Inception	
Int'l Small Cap - Active				
Acadian International (Net)	**12.65**	**9.65**	**8.69**	**Mar-89**
Custom Benchmark + 2%	12.43	10.05	8.31	Mar-89
Net of Fee Value Added vs Objective	*0.22*	*-0.40*	*0.37*	
Custom Benchmark	10.22	7.89		Mar-89
Net of Fee Value Added vs Benchmark	*2.43*	*1.77*		
Int'l Enhanced Index				
AQR Capital Management (Net)	**5.78**	**5.02**	**3.61**	**Mar-06**
Custom Benchmark + 1.5%	9.13	8.36	5.08	Mar-06
Net of Fee Value Added vs Objective	*-3.35*	*-3.35*	*-1.47*	
Custom Benchmark	7.51	6.76	3.53	Mar-06
Net of Fee Value Added vs Benchmark	*-1.74*	*-1.75*	*0.08*	
Int'l Developed				
Ativo International Developed (Net) *	**6.89**		**3.84**	**Dec-17**
MSCI EAFE Index + 2%	9.95		6.52	
Net of Fee Value Added vs Objective	*-3.06*		*-2.69*	
MSCI EAFE Index	7.78		4.12	
Net of Fee Value Added vs Benchmark	*-0.89*		*-0.28*	
Int'l Equity (Active)				
Baillie Gifford (Net)	**7.99**		**7.99**	**Mar-19**
MSCI ACWI x-US (Net) + 2%	9.67		9.67	
Net of Fee Value Added vs Objective	*-1.68*		*-1.68*	
MSCI ACWI x-US (Net)	7.51		7.51	
Net of Fee Value Added vs Benchmark	*0.48*		*0.48*	
Int'l Equity (Active)				
Earnest Partners (Net) *	**11.04**		**11.04**	**Mar-19**
MSCI ACWI x-US (Net) + 2%	9.67		9.67	
Net of Fee Value Added vs Objective	*1.37*		*1.37*	
MSCI ACWI x-US (Net)	7.51		7.51	
Net of Fee Value Added vs Benchmark	*3.53*		*3.53*	

Manager Performance Objectives

Global Equity	3-year	5-year	Since Inception	Inception Date
Global Equity - Active				
Wellington (Net)	**12.40**	**10.56**	**11.79**	**Aug-12**
MSCI ACWI (Net) + 2%	16.03	13.88	12.92	Aug-12
Net of Fee Value Added vs Objective	*-3.63*	*-3.32*	*-1.14*	
MSCI ACWI (Net)	13.75	11.64	10.71	Aug-12
Net of Fee Value Added vs Benchmark	*-1.35*	*-1.09*	*1.08*	
Global Equity - Active				
Ariel (Net) *	**9.65**		**7.57**	**Dec-17**
MSCI ACWI (Net) + 1.5%	15.45		11.58	
Net of Fee Value Added vs Objective	*-5.80*		*-4.01*	
MSCI ACWI (Net)	13.75		9.93	
Net of Fee Value Added vs Benchmark	*-4.10*		*-2.36*	

	3-year	5-year	Since Inception	Inception Date
Global Low Volatility - Active				
Acadian Global Low Vol (Net)	**8.08**	**7.72**	**7.97**	**Jun-15**
MSCI ACWI (Net) + 2%	16.03	13.88	11.68	Jun-15
Net of Fee Value Added vs Objective	*-7.95*	*-6.16*	*-3.70*	
MSCI ACWI (Net)	13.75	11.64	9.99	Jun-15
Net of Fee Value Added vs MSCI ACWI	*-5.67*	*-3.92*	*-2.02*	
MSCI ACWI Min Vol (Net)	7.55	8.48	8.56	Jun-15
Net of Fee Value Added vs MSCI ACWI Min Vol	*0.52*	*-0.76*	*-0.59*	

Manager Performance Objectives

Real Estate	3-year	5-year	Since Inception	Inception Date
Real Estate Securities - Public				
Adelante Capital Management (Net)	**13.51**	**11.56**	**10.61**	**Sep-01**
Wilshire Real Estate Securities + 1%	13.04	11.17	11.79	Sep-01
Net of Fee Value Added vs Objective	*0.47*	*0.39*	*-1.19*	
Wilshire Real Estate Securities	11.93	10.07	10.69	Sep-01
Net of Fee Value Added vs Index	*1.58*	*1.49*	*-0.08*	
CenterSquare (Net)	**12.89**		**13.89**	**May-18**
Wilshire Real Estate Securities + 1%	13.05		14.02	May-18
Net of Fee Value Added vs Objective	*-0.16*		*-0.13*	
Wilshire Real Estate Securities	11.93		12.89	May-18
Net of Fee Value Added vs Index	*0.96*		*1.00*	

Manager Performance Objectives

Fixed Income	3-year	5-year	Since Inception	Inception Date
Global Fixed Income				
Securian Asset Mgmt. (Net)	**1.99**	**2.55**	**4.04**	**May-07**
Bloomberg Aggregate + 0.5%	2.20	2.65	4.13	**May-07**
Net of Fee Value Added vs Objective	*-0.20*	*-0.10*	*-0.09*	
Bloomberg Aggregate	1.69	2.14	3.66	**May-07**
Net of Fee Value Added vs Benchmark	*0.31*	*0.41*	*0.39*	
Garcia Hamilton (Net)	**1.67**	**2.14**	**2.68**	**Oct-13**
Bloomberg Aggregate + 0.5%	2.20	2.65	2.85	Oct-13
Net of Fee Value Added vs Objective	*-0.53*	*-0.51*	*-0.17*	
Bloomberg Aggregate	1.69	2.14	2.34	Oct-13
Net of Fee Value Added vs Benchmark	*-0.02*	*0.00*	*0.34*	

	3-year	5-year	Since Inception	Inception Date
High Yield				
Oaktree Capital Management (Net)	**4.57**	**4.14**	**6.26**	**Dec-96**
Performance Objective	5.41	5.57	7.72	Dec-96
Net of Fee Value Added vs Objective	*-0.84*	*-1.43*	*-1.46*	
Custom Benchmark	4.37	4.53		Dec-96
Net of Fee Value Added vs Benchmark	*0.20*	*-0.38*		
BlackRock High Yield (Net)	**4.84**	**4.68**	**6.05**	**Sep-06**
Citigroup High Yield Cash Pay + 1%	5.41	5.57	7.51	Sep-06
Net of Fee Value Added vs Objective	*-0.57*	*-0.88*	*-1.47*	
Citigroup High Yield Cash Pay	4.37	4.53	6.45	Sep-06
Net of Fee Value Added vs Benchmark	*0.47*	*0.16*	*-0.41*	
Credit Opportunities				
Neuberger Berman (Net)	**3.03**	**3.85**	**5.30**	**Jan-16**
Custom Benchmark + 1%	3.93	4.48	6.41	Jan-16
Net of Fee Value Added vs Objective	*-0.89*	*-0.64*	*-1.11*	
Custom Benchmark	2.89	3.45	5.35	Jan-16
Net of Fee Value Added vs Benchmark	*0.14*	*0.40*	*-0.05*	

Manager Performance Objectives

MLP's	3-year	5-year	Since Inception	Inception Date
MLPs				
Harvest Fund Advisors (Net)	**8.94**	**4.62**	**6.45**	**Dec-11**
Alerian MLP Index + 1.5%	4.27	1.45	3.52	Dec-11
Net of Fee Value Added vs Objective	*4.67*	*3.17*	*2.93*	
Alerian MLP Index	2.70	-0.07	1.44	Dec-11
Net of Fee Value Added vs Benchmark	*6.24*	*4.69*	*5.01*	
Atlantic Trust CIBC (Net)	**6.29**	**2.86**	**6.40**	**Dec-11**
Alerian MLP Index + 1.5%	4.27	1.45	3.52	Dec-11
Net of Fee Value Added vs Objective	*2.02*	*1.41*	*2.87*	
Alerian MLP Index	2.70	-0.07	1.44	Dec-11
Net of Fee Value Added vs Benchmark	*3.59*	*2.93*	*4.96*	

Wilshire

Asset Allocation Research

2022 Asset Allocation Return & Risk Assumptions

As of December 2021

Contents

Introduction: Expected Future Returns

This report describes Wilshire's capital market assumptions process, which derives key inputs for use within institutional asset allocation studies. As the asset allocation decision drives more than 90% of a portfolio's return variance [1], it serves as a critical process that can assist fiduciaries in managing the key risks facing institutional investors. Unless otherwise noted, all return assumptions contained within this report represent median geometric returns based on a log-normal distribution.

Wilshire has been formulating long-term return, risk and correlation assumptions since the early 1980s and now updates these asset class forecasts on a quarterly basis. As it relates to our standard asset class forecasts used in asset-liability studies, we define "long-term" as estimates that span at least the next 10 years. This extended time horizon is consistent with the benefit / spending obligations of most institutional investors. In addition to our standard long-term assumptions, Wilshire maintains a suite of ultra-long-term (ULT) asset class assumptions that are intended to serve as estimates of the equilibrium level of returns available through various investment classes. These ULT assumptions can be blended with Wilshire's standard asset class forecasts to project portfolio returns for periods greater than 10 years. Unless otherwise noted, all future references made to long-term assumptions within this report reflect Wilshire's standard 10-year forecast horizon.

Wilshire's forecasting methodologies, which are illustrated in exhibits throughout the paper, have generally shown accuracy over 10-year intervals and we believe are superior to short-term estimates. Because of this long-term forecasting horizon, Wilshire's assumptions typically experience only a moderate level of change from quarter to quarter or year to year. However, during volatile or transformative market environments, one can expect more significant forecasting adjustments.

Further to the specific forecasting models described in this report, Wilshire imposes maximum return bands on growth assets. These bands are designed to protect against the occasional risk of individual asset class models pointing to outsized return forecasts. Rather than imposing a static or absolute return cap, we implement a dynamic process that establishes return bands based on risk-adjusted returns relative to those implied by Wilshire's U.S. Stock forecast. We believe this approach provides our desired level of protection, while allowing the practical impact of the bands to expand and contract with the general risk premiums priced into markets. Wilshire's current application limits the returns on individual growth / equity segments from exceeding the Sharpe Ratio (SR) of U.S. Stocks by more than 0.10; thus imposing a current SR limit of 0.34, which is 0.10 above the 0.25 SR implied within our U.S. Stock forecast. Although our expectation is that these return bands will only occasionally constrain our various forecasting models, a number of real asset class components were impacted for December 2021, which will be highlighted in their respective sections.

2021 Market Environment

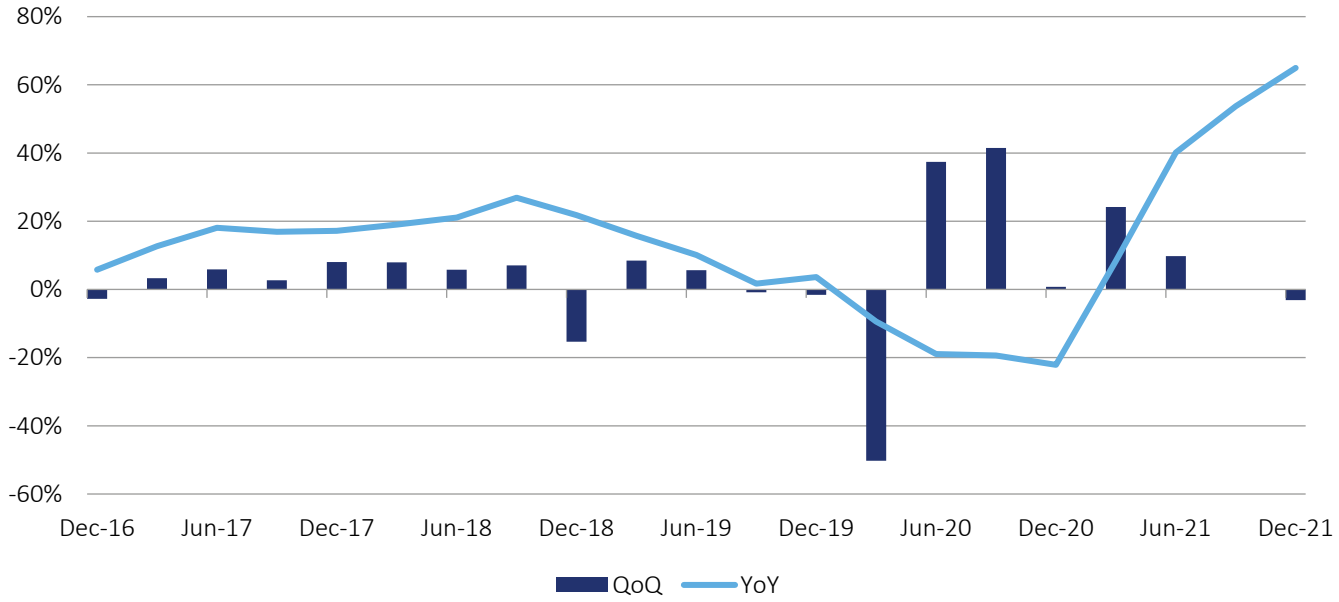
Assumption changes to the various asset classes reflect changes in underlying economic and market conditions as well as a discounting of how those conditions might change in the future. During 2021, the U.S. economy continued to rebound from the Coronavirus pandemic particularly during the first half of the year. Growth in hourly earnings was strong and unemployment fell while retail sales surged during the fourth quarter. Interestingly, consumer sentiment declined all year – likely due, in part, to new COVID variants and mounting inflation. Sharply rising inflation will be remembered as the economic story of 2021 as increases in the Consumer Price Index (CPI) have reached rates not seen in 40 years. Food and energy prices are up meaningfully, but so too are the major "core" CPI items of automobiles and apparel. The year started off with a bang as real GDP grew 6.5% (annualized) during the first six months while economic growth was up by an annual rate of 4.9% for the four quarters ending September 2021 versus a loss of -2.3% in 2020. Inflation pushed higher throughout the year as the CPI advanced 7.1% during 2021 compared to 1.3% the previous year. The 10-year break-even inflation rate also rose steadily last year and closed in December at 2.61% (up 62 bps for the year). The Treasury curve spiked higher to start the year with the 10-year Treasury going from 0.93% to 1.74%. The curve then fell in the longer end with the short end rising, for a fairly flat curve starting at the seven-year mark. By year's end, the 10-year yield was 1.52%, up 59 bps from a year earlier.

As can be seen in Exhibit 1, operating earnings rebounded from COVID-related restrictions by jumping 24% during the first quarter of 2021. Businesses continued to rebound during the second quarter although earnings growth is estimated to have

[1] Brinson, Singer and Beebower, Financial Analysts Journal 1991: "Determinants of Portfolio Performance II: An Update"

slowed during the second half of the year. While growth in operating earnings on the S&P 500 Index fell -22.1% in 2020, the annual growth rate for 2021 is a massive number at 65.0% (based on estimates as of early January).

Exhibit 1 – S&P 500 Earnings Growth (Operating EPS)



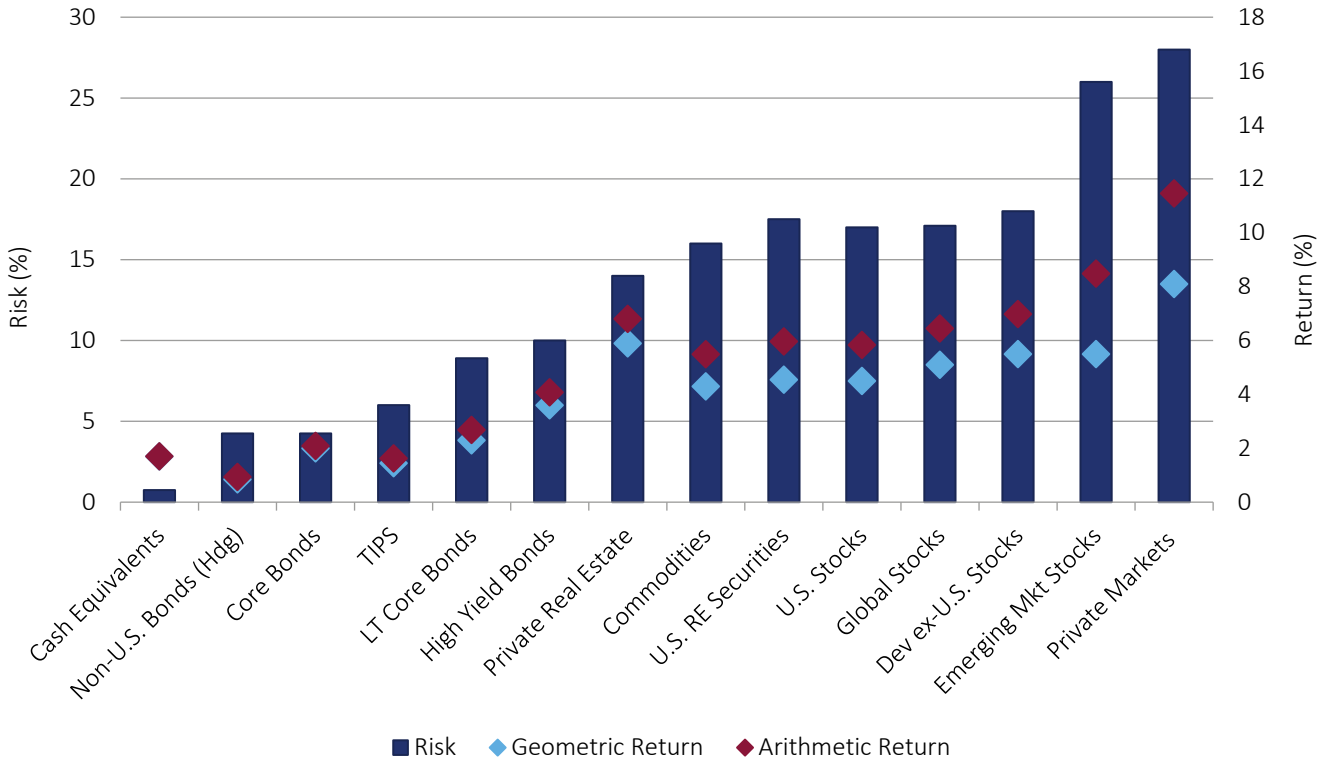
Data Source: S&P Dow Jones Indices

Spurred by strong earnings growth, it was a third consecutive huge year for U.S. stocks with the FT Wilshire 5000 Index up 26.7%, ending the year at an all-time high, after a gain of 20.8% for 2020. While non-U.S. equities could not keep pace, other developed markets delivered strong results (MSCI EAFE Index 11.8%) but emerging markets fell (MSCI EM Index -2.2%) as weakness in the Chinese real estate market weighed both on the country's economic growth and the broad EM index. Results with credit market indexes were mixed as investment grade bonds could not escape rising rates (Bloomberg Corporate Index -1.0%) but tightening high yield spreads pushed prices on those bonds higher (Bloomberg High Yield Index 5.3%). The aggregate spread on the high yield market finished the year near a decade-long low at 2.83% versus 3.60% a year earlier. Exhibit 2 presents Wilshire's December 2021 return forecasts and contrasts them with our December 2020 assumptions, while Exhibit 3 displays our current projections in graphical form.

Exhibit 2 – Wilshire's December 2021 Expected Return and Risk Assumptions

	Total Return			Risk		
	December			December		
	2020	2021	Change	2020	2021	Change
Investment Categories						
U.S. Stock	5.00 %	**4.50 %**	-0.50 %	17.00 %	**17.00 %**	0.00 %
Dev Ex-U.S. Stock (USD)	5.75	**5.50**	-0.25	18.00	**18.00**	0.00
Emerging Market Stock	5.75	**5.50**	-0.25	26.00	**26.00**	0.00
Global Stock	5.55	**5.10**	-0.45	17.15	**17.10**	-0.05
Private Equity	6.95	**8.10**	1.15	28.00	**28.00**	0.00
Cash Equivalents	0.70	**1.70**	1.00	0.75	**0.75**	0.00
Core Bond	1.30	**2.00**	0.70	4.30	**4.25**	-0.05
LT Core Bond	1.75	**2.30**	0.55	8.85	**8.90**	0.05
U.S. TIPS	0.80	**1.45**	0.65	6.00	**6.00**	0.00
High Yield Bond	3.10	**3.60**	0.50	10.00	**10.00**	0.00
Non-U.S. Bond (HDG)	0.35	**0.85**	0.50	4.30	**4.25**	-0.05
U.S. RE Securities	5.20	**4.55**	-0.65	17.00	**17.50**	0.50
Private Real Estate	6.20	**5.90**	-0.30	14.00	**14.00**	0.00
Commodities	2.85	**4.30**	1.45	15.00	**16.00**	1.00
Real Asset Basket	5.65	**5.60**	-0.05	10.15	**10.35**	0.20
Inflation	2.15	**2.60**	0.45	1.75	**1.75**	0.00
Total Returns Minus Inflation						
U.S. Stocks	2.85	**1.90**	-0.95			
U.S. Bonds	-0.85	**-0.60**	0.25			
Cash Equivalents	-1.45	**-0.90**	0.55			
Stocks Minus Bonds	3.70	**2.50**	-1.20			
Bonds Minus Cash	0.60	**0.30**	-0.30			

Exhibit 3 – December 2021 Return and Risk Assumptions



Historical Returns

A key check on the reasonableness of asset class assumptions is their relationship to historical returns. Exhibit 4 contrasts Wilshire's return assumptions with historical returns over various periods of time and market regimes.

Exhibit 4 – Historical Returns[2] vs. Wilshire Forward-Looking Assumptions

	Historical Returns (%)					Wilshire Dec. 2021	
	1802 - 2021 *	1926 - 2021	Inflationary 1970-1979	Bull Market 1980-1999	Lost Decade 2000-2009	Asset Class Forecasts 10-Year	30-Year
Total Returns							
Stocks	8.4	10.5	5.9	17.8	-1.0	4.5	6.9
Bonds	4.8	5.4	7.2	10.0	6.3	2.0	4.2
T-Bills	4.0	3.4	6.4	7.2	3.0	1.7	2.8
Inflation	1.5	2.9	7.4	4.0	2.5	2.6	2.6
Returns Minus Inflation							
Stocks	6.9	7.6	-1.5	13.8	-3.5	1.9	4.3
Bonds	3.4	2.5	-0.2	6.0	3.8	-0.6	1.7
T-Bills	2.5	0.4	-1.0	3.1	0.5	-0.9	0.2
Stocks Minus Bonds	3.6	5.1	-1.3	7.8	-7.3	2.5	2.7

*Returns 1802-2001 from "Stocks for the Long Run" (Siegel, 2002), S&P 500 and Bloomberg Barclays U.S. Aggregate Index thereafter.

[2] The source of historical returns presented in this report is Wilshire Compass℠ unless otherwise noted.

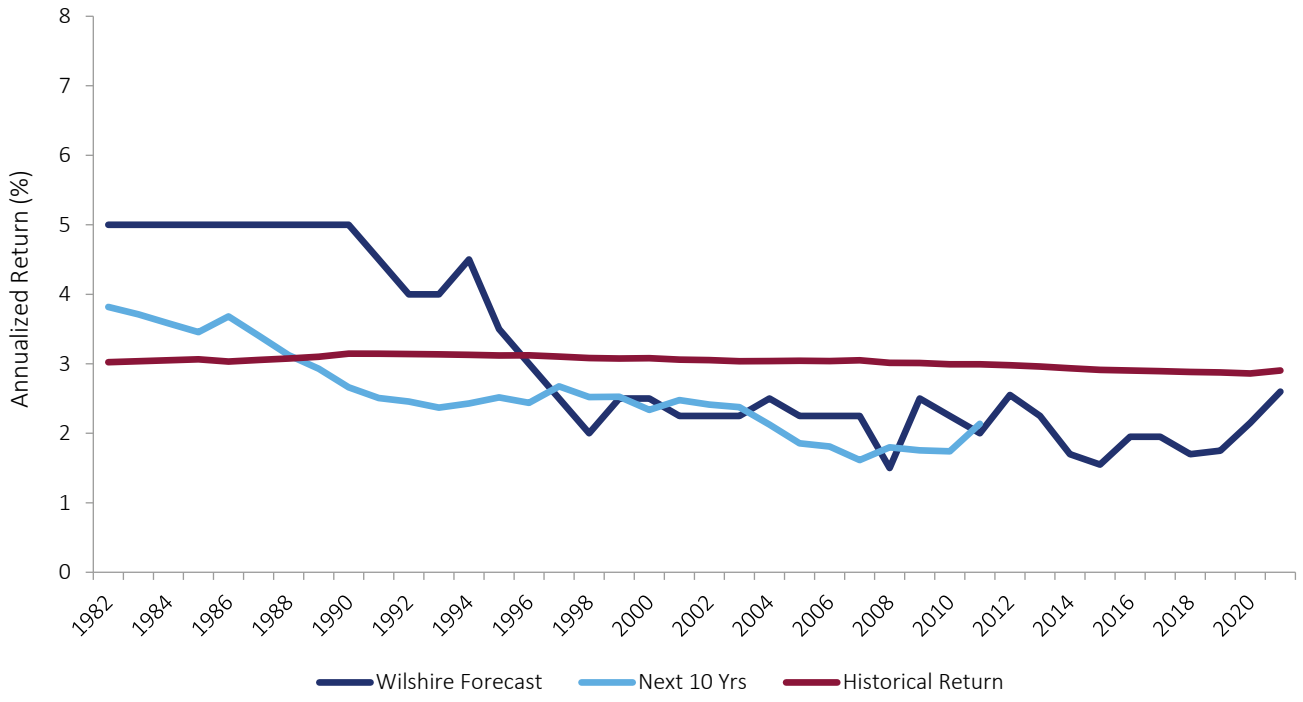
There are several notable relationships, in both absolute and relative terms.

- Reflective of the current low yield / low return environment, Wilshire's U.S. stock and bond return forecasts, 4.5% and 2.0%, respectively, are below the actual returns achieved during the 220- and 96-year periods ending 2021.
- Due to current short-term rates near zero and rising inflation expectations, Wilshire's expected real return on cash is still negative at -0.9%. This estimate is well below the 0.4% real return earned by cash during the 96 years since 1926.
- Building up from the low real return on cash, Wilshire's return estimates for stocks and bonds relative to inflation of 1.9% and -0.6%, respectively, are lower than the historical spreads of 7.6% for stocks and 2.5% for bonds.
- Wilshire's implied return forecast for stocks relative to bonds has decreased to 2.5% and is now below the 3.6% spread over the 220-year period and the 5.1% realized equity risk premium over the 96-year historical period.

Inflation

Wilshire's long-term inflation forecast is 2.60%, which is up 0.45% from last year's assumption. Our practice since 2003 has been to derive our inflation forecast by observing the market's break-even inflation rate – the spread between the yield on a 10-year Treasury and the real yield on a similar maturity Treasury Inflation Protected Security (TIPS). During periods of market stress, TIPS pricing may be affected by liquidity demands or a high level of inflation uncertainty, as was the case in 2008 when our inflation forecast was higher than actual break even. In 2020, an elevated level of volatility in the signal again resulted in our quarterly inflation assumption being different from 10-year break even. While Wilshire believes that the market's implied estimate of future inflation serves as a reasonable forecasting signal, there are times when several years of experience with these indicators, combined with a review of relevant macroeconomic data, will push our forecast away from the exact break-even spread. While our quarterly assumptions updates included a spread to break even during most of 2021, our December 2021 inflation forecast of 2.60% is the same as the rounded year-end break even of 2.61%. Exhibit 5 provides a summary of Wilshire's historical inflation forecast and the actual result for the following 10-year period.

Exhibit 5 – Wilshire's Inflation Forecast and Historical CPI



Equity

U.S. Stocks

The U.S. stock market, represented by the FT Wilshire 5000 Index℠, continued its upward climb throughout most of 2021, with indexes setting new record highs. The equity market was up 26.70% for the year with a relatively minor sell-off of -5% around the end of the third quarter. While strong returns could be found across all sectors and market segments, the Energy sector was particularly strong, up 56%, as was public listed Real Estate, up 40%. The largest U.S. sector, Information Technology at more than a quarter of the broad market, was up 31%. Despite three years of very strong equity returns, totaling 101%, cumulative, the P/E ratio on the U.S. index actually fell during 2021 as reported earnings improved – although the ratio was still elevated in a historic sense at year-end.

Wilshire employs two primary and distinct models in deriving our long-term stock forecasts: an Income-Growth-Valuation ("IGV") component model and a dividend-discount model (DDM), which we then evaluate through a purely valuation-based CAPE (cyclically-adjusted price / earnings) model. We see complementary value among the three signals and, therefore, consider each when deriving our equity forecasts. While the models are quantitative in design, we interpret each qualitatively, assessing their potential strengths and weaknesses through time and, importantly, within the current economic and market environment.

Wilshire's base IGV model, which we formally introduced during the global financial crisis, begins by utilizing the market's current dividend yield for income, a real earnings growth rate for growth (which combines with our inflation assumption to form a nominal growth estimate) and a valuation component that assumes a market price in 10 years that leads to a historical average dividend yield. As of the end of 2021, the IGV model suggests a long-term return for U.S. stocks of 2.40%. This signal compounds up from component contributions of approximately 1.35% from income, 4.65% from growth (2.00% real growth above Wilshire's 2.60% inflation assumption) and -3.45% from valuation change.

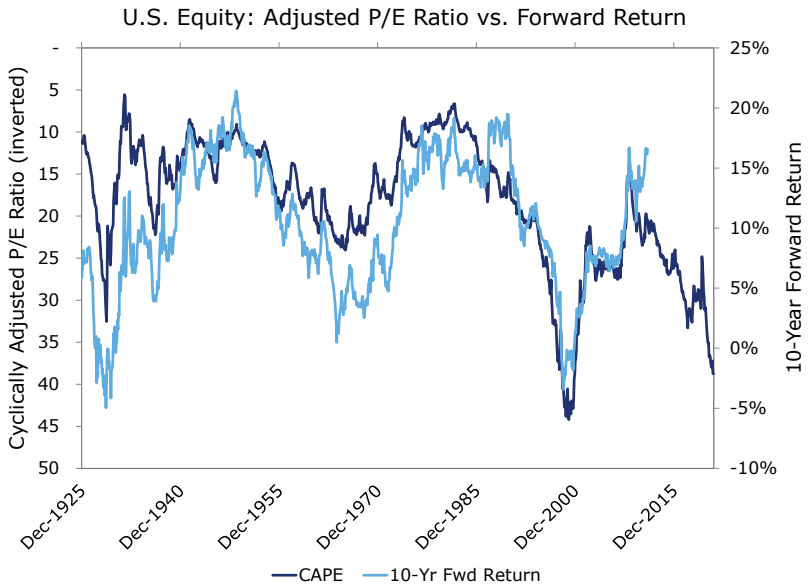
Turning to Wilshire's dividend discount model, we incorporate the following inputs as of December 2021:

- A year-end 2021 S&P 500 Index price of 4,766;
- A base earnings level of $202 per share;
- Earnings-per-share growth of 11.50% during the next five years, dropping incrementally to 4.65% from years six through 15;
- A 45% dividend payout ratio over the next five years.

Although our short-term earnings growth rate is elevated in the low double digits, it is still meaningfully below the earnings growth rates reported in 2021. Wilshire's current DDM forecast, which builds from the inputs listed above, points to a 7.50% long-term stock assumption.

In 2019, we explicitly introduced a CAPE signal into our equity forecasting process. While both the IGV and DDM incorporate measures of valuation levels – the IGV explicitly through its valuation component and the DDM through its use of both the market's current price and EPS levels, we find the CAPE ratio's cyclical nature of smoothing historical earnings to provide additional and valuable insights into anchoring long-term return prospects. Exhibit 6 below shows the strong relationship between the raw CAPE ratio and 10-year forward equity returns. Our various CAPE model signals (derived from varying regression time periods) point to a minimal return of 0.25% for U.S. stocks. As will be discussed in the non-U.S. equity segments which follow, we find the CAPE signal to be particularly useful in assessing relative return prospects between the U.S. and non-U.S. regions.

Exhibit 6 – Cyclically-adjusted Price/Earnings (CAPE) Signal



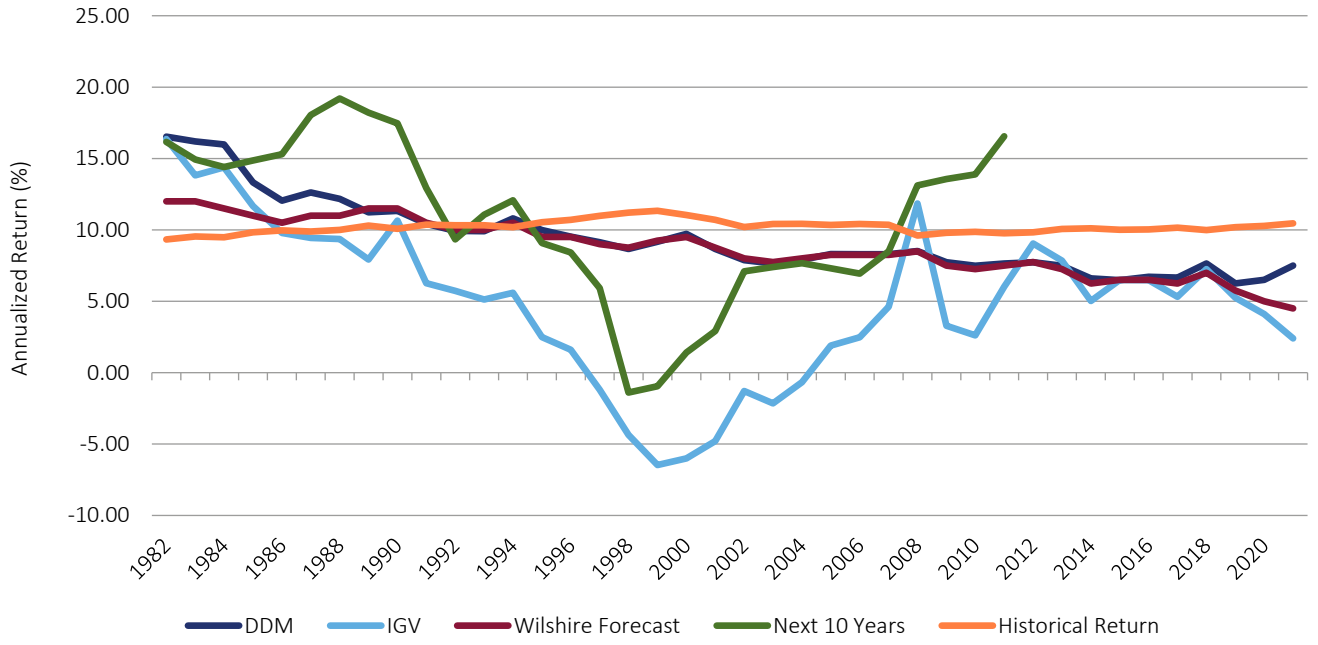
Data Source: Robert J. Shiller, Wilshire Compass

While we continue to value the DDM result, Wilshire believes that the IGV and CAPE models can offer valuable market insights, particularly during market regimes that present a significant challenge to a DDM framework. For example, the DDM failed to anticipate the depth of the negative equity environment experienced in the early-2000s. The heavy dependence on valuation levels within Wilshire's IGV and CAPE models better positioned them to forecast negative 10-year returns, although to differing magnitudes. Recent results reveal the potential value of these signals during periods of large fluctuation in price multiples. Our process incorporates these and other considerations when weighing the value of each model's signal against the current economic environment.

Wilshire's current long-term U.S. Stock assumption is 4.50%, which is well below the DDM model in recognition of the elevated valuation components of the IGV and CAPE signals. Exhibit 7 details the history of Wilshire's stock return forecast together with the IGV and DDM models' return forecasts, historical returns and the rolling returns for the 10-year period following each estimate[3].

[3] Historical signals for the IGV model reflect its current structure (i.e., nominal growth built from long-term real earnings growth plus Wilshire's inflation estimate, etc.), while the CAPE signal simply shows one of many constructs we observe (i.e., each being constructed through regression analysis performed over varying time periods.

Exhibit 7 – Wilshire U.S. Stock Forecast and Historical Equity Returns



Developed ex-U.S. Market Stocks

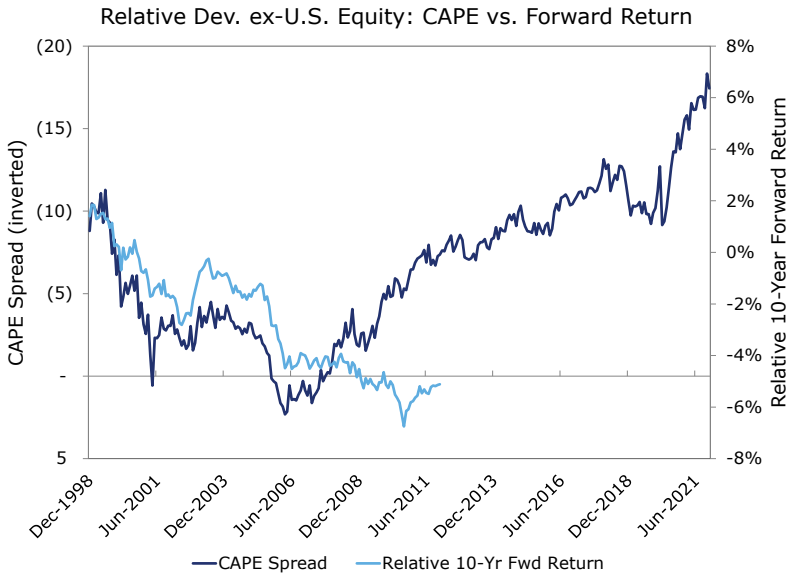
Wilshire has historically assumed the same expected return for the stocks of non-U.S. developed markets as it does for U.S. stocks. As demonstrated in Exhibit 8, the historical record supports the general view of return parity between these broad regional markets in the long run. In the 52 years since 1970, U.S. stocks, as represented by the S&P 500 Index, have returned 11.1% per year, versus 8.7% for developed market ex-U.S. stocks as measured by the MSCI EAFE Index in U.S. dollars. On a rolling basis, however, there have been several periods where the developed markets index has significantly outperformed U.S. stocks for prolonged periods of time. Given this long-term performance record, similar risk levels and common financial attitudes toward risk-taking, it would seem reasonable to anchor the return forecasts of non-U.S. developed market stocks to long-term expectations for U.S. stocks, barring significant relative valuation levels.

Exhibit 8 – Historical Equity Returns: 1970 – 2021

1970 - 2021 Annua	U.S. Dollar Return	U.S. Dollar Risk	Local Currency Return	Local Currency Risk
S&P 500 Index	11.1 %	15.2 %	11.1 %	15.2 %
MSCI EAFE Index	8.7	16.7	7.6	14.2
Europe	9.0	17.3	8.8	15.0
Pacific	8.8	19.2	6.9	16.6

Despite our default position of return parity, Wilshire does monitor relative valuation levels across regional markets to serve as a possible signal to add/deduct a return premium/discount to our non-U.S. equity forecasts. While we expect to have potential informational value at extreme market levels where significant deviations from the norm appear, we anticipate meaningful departures from return parity to be quite rare. The CAPE model discussed above within the U.S. Stocks section, serves as a valuable indicator of relative return prospects across regions. Exhibit 9 below demonstrates the strength of this signal by graphing relative CAPE ratios (U.S. vs. developed-ex-U.S.) against relative 10-year subsequent returns. As can be seen in the chart, current pricing points to relatively attractive non-U.S. valuations, which lead us to project a 100 bps return premium for developed-ex-U.S. stocks above U.S. stocks, leading to our December 2021 forecast of 5.50%.

Exhibit 9 – Developed-ex-U.S. vs. U.S. Stocks Relative CAPE Signal



Data Source: Robert J. Shiller, Wilshire Atlas, Wilshire Compass

Emerging Market Stocks

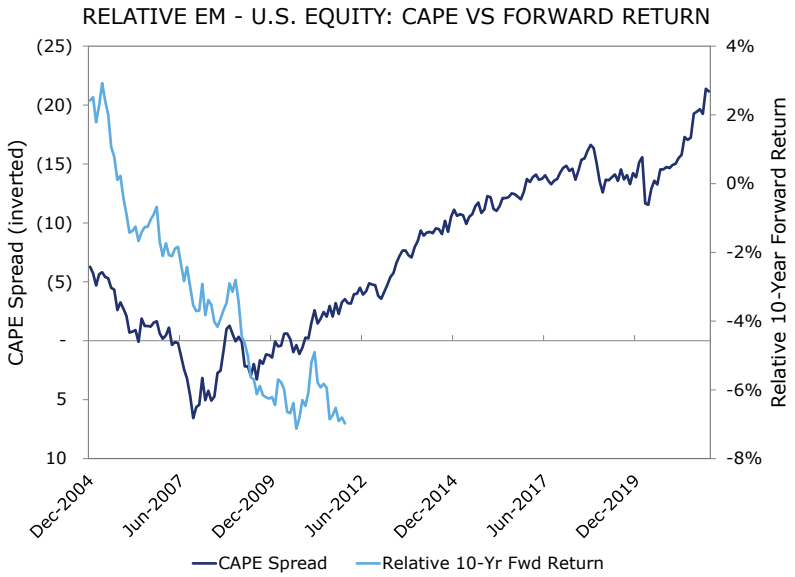
Consistent with the discussion of developed ex-U.S. stocks above, we incorporate a relative valuation component to our modeling of emerging market stocks. Wilshire continues to examine the relationships between the U.S. and emerging markets and believes that the rationale for starting with a consistent return expectation from U.S. to developed markets stocks applies to emerging markets. Some investors have long supported the view that emerging market stocks should produce returns above those of developed markets given their far higher growth projections in terms of GDP. While growth rates can be in the high single digits, they are also far more volatile than in developed markets – and emerging markets equity returns generally follow that risk profile. It is important to note that the historical record on emerging market performance shows mixed results. The rolling 5- and 10-year relative return lines in Exhibit 10 demonstrate the questionability of anticipating a sustainable return premium for emerging stocks over the long-term and serves as a reminder to global investors of how the segment's risk can result in periods of significant underperformance. These results give us little confidence in forecasting a perpetual return premium to emerging markets above our return forecast for the developed stock markets.

Exhibit 10 – Emerging Market Returns: 1988 – 2021

1988 - 2021 Annual	U.S. Dollar Return	Risk
S&P 500 Index	11.5 %	14.4 %
MSCI Emrg. Mkts.	10.3	22.2

Consistent with the process described above within the developed-ex-U.S. markets, we believe an assessment of a premium/discount to our U.S. forecast when relative valuations reveal meaningful departures from historical ranges provides the best opportunity to capture future return divergences. As with developed stocks and as can be seen in Exhibit 11 below, current relative CAPE valuations provide support for an expected return premium for emerging stocks. This relative signal leads us to attach a 1.00% premium above our U.S. forecast, resulting in a 5.50% assumption for emerging markets stocks.

Exhibit 11 – Emerging vs. U.S. Stocks Relative CAPE Signal



Even in our base case of geometric return parity with developed equity markets, Wilshire's research shows that efficient portfolios include a meaningful allocation to the emerging markets, consistent with a market-weighting. For example, setting all three regions to a common 4.50% return (i.e., to match our U.S. Stock forecast) and otherwise constructing an efficient frontier from Wilshire's underlying assumptions of risks and correlations for U.S., non-U.S. developed market and emerging market stocks suggests an allocation of approximately 11% to the emerging markets at a 17.10% risk level, which is representative of our expected risk for global stocks. This allocation is consistent with the emerging markets' market weight within the global equity opportunity set, reflecting a market-commensurate attraction to emerging market stocks despite their elevated risk level. We believe that, aside from periods of significant relative valuation levels, which we observe today, this provides strong support for our outlook of geometric return parity between the developed and emerging markets.

Global and Global ex-U.S. Market Stocks

Despite creating separate forecasts for the developed and emerging markets as discussed above, Wilshire's asset allocation work – unless otherwise directed by client circumstances – will implicitly assume a market weighted combination of our non-U.S. developed and emerging market components in a single non-U.S. equity asset class (currently with relative weights of 70% and 30%, respectively, which leads to a return expectation of 5.75% at 19.10% risk).

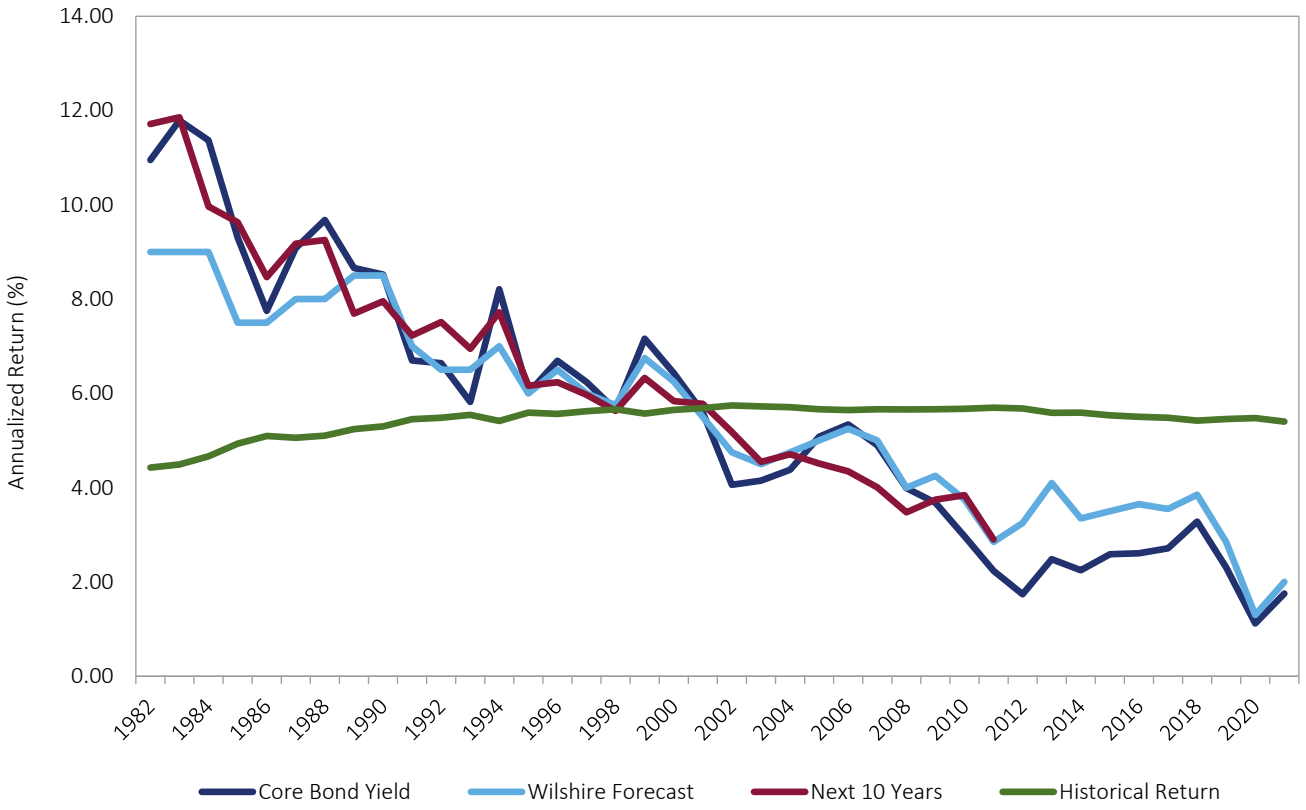
We can move the process one step further for clients that view the entire global equity market as a single asset class; thus seeking to eliminate any home-country bias within equity portfolios. Within this context, we currently construct the global market-weighted portfolio with allocations of 61% to U.S. stocks and 39% to the Global ex-U.S. market, resulting in a 5.10% return forecast at 17.10% estimated risk. We do note that, when incorporating the current regional return premiums discussed above, an optimized mix of our U.S., developed-ex-U.S. and EM stock forecasts at a 17.10% portfolio risk level leads to weights of approximately 30%, 66% and 4%, respectively (vs. 61%, 27% and 12% within the cap-weighted market). The optimized portfolio return estimate is 5.35% vs. 5.10% for the cap-weighted mix.

Fixed Income

Fixed Income Forecast Model

Wilshire's fixed income forecasting model has, since its inception, incorporated the contemporaneous yields-to-maturity of key sectors of the bond market as a key contributor to its return projection. Yields tend to be very strong predictors of bond returns, as demonstrated in the following graph that compares Wilshire's past bond return assumptions with historical returns, yields and rolling returns for the 10-year period following each forecast.

Exhibit 12 – Wilshire Bond Forecast and Historical Fixed Income Statistics



Data Source: Bloomberg

Forecasting fixed income involves two major components – current Treasury yield and credit spread levels along with expectations for changes in both of those inputs during the next 10 years. While default assumptions are important, as well, they mainly influence below-investment grade fixed income and will be discussed in more detail in relevant sections below. Wilshire's model begins with current market conditions, including inflation, and considers a gradual normalization of real yields and market spreads along with a 10-year forward yield curve. Expected returns are then based on moving from current conditions to forecasted levels. Details for specific market segments are included below.

In 2014, Wilshire introduced a separate forecast model for global developed market ex-U.S. fixed income. Our model utilizes the same framework as our U.S. fixed income forecast model while recognizing the fundamental differences between these bond markets. We also have formalized a separate but similar forecast model for the inflation-linked bond market outside of the U.S. The salient details of the global ex-U.S. fixed income forecast model are discussed below.

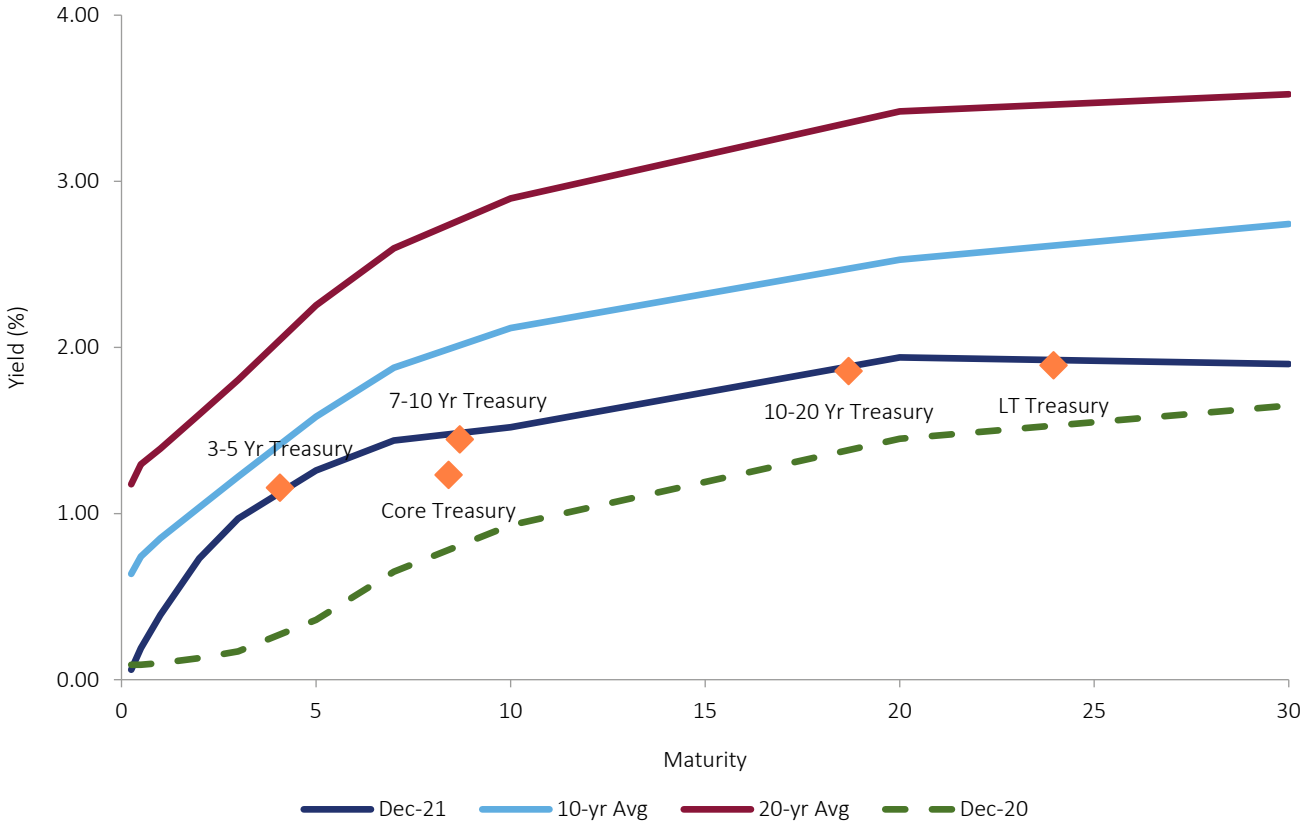
From a volatility perspective, it is worth noting that we revised our risk assumptions for a number of fixed income asset classes and segments during 2020, and remain at lower levels through year-end 2021. Interest rates have a natural floor, although that does not necessarily mean zero as recent history has shown that rates can go slightly negative by 25-100 bps. As rates approach that bottom, total returns tend to become less volatile as any significant rate changes are positive. Wilshire has, therefore, reduced our fixed income risk assumptions in recognition of this market environment. For example, our forecast for the risk of Core Bonds has gone from 5.15% to 4.25%.

The U.S. Treasury Yield Environment

The U.S. yield curve ended 2021 meaningfully higher across nearly all maturities and upward sloping. Long-term yields were up 49 bps (at the 20-year maturity) while the one-year yield rose 29 bps. Exhibit 13 illustrates the yield curve shift and compares the current curve to the historical 10 and 20-year averages. U.S. Treasuries are still near historically low yields across the maturity spectrum, anchored at the short end by the fed funds rate, with a sharp slope that flattens somewhat in the long end. The current spread between the 10- and two-year yields is 0.79% versus 1.08% for the 10-year average and

1.30% for 20-years. The current spread between the 30- and 10-year yields is 0.38% versus 0.63% for both the 10- and 20-year averages. As will be explained in the discussion of U.S. TIPS, the Bloomberg Barclays 7-10 Year Treasury Index shown in Exhibit 13 provides the supporting data for our TIPS forecast.

Exhibit 13 – Treasury Yield Curve Environment



Data Source: Bloomberg Index Services Limited, U.S. Department of Treasury

U.S. Treasury Bonds: Market and Long-Term

The Federal Reserve left the fed funds rate unchanged throughout 2021 at a range of 0% - 0.25%. Through the Fed's "dot plot," they are messaging that the current intent is for three, 25 basis point increases in the overnight rate before the end of 2022. Their median forecast for year-end 2023 is for a fed funds rate of 1.625%. During the December meeting, the committee announced that it would begin to reduce (i.e., taper) the monthly pace of its asset purchases starting in January. Wilshire's fixed income forecasting model assumes that bond market yields will rise during the next 10 years and that the yield on the Treasury Index will reach 2.50% based largely on current 10-year forward rates on Treasuries. Rising rates affect a current investment in Treasuries in two ways: 1) the principal value would decline as rates rise and 2) the reinvestment rate would increase, boosting interest income. Based on the Dec. 31, 2021, yield-to-maturity of 1.23% for the Bloomberg Treasury Index and its duration, Wilshire's model indicates that the improving reinvestment rate during the next 10 years is more than enough to compensate for the drop in principal value from rising rates. A simulated investment in Treasuries under this environment would yield a return of 1.35%. The same model applied to the Long-Term Treasury Index reveals an opposite result. Based on the Bloomberg Long Term Treasury Index year-end yield-to-maturity of 1.89% and its duration, a simulated investment would return 1.60%.

U.S. Bonds

The core bond market is represented by the Bloomberg U.S. Aggregate Bond Index and is comprised of four major segments: Treasuries, Government-related, Corporate and Securitized. Our approach has been to model each segment based on an

environment of rising Treasury rates but also normalizing spreads versus a historical average. Current spreads for investment grade U.S. credit are generally tighter than historic averages, so our credit model incorporates a slight widening of spreads for this sector during the projection horizon. The performance of a market-duration core bond index (currently 6.78 years) would benefit as rising Treasury rates and widening spreads combine to improve the reinvestment rate within the broad market. Our model suggests that the net effect is an overall boost in return for the core market with an expected return of 2.00% versus the index's year-end yield-to-worst of 1.75%.

Cash Equivalents

Wilshire's approach to forecasting a cash return, which can be thought of as a return on 3-month Treasury bills or something similar, is to observe several market signals as an estimate of short-term yields in 10 years. Historical relationships between cash and both inflation and longer-term Treasuries can be measured and then applied to our 10-year expectation for each to get a sense of what that implies about future cash returns. The market signals that we observe include:

- Historical yield difference between the broad Treasury market and cash
- Historical real yield on cash, or the difference between cash returns and inflation
- Current 10-year forward yield curve for expected short-term yields

Our 10-year cash yield forecast can then be utilized within our fixed income model to simulate what an investment in cash would return. Within that process, an assumed path to reach the yield forecast is necessary, i.e., when rates move and by how much. It is worth noting that our forecasted rise in rates is currently set to begin in 2022 and reach its terminal value after three years. Our assumptions for year-end 2021 result in a cash forecast of 1.70% versus the year-end yield on 91-day Treasury bills of 0.06%.

Non-U.S. Bonds

Exhibit 14 compares historical core U.S. bond return and risk values[4] with hedged and unhedged values of the Citigroup Non-U.S. Government Bond Index.

Exhibit 14 – U.S. vs. Non-U.S. Bond Returns: 1985 – 2021

	U.S. Dollar		Local Currency	
1985 - 2021 Annual	Return	Risk	Return	Risk
Core U.S. Bonds	6.6%	4.4%	6.6%	4.4%
FTSE Non-U.S. Govt.	6.9%	10.7%	6.2%	3.9%

Unhedged non-U.S. bonds offered better returns over the 37-year period due to a net fall in the dollar, in aggregate, for the entire period. Hedged non-U.S. bond returns take out expected and unexpected currency movements and have exhibited returns 0.4% below core U.S. bonds at less risk. Wilshire's long-term forecast for non-U.S. bonds does not include a currency return, positive or negative (i.e., we assume that currency impacts will wash out over time), and, therefore, relies upon historical hedged returns. Our risk forecasts, however, are derived from the experience of the unhedged indexes unless a hedged strategy is employed.

As mentioned earlier, Wilshire's Global Ex-U.S. Fixed Income forecast model explicitly reflects the fundamental and structural characteristics of this market. The framework for our return assumption forecasting is the same as that used for U.S. bonds. Due to the non-U.S. bond markets' elevated exposure to local-market Treasury securities and a lower yield environment outside of the U.S., our current return assumption for dollar-hedged global ex-U.S. core bonds is 0.85%; this reflects a 10-bps reduction to our unhedged global ex-U.S. core bond forecast return of 0.95%.

[4] Wilshire uses the Bloomberg U.S. Aggregate Index as the principal benchmark for core bonds.

Treasury Inflation Protected Securities (TIPS)

Wilshire typically recommends using an expected return for Treasury Inflation Protected Securities (TIPS) equal to the expected return for nominal Treasury bonds of similar maturity. As with other fixed income asset classes, we have modeled the Treasury segment closest in maturity to TIPS including our forecast for the interest rate environment during the next 10years. The average maturity for the Bloomberg Barclays U.S. TIPS Index was 7.97 years at year-end; the index with the closest average maturity is the U.S. Treasury 7-10 Year Index, at 8.70 years. The modeled return assumption for this index is 1.45%, resulting in a U.S. TIPS assumption equal to 1.45%.

Long-Term Bonds

Wilshire's return assumption for long-term bonds is derived from the yield-to-maturity on the Bloomberg Long Term Government/Credit Index. This index consists of Treasuries, government-related and corporate securities with a minimum maturity of 10 years. As with the core bond market, we modeled the various sectors within the index reflecting our custom return forecast for long-term Treasuries. The net effect of the changes is that the higher reinvestment rate during the period is not enough to offset the projected principal loss for the broad long-term market. Our return forecast for long-term core bonds is 2.30% versus an index yield of 2.58% at year-end.

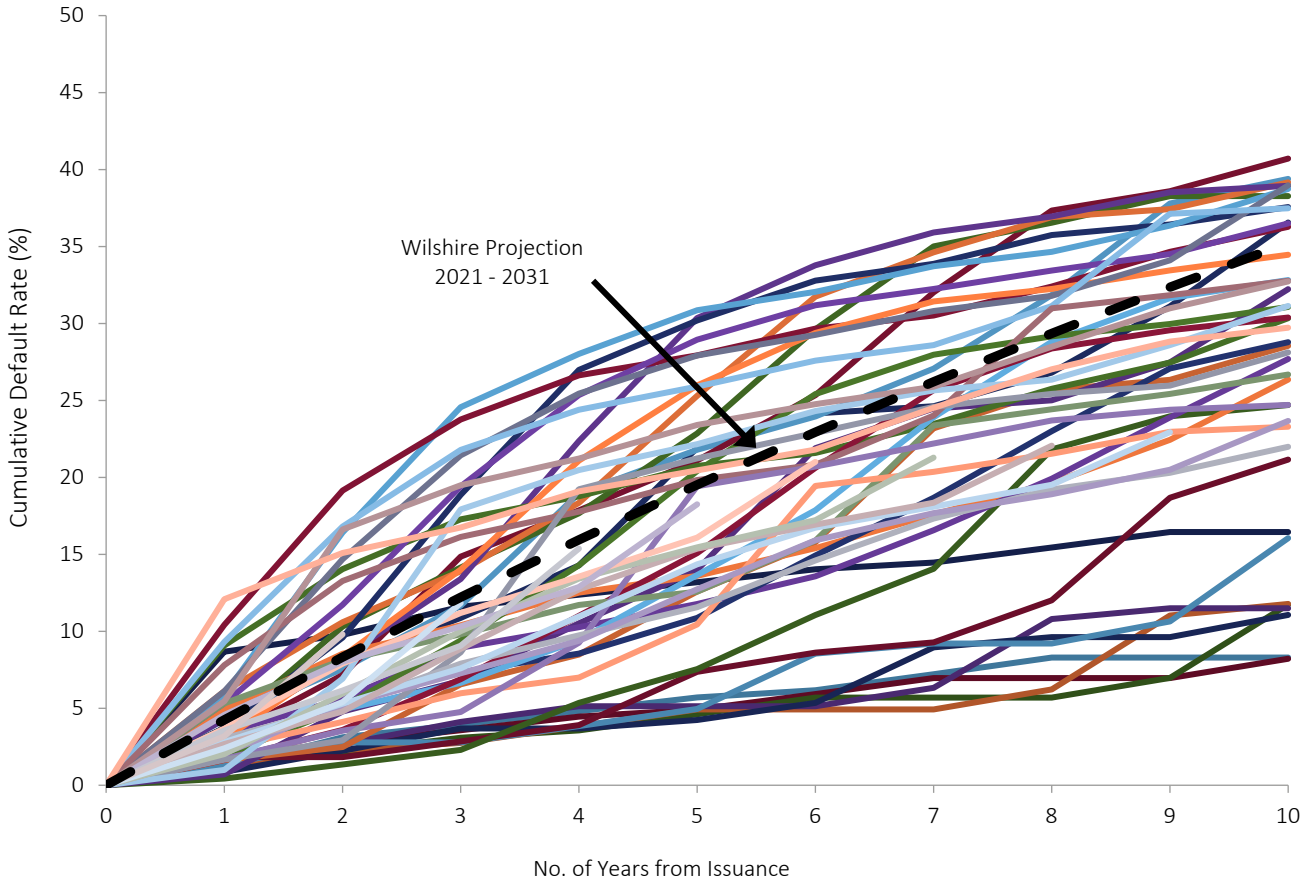
High Yield Bonds and Emerging Market Debt

Wilshire's return forecast for high yield bonds is 3.60%, 50 basis points higher than last year's assumption. Our return forecast is based upon our high yield bond model that accounts for the dynamic nature of credit yield spreads, defaults and recoveries. The current forecast incorporates the following assumptions:

- An initial yield spread of 3.21%, tighter than the 3.87% spread of one year prior;
- An annual default rate of 4.25% during the forecast period, reflecting the 20-year average default rate of speculative-grade U.S. debt;
- A 10-year cumulative default rate of 35%;
- An annual recovery rate of 45%, again reflecting the long-run average rate;
- A 10-year cumulative annual loss rate – defaults less recoveries – equal to 21%.

In Exhibit 15 we graph Wilshire's expected future default rates against all historical cumulative default rates from 1970 through 2020. Each line represents the historical cumulative default rates for high yield bonds issued in a single vintage year. The black dotted line is Wilshire's forward-looking default rate that is used in our expected return model for high yield bonds. Wilshire's default forecast line represents default expectations for a market portfolio holding bonds issued across various years. While it differs in nature from the vintage year default lines, which represent cumulative default rates specific to each single year of issue, the chart is useful in comparing our projection to historical default rate paths.

Exhibit 15 – Historical Cumulative Default Paths: 1970 – 2020



Data Source: Moody's Investor Service, Wilshire

Emerging market debt (EMD) has rapidly evolved into a unique segment of the fixed income universe. Until recently, EMD was typically viewed as simply a spread product among other high yield fixed income components, providing exposure to credit spread risk as well as country-specific risk. Investors today have multiple options to gain exposure to emerging market debt; they can invest in bonds denominated in hard currencies such as U.S. dollars or euros, as well as local currency denominated paper that may or may not be hedged into base currencies. Management of currency risk as a result becomes an important consideration with EMD investment. Local-currency EMD managed on an unhedged basis unsurprisingly introduces currency-related risk; however, even hard-currency EMD exposes investors to embedded currency risk, since issuers must convert earnings collected in local currency to hard currency to service bond debt[5]. Wilshire incorporates the mechanics of the high yield model described above in deriving our core hard-currency emerging market debt forecast of 3.35%. Wilshire assumes identical return forecasts for hard currency EMD and unhedged local-currency EMD; our hedged local-currency EMD forecast of 3.20% deducts 15 bps for the explicit and implicit costs of hedging emerging-economy currencies. Note that risk forecasts for hard-currency EMD and unhedged local-currency EMD are higher than those for hedged local-currency EMD due to currency risk.

Convertible Bonds

Convertible bonds are fixed income instruments that make regular interest payments but that can be converted into a predetermined number of common stock shares, usually at the discretion of the bondholder. Convertibles have grown in popularity as investors have searched for yield and looked to diversify their fixed income portfolios. Therefore, Wilshire now has a return forecast for convertibles but not through a separate or dedicated model. Given their structure, these bonds will

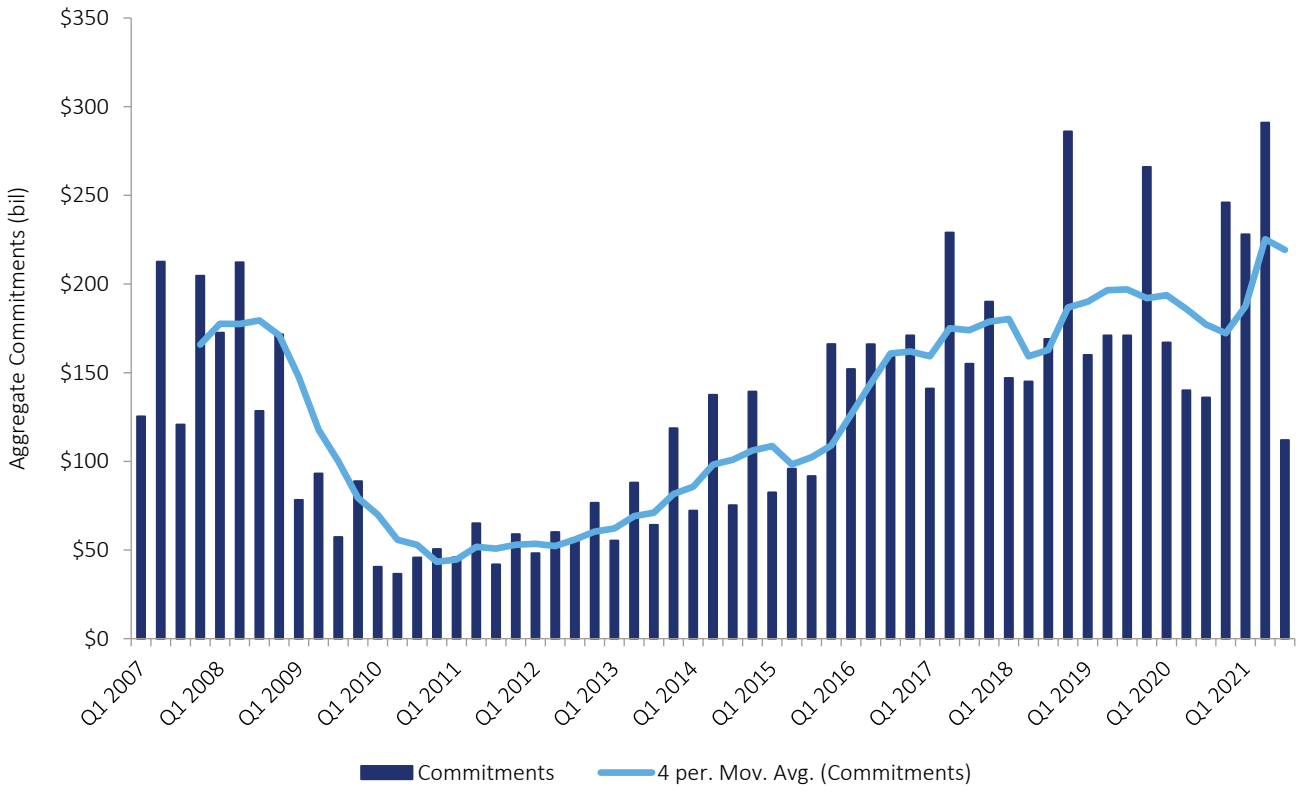
[5] Wilshire Associates Incorporated (2013). *Recent Developments in Emerging Markets Debt*: Walker.

"behave" both like credit instruments and equity, depending on market conditions. Our approach to forecasting convertible bonds is to create a basket of stocks and bonds that mirror their return pattern. A regression of a convertible bond index versus other asset classes produces a relatively strong relationship with U.S. equity explaining 55% of the history, investment-grade bonds equaling 19% and high yield bonds equal to 36%. Our model is, therefore, equal to a composite of those asset classes at those weights, with a negative 10% allocation to cash to arrive at a 100% weighted basket. As of December 2021, Wilshire's return forecast for convertible bonds equals 4.25% with an expected risk of 12.25%.

Private Market Investments

Private equity fundraising trended higher in 2021, exceeding levels seen before the global financial crisis. Global fundraising has averaged $219 billion per quarter during the year ending September 2021 versus $177 billion, on average, for the four quarters ending September 2020. Global private equity fundraising is displayed in Exhibit 16, including the $631 billion raised during the first three quarters of 2021.

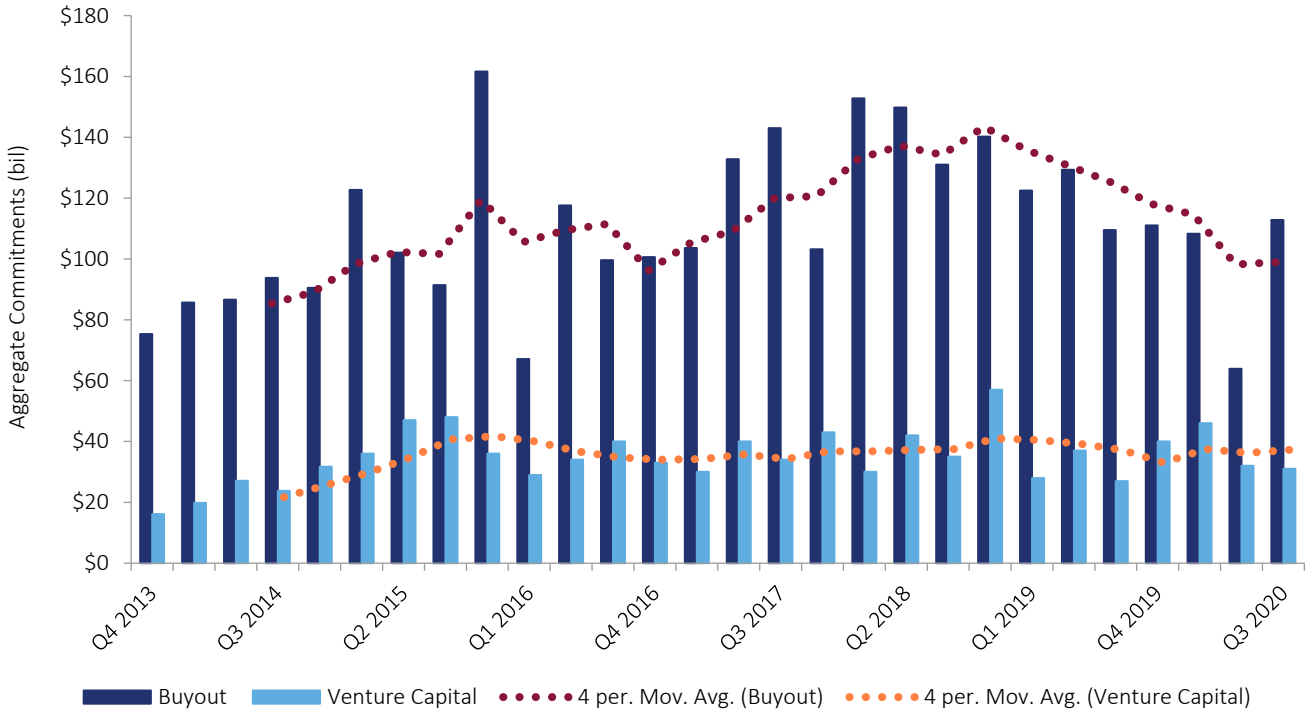
Exhibit 16 – Global Private Equity Fundraising



Data Source: Preqin

Exhibit 17 shows quarterly equity investments in buyout and venture capital-backed deals since 2013. Buyout commitments increased 97% for the four quarters ending September 2021 versus the preceding four quarters, while venture capital has increased 23% during the same periods.

Exhibit 17 – Buyout and Venture Capital Commitments



Data Source: Preqin

Wilshire's return and risk assumptions for individual private market asset classes are contained in Appendix B. Our private market return expectations are derived by drawing parallels to the public markets where appropriate, along with using private market data if available. Since there is not a passive, beta-only option when placing capital in the private markets, these investments necessitate an important element of active management whose results can vary dramatically. As such, Wilshire's return methodology embeds an assumption that investors can identify and access managers that can deliver above-median returns. This underscores the importance of implementation decisions, since without the ability to deploy capital with skillful managers one would likely not find private market returns compelling.

Risk estimates pose a unique challenge because infrequent private market investment valuations preclude the calculation of short-term periodic returns. As a result, projections of risk based on accounting data consistently understate risk. However, our return methodology offers a sense of what the true risk levels might be if the public markets were adjusted for commensurate leverage exposure or greater business risk. In general, Wilshire views the use of private equity as a type of leveraged equity return rather than a diversification tool. The linkage between these markets is quite intuitive, as private equity returns are subject to the receptiveness of the capital markets to generate potential outsized returns.

Buyouts and Venture Capital

Given the difficulty in accurately observing performance within private equity and a general lack of transparency, Wilshire employs a few return signals when forecasting such investments. Our "component model" attempts to identify and account for all key factors that contribute to an investment's realized return. The model includes five primary return components:

- Market beta: Sensitivity to systematic risk (i.e., public market equity); current assumptions for buyouts and venture capital are 1.10 and 1.25, respectively.
- Financial leverage: Adjustments for differences in leverage between public and private markets, including public market proxies for senior and subordinated debt within the private markets. Our total debt assumption for buyouts is 65% (i.e., a 2.9x leverage ratio) while for venture capital it is 0%.
- Illiquidity premium: Compensation for lack of access to invested capital, currently equal to 0.50%.

- Operational premium: Based on the historical results of successful managers, currently equal to 3% for buyouts and 4% for venture capital.
- Fee: Base and incentive fees paid to general partners based on a typical structure, currently equal to 2% base fee and 20% carry with a preferred return of 8%.

Given the complex financial composition of most buyout deals, we employ a second signal that is far more direct with less moving pieces. The first step is to adjust the public market equity forecast by the higher expected beta within buyouts, again equal to 1.10. The difference with this step and the component model is that we do not try and dissect the public equity assumption, therefore freeing this signal from changes in the public debt markets that may or may not flow through to private markets. The next step in the process is to add a "typical" return premium based on historical differences in buyout and public equity returns, currently equal to 6%. As this signal relies heavily on the public equity assumption, we include a valuation adjustment should there be any current relative pricing differences between the public and private markets. Finally, a fee structure is applied to the final buyout signal similar to the one described within the component model.

Therefore, this approach offers multiple return signals for buyout and venture capital investments. (Note, we arrive at a separate non-U.S. buyout forecast using inputs appropriate to the non-U.S. market.) Much like with our approach to public equity markets, we arrive at our private equity assumptions after a discussion about the final signals and what drove any changes during the quarter. As a final check, the assumptions are compared to a public markets-plus corridor, currently equal to the U.S. equity assumption plus 2% (on the low end) and then plus 6%. The final return forecast may lie outside of that corridor but, if so, must be firmly supported by the underlying inputs. As of year-end 2021, Wilshire's buyout assumptions are 6.75% (for the U.S.) and 7.25% (for non-U.S.) with a venture capital forecast of 7.65%, which is already built from a global public equity assumption.

Private Market Debt: Mezzanine and Distressed

Private market debt instruments offer investors fixed income-like private securities but at higher expected risk than public market bonds. Wilshire views mezzanine debt like a convertible bond. However, unlike publicly traded convertibles with characteristics combining stocks and bonds, mezzanine debt possesses characteristics combining buyouts and high yield bonds. Historical return data confirms a sensitivity to both asset classes. Wilshire's return forecast for mezzanine debt is 5.75% with a 20% risk expectation, which does lie between our high yield and buyout assumptions.

Distressed debt represents issues that are in default and should, therefore, provide higher expected returns than mezzanine debt, while also exhibiting sensitivity to underlying economic forces that impact the performance of buyouts and high yield bonds. Wilshire's return forecast for distressed debt is 6.00% with a 20% risk expectation. As a final step in our private market debt modeling, we compare forecasts across a spectrum of non-investment grade debt (bank loans, high yield, direct lending, mezzanine debt and distressed debt) to either confirm intuitive relative relationships or to identify a rationale when divergences from these historical relationships arise.

Private Markets Portfolio

The return and risk forecast for a diversified private markets portfolio is provided in Appendix B. The makeup of the private markets portfolio is as follows:

U.S. Buyouts	50%
Non-U.S. Buyouts	20%
Venture Capital	20%
Mezzanine Debt	5%
Distressed Debt	5%

When the components are geometrically calculated with a log-normal assumption, the forecast return for a diversified private markets portfolio is 8.10%, which is 3.60% above Wilshire's 4.50% expected return for U.S. stocks. The expected risk for the diversified private markets portfolio is 28.00%, which is slightly more than 1.6x the forecasted risk of U.S. stocks.

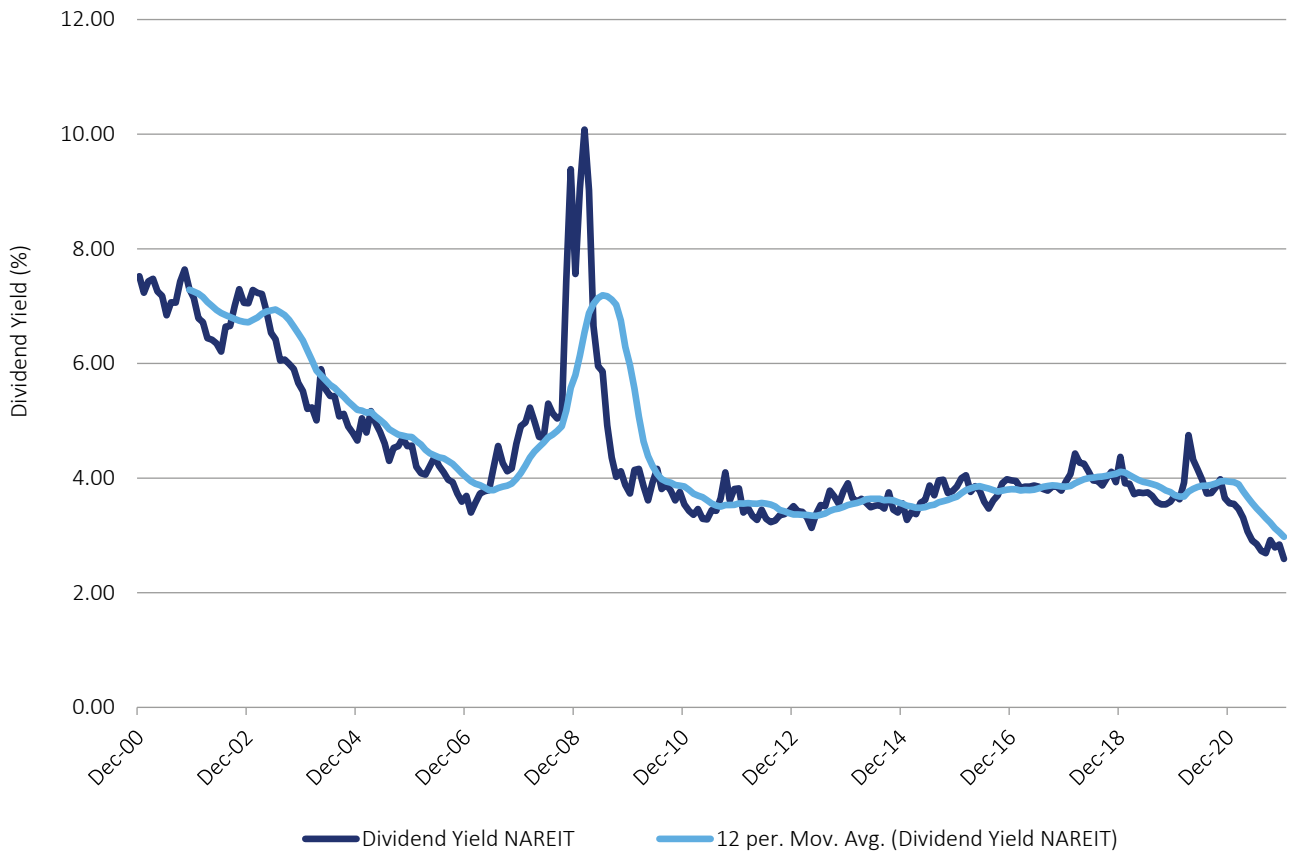
Real Assets

Asset correlation, or the degree to which asset prices move in tandem, results from a common sensitivity to underlying economic forces (i.e., growth, inflation, etc.). Real assets share a common sensitivity to inflation and therefore can partially protect real asset investment values against inflationary environments. This connection with inflation typically generates a relatively low correlation with other traditional assets. Therefore, Wilshire groups together the discussion of several asset classes into a Real Assets[6] section – Real Estate, Infrastructure, Timberland, Commodity Futures, Oil and Gas Partnerships and Midstream Energy Infrastructure. While we consider TIPS a member of the real asset class, they are absent from this section as a discussion of our TIPS methodology was included in the Fixed Income section above.

U.S. Real Estate Securities

Wilshire currently forecasts an expected return of 4.55% for U.S. real estate securities, which is 0.65% lower than our December 2020 assumption. Wilshire derives its forecast by combining the current dividend yield environment of Equity REITs with an expected dividend growth rate equal to three-quarters of long-run inflation.[7] Exhibit 18 contains the historical REIT dividend yield along with a one-year moving average.

Exhibit 18 – Equity REIT Dividend Yields



Data Source: FTSE Group and the National Association of Real Estate Investments Trusts

[6] Wilshire Associates Incorporated (2007). *Real Asset Investments*: Browning.

[7] Examining REIT dividend growth historically, Wilshire found that REITs were able to pass through about three-quarters of long-run inflation through rent and dividend increases.

Non-U.S. Real Estate Securities

Wilshire's usual practice is to assume comparable non-U.S. and U.S. returns within a global asset class containing regional components. Within this context we often employ a market or model-based approach to forecasting the U.S. component return, which we then build into a non-U.S. component assumption. However, we also consider relative valuation signals among regional markets to identify periods of relative valuation mismatch. In looking at yields on global public real estate securities, we do not currently see justification for instituting a premium or discount to our U.S. Real Estate Securities forecast for our non-U.S. assumption. A consistent or permanent return premium for either U.S. or non-U.S. securities is not supported by the historical record of total returns. Therefore, our approach leads to the same 4.55% long-term return forecast for non-U.S. real estate securities.

Private Real Estate

Wilshire's expected return assumption for private real estate is 5.90%, with an expected risk of 14.00%. The forecast is measured as a basket or portfolio of the three major real estate segments: 70% core, 15% value-add and 15% opportunistic real estate. Core real estate includes stable properties with high occupancy rates while the realized return that an investor earns is mostly income-based. Formulating an expected return begins with the available yield, or capitalization rate, in the core private market. The National Council of Real Estate Investment Fiduciaries (NCREIF) Property Index is comprised of thousands of properties acquired on behalf of tax-exempt institutions. NCREIF reports market data on the index on the properties themselves, meaning that any financial leverage that is employed by asset owners is not included. Wilshire's forecasting methodology begins with the most recent yields at the index level as being representative of the broad market generally. We also include an income growth rate as rents on core properties are expected to increase during our forecasting period. The growth rate is based on expected inflation, as owners may capture a portion of an economy's rising prices in increased rents, and is equal to 75% of our current inflation assumption. Beyond this "market return," our methodology focuses on four other potential drivers of return, some of which are informed by the public markets:

- Financial leverage: Debt equal to 20% of total capital, including floating and fixed rate debt
- Illiquidity premium: Core real estate funds offer regular redemptions, so zero in this case
- Operational premium: Based on the historical results of successful managers
- Fees: Average fee on a core real estate fund is 1%

Exhibit 19 contains all the year-end core private real estate inputs, along with the model return. The final assumption of 5.15% that is shown in Appendix B is lower than the 5.95% in the table below due to the Sharpe Ratio return band that was discussed in the Introduction.

Exhibit 19 – Core Private Real Estate: Return Assumption Inputs

	MARKET RETURN		CORE REAL ESTATE
Capitalization Rate +	4.00%	Market Return	5.95%
(Inflation Capture *	75%	Leverage Contribution	0.50%
Expected Inflation)	2.60%	Illiquidity Premium	0.00%
		Operational Premium	0.50%
		Fee (Base/Perf.)	-1.00%
Market Return	5.95%	Net Successful Return	5.95%

Value-add and opportunistic real estate are very different investment types from core, and Wilshire's approach to forecasting returns in each segment is similarly different. Such properties require substantial investment to develop or even repurpose a site before earning a meaningful return, which comes mostly in the form of price appreciation. Active managers in this space deploy significant debt, often more than 50% of total capital, and the illiquidity profile of a fund is similar to what is common within the private equity market. Therefore, Wilshire's approach to forecasting returns within value-add and opportunistic real estate is to observe what managers within these two market segments have been able to earn above core real estate managers. The available data are sufficiently robust to make such observations, with 20 to 30 years of data from multiple sources. Value-add funds have been able to outperform by somewhat less than 2%, at the minimum, but as much as nearly 4% during other periods. The assumption utilized within our methodology is currently 3%, which would imply an 8.95% net

successful return assumption. However, at our 17.50% expected risk for this market segment, such an assumption would violate our Sharpe Ratio-based return band. Therefore, Wilshire's adjusted return forecast as-of Dec. 31, 2021, is 6.30% for value-add real estate.

For the opportunistic segment, we based our assumption on relative performance versus value-add real estate. When considering the previous 30 years of data, opportunistic funds have not performed particularly well on a relative basis. However, the recent history is more promising. Opportunistic funds have outperformed value-add by an average of 2% on a rolling 10-year basis since 2008. The assumption utilized within our methodology is currently 1% (above the model's original value-add forecast of 8.95%), for a 9.95% net successful return for opportunistic private real estate. However, such a return at an assumed risk of 25.00% also would violate the return band and is, therefore capped at 7.55%. For additional detail regarding our methodology, please see our 2018 paper on private real estate forecasting[8].

Infrastructure

Similar to Wilshire's approach to forecasting real estate, we evaluate opportunities in both the public and private segments of the infrastructure asset class. Global listed infrastructure (GLI) consists of public companies that engage in the management and operating of essential infrastructure assets such as power plants, transportation networks and communications systems. Also like with public real estate, GLI companies exhibit dividend yields much higher than the broad equity market and their total return is dependent on yield. Our approach to forecasting returns begins with the current yield on the GLI market and assumes an expected dividend growth rate equal to three-quarters of long-run inflation. This growth assumption is consistent with our public real estate methodology. While the historical dataset for GLI is not as robust as with public real estate, we feel comfortable applying the same growth rate as both asset classes have similar economic sensitivity to inflation. Wilshire currently forecasts an expected return of 4.95% for GLI with risk equal to 17.00%.

Direct, private infrastructure investments cover a broad range of asset types, ranging from stabilized, income producing assets ("brownfield infrastructure") to new and unproven development projects ("greenfield infrastructure"). These physical assets are further differentiated by geographic location, sector, financing and other characteristics. Similar to real estate properties, infrastructure returns are primarily generated by owning and operating physical assets; and like real estate, operating income is often linked directly or indirectly to long-term inflation trends. As such, Wilshire's approach to forecasting private infrastructure mirrors our private real estate model with two modifications: 1) yields reflective of the infrastructure market and 2) leverage typical of private infrastructure funds. The private market infrastructure yield (cap rate) assumption begins with the cap rate found in the private real estate market. We then observe any difference in yields in the public real estate and infrastructure markets and adjust the cap rate accordingly. Wilshire's current forecast of 7.55% for private infrastructure, with a risk of 25.00%, represents an allocation to a typical core infrastructure fund.

Timberland

Timberland investment returns are driven by four primary components: biological growth, the market price for timber, the market price for land and the skill of active management. Wilshire's model return for the timber asset class is 7.60% and is based on a return attribution of 5.00% annual biological growth and a 2.60% increase in timber market prices. The timber market price component is consistent with our inflation forecast and reflects the ability of timberland products to capitalize expected and unexpected inflation over long time periods. The holding period return to land is assumed to be negligible, and thus estimated to have no addition to return unless successful management is employed. However, after our Sharpe-ratio return band is applied to the timber model return, the final assumption becomes 5.80% at a risk of 15.00%. For a more detailed discussion on our forecast methodology, please refer to Wilshire's research paper "Timberland Investments – Does the Return Fall Far From the Tree?"[9]

[8] Wilshire Associates Incorporated (2018). *Forecasting Private Real Estate Returns: Building Return Assumptions in Private Markets*: Foresti and Rush.

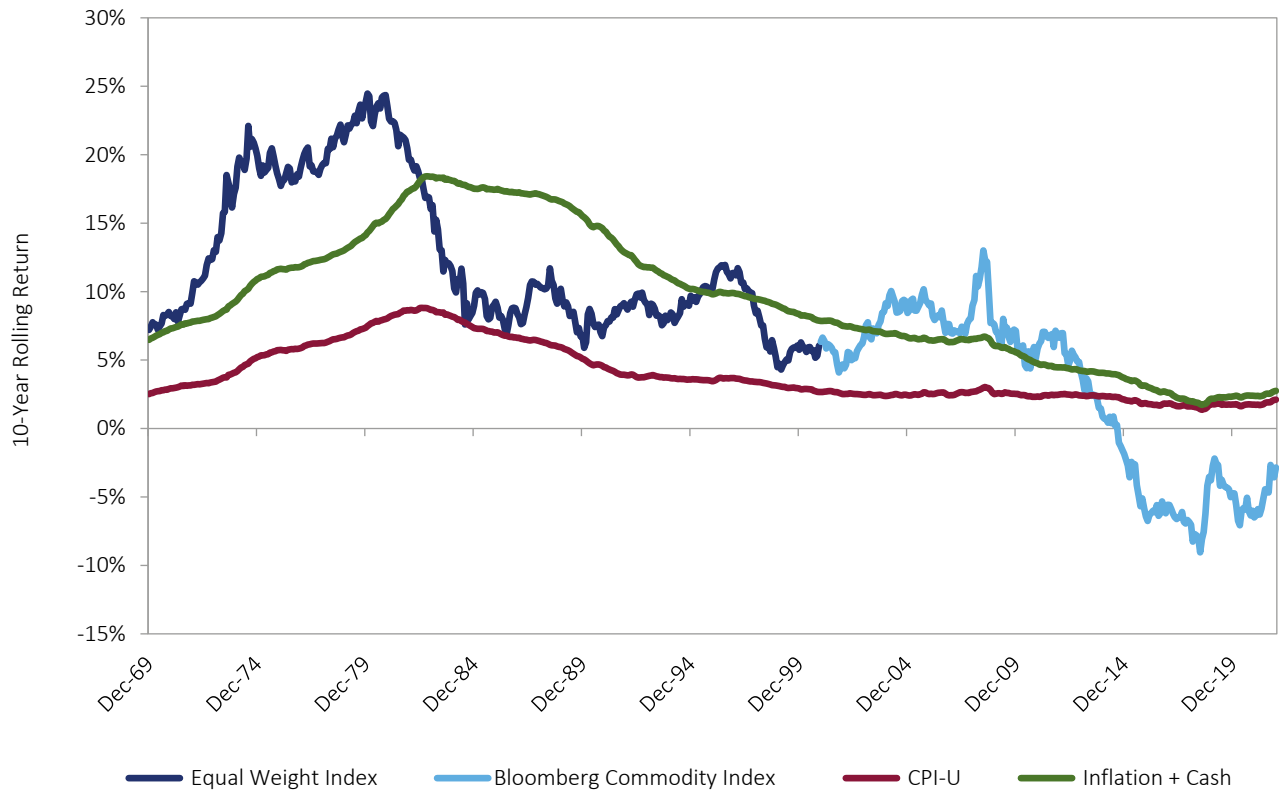
[9] Wilshire Associates Incorporated (2007). *Timberland Investments: Does the Return Fall Far From the Tree?:* Browning.

Commodity Futures

The returns for commodities differ from other asset classes because commodities do not represent compensation for the risk associated with future cash flow uncertainty. Instead, investors in commodity futures can be compensated for providing insurance to producers, thus insulating the business operations of these commodity producers from short-term commodity price fluctuations. In other words, a majority of a commodity future investor's exposure is to short-term economic conditions.

Wilshire's approach to forecasting a return for a basket of commodity futures focuses on the three components of the asset class's total return: changes in spot prices, collateral yield and contract roll yield. The first two inputs are rather straightforward. Our "spot price" return is represented by our inflation assumption and the collateral yield is equal to our forecast on cash. Our assumption for roll yield is currently zero. Prior to the early 2000s, roll yield was positive within the commodities market. However, for the past decade or so, roll yield has been negative. Given these mixed results, we currently find it prudent to assume a 0% return from roll, rather than essentially picking one of the historical trends. We will continue to monitor this component going forward. Therefore, currently our commodities assumption is inflation (2.60%) plus cash (1.70%), equal to 4.30%. Exhibit 20 contains a return history for the Bloomberg Commodity Index, an equal weight index, CPI-U and the sum of actual inflation plus the return on cash through time.

Exhibit 20 – Historical Commodity Index Returns



Data Source: Gorton and Rouwenhorst "Facts and Fantasies about Commodity Futures"

Wilshire's forecasted risk for commodity futures is 16.00% based on the composition of the Bloomberg Commodity Index. It is important to note that other indexes differ in composition from the Bloomberg index and may be substantially more or less risky.

The low measured correlation of commodity returns with more traditional assets, such as stocks and bonds, stems from their price sensitivity to current economic supply and demand forces. In contrast, stock and bond valuations are more heavily

driven by forward-looking expectations. Historically, these factors have caused traditional assets and commodities to have lower correlations. A complete list of correlations for commodities versus other asset classes can be found in Appendix A.

Midstream Energy Infrastructure

As midstream energy infrastructure is predominately a yield-returning asset class, Wilshire looks to both the current yield and potential for yield increases in the future to formulate a return assumption. Our starting point is the current yield environment within the asset class, as represented by the Alerian US Midstream Energy Index. For future growth rates, we utilize the same growth assumption that we employ within other segments of real assets, which is equal to three-quarters of expected long-run inflation. Our model return of 8.30% is equal to the Alerian index's 6.34% yield plus three-quarters of our inflation forecast of 2.60%. However, due to our Sharpe-ratio return band application, the year-end return assumed is 6.60%. Wilshire's risk forecast is based on historical observations and is currently equal to 19.00%. Finally, it should be noted that this asset class differs, somewhat, from global listed infrastructure although some investors choose to invest in both with one allocation, which our asset-liability process can easily accommodate.

Private Energy

Wilshire's private energy assumption utilizes the midstream energy infrastructure assumption as a starting point in forecasting returns. There are two major differences, however, between the two asset classes. The first is the amount of leverage utilized, with the public segment employing a higher level of borrowing. Secondly, private energy funds typically invest in more "upstream," or extraction, projects. This fact results in two adjustments within our forecasting methodology. Exploration projects will have a greater exposure to energy prices than midstream transportation, which we capture by utilizing the risks embedded within our commodity assumptions. The other adjustment is to allow for value-added possibilities through upstream investments. The net result is a current long-term return forecast of 6.40%, after our return band is applied, with an expected annual volatility of 18.00%. It is worth noting that the risk assumption is lower than that for midstream energy and reflects the lower amount of leverage typically employed within the asset class.

Real Asset Basket

In an effort to assist institutions who take a holistic approach to inflation linked investing, Wilshire develops forecasts for a broadly diversified real asset basket. In that approach, we construct a 50 / 50 combination of underlying public and private real asset portfolios. The public market portfolio is designed to provide a meaningful real return while maintaining appropriate diversification benefits and inflation sensitivity. The underlying sub-component asset classes in the private basket are approximately risk weighted to efficiently gain exposure to the inflation capture of the individual underlying investments. The sub-components are as follows:

Public Real Asset Basket	
Global REITs	31%
U.S. TIPS	48%
Commodity Futures	33%
Gold	9%
Infrastructure/Mid. Energy	12%
Borrowing	-33%

Private Real Asset Basket	
Private Real Estate	35%
Timberland	35%
Private Energy	30%

The aggregate real asset basket is expected to return 5.60% and is included in the standard annual asset class matrix (Appendix A). Furthermore, the individual real asset basket component classes along with the private and public combinations can be found in Appendix B.

Hedge Funds

While Wilshire primarily views hedge funds as implementation vehicles, rather than as a separate asset class, we do maintain return, risk and correlation assumptions to support their use within asset allocation studies. We maintain forecasts for five major styles or strategy groupings that are common within the hedge fund industry and can further combine these styles to support Wilshire's Directional vs. Diversifying implementation approach to marketable securities.[10] For each of these strategies, Wilshire uses a building block approach with the following three components: a risk-free rate (i.e., a cash equivalent return), a systematic market component (i.e., beta) and an active component (i.e., alpha). It is important to note that the inclusion of an alpha or skill-based component makes our expectations for hedge funds unique to many of the public market forecasts in this report, whose return expectations are beta-only. Using regression analysis to identify beta factors to different asset classes, Wilshire can create synthetic hedge fund style returns that demonstrate reasonable tracking against actual hedge fund style indexes. We are then able to utilize the information contained in our underlying asset class forecasts to model the implied returns of the five hedge fund styles. Below we summarize the results for December 2021 along with forecasts for an industry representative basket of hedge fund strategies. A more detailed discussion of the forecasting methodology can be found in Wilshire's 2013 research note[11].

Strategy	Basket Weight	Expected Return (%)	Expected Risk (%)
Equity Market Neutral	10%	3.60	4.50
Event Driven	25%	4.80	7.00
Equity Long/Short	35%	5.30	9.75
Global Macro	5%	4.60	6.75
Relative Value	25%	4.35	5.75
HF Industry Representative Basket		**4.80**	**6.60**

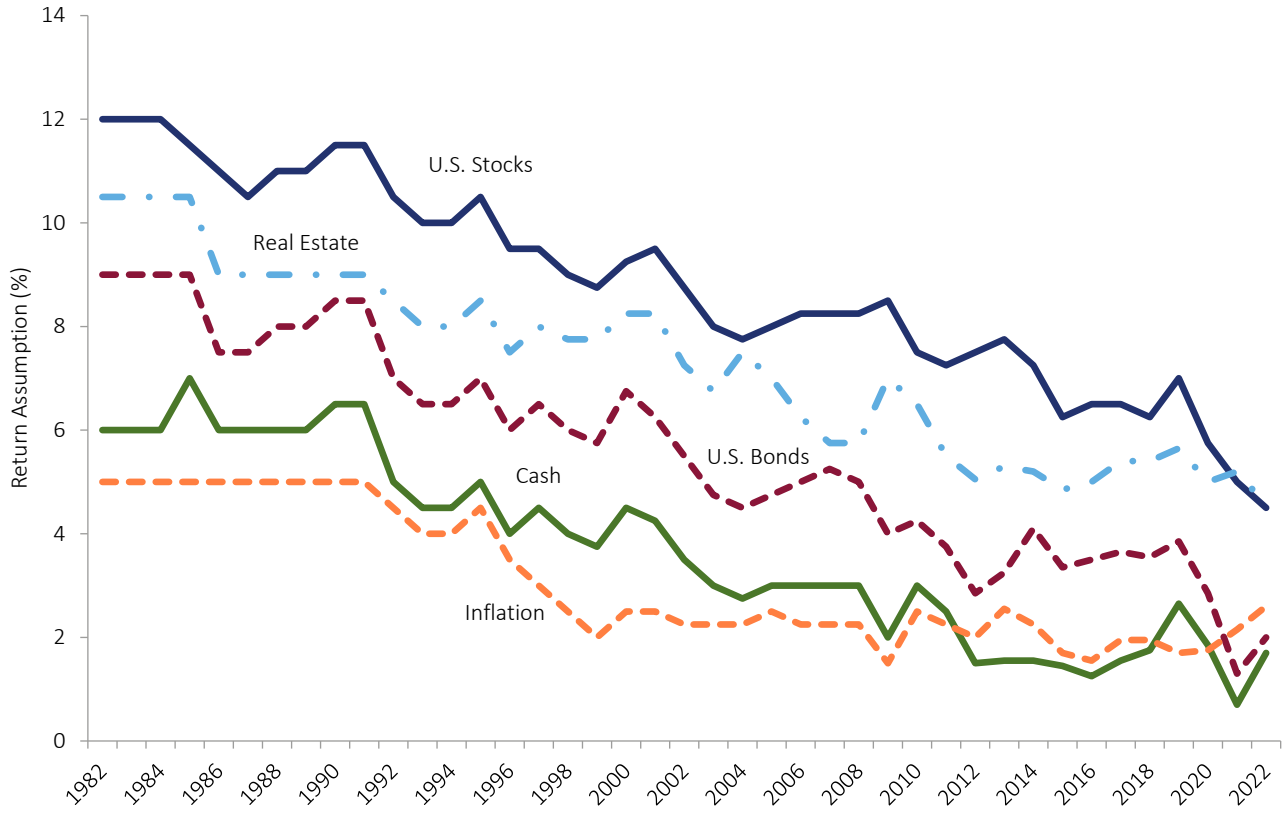
Wilshire's Historical Forecasts

Exhibit 21 shows how Wilshire's annual return forecasts have changed over the past 41 years. Notice the relative relationship between asset classes and how, when the assumptions change, they generally move together. This co-movement in assumptions is the result of common economic drivers, such as the level of growth, inflation and interest rates, which contribute to all asset class valuations, thereby linking various investments to each other in, at minimum, an indirect way.

[10] Wilshire Associates Incorporated (2018). *Hedge Funds 2.0: An Integrated Approach to Investing in Marketable Alternatives*: Foresti and Gnall.

[11] Wilshire Associates Incorporated (2013). *Hedge Fund Style Assumptions*: Foresti.

Exhibit 21 – Historical Returns



Risk and Correlation

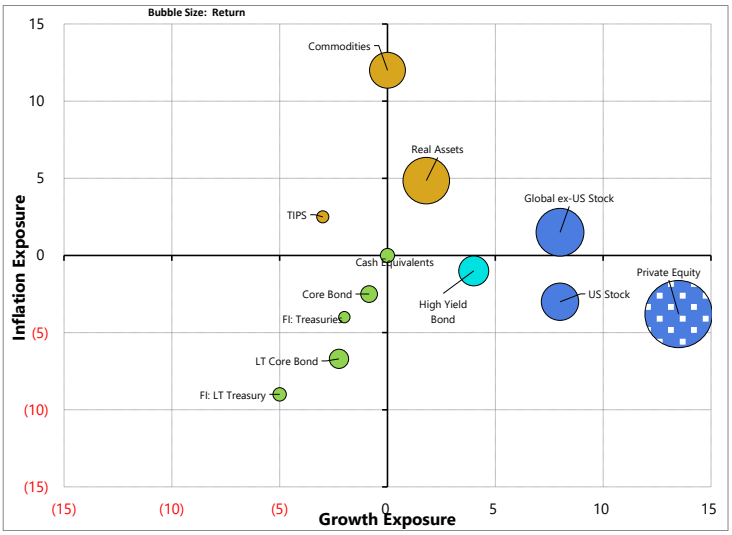
Wilshire's approach to forecasting long-term risk and correlation is largely based on observed historical asset class behavior and an understanding of the discounting properties of individual asset classes to changes in economic factors. Generally, past relationships across market cycles serve as reasonable predictors of future long-term risk and correlation, as they provide statistical evidence of the commonality of asset class reactions to underlying economic conditions. In practice, Wilshire applies financial theory and judgment to the interpretation and analysis of historical results. The role of judgment ("art") versus measured statistics ("science") is more pronounced for investment categories with less historical data or that have experienced material structural changes. In general, Wilshire places much more confidence in the predictive accuracy of past relationships for asset classes with longer and more robust historical data. In this report we rely upon historical measurements of risk and correlation through 2021 to estimate future risk and correlation. To maximize the quality of our estimates, we observe this historical behavior over various time horizons (i.e., five years, 10 years, full history, etc.). Wilshire does not use a preset or static rolling time period to derive these forecasts, as such an approach could result in forward numbers reacting too quickly to what may prove to be short-term relationships or event driven anomalies between markets.

One of the greatest challenges in constructing well-diversified portfolios is the instability of correlation relationships between various asset classes. Having access to longer track records does not resolve this complication; in fact, a longer historical record can sometimes serve as greater evidence of unstable correlations through time. However, many of these unstable relationships can be better understood when observing the more predictable relationship of asset class returns versus underlying economic factors. In 2014, Wilshire published two related research reports on factor-based asset allocation, including one that presented a practical approach to utilizing such factors. In that research, we presented a two-factor framework to assist in understanding the more predictable relationship between asset returns and the common economic factors of inflation and growth.

In Exhibit 22 below, we present several of the major asset classes along these dimensions to provide a sense of the common factor exposures that contribute to either the stability or instability of correlation relationships. Assets with similar exposure

to both factors are more likely to show stable relationships across market regimes, while those with common exposure to just one factor are likely to reveal correlation instability; with high correlations when returns are driven by the factor to which they share similar exposure and divergent returns in periods where the factor to which they have dissimilar exposures is driving returns. As discussed in the aforementioned research report, incorporating these factor exposures within an asset-liability study can assist in protecting against the unpredictability that is the consequence of unstable asset class correlations.

Exhibit 22 – Asset Class Exposures to Growth & Inflation



Finally, and as is the case every year, we did make minor modifications to several risk and correlation assumptions primarily as the result of relative moves in sub-asset class component weights. With the exception of the bond risk estimates discussed earlier, we view these changes as minor and insignificant rather than indicative of a more meaningful shift in our view of asset class relationships.

A full listing of Wilshire's risk and diversification assumptions for all asset classes can be found in Appendix A.

Appendix A: Wilshire December 2021 Correlation Matrix

	Equity						Fixed Income						Real Estate					
	U.S. Stock	Dev. ex-U.S. Stock	Emg. Mrkt. Stock	Global ex-U.S. Stock	Global Stock	Private Equity	Cash	Core Bond	LT Core Bond	U.S. TIPS	High Yield	Non-U.S. Bond	Real Estate Secs.	RI Estate Secs.	Private Real Eestate	Cmdty	Real Assets	U.S. CPI
Expected Compound Return (%)	4.50	5.50	5.50	5.75	5.10	8.10	1.70	2.00	2.30	1.45	3.60	0.85	4.55	4.70	5.90	4.30	5.60	2.60
Expected Arithmetic Return (%)	5.85	7.00	8.50	7.40	6.45	11.45	1.70	2.10	2.70	1.65	4.10	0.95	5.95	5.95	6.80	5.50	6.10	2.60
Expected Risk (%)	17.00	18.00	26.00	19.10	17.10	28.00	0.75	4.25	8.90	6.00	10.00	4.25	17.50	16.45	14.00	16.00	10.35	1.75
Cash Yield (%)	1.25	2.50	2.00	2.35	1.70	0.00	1.70	2.95	3.15	2.25	7.35	1.65	2.60	2.60	2.30	1.70	1.85	0.00
Correlations																		
U.S. Stock	1.00																	
Dev Ex-U.S. Stock (USD)	0.81	1.00																
Emerging Market Stock	0.74	0.74	1.00															
Global Ex-U.S. Stock	0.83	0.96	0.87	1.00														
Global Stock	0.95	0.92	0.83	0.94	1.00													
Private Equity	0.74	0.64	0.62	0.67	0.74	1.00												
Cash Equivalents	-0.05	-0.09	-0.05	-0.08	-0.07	0.00	1.00											
Core Bond	0.28	0.13	0.00	0.09	0.20	0.31	0.19	1.00										
Lt Core Bond	0.31	0.16	0.01	0.12	0.23	0.32	0.11	0.92	1.00									
U.S. TIPS	-0.05	0.00	0.15	0.05	0.00	-0.03	0.20	0.59	0.47	1.00								
High Yield Bond	0.54	0.39	0.49	0.45	0.51	0.34	-0.10	0.25	0.32	0.05	1.00							
Non-U.S. Bond (Hdg)	0.16	0.25	-0.01	0.17	0.18	0.26	0.10	0.66	0.65	0.39	0.26	1.00						
U.S. RE Securities	0.58	0.47	0.44	0.49	0.56	0.50	-0.05	0.17	0.23	0.10	0.56	0.05	1.00					
Global RE Securities	0.64	0.58	0.56	0.61	0.65	0.58	-0.05	0.17	0.22	0.11	0.61	0.03	0.96	1.00				
Private Real Estate	0.54	0.44	0.44	0.47	0.52	0.51	-0.05	0.19	0.25	0.09	0.57	0.05	0.77	0.75	1.00			
Commodities	0.25	0.34	0.39	0.38	0.32	0.27	0.00	-0.02	-0.02	0.25	0.29	-0.10	0.25	0.28	0.25	1.00		
Real Asset Basket	0.48	0.51	0.58	0.57	0.54	0.47	-0.02	0.23	0.25	0.39	0.56	0.05	0.70	0.75	0.70	0.65	1.00	
Inflation (CPI)	-0.10	-0.15	-0.13	-0.15	-0.13	-0.10	0.10	-0.12	-0.12	0.15	-0.08	-0.08	0.05	0.03	0.05	0.44	0.26	1.00

Appendix B: Wilshire December 2021 Alternative Investment Assumptions

	Basket Weight	Expected Return (%)	Expected Risk (%)
Private Equity			
Buyouts	50%	6.75	30.00
Venture Capital	20%	7.65	44.00
Distressed Debt	5%	6.00	20.00
Mezzanine Debt	5%	5.75	20.00
Non-Us Buyouts	20%	7.25	32.00
Private Equity Basket		8.10	28.00
Private Real Estate			
Core	70%	5.15	12.00
Value Added	15%	6.30	17.50
Opportunisitc	15%	7.55	25.00
Private Real Estate Basket		5.90	14.00
Public Real Assets			
Global Real Estate	31%	4.70	16.45
U.S. Tips	48%	1.45	6.00
Commodities	33%	4.30	16.00
Gold	9%	4.30	18.00
Infrastrc. / Mdstrm Energy	12%	4.35	16.20
Borrowing	-33%	1.70	0.75
Public Real Assets Basket		4.50	11.45
Private Real Assets			
Private Real Estate	35%	5.90	14.00
Timber	35%	5.80	15.00
Private Energy	30%	6.40	18.00
Private Real Assets Basket		6.55	11.25
Hedge Funds			
Equity Market Neutral	10%	3.60	4.50
Event Driven	25%	4.80	7.00
Equity Long/Short	35%	5.30	9.75
Global Macro	5%	4.60	6.75
Relative Value	25%	4.35	5.75
Hedge Fund Basket		4.80	6.60

Appendix C: Historical 1-, 5- & 10-Year Rolling

1-Year Returns

Year	S&P 500 Index	Bond Index	T-Bills	CPI	Year	S&P 500 Index	Bond Index	T-Bills	CPI
1926	11.6	7.4	3.3	-1.5	1974	-26.4	0.2	8.2	12.4
1927	37.5	7.4	3.1	-2.1	1975	37.2	12.3	5.8	7.0
1928	43.6	2.8	3.5	-1.0	1976	24.1	15.6	5.0	4.9
1929	-8.4	3.3	4.7	0.2	1977	-7.3	3.0	5.4	6.7
1930	-24.9	8.0	2.4	-6.0	1978	6.4	1.4	7.5	9.0
1931	-43.4	-1.9	1.1	-9.5	1979	18.5	1.9	10.3	13.3
1932	-8.2	10.8	1.0	-10.3	1980	32.2	2.7	11.8	12.5
1933	54.0	10.4	0.3	0.5	1981	-4.9	6.3	14.5	8.9
1934	-1.4	13.8	0.2	2.0	1982	21.1	32.6	11.1	3.8
1935	47.7	9.6	0.1	3.0	1983	22.4	8.4	8.8	3.8
1936	33.9	6.7	0.2	1.2	1984	6.1	15.2	9.9	4.0
1937	-35.0	2.8	0.3	3.1	1985	32.1	22.1	7.7	3.8
1938	31.1	6.1	0.0	-2.8	1986	18.6	15.3	6.1	1.1
1939	-0.4	4.0	0.0	-0.5	1987	5.2	2.8	5.4	4.4
1940	-9.8	3.4	0.0	1.0	1988	16.8	7.9	6.7	4.4
1941	-11.6	2.7	0.0	9.7	1989	31.5	14.5	9.0	4.6
1942	20.4	2.6	0.3	9.3	1990	-3.2	9.0	8.3	6.1
1943	25.9	2.8	0.4	3.2	1991	30.6	16.0	6.4	3.1
1944	19.7	4.7	0.3	2.1	1992	7.7	7.4	3.9	2.9
1945	36.4	4.1	0.3	2.3	1993	10.0	9.8	3.2	2.8
1946	-8.1	1.7	0.4	18.2	1994	1.3	-2.9	4.2	2.7
1947	5.7	-2.3	0.5	9.0	1995	37.5	18.5	6.1	2.5
1948	5.5	4.1	0.8	2.7	1996	23.1	3.6	5.4	3.3
1949	18.8	3.3	1.1	-1.8	1997	33.3	9.7	5.5	1.7
1950	31.7	2.1	1.2	5.8	1998	28.8	8.7	5.4	1.6
1951	24.0	-2.7	1.5	5.9	1999	21.0	-0.8	4.6	2.7
1952	18.4	3.5	1.7	0.9	2000	-9.1	11.6	6.2	3.4
1953	-1.0	3.4	1.8	0.6	2001	-11.9	8.4	4.4	1.6
1954	52.6	5.4	0.9	-0.5	2002	-22.1	10.3	1.8	2.4
1955	31.6	0.5	1.6	0.4	2003	28.7	4.1	1.2	1.9
1956	6.6	-6.8	2.5	2.9	2004	10.9	4.3	1.3	3.3
1957	-10.8	8.7	3.2	3.0	2005	4.9	2.4	3.1	3.4
1958	43.4	-2.2	1.5	1.8	2006	15.8	4.3	4.8	2.5
1959	12.0	-1.0	3.0	1.5	2007	5.5	7.0	5.0	4.1
1960	0.5	9.1	2.7	1.5	2008	-37.0	5.2	2.0	0.1
1961	26.9	4.8	2.1	0.7	2009	26.5	5.9	0.2	2.7
1962	-8.7	8.0	2.7	1.2	2010	15.1	6.5	0.1	1.5
1963	22.8	2.2	3.1	1.7	2011	2.1	7.8	0.1	3.0
1964	16.5	4.8	3.5	1.2	2012	16.0	4.2	0.1	1.7
1965	12.5	-0.5	3.9	1.9	2013	32.4	-2.0	0.1	1.5
1966	-10.1	0.2	4.8	3.4	2014	13.7	6.0	0.0	0.8
1967	24.0	-5.0	4.2	3.0	2015	1.4	0.6	0.1	0.7
1968	11.1	2.6	5.2	4.7	2016	12.0	2.7	0.3	2.1
1969	-8.5	-8.1	6.6	6.1	2017	21.8	3.5	0.9	2.1
1970	4.0	18.4	6.5	5.5	2018	-4.4	0.0	1.9	1.9
1971	14.3	11.0	4.4	3.4	2019	31.5	8.7	2.3	2.3
1972	19.0	7.3	3.8	3.5	2020	18.4	7.5	0.7	1.4
1973	-14.8	2.3	6.9	8.7	2021	28.7	-1.5	0.0	7.0
					Winning Percentage:	**64.6%**	**22.9%**	**12.5%**	

5-Year Returns

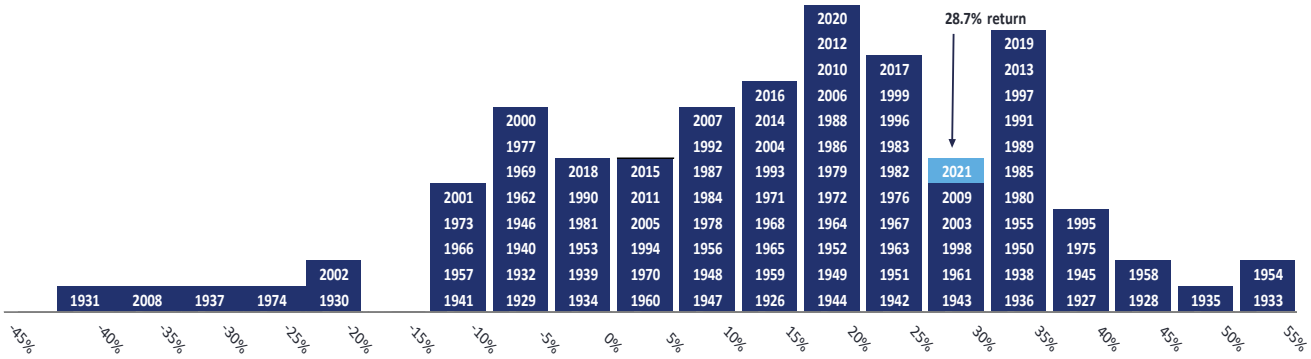
Year	S&P 500 Index	Bond Index	T-Bills	CPI
1926-30	8.7	5.8	3.4	-2.1
1927-31	-5.1	3.9	3.0	-3.7
1928-32	-12.5	4.5	2.5	-5.4
1929-33	-11.2	6.0	1.9	-5.1
1930-34	-9.9	8.1	1.0	-4.8
1931-35	3.1	8.4	0.5	-3.0
1932-36	22.5	10.3	0.3	-0.8
1933-37	14.3	8.6	0.2	2.0
1934-38	10.7	7.8	0.1	1.3
1935-39	10.9	5.8	0.1	0.8
1936-40	0.5	4.6	0.1	0.4
1937-41	-7.5	3.8	0.1	2.0
1938-42	4.6	3.8	0.1	3.2
1939-43	3.8	3.1	0.1	4.5
1940-44	7.7	3.3	0.2	5.0
1941-45	17.0	3.4	0.3	5.3
1942-46	17.9	3.2	0.3	6.8
1943-47	14.8	2.2	0.4	6.8
1944-48	10.9	2.4	0.5	6.7
1945-49	10.7	2.2	0.6	5.8
1946-50	9.9	1.8	0.8	6.6
1947-51	16.7	0.9	1.0	4.3
1948-52	19.4	2.0	1.3	2.7
1949-53	17.9	1.9	1.5	2.2
1950-54	23.9	2.3	1.4	2.5
1951-55	23.9	2.0	1.5	1.4
1952-56	20.2	1.1	1.7	0.8
1953-57	13.6	2.1	2.0	1.3
1954-58	22.3	1.0	1.9	1.5
1955-59	15.0	-0.3	2.3	1.9
1956-60	8.9	1.4	2.6	2.1
1957-61	12.8	3.8	2.5	1.7
1958-62	13.3	3.6	2.4	1.3
1959-63	9.8	4.5	2.7	1.3
1960-64	10.7	5.7	2.8	1.2
1961-65	13.2	3.8	3.1	1.3
1962-66	5.7	2.9	3.6	1.9
1963-67	12.4	0.3	3.9	2.2
1964-68	10.2	0.4	4.3	2.8
1965-69	5.0	-2.2	4.9	3.8
1966-70	3.4	1.2	5.4	4.5
1967-71	8.4	3.3	5.4	4.5
1968-72	7.5	5.8	5.3	4.6
1969-73	2.0	5.8	5.6	5.4
1970-74	-2.4	7.6	6.0	6.6
1971-75	3.2	6.5	5.8	6.9
1972-76	4.9	7.4	5.9	7.2
1973-77	-0.2	6.5	6.3	7.9
1974-78	4.3	6.3	6.4	8.0
1975-79	14.8	6.7	6.8	8.1
1976-80	13.9	4.8	8.0	9.2
1977-81	8.0	3.1	9.9	10.1
1978-82	13.9	8.4	11.0	9.5
1979-83	17.2	9.8	11.3	8.4
1980-84	14.6	12.6	11.2	6.5
1981-85	14.6	16.5	10.4	4.8
1982-86	19.7	18.4	8.7	3.3
1983-87	16.4	12.5	7.6	3.4
1984-88	15.4	12.4	7.1	3.5
1985-89	20.4	12.3	7.0	3.7
1986-90	13.2	9.8	7.1	4.1
1987-91	15.4	9.9	7.1	4.5
1988-92	15.9	10.9	6.8	4.2
1989-93	14.5	11.3	6.1	3.9
1990-94	8.7	7.7	5.2	3.5
1991-95	16.6	9.5	4.8	2.8
1992-96	15.2	7.0	4.6	2.8
1993-97	20.2	7.5	4.9	2.6
1994-98	24.1	7.3	5.3	2.4
1995-99	28.6	7.7	5.4	2.4
1996-00	18.3	6.5	5.4	2.5
1997-01	10.7	7.4	5.2	2.2
1998-02	-0.6	7.5	4.5	2.3
1999-03	-0.6	6.6	3.6	2.4
2000-04	-2.3	7.7	3.0	2.5
2001-05	0.5	5.9	2.4	2.5
2002-06	6.2	5.1	2.4	2.7
2003-07	12.8	4.4	3.1	3.0
2004-08	-2.2	4.6	3.2	2.7
2005-09	0.4	5.0	3.0	2.6
2006-10	2.3	5.8	2.4	2.2
2007-11	-0.3	6.5	1.5	2.3
2008-12	1.7	5.9	0.5	1.8
2009-13	17.9	4.4	0.1	2.1
2010-14	15.4	4.5	0.1	1.7
2011-15	12.6	3.2	0.1	1.5
2012-16	14.7	2.2	0.1	1.4
2013-17	15.8	2.1	0.3	1.4
2014-18	8.5	2.5	0.6	1.5
2015-19	11.7	3.0	1.1	1.8
2016-20	15.2	4.4	1.2	1.9
2017-21	18.5	3.6	1.2	2.9
Winning Percentage:	**72.8%**	**23.9%**	**3.3%**	

10-Year Returns

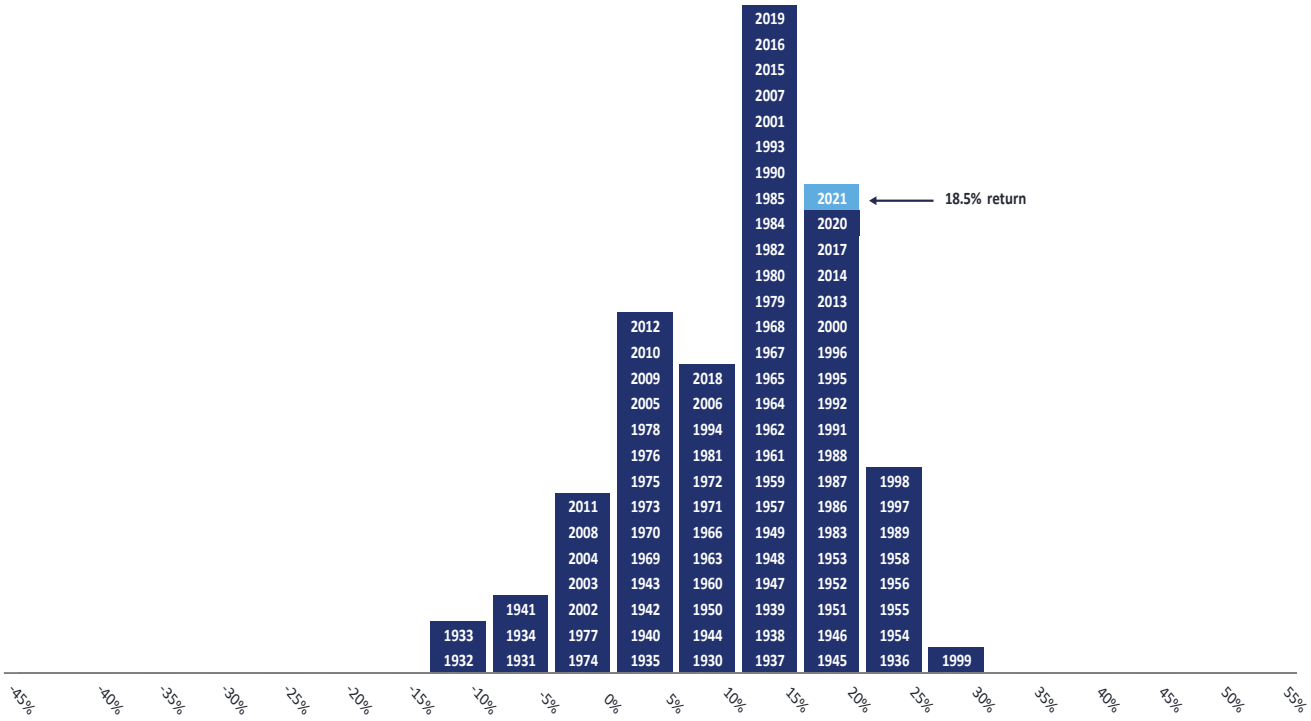
Year	S&P 500 Index	Bond Index	T-Bills	CPI
1926-35	5.9	7.1	2.0	-2.6
1927-36	7.8	7.0	1.7	-2.3
1928-37	0.0	6.5	1.4	-1.8
1929-38	-0.9	6.9	1.0	-2.0
1930-39	-0.1	6.9	0.6	-2.0
1931-40	1.8	6.5	0.3	-1.3
1932-41	6.4	7.0	0.2	0.6
1933-42	9.4	6.2	0.1	2.6
1934-43	7.2	5.4	0.1	2.9
1935-44	9.3	4.5	0.2	2.9
1936-45	8.4	4.0	0.2	2.8
1937-46	4.4	3.5	0.2	4.4
1938-47	9.6	3.0	0.2	5.0
1939-48	7.3	2.8	0.3	5.6
1940-49	9.2	2.7	0.4	5.4
1941-50	13.4	2.6	0.5	5.9
1942-51	17.3	2.0	0.7	5.5
1943-52	17.1	2.1	0.8	4.7
1944-53	14.3	2.2	1.0	4.4
1945-54	17.1	2.2	1.0	4.2
1946-55	16.7	1.9	1.1	4.0
1947-56	18.4	1.0	1.3	2.5
1948-57	16.4	2.1	1.6	2.0
1949-58	20.1	1.4	1.7	1.9
1950-59	19.4	1.0	1.9	2.2
1951-60	16.2	1.7	2.0	1.8
1952-61	16.4	2.4	2.1	1.3
1953-62	13.4	2.9	2.2	1.3
1954-63	15.9	2.7	2.3	1.4
1955-64	12.8	2.7	2.6	1.6
1956-65	11.1	2.6	2.8	1.7
1957-66	9.2	3.3	3.0	1.8
1958-67	12.9	1.9	3.1	1.8
1959-68	10.0	2.4	3.5	2.1
1960-69	7.8	1.7	3.9	2.5
1961-70	8.2	2.5	4.3	2.9
1962-71	7.1	3.1	4.5	3.2
1963-72	9.9	3.0	4.6	3.4
1964-73	6.0	3.0	5.0	4.1
1965-74	1.2	2.6	5.4	5.2
1966-75	3.3	3.8	5.6	5.7
1967-76	6.7	5.3	5.7	5.9
1968-77	3.6	6.2	5.8	6.2
1969-78	3.2	6.1	6.0	6.7
1970-79	5.9	7.2	6.4	7.4
1971-80	8.4	5.6	6.9	8.1
1972-81	6.4	5.2	7.9	8.6
1973-82	6.6	7.4	8.6	8.7
1974-83	10.6	8.1	8.8	8.2
1975-84	14.7	9.6	9.0	7.3
1976-85	14.2	10.5	9.2	7.0
1977-86	13.7	10.5	9.3	6.6
1978-87	15.2	10.4	9.3	6.4
1979-88	16.3	11.1	9.2	5.9
1980-89	17.5	12.4	9.1	5.1
1981-90	13.9	13.1	8.7	4.5
1982-91	17.5	14.1	7.9	3.9
1983-92	16.2	11.7	7.2	3.8
1984-93	14.9	11.9	6.6	3.7
1985-94	14.4	10.0	6.1	3.6
1986-95	14.9	9.6	5.9	3.5
1987-96	15.3	8.5	5.8	3.7
1988-97	18.0	9.2	5.9	3.4
1989-98	19.2	9.3	5.7	3.1
1990-99	18.2	7.7	5.3	2.9
1991-00	17.5	8.0	5.1	2.7
1992-01	12.9	7.2	4.9	2.5
1993-02	9.3	7.5	4.7	2.5
1994-03	11.1	6.9	4.5	2.4
1995-04	12.1	7.7	4.2	2.4
1996-05	9.1	6.2	3.9	2.5
1997-06	8.4	6.2	3.8	2.4
1998-07	5.9	6.0	3.8	2.7
1999-08	-1.4	5.6	3.4	2.5
2000-09	-1.0	6.3	3.0	2.5
2001-10	1.4	5.8	2.4	2.3
2002-11	2.9	5.8	2.0	2.5
2003-12	7.1	5.2	1.8	2.4
2004-13	7.4	4.5	1.7	2.4
2005-14	7.7	4.7	1.5	2.1
2006-15	7.3	4.5	1.2	1.9
2007-16	6.9	4.3	0.8	1.8
2008-17	8.5	4.0	0.4	1.6
2009-18	13.1	3.5	0.4	1.8
2010-19	13.6	3.7	0.6	1.8
2011-20	13.9	3.8	0.6	1.7
2012-21	16.6	2.9	0.6	2.1
Winning Percentage:	**79.3%**	**16.1%**	**4.6%**	

Appendix D: Histogram of 1-, 5- & 10-Year S&P 500 Index Returns

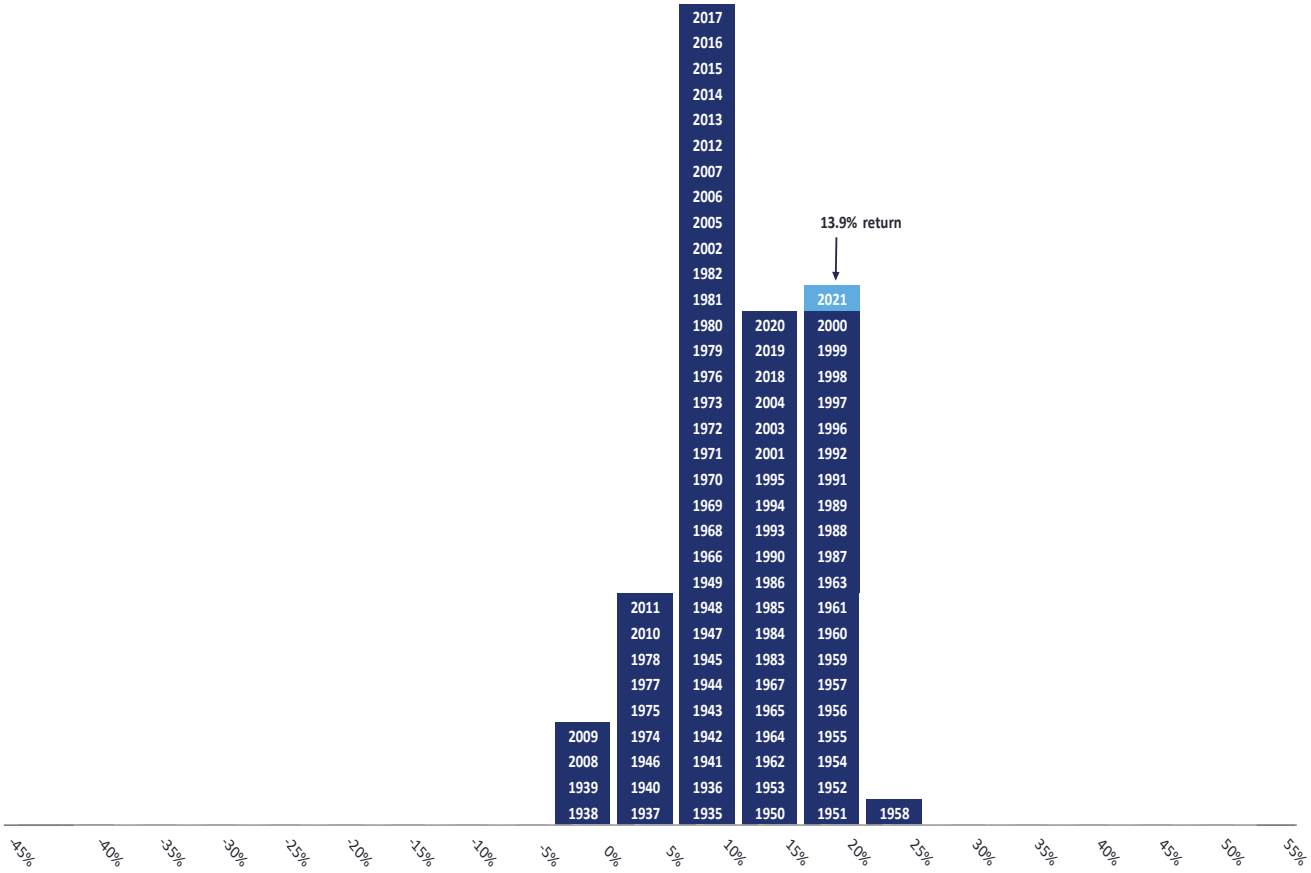
1-Year Returns Ending



5-Year Annualized Returns Ending



10-Year Annualized Returns Ending



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DISCUSSION SHEET

Employees' Retirement Fund
Board of Trustees Meeting

May 10, 2022

Issue: Baillie Gifford & Co.

Attachments: None

Discussion: Baillie Gifford returns have underperformed the MSCI ACWI x-US benchmark for the year-to-date period ending May 9, 2022.

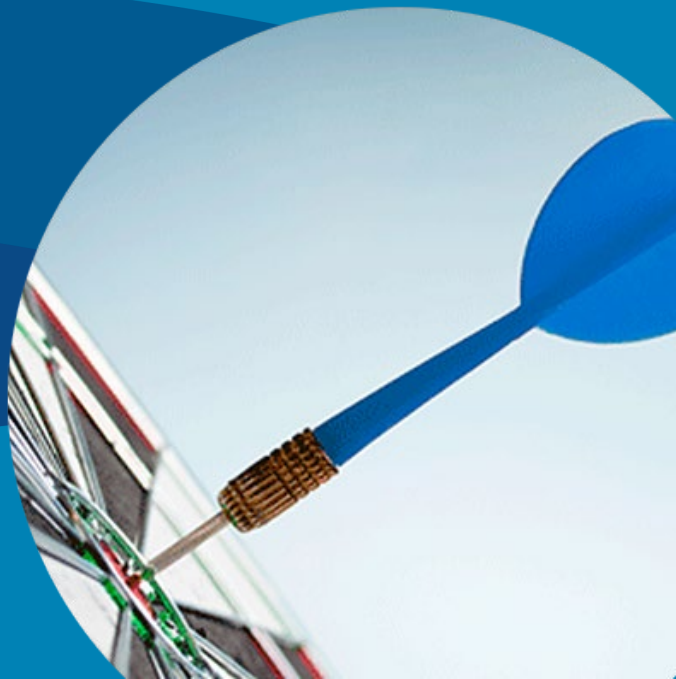
We recommend that Baillie Gifford be placed on watch for six months and re-evaluated at that time. ERF will review their monthly performance during this time.

Recommendation: Suggested motion for the approval is as follows: Move to approve placing Baillie Gifford & Co. on watch for six months.

City of Dallas Employees' Retirement Fund

December 31, 2021

Final Valuation Results



Actuarial Valuation

- Prepared as of December 31, 2021, using member data, financial data, benefit and contribution provisions, actuarial assumptions and methods
- Purposes:
  - Measure the actuarial liabilities of the ERF
  - Determine actuarial required contribution rate
    - Current Total Obligation Rate
    - Current Adjusted Total Obligation Rate
  - Provide other information for reporting
    - GASB #67 & #68, Annual Comprehensive Financial Report
  - Explain changes in actuarial condition of the Fund

Key Issues and Changes

- ERF's investment return was above its investment target of 7.25% on both a market value and actuarial value basis in 2021
  - Return on market value was 16.87%
    - Dollar-weighted return
    - Versus preliminary return of 14.46%
  - Excess in investment income of $347 million
    - $40 million of deferred shortfalls were offset, $61 million recognized in this valuation, with the remaining $246 million deferred
- $29 million liability experience loss in 2021
  - Loss from cost of living adjustment being double the assumption
  - Loss from salary increases being higher than assumed
  - Gain on retiree mortality (more deaths than assumed)

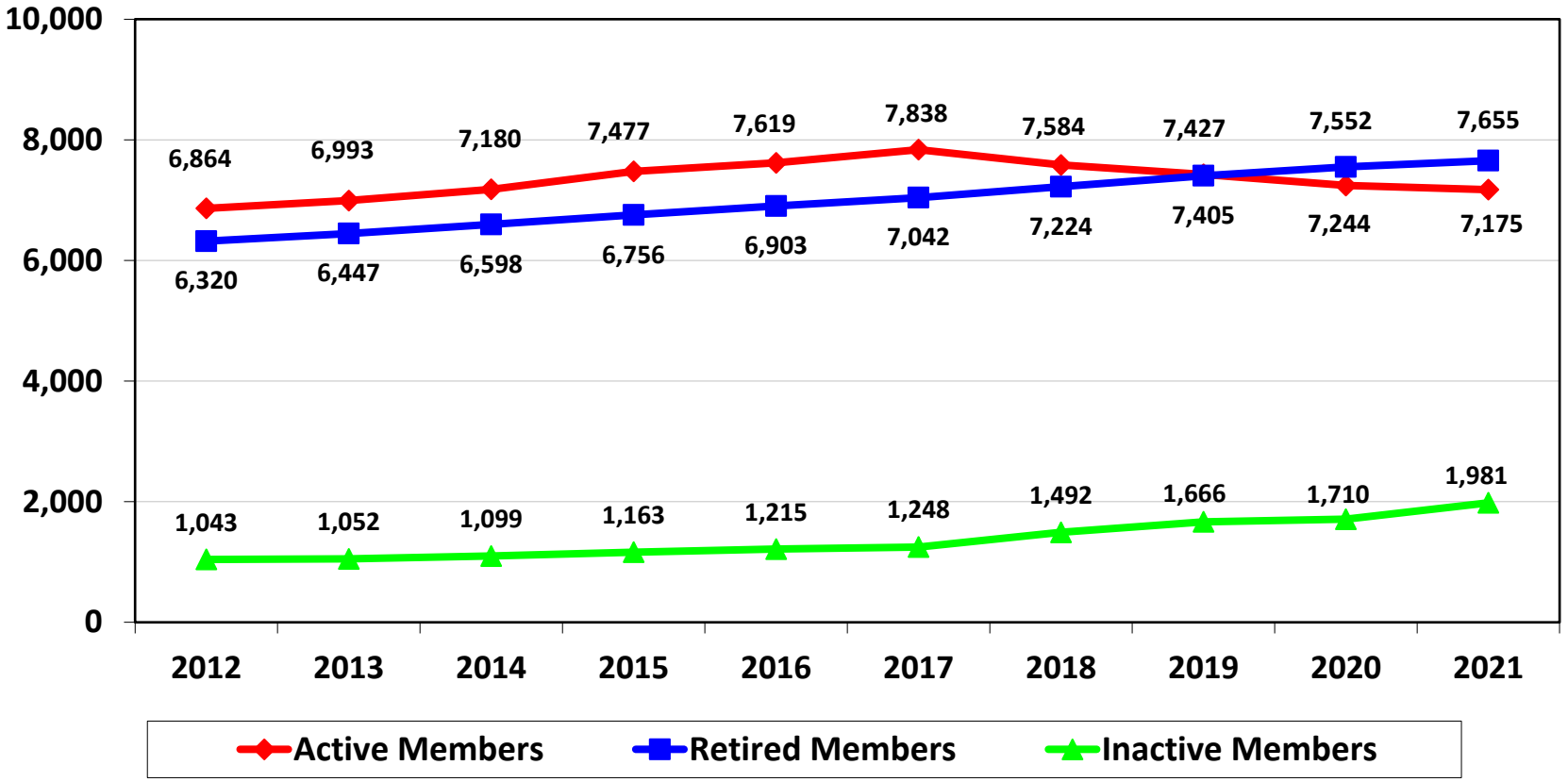
Key Issues and Changes

- Payroll increased more than expected, despite slight drop in active membership
  - 3.3% increase versus 2.5% increase assumption
- Current Total Obligation Rate exceeds 36% of pay cap
  - CATOR is 36.00%
  - City contribution rate is 22.68%
  - Member rate is 13.32%
- The new Tier became effective January 1, 2017
  - Over 2,800 employees in new Tier at December 31, 2021
    - New Tier is approximately 39% of the active employees
  - NC% decreased from 20.11% last year to 19.71% this year

Membership

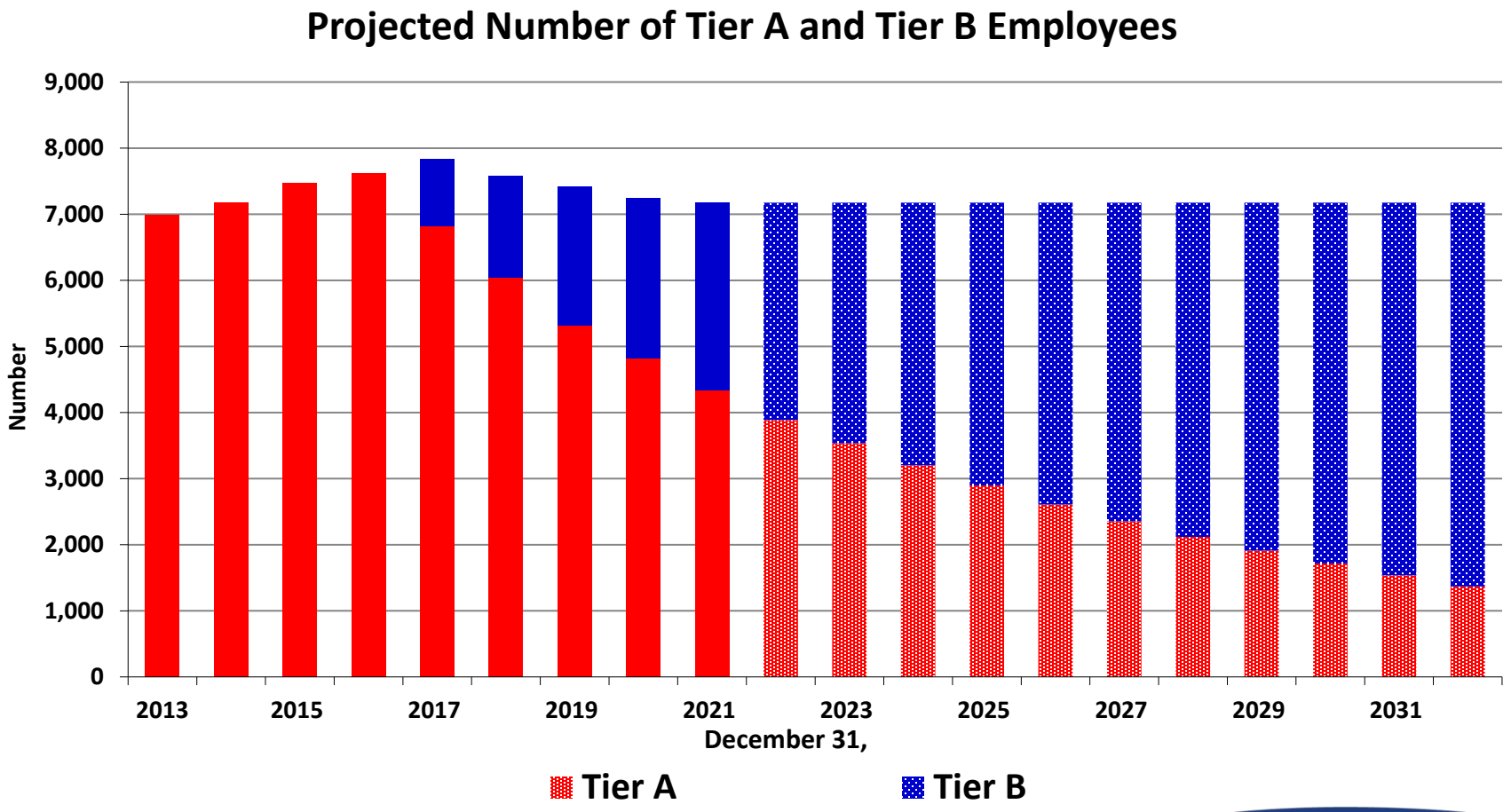
- The number of active members decreased from 7,244 to 7,175, a 1.0% decrease
- Payroll for active members increased from $428.8 million to $442.9 million, a 3.3% increase
- The number of members in payment status increased by a net 103, from 7,552 to 7,655, a 1.4% increase
- There are 0.9 active members for each retiree, compared to 1.2 in 2010

Active Members and Retired Members



Note: active membership decreased 1.0% versus last year

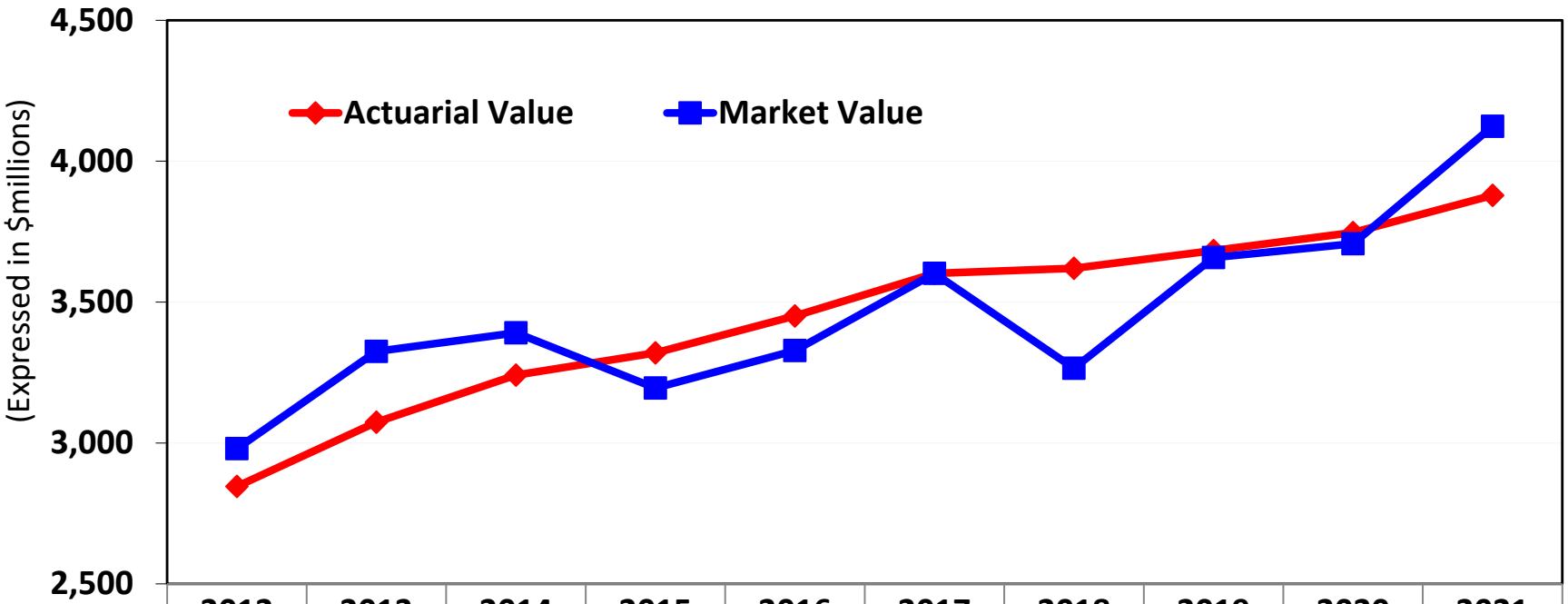
Projected Active Membership



Assets

- Fair market value (unaudited) increased from $3.707 billion to $4.124 billion
- Return on market value of assets was approximately 16.87% in 2021
- Actuarial value is $3.879 billion, compared to $3.747 billion last year
- Actuarial rate of return was 8.85% in 2021
  - Greater than 7.25% assumed rate
- Actuarial value is 94.0% of fair market value
- Net deferred investment gains of $246 million still to be recognized in actuarial value of assets

Historical Asset Values



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Actuarial Value	2,846	3,074	3,241	3,320	3,451	3,602	3,620	3,683	3,747	3,879
Market Value	2,980	3,325	3,391	3,195	3,328	3,602	3,265	3,658	3,707	4,124

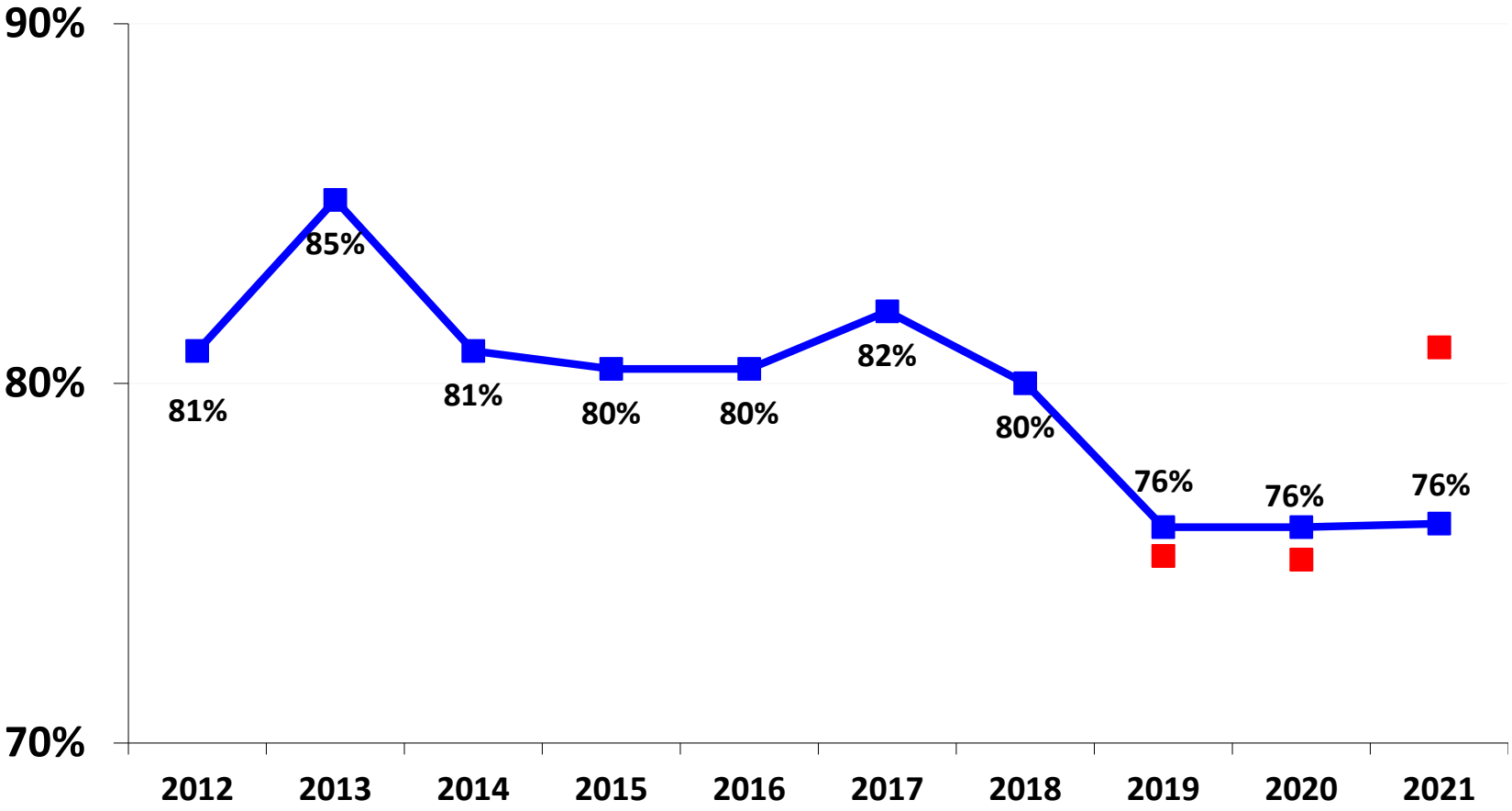
Actuarial Results

- Actuarial Accrued Liability (AAL) of benefits is now $5.094 billion
- Unfunded Actuarial Accrued Liability (UAAL) increased from $1,186 million to $1,216 million
  - Expected to increase to $1,211 million
  - Reflects $58 million gain on actuarial value of assets and $29 million loss on liabilities
  - UAAL increased $34 million due to difference between calculated contribution rate and actual contribution rate

Actuarial Results

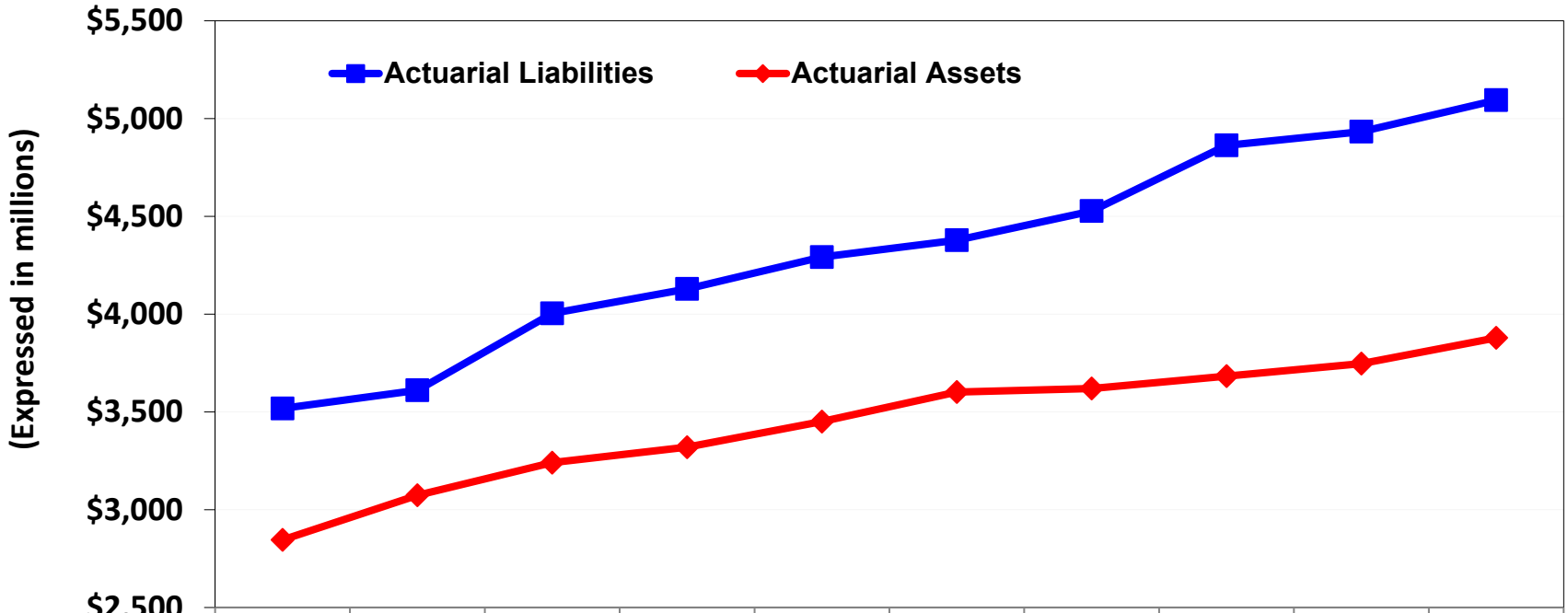
- Funded ratio (actuarial assets divided by actuarial accrued liability) increased from 76.0% in 2020 to 76.1% in 2021
- Funded ratio using market value is 81.0%
  - Was 75.1% last year
- Total 30-year contribution rate is 34.64%
  - Does not include POB debt service payments
  - Based on open-group projection
  - 34.85% last year

Historical Funded Ratios



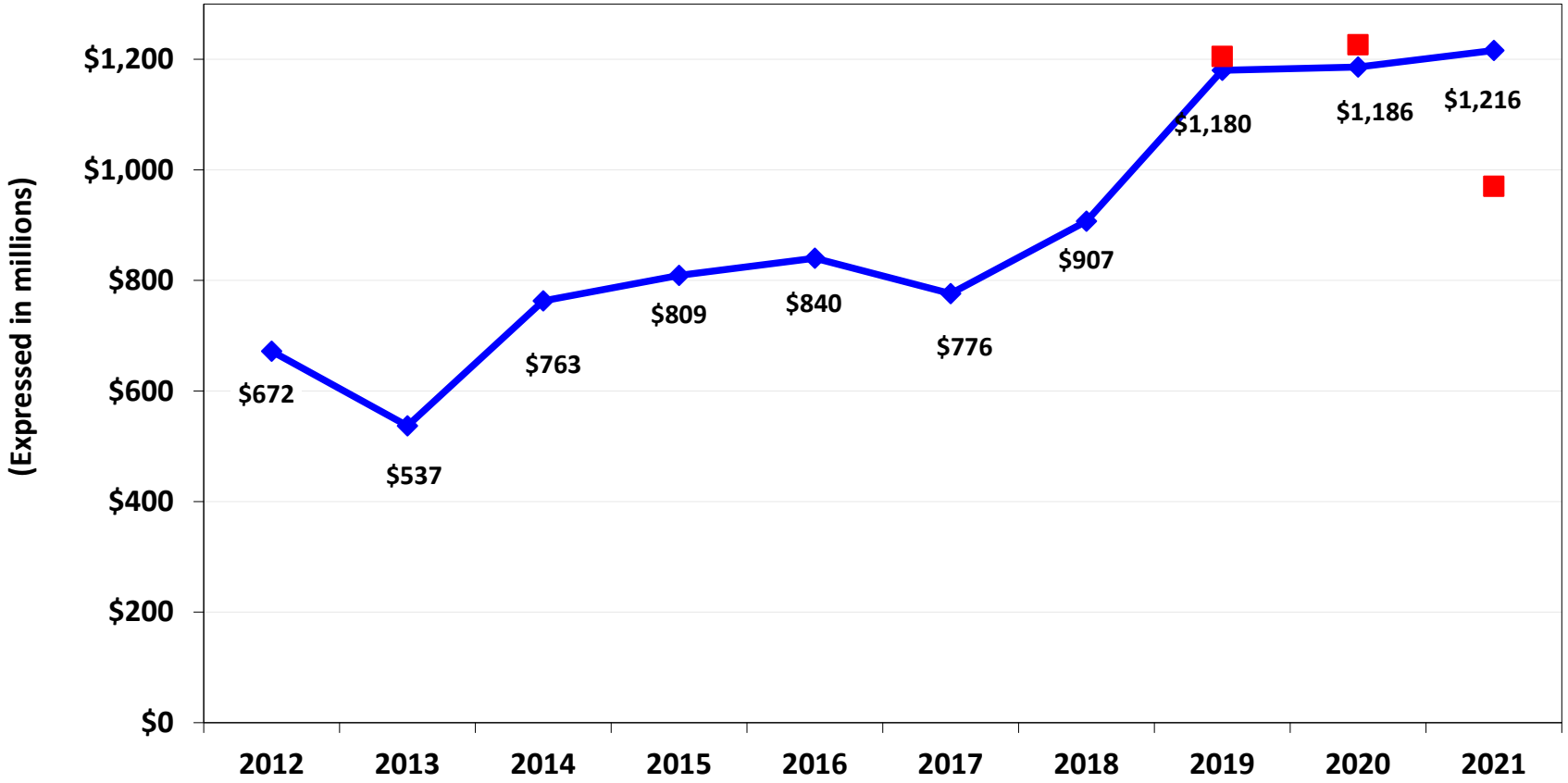
Funded ratio using market value of assets as of December 31, 2019 is 75%.
Funded ratio using market value of assets as of December 31, 2020 is 75%.
Funded ratio using market value of assets as of December 31, 2021 is 81%.

Liabilities vs. Assets



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Actuarial Liabilities	3,518	3,611	4,004	4,129	4,292	4,378	4,527	4,863	4,933	5,094
Actuarial Assets	2,846	3,074	3,241	3,320	3,451	3,602	3,620	3,683	3,747	3,879

Unfunded Actuarial Accrued Liability (UAAL)



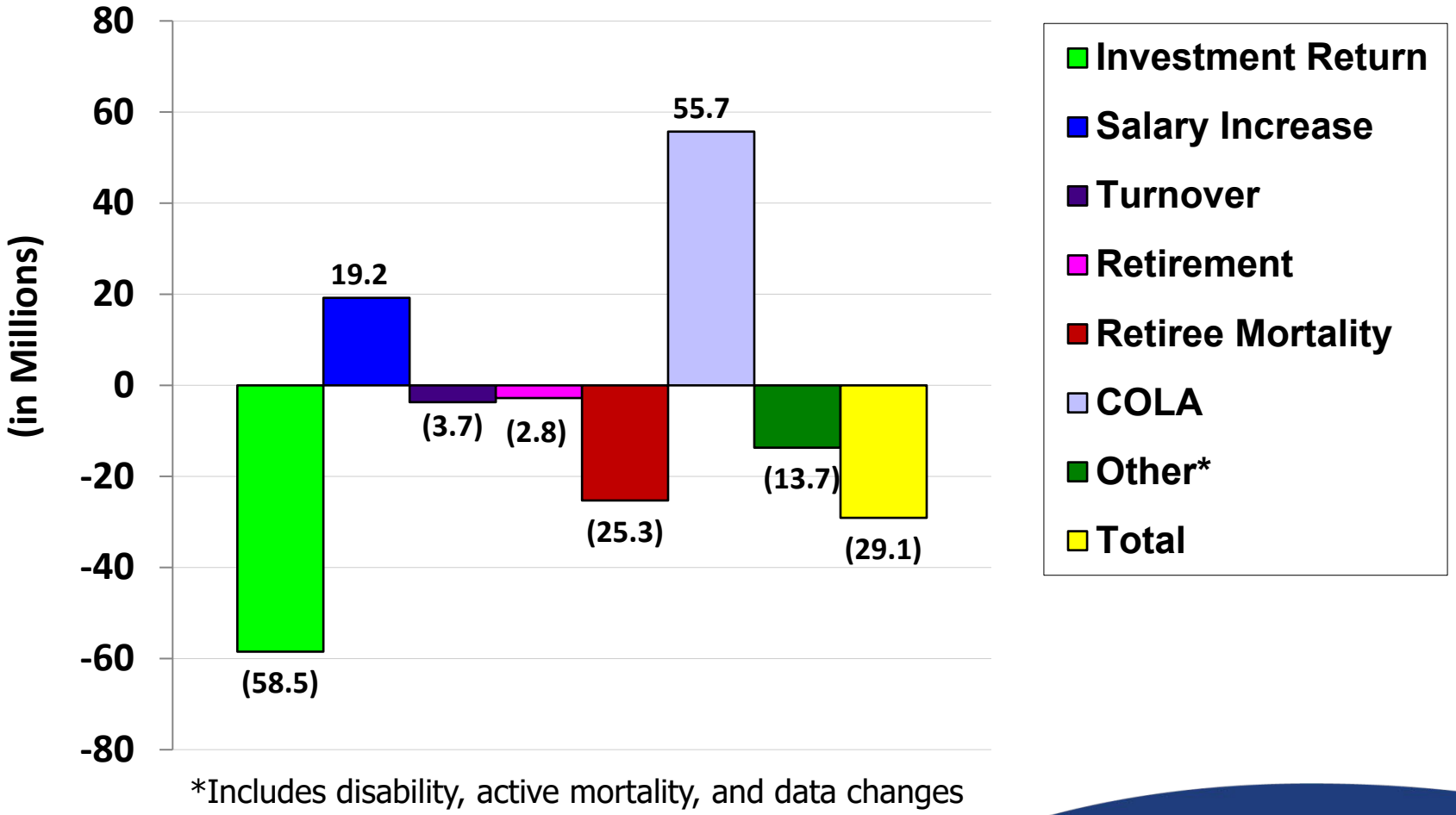
UAAL based on market value of assets as of December 31, 2019 is $1,205 million.
UAAL based on market value of assets as of December 31, 2020 is $1,226 million.
UAAL based on market value of assets as of December 31, 2021 is $1,056 million.

Reconciliation of UAAL

▪ UAAL 12/31/20		$1,185.8
▪ Expected Changes		
• Amortization Payment for 2021	(59.0)	
• Interest Adjustments	83.9	
		24.9
▪ Difference between expected and actual contributions		33.9
▪ Actuarial Experience Gain		(29.1)
▪ UAAL 12/31/21		$1,215.5

$ in Millions

2021 Actuarial (Gains) and Losses



*Includes disability, active mortality, and data changes

Actuarial Required Contribution Rate

- We use an Open Group projection to determine the Actuarially Required Contribution Rate (ARC)
  - Reflects declining average Normal Cost % over time due to new tier of benefits
  - Rate is determined as level percentage of pay so amortization rate is increasing over time
  - Based on 30-year funding period
  - Debt service is not included

Actuarial Required Contribution Rate

- ARC as of December 31, 2021 is 34.64%
  - Decrease from 34.85% in prior year
  - Compares to actual rate expected to be contributed in fiscal year 2023 of 27.44%
    - Total rate of 36.00% of pay less POB Credit of 8.56%
  - Slight decrease due to investment gains and greater than expected payroll growth

Fiscal Year Beginning October 1st

		2021	2022
1.	Prior Adjusted Total Obligation Rate	36.00%	36.00%
2.	Actuarially Required Contribution Rate	34.85%	34.64%
3.	Debt Service		
	a) Scheduled Debt Service Payment	$ 39,200,283	$ 38,843,241
	b) Projected Payroll	$439,544,160	$453,934,344
	c) Pension Obligation Bond Credit (a/b)	8.92%	8.56%
4.	Current Total Obligation Rate (2+3c)	43.77%	43.20%
5.	Current Adjusted Total Obligation Rate	36.00%	36.00%
6.	Allocation of Contribution Rates for Fiscal Year Beginning 1st		
	a) Employee (5 x .37)	13.32%	13.32%
	b) City (5 x .63)	22.68%	22.68%
7.	City Contribution to Fund (6.b. – 3.c)	13.76%	14.12%

The formula for contributions are based on Dallas City Code 40A originally established with City ordinance 25695

Valuation Summary

- The Actuarially Required Contribution to the Fund decreased from 34.85% to 34.64%
- The total contribution rate including the debt service decreased from 43.77% to 43.20%
- $246 million in deferred investment gains still to be recognized or offset

Valuation Summary

- Calculated contribution rate is projected to remain relatively level until POBs are paid off
  - Assuming all assumptions are met including 7.25% return on AVA
  - Impact of shortfall in contributions because of 36.00% maximum rate is being somewhat offset by
    - 30-year rolling amortization period
    - Decrease in average normal cost due to new tier of benefits
- Actual contribution rate will remain at 36% cap for foreseeable future

Level 30-Year Rate

- Actuarially Required Contribution rate is determined without regards to the debt service payments
  - Actual cash flows will reflect the debt service payments
- More useful number for decision making purposes would be the level 30-year contribution rate including the debt service
  - We have determined this rate as 40.02% of pay

GASB Preview

- GASB 67/68
  - Fund once again passes the Single Discount Rate (SDR) test
  - Anticipated Single Discount Rate is 7.25%
  - Versus 5.27% last year
- NPL decreased from $2.5 billion last year to an estimated $1.0 billion as of 12-31-2021
  - Volatile number
    - Due to the fixed rate contribution ERF has bounced back and forth on passing the SDR test
    - Passed in 2014, 2016, 2017 and 2021
    - Did not pass in intervening years

Employees' Retirement Fund of the City of Dallas

Actuarial Valuation Report
as of December 31, 2021

P: 469.524.0000 | www.grsconsulting.com

May 6, 2022

Board of Trustees
Employees' Retirement Fund of the City of Dallas
1920 McKinney Avenue
10th Floor
Dallas, Texas 75201

Dear Members of the Board:

We are pleased to present our report of the actuarial valuation of the Employees' Retirement Fund of the City of Dallas ("ERF" or the "Fund") as of December 31, 2021.

This valuation provides information on the financial health of ERF. It includes a determination of the actuarially calculated contribution rates for the 2022 calendar year. In addition, it also contains the information necessary to determine the current total obligation rate and the current adjusted total obligation rate for the fiscal year beginning October 1, 2022 per City Ordinance. The current adjusted total obligation rate is a function of the previous year's adjusted total obligation rate, this year's actuarially calculated contribution rate, and the rate necessary to make the debt service payment on the previously issued pension obligation bonds for fiscal year 2023.

In addition, the report provides various summaries of the data. A separate report is issued with regard to valuation results determined in accordance with Governmental Accounting Standards Board (GASB) Statements 67 and 68. Results of this report should not be used for any other purpose without consultation with the undersigned. Valuations are prepared annually as of December 31st, the last day of the ERF plan year. This report was prepared at the request of the Board and is intended for use by the ERF staff and those designated or approved by the Board. This report may be provided to parties other than ERF staff only in its entirety and only with the permission of the Board.

As authorized in Chapter 40A-4(a)(16) of the Dallas City Code, the actuarial methods and assumptions are set by the Board of Trustees, based upon recommendations made by the plan's actuary. An experience study was performed for the five-year period ending December 31, 2019. As a result of that study, revised assumptions were adopted by the Board effective with the valuation as of December 31, 2019. There were no changes in the actuarial assumptions or methods since the prior valuation.

We believe the assumptions are internally consistent, reasonable, and, where appropriate, based on the actual experience of the ERF. All of the methods and assumptions used in this valuation were selected in compliance with the Actuarial Standards of Practice. All actuarial methods and assumptions are described under Section P of this report. The results of the actuarial valuation are dependent on the actuarial assumptions used. Actual results can and almost certainly will differ, as actual experience deviates from the assumptions.

Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rates and funding periods. Due to the limited scope of this assignment, GRS did not perform an analysis of the potential range of such possible future differences. The actuarial calculations are intended to provide information for rational decision making. Other than the sensitivity analysis shown in Section L, this report does not include a more robust assessment of the future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

This valuation is based on the provisions of ERF in effect as of the valuation date, data on the ERF membership and information on the asset values of the Fund as of December 31, 2021. The member, annuitant and asset data used in the valuation were all prepared and furnished by ERF staff. While certain checks for reasonableness were performed, the data used was not audited.

To the best of our knowledge, this report is complete and accurate and was conducted in accordance with the Actuarial Standards of Practice as set forth by the Actuarial Standards Board and in compliance with the provisions of the Dallas City Code. The undersigned are independent actuaries and consultants. Mr. Falls is a Fellow of the Society of Actuaries, an Enrolled Actuary, and a Member of the American Academy of Actuaries and he meets the Qualification Standards of the American Academy of Actuaries. Both Mr. Falls and Mr. Ward have significant experience in performing valuations for large public retirement systems.

We would like to thank the ERF staff for their assistance in providing all necessary information to complete this valuation. Their courteous help is very much appreciated. We look forward to discussing this actuarial valuation report with you at your convenience. Please do not hesitate to let us know if you have any questions or need additional information.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

Lewis Ward
Consultant

R. Ryan Falls, FSA, EA, MAAA
Senior Consultant

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EXECUTIVE SUMMARY

($ in 000s)

The key results from the actuarial valuation of the Employees' Retirement Fund of the City of Dallas as of December 31, 2021 may be summarized as follows:

	December 31, 2020	December 31, 2021
· Members		
- Actives	7,244	7,175
- Benefit recipients	7,552	7,655
- Deferred vested*	911	974
- Other terminated*	799	1,007
- Total	16,506	16,811
· Covered payroll (including overtime)	$ 428,824	$ 442,863
· Normal cost	$ 84,929	$ 85,892
as % of expected payroll	20.11%	19.71%
· Actuarial accrued liability	$ 4,932,886	$ 5,094,362
· Actuarial value of assets	$ 3,747,078	$ 3,878,846
· Market value of assets	$ 3,706,753	$ 4,124,443
· Unfunded actuarial accrued liability (UAAL)	$ 1,185,808	$ 1,215,516
· Estimated yield on assets (market value basis)	6.42%	16.87%
· Estimated yield on assets (actuarial value basis)	6.81%	8.85%
· Contribution Rates		
- Prior Adjusted Total Obligation Rate	36.00%	36.00%
- Current Total Obligation Rate	43.77%	43.20%
- Current Adjusted Total Obligation Rate	36.00%	36.00%
· Actuarial gains/(losses)		
- Assets	$ (16,030)	$ 58,475
- Actuarial liability experience	$ 69,812	$ (29,375)
- Assumption and method changes	$ 0	$ 0
· 30-year level % of pay funding cost	$ 153,181	$ 157,243
as % of payroll (Employee + City)	34.85%	34.64%
· Funded ratio		
- Based on actuarial value of assets	76.0%	76.1%
- Based on market value of assets	75.1%	81.0%

** Deferred vested are members who have applied for a deferred pension. Other terminations are other members who have terminated and still have contribution balances in the Fund.*

PURPOSES OF THE ACTUARIAL VALUATION

At your request, we have performed the actuarial valuation of the Employees' Retirement Fund of the City of Dallas ("ERF" or the "Fund") as of December 31, 2021.

The purposes of an actuarial valuation are as follows:

- To determine the funding status of ERF as of the valuation date;
- To develop the actuarially determined level of contributions for ERF for the 2022 calendar year; and
- To develop the current total obligation rate and the current adjusted total obligation rate for the fiscal year beginning October 1, 2022.

REPORT HIGHLIGHTS

($ in 000s)

The following is a set of key actuarial results from the prior year's valuation as compared to the current year:

	Valuation Date	
	December 31, 2020	**December 31, 2021**
Contribution Rates (% of Payroll)		
Normal Cost (including administrative expense)	21.44%	21.19%
Total Actuarial Contribution Rate	34.85%	34.64%
Total Projected Actuarial Contribution	$153,181	$157,243
Funded Status (on AVA basis)		
Actuarial Accrued Liability	$4,932,886	$5,094,362
Actuarial Value of Assets	3,747,078	3,878,846
Unfunded Actuarial Accrued Liability	$1,185,808	$1,215,516
Funded Ratio	75.96%	76.14%

FUNDING PROCESS

Based on the previous work of the Employees' Retirement Fund Study Committee, which was ratified by the ERF Board, the Dallas City Council and the voters of Dallas, a new funding process commenced October 1, 2005. From this date forward, a new "current adjusted total obligation rate" will be contributed jointly by the City (63%) and the Membership (37%). This current adjusted total obligation rate will cover both the debt service tied to the pension obligation bonds issued in 2005 and the contributions to the ERF. In subsequent years, the contribution rate changes only if the actuarial valuation develops a "current total obligation rate" which differs from the "prior adjusted total obligation rate" by more than 3.00% (plus or minus).

As shown in Section N – Table 3 and discussed later in this report, the "current total obligation rate" (Item 4 in Table 3) exceeds the "prior adjusted total obligation rate" (Item 1 in Table 3) as of December 31, 2021. This means that the "current adjusted total obligation rate" will remain at 36.00% of active member payroll for the fiscal year beginning October 1, 2022. It should be noted that under the contribution corridor methodology, the "current adjusted total obligation rate" would have been higher if not for the maximum rate of 36.00% allowed under Chapter 40A of the Dallas City Code.

ACTUARIAL CONTRIBUTIONS

As shown in Section N – Table 2, the Actuarially Required Contribution Rate developed in this actuarial valuation is 34.64% of active member payroll. This rate excludes the amount needed to make the City's debt service payment on the pension obligation bonds in fiscal year 2023. This rate is the total level rate of pay (member + City) that would need to be contributed each of the next 30 years to pay off the unfunded liability of the Fund over that 30-year period. Note that because the total rate is assumed to remain level and the average normal cost as a percentage of pay is expected to decline over that time period (due to Tier B), the payment towards the unfunded liability as a percentage of pay is expected to increase over the 30-year period.

As shown in Section N – Table 3 of this report, the debt service payment is determined to be 8.56% of projected payroll. The sum of these rates is 43.20% (the Current Total Obligation Rate), which is 7.20% more than the Prior Adjusted Total Obligation Rate of 36.00%. Because the total contribution rate cannot exceed 36.00%, the total contribution rate in fiscal year 2023 (the Current Adjusted Total Obligation Rate) to fund the ERF and make the debt service payment on the pension obligation bonds will be 36.00%, which is the maximum rate allowed under Chapter 40A of the Dallas City Code.

The members contribute 37% of the Current Adjusted Total Obligation Rate and the City contributes 63%. Hence, the members' portion of the 36.00% total contribution rate will be 13.32% and the City portion will be 22.68%. All of the member contribution rate will be contributed to the ERF. As noted above, 8.56% of the City's contribution rate will go towards the debt service on the pension obligation bonds and the remaining 14.12% will be contributed towards the ERF. This means a total contribution rate of 27.44% will be contributed to the ERF for the 2023 fiscal year, which compares to the actuarially calculated rate of 34.64%.

ACTUARIAL ASSUMPTIONS

Section P of this report includes a summary of the actuarial methods and assumptions used in this valuation. In short, costs are determined using the Entry Age Normal actuarial cost method. The assumed annual investment return rate is 7.25% and includes an annual assumed rate of inflation of 2.50%.

There were no changes in the actuarial assumptions since the prior valuation report. Please see Section P of this report for a summary description of these methods and assumptions.

ERF BENEFITS

The City of Dallas voters approved a new tier of benefits for City of Dallas municipal employees hired after December 31, 2016.

There were no changes in the benefit provisions of ERF since the prior valuation. Please see Section Q for a summary description of the ERF benefits.

EXPERIENCE DURING PREVIOUS YEARS

An Actuarial (Gain)/Loss Analysis [(G)/L] reviews the effects of the actual experience on the expected Unfunded Actuarial Accrued Liability (UAAL). If any unexpected difference increases assets or reduces liabilities (i.e., reductions in the UAAL), we have an actuarial gain. Unexpected increases in the UAAL results in an actuarial loss.

On a market value return basis, the Fund returned approximately 16.87% (calculated on a dollar-weighted basis, net of investment expenses). Given this return, the actual investment income was greater than the expected investment income on the market value of assets; therefore, an investment gain occurred. Please see Section N – Table 6 for the determination of the actuarial value of assets (AVA) and page 48 for a description of the AVA methodology. As developed on Section N – Table 9a, there was a $58.5 million gain on the actuarial value of assets as of December 31, 2021. The rate of return on the actuarial value of assets for 2021 was 8.85% (calculated on a dollar-weighted basis, net of investment expenses). This result was greater than the investment return assumption of 7.25%.

As developed on Section N – Table 8, ERF experienced an overall actuarial experience gain in calendar year 2021 in the amount of $29.1 million. Since there was a $58.5 million gain on the actuarial value of assets, this implies there was a liability actuarial loss of about $29.4 million derived from demographic assumptions and non-investment economic assumptions (cost-of-living-adjustment). Please see Section N – Table 9b for an analysis of the experience loss by source.

The total (G)/L for the prior 5 years is broken down as follows ($ in millions):

		2017	2018	2019	2020	2021
1)	Actuarial (Gain)/Loss on Assets	($19.85)	$88.73	$35.80	$16.03	($58.48)
2)	Actuarial (Gain)/Loss on Liabilities	(61.02)	11.35	(6.16)	(69.81)	29.38
3)	Total Actuarial (Gain) or Loss (1+2)	($80.87)	$100.08	$29.64	($53.78)	($29.10)

The unfunded actuarial accrued liability (UAAL) also increased $33.9 million due to the shortfall between the calculated contribution rate and the actual contributions during 2021.

ASSET INFORMATION

The assets of the Fund (on a market value basis) increased from $3,707 million as of December 31, 2020 to $4,124 million as of December 31, 2021.

An asset smoothing method (adopted by the Board) is used to recognize asset gains and losses. The purpose of such a smoothing method is to allow the use of market values, but to dampen the effect of the typical year-to-year market fluctuations. Please see page 48 of this report for a description of the smoothing method (actuarial value of asset method). See Table 6 in Section N of this report for the determination of the actuarial value of assets as of December 31, 2021.

The actuarial value of assets has increased from $3,747 million to $3,879 million during 2021. The actuarial assets are greater than the expected actuarial assets, $3,821 million, due to favorable investment experience in calendar year 2021. This resulted in an actuarial gain on the actuarial assets of $58.5 million.

The rate of return on investments for 2021 on the actuarial value of assets was 8.85%, compared to 6.81% in 2020. The detailed determinations of asset values utilized in this valuation and the change in assets in the last year are exhibited in Tables 4 and 5 of Section N of this report.

FUNDED STATUS

The funded status of ERF is measured by the Funded Ratio and the Unfunded Actuarial Accrued Liability (UAAL). The Funded Ratio is the ratio of the actuarial value of assets available for benefits to the actuarial accrued liability (AAL) of the Fund on the valuation date. Therefore, it reflects the portion of the AAL that is covered by ERF assets. The UAAL is the difference between these two amounts.

A Funded Ratio of 100% means that the funding of ERF is precisely on schedule as of the particular valuation date. In addition, an increasing funded ratio from year-to-year may also mean that the funding of ERF is on schedule. By monitoring changes in the Funded Ratio each year, we can determine whether or not funding progress is being made.

Based on the market value of assets, the Funded Ratio of ERF increased from 75.1% as of December 31, 2020 to 81.0% as of December 31, 2021. Based on the actuarial value of assets, the Funded Ratio of ERF increased from 76.0% as of December 31, 2020 to 76.1% as of December 31, 2021.

The UAAL increased from $1,185.8 million as of December 31, 2020 to $1,215.5 million as of December 31, 2021. Since the UAAL is positive, this implies the actuarial accrued liabilities exceed the actuarial assets of the Fund as of December 31, 2021.

The actual $29.7 million increase in the UAAL was less than the expected increase of $58.8 million ($24.9 million due to negative amortization and $33.9 million as a result of the actual contributions being less than the actuarially determined contribution rate), resulting in a net actuarial experience gain in total. The primary reasons the increase in the UAAL was less than expected were favorable investment experience and mortality experience.

The funded status is one of many metrics used to show trends and develop future expectations about the health of a retirement system. The funded status measure itself is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations or assessing the need for or the amount of future contributions since it does not reflect normal cost contributions, the timing of amortization payments, or future experience other than expected.

GASB DISCLOSURE

Governmental Accounting Standards Board (GASB) Statement Numbers 67 and 68 detail the current accounting standards for ERF and the Fund's sponsor, the City of Dallas, Texas. These new standards were effective with the plan year ending December 31, 2014 for the Fund and the fiscal year ending September 30, 2015 for the City. The new standards created a clear distinction between the funding requirements of a pension plan and the accounting requirements. Because of these changes, the GASB disclosure information will no longer be included in the actuarial valuation report, but will instead be provided under separate cover.

Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. Investment risk – actual investment returns may differ from the expected returns;
2. Asset/Liability mismatch – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
6. Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions (Continued)

The effects of certain trends in experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise, if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The Current Adjusted Total Obligation Rate shown in the Executive Summary may be considered as a minimum contribution rate that complies with Chapter 40A of the Dallas City Code. However, due to the contribution rate cap, this is less than the actuarially calculated rate. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

PLAN MATURITY MEASURES

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Several generally accepted plan maturity measures are described below and are followed by a table showing a 10-year history of the measurements for Dallas ERF.

RATIO OF MARKET VALUE OF ASSETS TO PAYROLL

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

RATIO OF ACTUARIAL ACCRUED LIABILITY TO PAYROLL

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions (Continued)

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

RATIO OF ACTIVES TO RETIREES AND BENEFICIARIES

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees, resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives, resulting in a ratio below 1.0.

RATIO OF NET CASH FLOW TO MARKET VALUE OF ASSETS

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

DURATION OF PRESENT VALUE OF BENEFITS

The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, duration of 10 indicates that the liability would increase approximately 10% if the assumed rate of return were lowered 1%.

ADDITIONAL RISK ASSESSMENT

Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability. While a robust measurement of additional risk assessment is outside the scope of the annual actuarial valuation, we have included a scenario test of a 1% increase or 1% decrease in the investment return assumption. The results of this test are shown at the end of this section.

Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions (Continued)

	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Ratio of the market value of assets to total payroll	9.31	8.64	8.43	7.71	8.55	8.13	8.12	9.34	9.72	9.01
Ratio of actuarial accrued liability to payroll	11.50	11.50	11.21	10.68	10.39	10.48	10.50	11.03	10.55	10.64
Ratio of actives to retirees and beneficiaries	0.94	0.96	1.00	1.05	1.11	1.10	1.11	1.09	1.08	1.09
Ratio of net cash flow to market value of assets	-4.6%	-4.9%	-4.8%	-5.1%	-4.3%	-4.4%	-4.5%	-4.2%	-4.4%	-5.1%
Duration of the actuarial present value of benefits*	12.54	12.69	12.37	NA	NA	NA	NA	NA	NA	NA

*Duration measure not available prior to 2019

Impact on Funding Metrics of Investment Return Assumption +/- 1%

	Investment Return Assumption		
Cost Item	6.25%	7.25%	8.25%
Normal Cost % (excluding admin expenses)	24.39%	19.71%	16.23%
UAAL ($ in millions)	$1,813.8	$1,215.5	$715.0
30-year funding rate (employee + City)	43.79%	34.64%	26.21%
Funded Ratio	68.1%	76.1%	84.4%
Funding Period	Infinite	51 years	28 years

CLOSING COMMENTS

The unfunded actuarial accrued liability of the Fund has increased by less than expected due to favorable experience from investments and mortality. Offsetting these gains, there were losses from the 5.00% cost of living adjustment and from salary increases being greater than expected.

The calculated contribution rate necessary to pay the Fund's normal cost and amortize the UAAL over 30 years is 34.64% of pay. When the debt service payment on the Pension Obligation Bonds is considered, the total contribution rate is 43.20% of payroll. However, Chapter 40A of the Dallas City Code limits the contribution rate to 36.00% of payroll, therefore, the total rate to be contributed by the employees and the City for fiscal year 2023 will be 36.00% of pay.

Following adoption of the proposed changes by the ERF Board, the Dallas City Council, and approval by the City of Dallas voters, the new tier of benefits became effective for employees hired after December 31, 2016 and the outlook for the ERF improved. Based on our projections, reflecting the new tier of benefits and assuming the actuarial assumptions are exactly met (including a 7.25% return on the actuarial value of assets), ERF is expected to be fully funded in approximately 51 years.

ACTUARIAL TABLES

Summary of Actuarial Values
As of December 31, 2021

($ in 000s)

		Entry Age Actuarial Values		
	APV* of Projected Benefits	Actuarial Accrued Liability (AAL)	Normal Cost $	Normal Cost % of Pay**
1 Active Members				
a. Retirement	$ 1,899,956	$ 1,456,787	$ 62,161	14.26%
b. Death	19,016	11,438	1,035	0.24%
c. Disability	12,339	4,747	1,044	0.24%
d. Termination	141,178	(5,505)	19,634	4.50%
e. Health Subsidy	42,759	31,622	2,018	0.47%
Total	$ 2,115,248	$ 1,499,089	$ 85,892	19.71%
2 Benefit Recipients	3,456,659	3,456,659		
3 Other Inactive	138,614	138,614		
4 Total Actuarial Values of Benefits	$ 5,710,521	$ 5,094,362	$ 85,892	19.71%
5 Actuarial Value of Assets		$ 3,878,846		
6 Unfunded Actuarial Accrued Liability (4 - 5)		$ 1,215,516		
7 Funding Ratio		76.14%		
8 Market Value Measurements				
UAAL on market value		$ 969,919		
Funded Ratio on market value		80.96%		

* *APV – Actuarial Present Value*

** *Percentage of expected payroll for continuing active members.*

Demonstration of Actuarially Required Contribution Rate for FY 2023

Valuation as of December 31,	Actuarially Determined Total Contribution Rate	Projected Compensation for Plan Year (in $M)	Total Contributions to Fund for Plan Year (in $M)	Actuarial Accrued Liability (AAL $M)	Actuarial Value of Assets (AVA $M)	Unfunded Actuarial Accrued Liability (UAAL $M)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2021	34.64%	$ 442.9	$ 153.4	$ 5,094.4	$ 3,878.8	$ 1,215.5
2022	34.64%	454.4	157.4	5,213.8	3,969.9	1,243.9
2023	34.64%	467.6	162.0	5,335.8	4,064.6	1,271.3
2024	34.64%	481.2	166.7	5,451.5	4,154.8	1,296.7
2025	34.64%	495.4	171.6	5,560.5	4,240.4	1,320.2
2026	34.64%	510.0	176.7	5,662.9	4,321.6	1,341.3
2027	34.64%	525.1	181.9	5,758.8	4,398.8	1,360.0
2028	34.64%	540.8	187.3	5,848.9	4,472.9	1,376.0
2029	34.64%	557.2	193.0	5,934.1	4,545.0	1,389.1
2030	34.64%	574.0	198.9	6,014.6	4,615.6	1,399.1
2031	34.64%	591.8	205.0	6,091.1	4,685.6	1,405.5
2032	34.64%	610.0	211.3	6,164.7	4,756.7	1,408.0
2033	34.64%	628.2	217.6	6,235.4	4,829.3	1,406.1
2034	34.64%	646.8	224.1	6,303.0	4,903.4	1,399.6
2035	34.64%	666.1	230.7	6,367.5	4,979.6	1,387.9
2036	34.64%	686.1	237.6	6,429.2	5,058.6	1,370.7
2037	34.64%	706.6	244.8	6,488.8	5,141.4	1,347.4
2038	34.64%	727.8	252.1	6,546.9	5,229.3	1,317.6
2039	34.64%	749.8	259.7	6,604.4	5,323.8	1,280.6
2040	34.64%	772.7	267.7	6,662.4	5,426.5	1,235.9
2041	34.64%	796.4	275.9	6,721.8	5,539.0	1,182.7
2042	34.64%	820.8	284.3	6,783.2	5,662.8	1,120.4
2043	34.64%	846.0	293.1	6,847.6	5,799.5	1,048.0
2044	34.64%	872.0	302.1	6,916.5	5,951.5	965.0
2045	34.64%	898.8	311.3	6,991.5	6,121.2	870.3
2046	34.64%	926.2	320.8	7,073.9	6,311.0	762.9
2047	34.64%	954.4	330.6	7,164.8	6,522.8	642.0
2048	34.64%	983.2	340.6	7,265.2	6,758.9	506.3
2049	34.64%	1,012.7	350.8	7,375.8	7,021.1	354.7
2050	34.64%	1,043.0	361.3	7,497.2	7,311.2	186.0
2051	34.64%	1,074.1	372.1	7,630.0	7,631.2	(1.3)

Information for City Ordinance 25695
For the Fiscal Year Commencing October 1, 2022

1	**Prior Adjusted Total Obligation Rate**	36.00%
2	**Actuarially Required Contribution Rate***	34.64%
3	**Debt Service**	
	a Scheduled Debt Service Payment for FY 2023	$ 38,843,241
	b Projected Payroll	$ 453,934,344
	c Pension Obligation Bond Credit Rate (a/b)	8.56%
4	**Current Total Obligation Rate (2 + 3c)**	43.20%
5	**Current Adjusted Total Obligation Rate**	36.00% **
6	**Allocation of Contribution Rates Commencing October 1, 2022**	
	a Employee (5 x .37)	13.32%
	b City (5 x .63)	22.68%

* Actuarially determined level contribution rate as demonstrated on Table 2.

** If the absolute value of the difference between the Prior Adjusted Total Obligation Rate (PATOR) and the Current Total Obligation Rate (CTOR) is less than or equal to 3.0% then:

Current Adjusted Total Obligation Rate (CATOR) = PATOR

otherwise:

1) If PATOR - CTOR > 3.00% then the CATOR is set equal to the greater of:
   a) the average of the Prior Adjusted Total Obligation Rate and the Current Total Obligation Rate; or
   b) 90% of the Prior Adjusted Total Obligation Rate

or

2) If PATOR - CTOR < -3.00% then the CATOR is set equal to the lesser of:
   a) the average of the Prior Adjusted Total Obligation Rate and the Current Total Obligation Rate; or
   b) 110% of the Prior Adjusted Total Obligation Rate

Additionally, the CATOR cannot exceed 36.00%.

Excerpts from City Ordinance 25695

ACTUARIALLY REQUIRED CONTRIBUTION RATE – means, for any fiscal year, a rate of contribution to the fund, expressed as a percentage of members' projected wages for such fiscal year, which is the sum of the following as determined in the actuarial valuation report for the preceding plan year:

(A) the actuarial present value of the pension plan benefits and expenses that are allocated to a valuation period by the actuarial cost method; and

(B) the contribution that will amortize the difference between the actuarial accrued liability of the fund and the actuarial value of the assets of the fund over the period of years required by generally accepted accounting principles.

CITY CONTRIBUTIONS – means, for each pay period ending during a transition year, the city shall contribute to the retirement fund an amount equal to:

(A) 63% times the current total obligation rate for that fiscal year times the members' wages for the pay period, minus

(B) The pension obligation bond credit rate for that fiscal year times the members' wages for the pay period;

and, for each pay period ending during each fiscal year, except for a transition year, the city shall contribute to the retirement fund an amount equal to:

(C) 63% times the current adjusted total obligation rate for that fiscal year times the members' wages for the pay period, minus

(D) The pension obligation bond credit rate for that fiscal year times the members' wages for the pay period.

EMPLOYEE CONTRIBUTIONS – means, for each pay period ending during a transition year, each member shall contribute to the retirement fund an amount equal to:

(A) 37% times the current total obligation rate for that fiscal year times the member's wages for the pay period;

and, for each pay period ending during each fiscal year, except for a transition year, the member shall contribute to the retirement fund an amount equal to:

(B) 37% times the current adjusted total obligation rate for that fiscal year times the member's wages for the pay period.

CURRENT ADJUSTED TOTAL OBLIGATION RATE – means, for any fiscal year, the rate determined by the board as follows, using whichever formula is applicable:

(A) If the current total obligation rate minus the prior adjusted total obligation rate is greater than three, then the current adjusted total obligation rate for such fiscal year is equal to the lesser of:

(i) the prior adjusted total obligation rate plus one-half times the difference of the current total obligation rate minus the prior adjusted total obligation rate; or

(ii) 110 percent times the prior adjusted total obligation rate; or

(iii) 36 percent.

(B) If the difference between the current total obligation rate and the prior adjusted total obligation rate is less than three, then the current adjusted total obligation rate for such fiscal year is equal to the prior adjusted total obligation rate.

(C) If the prior adjusted total obligation rate minus the current total obligation rate is greater than three, then the current adjusted total obligation rate for such fiscal year is equal to the greater of:

(i) the prior adjusted total obligation rate minus one-half times the difference of the prior adjusted total obligation rate minus the current total obligation rate; or

(ii) 90 percent times the prior adjusted total obligation rate.

CURRENT TOTAL OBLIGATION RATE – means, for any fiscal year, the rate adopted by the board that is equal to the sum of the pension obligation bond credit rate for such fiscal year plus the actuarially required contribution rate for such fiscal year.

PENSION OBLIGATION BOND CREDIT RATE – means, for any fiscal year, the rate adopted by the board that is a percentage calculated by dividing:

(A) the debt service due during such fiscal year on any pension obligation bonds, the proceeds of which have been deposited in the fund, by:

(B) the total members' projected wages for such fiscal year, as reported in the relevant actuarial valuation report.

PRIOR ADJUSTED TOTAL OBLIGATION RATE – means:

(A) for the fiscal year commencing October 1, 2006, the current total obligation rate that was effective for the prior fiscal year; and

(B) for each fiscal year commencing on or after October 1, 2007, the current adjusted total obligation rate that was effective for the prior fiscal year.

PROJECTED PAYROLL – means the covered payroll for the valuation proceeding the fiscal year multiplied by the payroll growth assumption.

TRANSITION YEAR – means each of the following:

(A) the first fiscal year in which debt service payments related to pension obligation bonds are due from the city;

(B) the first fiscal year in which no debt service payments related to pension obligation bonds are due from the city; and

(C) the fiscal year beginning October 1, 2005.

Net Assets Available for Benefits

($ in 000s)

	December 31, 2020	December 31, 2021
1 Assets		
a. Cash & Short-Term	$ 336,137	$ 473,616
2 Receivables		
a. Accrued Investment Income	$ 14,925	$ 13,295
b. Securities Sold	6,188	1,848
c. Employer Contribution	467	2,445
d. Employee Contribution	439	702
e. Pending Contracts	406,359	287,389
	$ 428,378	$ 305,679
3 Investments		
a. Index Funds	$ 208,318	$ 239,274
b. Fixed Income	976,820	991,047
c. Equities	1,888,059	2,099,386
d. Real Estate	222,726	293,969
e. Private Equity	316,237	373,575
	$ 3,612,160	$ 3,997,251
4 Total Assets	$ 4,376,675	$ 4,776,546
5 Liabilities		
a. Accounts Payable	$ 8,482	$ 9,005
b. Investment Transactions	661,440	643,098
	$ 669,922	$ 652,103
6 Net Assets Available For Benefits	$ 3,706,753	$ 4,124,443

Change in Assets Available for Benefits
Fiscal Year Ending December 31, 2021

($ in 000s)

	2020	2021
1 Assets Available at Beginning of Year	$ 3,658,088	$ 3,706,753
Adjustment *	0	0
	$ 3,658,088	$ 3,706,753
2 Revenues		
a. Employer Contributions	$ 61,615	$ 63,583
b. Employee Contributions	58,358	59,256
c. Investment Income	91,867	82,467
d. Investment Expense	(17,915)	(17,900)
e. Realized and Unrealized Gains (Losses)	153,972	543,700
f. Other (Security Lending)	1,181	971
Total Revenues	$ 349,078	$ 732,077
3 Expenses		
a. Benefits	$ 287,465	$ 296,586
b. Refunds	6,857	10,452
c. Operating Expense	6,091	7,349
Total Expense	$ 300,413	$ 314,387
4 Assets Available at End of Year (1 + 2 - 3)	$ 3,706,753	$ 4,124,443

** Change due to difference between unaudited asset value used for prior valuation and audited asset value reported the following year.*

Development of Actuarial Value of Assets

($ in 000s)

		December 31, 2021
1.	Market value of assets at beginning of year	$ 3,706,753
2.	External cashflow	
	a. Contributions	$ 122,839
	b. Benefits and refunds paid	(307,038)
	c. Administrative and miscellaneous expenses	(7,349)
	d. Subtotal	(191,548)
3.	Assumed investment return rate for fiscal year	7.25%
4.	Assumed investment income for fiscal year	$ 261,917
5.	Expected Market Value at end of year (1+ 2 + 4)	$ 3,777,122
6.	Market value of assets at end of year	$ 4,124,443
7.	Difference (6 - 5)	$ 347,321

8. Development of amounts to be recognized as of December 31, 2021:

Fiscal Year End	Remaining Deferrals of Excess (Shortfall) of Investment Income	Offsetting of Gains/(Losses)	Net Deferrals Remaining	Years Remaining	Recognized for this valuation	Remaining after this valuation
	(1)	(2)	(3) = (1) + (2)	(4)	(5) = (3) / (4)	(6) = (3) - (5)
2017	$ 0	$ 0	$ 0	1	$ 0	$ 0
2018	(16,581)	16,581	0	2	0	0
2019	0	0	0	3	0	0
2020	(23,744)	23,744	0	4	0	0
2021	347,321	(40,325)	306,996	5	61,399	245,597
Total	$ 306,996	$ 0	$ 306,996		$ 61,399	$ 245,597

9.	Final actuarial value of plan net assets, end of year (Item 6 - Item 8, Column 6)	$ 3,878,846
10.	Ratio of actuarial value to market value	94.0%

Notes: Remaining deferrals in Column (1) for prior years are from last year's report Table 6, column 6. The number in the current year is Item 7, above. Column 2 is a direct offset of the current year's excess/(shortfall) return against prior years' excess/(shortfall) of the opposite type.

Historical Investment Performance

Dollar Weighted Basis Net of Investment Expenses

Calendar Year	On Market Value	On Actuarial Value
2002	-9.81%	-5.37%
2003	27.05%	2.03%
2004	15.22%	9.38%
2005	7.93%	13.71%
2006	16.90%	13.03%
2007	3.56%	9.58%
2008	-31.31%	-3.76%
2009	30.35%	6.79%
2010	15.77%	4.30%
2011	0.86%	1.15%
2012	14.29%	2.82%
2013	16.75%	10.65%
2014	6.14%	10.29%
2015	-1.83%	7.02%
2016	8.65%	8.51%
2017*	12.34%	8.99%
2018	-5.15%	5.23%
2019	17.30%	6.74%
2020	6.42%	6.81%
2021	16.87%	8.85%
5-year average ending in 2021	9.22%	7.31%
10-year average ending in 2021	8.91%	7.57%

*The yield on the actuarial value of assets for 2017 includes the impact of the method change for the Actuarial Value of Assets.

Analysis of Change in Unfunded Actuarial Accrued Liability
For the Year Ending December 31, 2021

($ in 000s)

1. UAAL as of December 31, 2020		$ 1,185,808
2. Expected Change in UAAL during 2021		
a. Expected Amortization Payment for CY 2021 based on the Actuarially Determined Contribution Rate	(58,949)	
b. Interest adjustments on 1 & 2a to Year End @ 7.25%	83,872	
c. Expected change in UAAL		24,923
3. Increase/(Decrease) in UAAL Due to Difference Between the Actuarially Determined Contribution Rate and Actual Contribution Rate		33,885
4. Net Actuarial Experience (Gains) & Losses		(29,100)
5. Assumption and Method Changes		0
6. UAAL as of December 31, 2021		$ 1,215,516

Investment Experience (Gain) or Loss

($ in 000s)

Item		Valuation as of December 31, 2021
1.	**Actuarial assets, beginning of year**	$ 3,747,078
2.	**Contributions**	122,839
3.	**Benefits and refunds paid with administrative expenses**	(314,387)
4.	**Assumed net investment income at 7.25% on**	
	a. Beginning of year assets	271,663
	b. Contributions	4,375
	c. Benefits and refunds paid with administrative expenses	(11,197)
	d. Total	$ 264,841
5.	**Expected actuarial assets, end of year** (Sum of Items 1 through 4)	3,820,371
6.	**Actual actuarial assets, end of year**	3,878,846
7.	**Asset experience (gain)/loss for year**	(58,475)

Analysis of Actuarial (Gains) and/or Losses for 2021

($ in 000s)

	2021
Investment Return	$ (58,475)
Salary Increase	19,231
Age and Service Retirement	(2,809)
General Employment Termination	(3,695)
Disability Incidence	(259)
Active Mortality	550
Benefit Recipient Mortality	(25,294)
Actual vs. Expected Cost of Living Adjustment (COLA)*	55,708
Other	(14,057)
Total Actuarial (Gain)/ Loss	$ (29,100)

* Actual COLA of 5.00% for Tier A and 3.00% for Tier B versus expected COLAs of 2.50% for Tier A and 2.20% for Tier B.

Schedule of Funding Status

($ in 000s)

End of Year	Actuarial Value of Assets (a)	AAL (b)	UAAL (b-a)	Funding Ratio (a/b)	Payroll* (c)	UAAL as % of Payroll ((b-a)/c)
1998	$1,617,468	$1,750,430	$132,962	92.40%	$275,547	48.30%
1999	1,862,644	1,873,998	11,353	99.39%	282,127	4.00%
2000	1,997,828	2,038,078	40,250	98.03%	298,355	13.50%
2001	2,017,041	2,276,488	259,447	88.60%	332,842	77.90%
2002	1,863,701	2,399,569	535,868	77.67%	324,615	165.08%
2003	1,843,099	2,489,071	645,972	74.05%	318,492	202.82%
2004	2,482,082	2,488,270	6,188	99.75%	331,201	1.87%
2005	2,739,269	2,606,173	(133,096)	105.11%	332,446	-40.04%
2006	2,998,099	2,761,404	(236,695)	108.57%	344,997	-68.61%
2007	3,183,260	2,915,164	(268,096)	109.20%	370,150	-72.43%
2008	2,957,506	3,075,385	117,879	96.17%	389,362	30.27%
2009	3,031,652	3,192,120	160,468	94.97%	375,164	42.77%
2010	3,027,439	3,282,126	254,687	92.24%	332,045	76.70%
2011	2,916,746	3,391,652	474,906	86.00%	318,972	148.89%
2012	2,846,124	3,518,356	672,232	80.89%	340,452	197.45%
2013	3,074,284	3,610,845	362,477	85.14%	352,486	102.83%
2014	3,241,053	4,004,055	763,002	80.94%	374,002	204.01%
2015	3,320,387	4,129,133	808,746	80.41%	404,981	199.70%
2016	3,451,463	4,291,802	840,339	80.42%	420,693	199.75%
2017	3,601,612	4,377,844	776,232	82.27%	432,854	179.33%
2018	3,620,319	4,526,996	906,677	79.97%	435,375	208.25%
2019	3,682,959	4,863,325	1,180,366	75.73%	444,737	265.41%
2020	3,747,078	4,932,886	1,185,808	75.96%	439,544	269.78%
2021	3,878,846	5,094,362	1,215,516	76.14%	453,934	267.77%

* *Projected to following year.*

Summary of Data Characteristics

As of December 31,	2019	2020	2021
Active Members			
Number	7,427	7,244	7,175
Total Annualized Earnings of Members as of 12/31 (000s)	$ 433,890	$ 428,824	$ 442,863
Average Earnings	58,421	59,197	61,723
Benefit Recipients			
Number	7,405	7,552	7,655
Total Annual Retirement Income (000s)	$ 269,263	$ 277,429	$ 294,130
Total Annual Health Supplement (000s)	10,984	10,929	11,077
Average Total Annual Benefit	37,871	38,228	39,870
Inactive Members*			
Deferred Vested	877	911	974
Deferred Nonvested	789	799	1,007
Total	1,666	1,710	1,981

** The number of inactives on 12/31/2021 includes 974 members who have applied for a deferred pension and 1,007 other members who have terminated and still have contribution balances in the Fund.*

Distribution of Active Members and Payroll by Age and Years of Service

	Years of Service								
Age	**Under 1**	**1-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30 & Over**	**Totals**
Under 20	4								4
	$139,901								$139,901
20-24	94	73							167
	$3,712,985	$3,198,406							$6,911,391
25-29	157	284	76						517
	$7,078,931	$13,543,283	$3,947,658						$24,569,872
30-34	158	335	239	36					768
	$7,289,985	$18,123,730	$13,255,721	$2,272,625					$40,942,061
35-39	138	241	236	127	48				790
	$7,055,806	$13,941,127	$14,617,183	$8,615,764	$3,285,603				$47,515,483
40-44	118	230	254	130	105	38	2		877
	$6,449,088	$13,725,063	$16,051,559	$8,769,853	$7,289,613	$2,631,995	$204,280		$55,121,451
45-49	95	227	202	139	128	134	49		974
	$4,759,687	$13,820,588	$13,524,587	$9,567,088	$9,299,243	$9,165,367	$3,366,898		$63,503,458
50-54	78	199	238	118	136	180	100	16	1,065
	$4,084,437	$12,832,619	$14,384,731	$7,904,679	$9,894,757	$12,964,257	$7,568,958	$1,209,975	$70,844,413
55-59	60	172	189	174	172	139	62	28	996
	$3,217,809	$11,088,368	$11,385,504	$11,087,222	$11,935,226	$9,361,155	$4,960,914	$2,295,013	$65,331,211
60-64	44	106	133	113	100	84	39	34	653
	$2,396,590	$6,258,428	$8,009,182	$7,513,462	$7,049,388	$5,657,925	$3,439,728	$3,076,687	$43,401,390
65&Over	8	42	68	66	55	56	35	34	364
	$430,764	$2,427,936	$4,206,940	$4,593,530	$3,691,035	$3,775,847	$2,474,018	$2,982,074	$24,582,144
Totals	954	1,909	1,635	903	744	631	287	112	7,175
	$46,615,983	$108,959,548	$99,383,065	$60,324,223	$52,444,865	$43,556,546	$22,014,796	$9,563,749	$442,862,775

Distribution of Benefit Recipients as of December 31, 2021

Age	Number	Annual Benefit*	Annual Average Benefit*
Under 50	41	$ 747,093	$ 18,222
50-54	165	7,428,114	45,019
55-59	594	28,515,392	48,006
60-64	1,332	54,462,678	40,888
65-69	1,652	64,658,632	39,140
70-74	1,710	69,652,124	40,732
75-79	1,024	36,012,040	35,168
80-84	612	18,683,666	30,529
85-89	317	8,942,051	28,208
90 & Over	208	5,028,479	24,175
Total	7,655	$ 294,130,270	$ 38,423

* *Does not include Health Benefit Supplement.*

Schedule of Active Member Valuation Data

Year Ending December 31,	Active Participants	Percent Change	Covered Payroll	Percent Change	Average Salary	Percent Change
2007	8,117	-	$ 359,369,000	-	$ 44,274	-
2008	8,371	3.1%	378,021,000	5.2%	45,158	2.0%
2009	7,654	-8.6%	364,237,000	-3.6%	47,588	5.4%
2010	7,034	-8.1%	322,374,000	-11.5%	45,831	-3.7%
2011	6,745	-4.1%	309,682,000	-3.9%	45,913	0.2%
2012	6,864	1.8%	330,536,000	6.7%	48,155	4.9%
2013	6,993	1.9%	342,219,000	3.5%	48,937	1.6%
2014	7,180	2.7%	363,109,000	6.1%	50,572	3.3%
2015	7,477	4.1%	393,186,000	8.3%	52,586	4.0%
2016	7,619	1.9%	409,433,000	4.1%	53,738	2.2%
2017	7,838	2.9%	421,269,000	2.9%	53,747	0.0%
2018	7,584	-3.2%	423,723,000	0.6%	55,871	4.0%
2019	7,427	-2.1%	433,890,000	2.4%	58,421	4.6%
2020	7,244	-2.5%	428,824,000	-1.2%	59,197	1.3%
2021	7,175	-1.0%	442,863,000	3.3%	61,723	4.3%

Schedule of Retirees and Beneficiaries Added to and Removed from Rolls

Year Ending December 31,	Added to Rolls		Removed from Rolls		Rolls-End of Year		% Increase in Annual Allowances	Average Annual Allowances
	Number	Annual Allowances	Number	Annual Allowances	Number	Annual Allowances		
2007	239	$ 7,250,468	205	$ 4,551,742	5,304	$142,267,609	-	$ 26,823
2008	383	8,905,680	211	4,684,964	5,476	154,692,846	8.7%	28,249
2009	446	9,268,740	216	4,795,982	5,706	165,826,328	7.2%	29,062
2010	508	12,798,268	221	4,907,000	5,993	179,730,384	8.4%	29,990
2011	404	10,012,165	198	4,396,317	6,199	193,851,170	7.9%	31,271
2012	325	9,795,464	204	4,529,539	6,320	202,120,582	4.3%	31,981
2013	324	11,246,955	197	4,327,990	6,447	210,027,512	3.9%	32,578
2014	370	12,415,771	219	4,821,713	6,598	219,150,070	4.3%	33,215
2015	476	13,777,204	318	6,847,464	6,756	226,019,290	3.1%	33,455
2016	384	12,746,549	237	5,562,549	6,903	237,992,528	5.3%	34,477
2017	383	9,893,931	244	6,375,641	7,042	244,768,143	2.8%	34,758
2018	402	14,905,595	220	5,976,286	7,224	258,085,328	5.4%	35,726
2019	478	17,715,050	297	8,368,302	7,405	269,263,106	4.3%	36,362
2020	455	28,634,730	308	11,614,128	7,552	277,428,698	3.0%	36,736
2021	424	16,109,924	321	8,655,976	7,655	294,130,270	6.0%	38,423

Solvency Test

($ in 000s)

Valuation Date	Aggregated Accrued Liabilities for: Active and Inactive Members Contributions	Aggregated Accrued Liabilities for: Retirees and Beneficiaries	Aggregated Accrued Liabilities for: Active and Inactive Members (Employer Financed Portion)	Reported Assets	Portions of Accrued Liabilities Covered by Reported Assets: (5)/(2)	Portions of Accrued Liabilities Covered by Reported Assets: [(5)-(2)]/3	Portions of Accrued Liabilities Covered by Reported Assets: [(5)-(2)-(3)]/(4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
December 31, 2007	$ 206,090	$ 1,591,731	$ 1,117,343	$ 3,183,260	100.0%	100.0%	100.0%
December 31, 2008	221,667	1,707,599	1,146,119	2,957,506	100.0%	100.0%	89.7%
December 31, 2009	228,666	1,834,491	1,128,963	3,031,652	100.0%	100.0%	85.8%
December 31, 2010	232,727	2,041,322	1,008,077	3,027,439	100.0%	100.0%	74.7%
December 31, 2011	240,821	2,181,731	969,100	2,916,746	100.0%	100.0%	51.0%
December 31, 2012	257,716	2,250,533	1,010,107	2,846,124	100.0%	100.0%	33.4%
December 31, 2013	278,892	2,319,424	1,012,529	3,074,284	100.0%	100.0%	47.0%
December 31, 2014	301,567	2,578,071	1,124,417	3,241,053	100.0%	100.0%	32.1%
December 31, 2015	325,607	2,650,638	1,152,888	3,320,387	100.0%	100.0%	29.9%
December 31, 2016	350,646	2,770,533	1,170,623	3,451,463	100.0%	100.0%	28.2%
December 31, 2017	373,193	2,854,818	1,149,833	3,601,612	100.0%	100.0%	32.5%
December 31, 2018	392,004	2,989,597	1,145,395	3,620,319	100.0%	100.0%	20.8%
December 31, 2019	408,984	3,228,576	1,225,766	3,682,959	100.0%	100.0%	3.7%
December 31, 2020	430,411	3,312,228	1,190,247	3,747,078	100.0%	100.0%	0.4%
December 31, 2021	448,149	3,456,659	1,189,554	3,878,846	100.0%	99.2%	0.0%

EXPERIENCE TABLES

Pay Experience for Employees who are Active at Beginning and End of Year
Valuation Pay Analysis
Analyzed by Years of Service

Service Beginning of Year	Experience for 2021			
	Number	Expected Pay	Actual Pay	Ratio A/E
Under 5	1,692	$ 92,635,691	$ 95,295,899	103%
5-9	1,741	104,248,481	105,549,050	101%
10-14	860	57,025,663	57,538,476	101%
15-19	861	59,239,616	59,806,475	101%
20-24	605	41,191,540	41,875,331	102%
25-29	324	24,465,541	24,752,364	101%
30 & Over	126	10,458,937	10,571,211	101%
Total	6,209	$ 389,265,469	$ 395,388,806	102%
Over 10 Years	2,776	$ 192,381,297	$ 194,543,857	101%

Service Beginning of Year	Experience for 2020-2021			
	Number	Expected Pay	Actual Pay	Ratio A/E
Under 5	3,703	$ 200,233,852	$ 201,356,794	101%
5-9	3,429	203,066,757	202,653,206	100%
10-14	1,847	121,426,823	120,584,751	99%
15-19	1,578	108,641,220	108,249,387	100%
20-24	1,323	90,606,951	89,714,232	99%
25-29	623	46,821,916	46,429,775	99%
30 & Over	267	22,067,074	21,935,261	99%
Total	12,770	$ 792,864,593	$ 790,923,406	100%
Over 10 Years	5,638	$ 389,563,984	$ 386,913,406	99%

Analysis of Retirement Experience

Each Age

Age	2021 Retirement			2020-2021 Retirement		
	Actual	Expected	Ratio A/E	Actual	Expected	Ratio A/E
46	-	-	N/A	-	-	N/A
47	-	-	N/A	-	-	N/A
48	-	-	N/A	-	-	N/A
49	1	0.20	500%	1	0.60	167%
50	7	6.65	105%	9	10.55	85%
51	5	7.80	64%	9	17.30	52%
52	7	8.60	81%	16	18.20	88%
53	12	13.70	88%	21	25.50	82%
54	9	9.75	92%	17	20.30	84%
55	9	9.35	96%	24	21.10	114%
56	12	14.35	84%	25	25.65	97%
57	14	12.65	111%	31	26.75	116%
58	12	11.65	103%	27	26.80	101%
59	13	15.25	85%	24	28.30	85%
60	26	18.59	140%	55	40.07	137%
61	24	17.17	140%	40	34.82	115%
62	20	16.14	124%	35	34.34	102%
63	14	15.49	90%	28	30.89	91%
64	6	14.27	42%	17	30.76	55%
65	14	17.65	79%	32	35.18	91%
66	14	16.06	87%	28	29.28	96%
67	9	10.45	86%	19	20.48	93%
68	5	6.98	72%	14	15.33	91%
69	7	6.24	112%	12	10.91	110%
70 & Over	11	79.00	14%	39	171.00	23%
Total	251	327.99	77%	523	674.11	78%
Total Under 70	240	248.99	96%	484	503.11	96%

Analysis of Retirement Experience

Age Groups

Age Group	2021 Retirements			2020-2021 Retirements		
	Actual	Expected	Ratio A/E	Actual	Expected	Ratio A/E
Under 55	41	46.70	88%	73	92.45	79%
55-59	60	63.25	95%	131	128.60	102%
60-64	90	81.66	110%	175	170.88	102%
65-69	49	57.38	85%	105	111.18	94%
70 & Over	11	79.00	14%	39	171.00	23%
Total	251	327.99	77%	523	674.11	78%
Total Under 70	240	248.99	96%	484	503.11	96%

Analysis of Turnover Experience

Years of Service	2021 Quits			2020-2021 Quits		
	Actual	Expected	Ratio A/E	Actual	Expected	Ratio A/E
0-4	501	348.83	144%	890	736.60	121%
5-9	190	131.45	145%	316	255.13	124%
10-14	47	26.14	180%	76	54.59	139%
15-19	17	13.42	127%	34	24.58	138%
20-24	6	4.81	125%	16	11.19	143%
25-29	1	0.46	216%	1	0.94	106%
Total	762	525.10	145%	1,333	1,083.04	123%

Analysis of Active Mortality Experience

Age	2021 Deaths			2020-2021 Deaths		
	Actual	Expected	Ratio A/E	Actual	Expected	Ratio A/E
20-24	0	0.02	0%	0	0.05	0%
25-29	1	0.10	962%	2	0.21	935%
30-34	1	0.21	486%	1	0.41	241%
35-39	3	0.30	984%	5	0.61	814%
40-44	1	0.49	203%	2	1.01	197%
45-49	2	0.84	237%	3	1.73	174%
50-54	3	1.45	207%	7	2.93	239%
55-59	2	2.03	98%	5	4.12	121%
60 and Over	7	3.29	213%	15	6.54	229%
Total	20	8.74	229%	40	17.62	227%

Analysis of Disability Experience

Age	2021 Disabilities			2020-2021 Disabilities		
	Actual	Expected	Ratio A/E	Actual	Expected	Ratio A/E
20-24	0	0.00	0%	0	0.00	0%
25-29	0	0.02	0%	0	0.05	0%
30-34	0	0.12	0%	0	0.24	0%
35-39	0	0.28	0%	0	0.56	0%
40-44	0	0.53	0%	0	1.09	0%
45-49	0	0.93	0%	0	1.89	0%
50-54	0	1.33	0%	0	2.66	0%
55-59	0	1.46	0%	0	2.93	0%
60 and Over	0	0.91	0%	0	1.71	0%
Total	0	5.58	0%	0	11.15	0%

Analysis of Retiree Mortality Experience*

Age	2021 Experience			2020-2021 Experience		
	Actual	Expected	Ratio A/E	Actual	Expected	Ratio A/E
Under 60	3	2.44	123%	9	4.93	183%
60-64	19	8.07	235%	27	16.09	168%
65-69	26	17.49	149%	53	35.49	149%
70-74	51	29.98	170%	83	57.43	145%
75-79	31	26.89	115%	71	52.61	135%
80-84	29	25.46	114%	57	49.92	114%
85-89	25	20.35	123%	53	40.69	130%
90 & over	31	25.36	122%	53	49.40	107%
Total	215	156.04	138%	406	306.56	132%

**This analysis does not include beneficiary, QDRO, or disabled deaths.*

ACTUARIAL METHODS AND ASSUMPTIONS

The most recent experience study was completed in conjunction with the December 31, 2019 actuarial valuation. Please see our experience study, dated June 2020, to see more detail of the rationale for the current assumptions. As authorized under Sec. 40A-9 of Chapter 40A, the actuarial methods and assumptions are established set by the Board of Trustees based upon recommendations from the Fund's actuary.

Entry Age Normal Method

The Entry Age Normal actuarial cost method is the actuarial valuation method used for all purposes under ERF. The concept of this method is that funding of benefits for each member should be affected as a, theoretically, level contribution (as a level percentage of pay) from entry into ERF to termination of active status.

The Normal Cost (NC) for a fiscal year under this method is determined as described in the prior paragraph for each individual member. The ERF NC for the year is the total of individual normal costs determined for each active member. The Actuarial Accrued Liability (AAL) under this method is the theoretical asset balance of the normal costs that would have accumulated to date based upon current actuarial assumptions. To the extent that the current assets of the fund are insufficient to cover the AAL, an Unfunded Actuarial Accrued Liability (UAAL) develops.

Actuarially Determined Contribution

The actuarially determined contribution rate is developed using an open group projection. The total contribution rate (member plus City) is the level percentage of pay needed to fund the Normal Cost for each year and pay off the UAAL over 30 years.

In the open group projection, the demographic assumptions are applied to the current active employees and any employees that are assumed to leave employment are replaced one for one with a new employee. Over time this results in the change of the employee group from mostly Tier A members to Tier B members. The projection is built to assume no gains or losses on the actuarial accrued liability or the actuarial value of assets.

In the projection, new members' pay is assumed to increase at 3.00% year over year (i.e. a new employee in 2022 is assumed to be hired at a salary that is 3.00% greater than a new employee hired in 2021). The 3.00% growth rate is equal to our wage inflation assumption of 3.00% (ultimate salary increase

assumption). Note that this is not an assumption that payroll will grow at 3.00% per year. Payroll could grow more slowly in the near-term due to membership demographics.

New Entrant Profile

For the purposes of determining the funding period, an open group projection is used which replaces on a one-to-one basis each active member who leaves employment with an average new hire. The average new hire is determined based on a new entrant profile, which is created from the valuation data by determining the entry age and entry pay for anyone with between one and six years of service as of the valuation date, with salaries normalized to the valuation date. A summary of the new entrant profile is shown in the table below, with 60% of the population being male. The salaries below would be applicable for the year preceding the valuation date. Future cohorts of new hires have starting salaries that are assumed to grow at the General Wage Inflation of 3.00% over the salaries of the previous year.

New Entrant Profile		
Entry Age	**# of Employees**	**Average Salary**
15-19	2	$50,325
20-24	168	42,076
25-29	321	46,684
30-34	314	50,677
35-39	228	52,539
40-44	230	56,535
45-49	205	56,856
50-54	185	59,947
55-59	146	54,524
60-64	65	61,295
65-69	8	51,568
Total	**1,872**	**$52,432**

Actuarial Value of Asset Method

The method for determining the actuarial value of assets in future years is equal to the market value of assets less a five-year phase in of the excess (shortfall) between expected investment return and actual income. The actual calculation is based on the difference between actual market value and the expected market value of assets each year, and recognizes the cumulative excess return (or shortfall) at a minimum rate of 20% per year. Each year, a base is set up to reflect this difference. If the current year's base is of opposite sign to the deferred bases, then it is offset dollar for dollar against the deferred bases. Any remaining bases are then recognized over the remaining period for the base.

ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

Annual Rate of Investment Return: For all purposes under the Fund, the rate of investment return is assumed to be 7.25% per annum, net of investment expenses. This rate includes an annual assumed rate of inflation of 2.50%. In addition, annual cost-of-living adjustments are assumed to occur on average at the rate of 2.50% per annum for Tier A members and 2.20% for Tier B members (due to the lower maximum on cost-of-living-adjustments).

Annual Compensation Increases: Each member's compensation is assumed to increase in accordance with a table based on actual ERF experience. Sample rates follow:

Years of Service	Merit, Promotion, Longevity	General	Total
0	5.25 %	3.00 %	8.25 %
1	4.25	3.00	7.25
2	3.25	3.00	6.25
3	2.50	3.00	5.50
4	2.00	3.00	5.00
5	1.75	3.00	4.75
6	1.75	3.00	4.75
7	1.25	3.00	4.25
8	1.25	3.00	4.25
9	1.00	3.00	4.00
10	1.00	3.00	4.00
11	1.00	3.00	4.00
12	0.75	3.00	3.75
13	0.75	3.00	3.75
14	0.75	3.00	3.75
15	0.75	3.00	3.75
16	0.75	3.00	3.75
17	0.75	3.00	3.75
18	0.50	3.00	3.50
19 & Over	0.00	3.00	3.00

ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

Mortality:

Disabled Lives: The gender-distinct 2019 Texas Municipal Retirees Mortality Table for males and females respectively, set forward 4 years for males and 3 years for females. Generational mortality improvements in accordance with the ultimate rates from the scales published through 2019 by Retirement Plans Experience Committee of the Society of Actuaries ("Ultimate MP") and projected from the year 2019.

Sample rates as of 2021 follow (rate per 1,000), with projected mortality applied:

	Disability Mortality Rate	
Age	**Male**	**Female**
20	35	30
30	35	30
40	35	30
50	35	30
60	35	30
70	35	30
80	82	50
90	236	161

Other Benefit Recipients: The gender-distinct 2019 Texas Municipal Retirees Mortality Tables are used for males and females respectively. Generational mortality improvements in accordance with the ultimate rates from the scales published through 2019 by Retirement Plans Experience Committee of the Society of Actuaries ("Ultimate MP") and projected from the year 2019.

Sample rates as of 2021 follow (rate per 1,000), with projected mortality applied:

	Mortality Rate	
Age	**Male**	**Female**
30	0.4	0.1
40	0.8	0.3
50	2.7	1.1
60	7.4	3.5
70	19.8	11.0
80	54.8	35.1
90	154.3	112.1

ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

Mortality, Continued:

Active Members: The PubG-2010 Employee Mortality Table for General Employees tables are used for males and females respectively. Generational mortality improvements in accordance with the ultimate rates from the scales published through 2019 by Retirement Plans Experience Committee of the Society of Actuaries ("Ultimate MP") and projected from the year 2010.

Sample rates as of 2021 follow (rate per 1,000), with projected mortality applied:

	Mortality Rate	
Age	**Male**	**Female**
30	0.3	0.1
40	0.6	0.3
50	1.3	0.7
60	2.9	1.7
70	6.3	4.4
80	15.5	11.9
90	132.4	103.7

10% of active deaths are assumed to be service related.

Disability: A client-specific table of disability incidence with sample rates follows (rate per 1,000):

Age	**Disability Rate**
30	0.1
40	0.5
50	1.2
60	2.2

20% of disabilities are assumed to be service related. There is a 0% assumption of disability for members who have over 10 years of service and are eligible for retirement.

ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

Retirement: Upon eligibility, active members are assumed to retire as follows (rate per 1,000):

Tier A:

Age	Male		Female	
	First Year Eligible	Thereafter	First Year Eligible	Thereafter
48-49	100	100	100	100
50	550	550	450	350
51	500	450	400	350
52	500	300	400	300
53	400	300	350	300
54	350	250	350	200
55	300	250	350	250
56	300	250	350	250
57	300	250	350	250
58-59	300	250	250	200
	Service < 18 yrs.	Service 18 yrs.+	Service < 18 yrs.	Service 18 yrs. +
60	80	230	90	200
61	90	230	90	180
62	100	230	90	200
63	100	230	150	150
64	150	230	120	130
65	150	230	120	300
66	200	230	150	300
67	200	230	250	300
68	200	230	150	300
69	200	230	150	300
70	1,000	1,000	1,000	300

ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

Retirement, Continued:
Upon eligibility, active members are assumed to retire as follows (rate per 1,000):

Tier B:

Age	Male		Female	
	Service < 40 yrs.	Service 40 yrs. +	Service < 40 yrs.	Service 40 yrs. +
<55	10	350	10	350
55-56	20	350	20	350
57-58	30	350	30	350
59-60	40	350	40	350
61-62	50	350	50	350
63-64	60	350	60	350
65	180	600	200	450
66	200	250	250	250
67	200	250	250	250
68	200	250	150	250
69	200	250	150	250
70	1,000	1,000	1,000	1,000

*For service < 40 yrs, rates shown are for those who met the rule of 80.

Retirement of Deferred Vested Members:
All deferred vested members are assumed to commence payment at their normal retirement age, which is age 60 for Tier A members and age 65 for Tier B members.

ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

General Turnover: A table of termination rates based on ERF experience as shown below.

	Terminations (per 1,000)	
Years of Service	**Male**	**Female**
0	228	200
1	180	165
2	144	150
3	110	120
4	90	95
5	75	90
6	67	80
7	60	65
8	51	48
9	43	48
10	33	45
11	33	32
12	30	30
13	30	30
14	22	20
15	22	14
16	19	14
17	19	14
18	19	14
19	19	14
20	12	14
21	12	14
22	12	6
23	12	6
24	12	6
25	12	6
26 & Over	5	6

There is 0% assumption of termination for members eligible for retirement.

Refunds of Contributions: Members are assumed to choose the most valuable termination benefit.

ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

Operational Expenses: The amount of estimated administrative expenses expected in the next year is assumed to be equal to the prior year's expenses and is incorporated in the Normal Cost.

Marital Status: 75% of active male members and 50% of active female employees are assumed to be married.

Vacation Leave Conversions: Members with 20 or more years of service are assumed to convert unused vacation leave to 1.5 months of service. Other members are assumed to convert unused vacation leave to 1 month of service. No vacation leave conversion is assumed for disability retirement.

Spouse Age: The female spouse is assumed to be 3 years younger than the male spouse.

Payroll Growth Rate: Used to estimate projected payroll for the following fiscal year only. Assumed to be equal to the inflation rate of 2.50%. This assumption is not used as part of the open group projection used to calculate the Actuarially Determined Contribution Rate.

Member's Pay: In determining the member's valuation salary, the greater of the prior calendar year's gross pay and the member's rate of compensation is used.

Form of Payment: For Tier A it is assumed that 60% of married active male members and 84% of married active female employees will elect a Joint & 50% Survivor form of payment. Taking into consideration the marriage assumption and the inherent subsidy in the ERF's Joint & 100% Survivor factors, the male employees are valued with Joint and 28.0% Survivor annuities and the female employees are valued with Joint and 19.5% Survivor annuities. It is also assumed that 100% of Tier B employees will elect the normal form of payment under Tier B.

Data Adjustments: Certain records are missing spousal information. For these records we use the marital status assumption and spousal age difference assumption to value these records. No other adjustments are made to the data.

Actuarial Equivalence Assumptions: for form of payment conversion and Tier B early retirement factors are based on the following assumptions:

a. Interest Rate of 8.00%.

b. Mortality: Unisex blend (60% male and 40% female) of the following assumptions for males and females. 109% of the RP-2000 Combined Healthy Table for males with Blue Collar adjustment projected to 2026 using improvement scale BB for males. 103% of the RP-2000 Combined Healthy Table for females with Blue Collar adjustment projected to 2026 using improvement scale BB for females.

c. Cost-of-living-adjustments (COLA): a 3.00% COLA assumption for Tier A members and a 2.50% COLA assumption for Tier B members.

ACTUARIAL METHODS AND ASSUMPTIONS (cont.)

Actuarial Model: This report was prepared using our proprietary valuation model and related software which in our professional judgment has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

Changes in Methods and Assumptions Since Prior Valuation: None.

SUMMARY OF BENEFIT PROVISIONS

Employees' Retirement Fund of the City of Dallas
As of December 31, 2021

Membership

An employee becomes a member upon permanent employment and contributes to the Fund.

Tier A

A person who was employed by the City prior to January 1, 2017, or who was re-employed by the City on or after January 1, 2017 and whose pre January 1, 2017 credited service was not cancelled by withdrawal or forfeiture or was reinstated.

Tier B

A person who was employed by the City on or after January 1, 2017, or who was re-employed by the City on or after January 1, 2017 and whose pre January 1, 2017 credited service has been cancelled by withdrawal or forfeiture.

Contributions

Member: 37% of the current adjusted total obligation rate. New rates effective October 1 after the valuation date.

City: 63% of the current adjusted total obligation rate. New rates effective October 1 after the valuation date.

Definitions

Final Average Salary:

Tier A

Average monthly salary over the member's highest three years (or 36 months) of service.

Tier B

Average monthly salary over the member's highest five years (or 60 months) of service.

Credited Service: Length of time as an employee of the City of Dallas and while making contributions to the Fund.

SUMMARY OF BENEFIT PROVISIONS (cont.)

Retirement Pension

Eligibility:

Tier A

a. Attainment of age 60; or

b. Attainment of age 55 (if credited service began before May 9, 1972); or

c. At any age after completion of 30 years of credited service with a reduced benefit before age 50; or

d. Attainment of age 50, if the sum of an active member's age and credited service is at least equal to 78.

Tier B

a. Attainment of age 65 and 5 years of service; or

b. At any age after completion of 40 years of credited service; or

c. At any age if the sum of an active member's age and credited service is at least equal to 80 (under this eligibility the member's pension will be actuarially reduced for each year prior to the age of 65 that the member retires).

d. Restricted Prior Service Credit included for eligibility (if approved).

Retirement Benefits:

Tier A

The retirement benefit equals 2-3/4% multiplied by average monthly earnings multiplied by credited service limited to a maximum of 36.3636 years plus a monthly $125 health supplement (prorated for service less than 5 years).

Tier B

The retirement benefit equals 2-1/2% multiplied by average monthly earnings multiplied by credited service limited to a maximum of 40 years (no monthly health supplement).

Form of Payment:

Tier A

An unreduced pension benefit under a joint and one-half survivor option with 10 years guaranteed or a ten-year certain and life option. An actuarially equivalent joint and full survivor option is also available.

Tier B

An unreduced pension payable for life with 10 years guaranteed. Actuarially equivalent joint and survivor options (50% and 100%) are also available.

SUMMARY OF BENEFIT PROVISIONS (cont.)

Early Retirement Factors:

Tier A

For members retiring prior to age 50 with 30 or more years of service the pension shall be multiplied by the following percentage:

Age	Percentage
49	93.3
48	87.2
47	81.5
46	76.3
45	71.5
44	67.0

Tier B

For members retiring prior to age 65 with less than 40 years of service, the pension shall be multiplied by the following percentage:

Age	Percentage	Age	Percentage
64	89.72	56	40.03
63	80.66	55	36.41
62	72.64	54	33.15
61	65.53	53	30.22
60	59.21	52	27.57
59	53.58	51	25.18
58	48.56	50	23.01
57	44.06	49	21.05

Deferred Retirement

Eligibility: Deferred retirement pension benefit commencing at age 60 for Tier A members or at age 65 for Tier B members, with at least five (5) years of credited service, and accumulated contributions are left on deposit with the Fund.

Monthly Benefit: The deferred retirement benefit is equal to the retirement pension based on earnings and credited service at the time of termination.

SUMMARY OF BENEFIT PROVISIONS (cont.)

Disability Retirement Pension

Non-Service Disability:

1. Eligibility: Five (5) years of service and totally and permanently incapacitated for duty.
2. Monthly Benefit: Computed based on average monthly earnings and credited service at time of disability but not less than 10 times the percentage multiplier multiplied by the average monthly earnings.

Service Disability:

1. Eligibility: Totally and permanently incapacitated from the further performance of duty as a result of injury while in the course of employment for the City.

2. Monthly Benefit: Calculated as a non-service disability pension but not less than $1,000 per month.

Death Benefits

Eligibility: active or inactive members who die prior to retirement

Benefit: For members with less than 2 years of service or inactive member with less than 5 years of service: refund of the members contributions.

Benefit: For members with more than 2 years of service but less than 15 years of service: an unreduced pension to designated beneficiary for 120 months or a one-half survivor option for life with 120 payments guaranteed.

Benefit: For members eligible for retirement or members and inactive members with more than 15 years of service: an unreduced pension to designated beneficiary for 120 months or a Full Survivor option for life with 120 payments guaranteed.

Form: Benefit paid in accordance with the option on file, or the eligible option, or if no eligible beneficiary, a lump sum equivalent of 10 years of benefit payments to the member's estate.

Minimum Benefit for Service Death: For job-related death a minimum of 10 years of service used in calculation of benefit. Benefit will not be less than $1,000 per month.

SUMMARY OF BENEFIT PROVISIONS (cont.)

Return of Accumulated Contributions

A member at the time of termination is entitled to be paid accumulated contributions without interest.

Cost-of-Living Adjustments

An annual cost-of-living adjustment to the base pension benefit shall be made based on the greater of:

Tier A

a. The percentage of change in the price index for October of the current year over October of the previous year, up to 5%, or

b. The percentage of annual average change in the price index for the 12-month period ending with the effective date of the adjustment, up to 5%.

Tier B

c. The percentage of change in the price index for October of the current year over October of the previous year, up to 3%, or

d. The percentage of annual average change in the price index for the 12-month period ending with the effective date of the adjustment, up to 3%.

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Consortium 2022: Meet the Speakers

19th Annual Consortium | New York Hilton Midtown

June 14-15, 2022

We are thrilled and honored to share a sneak peak of the Consortium 2022 line-up of speakers who are helping drive the industry forward from their positions of leadership. The group hails from a range of organizations that invest in small, emerging, and diverse managers -- as well as from the managers themselves.

John A. Barker
Deputy Chief Investment Officer, The Kresge Foundation

Angel Brunner
Founder and Chief Executive Officer, EB5 Capital

Kerstin Dittmar
Managing Partner and Chief Investment Officer, L2Point

David Gilmore
Deputy Chief Investment Officer, The Harry and Jeanette Weinberg Foundation

AJ Hernandez
Director of Emerging

Jarvis Hollingsworth
Chair of the Board of Trustees,

Andrew Junkin
Chief Investment Officer, Office of

Martin Laguerre
Executive Vice President, and

Managers, New York State Common Retirement Fund

Teacher Retirement System of Texas

the General Treasurer at State of Rhode Island

Head of Private Equity and Capital Solutions, CDPQ

Leslie Lenzo
Chief Investment Officer, Advocate Aurora Health

Bryan Lewis
Vice President and Chief Investment Officer, U.S. Steel

Brian S. O'Neil
Chief Investment Officer, Robert Wood Johnson Foundation

Chrissie Pariso
Managing Director, MPowered Capital

Miriam Rivera
Chief Executive Officer, Co-Founder, and Managing Director, Ulu Ventures

Sherrese Clark Soares
Chief Executive Officer, Founder, Board Director, Tempo Music

Ian Toner
Chief Investment Officer, Verus

Sophia Tsai
Managing Director, Investments, Trinity Wall Street

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These top industry professionals are representative of the robust content we have planned. Look for updates on additional speakers and agenda content as we get closer to the event!

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At A Glance

For period ended April 30,2022

	2021		2022	
Retirements	**This Month**	**YTD**	**This Month**	**YTD**
Age	14	73	19	72
Service	1	11	0	5
Rule of 78	10	38	9	37
QDRO	0	0	0	1
Total	25	122	28	115
Disability Retirements				
Service	0	0	0	0
Non-service	0	3	0	0
Total	0	3	0	0
Benefits Paid	$ 24,666,822.64	$ 98,027,451.26	$ 26,651,511.67	$ 105,558,438.64
Refunds	$ 1,012,921.46	$ 2,898,179.14	$ 714,316.76	$ 3,570,185.09
Number of refunds	62	173	60	208
***Contributions**	$ 9,066,879.52	$ 36,499,613.41	$ 9,635,991.18	$ 38,370,462.25

Members on record at month end

	Retirees & beneficiaries	Disabilities	Actives	Tier A actives	Tier B Actives
Jan	*7,658*	*139*	*7,313*	*4,279*	*3,034*
Feb	*7,671*	*138*	*7,328*	*4,232*	*3,096*
Mar	*7,680*	*138*	*7,361*	*4,192*	*3,169*
April	*7,690*	*135*	*7,346*	*4,148*	*3,198*
May					
June					
July					
Aug					
Sep					
Oct					
Nov					
Dec					

Employees' Retirement Fund of the City of DALLAS

Dallas Employees Retirement Fund

Compensation Review

May 10, 2022

McLAGAN

AON
Empower Results®

Introduction

- Dallas Employees Retirement Fund asked McLagan to review the competitiveness of Dallas ERF's compensation program.
- Recognizing that Dallas ERF competes with a broad range of firms for investment talent, McLagan assembled pay data from three compensation reference groups (see Appendix for additional detail on each group):
  I. All US based public funds.
  II. Public funds with AUM less than $35B.
  III. All private sector investment organizations - including advisory firms, banks, insurance companies, endowments, foundations, and corporate plan sponsors.
- This report contains information about the competitive range of salary and total cash compensation (e.g., salary + cash incentives) for 31 Dallas ERF employees.
- Note that long-term incentives, common in the private sector, have been excluded (e.g., stock options, mutual fund deferrals, restricted stock, etc.).

McLagan Recommendation to the Board

- While the private sector dominates the labor market for the majority of ERF's positions (e.g., there are far more similar jobs in the private sector than the public sector, ERF must recognize it is a public employer located in Dallas, TX and offers benefits that may not be available at many private sector employers.
- For these reasons, McLagan recommends that ERS focus on the "All Public Funds" data presented in this report to represent the most robust sample of other public funds.
- The definitions used in this report include:
  - 25th Percentile: the value in which 25% of the sample is paid less (75% is paid more).
  - 50th Percentile / Median: the value in which 50% of the sample is paid more and 50% is paid less. This is generally where most public funds target their compensation philosophy.
  - 75th Percentile: the value in which 75% of the population is paid less (25% is paid more).

Aggregate Spend Analysis

- From a base salary perspective, Dallas ERF $3.3M aggregate spend for 31 employees approximates the median of all Public Funds and 75th percentile for Public Funds with AUM < $35B.
- Dallas ERF is positioned substantially below the private sector 25th percentile.

Dallas ERF Agg Spend vs. Public Funds and Private Sector Firms									
			Aggregate Spend ($000s)			% Diff to Market			Mkt Positioning
	# of EEs	Dallas ERF	25th	Median	75th	LowQ	Median	HighQ	
Base Salary									
Public Funds	31	$3,301	$2,810	$3,347	$3,966	+17%	-1%	-17%	3
Public Funds AUM <$35B	31	3,301	2,621	2,989	3,419	+26%	+10%	-3%	2
Private Sector Firms	31	3,301	4,959	5,591	6,473	-33%	-41%	-49%	4
Total Cash Compensation									
Public Funds	31	$3,317	$2,843	$3,399	$4,221	+17%	-2%	-21%	3
Public Funds AUM <$35B	31	3,317	2,657	3,016	3,500	+25%	+10%	-5%	2
Private Sector Firms	31	3,317	8,292	11,267	16,126	-60%	-71%	-79%	4

Pay Positioning Varies by Function

- Salary and total cash compensation positioning varies by function.
- Management and administrative positions fall within +/- 5% of median total cash while the two investment positions are well below market.

Dallas ERF vs Competitive Market															
		Dallas ERF		Salary						Total Cash					
				Aggregate Spend			% Variance			Aggregate Spend			% Variance		
	# off EEs	Salary	Total Cash	LowQ	Median	HighQ	LowQ	Median	HighQ	LowQ	Median	HighQ	LowQ	Median	HighQ
Public Funds															
Management	7	1,178	1,210	909	1,140	1,479	+30%	+3%	-20%	925	1,156	1,659	+31%	+5%	-27%
Investments	2	170	180	193	217	235	-12%	-22%	-28%	200	228	258	-10%	-21%	-30%
Administrative	25	1,953	1,928	1,709	1,991	2,252	+14%	-2%	-13%	1,718	2,015	2,303	+12%	-4%	-16%
Total	**34**	**3,301**	**3,317**	**2,810**	**3,347**	**3,966**	**+17%**	**-1%**	**-17%**	**2,843**	**3,399**	**4,221**	**+17%**	**-2%**	**-21%**
Public Funds AUM <$35B															
Management	7	1,178	1,210	813	1,025	1,205	+45%	+15%	-2%	838	1,048	1,277	+44%	+15%	-5%
Investments	2	170	180	176	205	225	-4%	-17%	-25%	187	209	234	-4%	-14%	-23%
Administrative	25	1,953	1,928	1,632	1,759	1,989	+20%	+11%	-2%	1,632	1,759	1,989	+18%	+10%	-3%
Total	**34**	**3,301**	**3,317**	**2,621**	**2,989**	**3,419**	**+26%**	**+10%**	**-3%**	**2,657**	**3,016**	**3,500**	**+25%**	**+10%**	**-5%**
Private Sector															
Management	7	1,178	1,210	1,783	2,120	2,617	-34%	-44%	-55%	4,231	6,702	10,646	-71%	-82%	-89%
Investments	2	170	180	211	248	280	-20%	-32%	-39%	269	330	390	-33%	-46%	-54%
Administrative	25	1,953	1,928	2,965	3,223	3,577	-34%	-39%	-45%	3,792	4,236	5,090	-49%	-54%	-62%
Total	**34**	**3,301**	**3,317**	**4,959**	**5,591**	**6,473**	**-33%**	**-41%**	**-49%**	**8,292**	**11,267**	**16,126**	**-60%**	**-71%**	**-79%**

All Public Funds

All Public Pension Funds					
	Location	12/31/19 AUM		Location	12/31/19 AUM
CA Public Employees' Retirement Sys	Sacramento, CA	$394.7	PA State Employees' Retirement Sys	Harrisburg, PA	$31.0
CA State Teachers' Retirement Sys	West Sacramento, CA	254.1	Employees Retirement Sys of Texas	Austin, TX	29.4
New York State & Local Retirement Sys	New York, NY	225.9	Alaska Retirement Management Board	Juneau, Alaska	27.9
Florida State Board of Administration	Tallahassee, FL	169.7	New Mexico State Investment Council	Santa Fe, NM	27.4
Teacher Retirement Sys of Texas	Austin, TX	160.0	Louisiana Teachers' Retirement Sys	Baton Rouge, LA	21.5
New York State Teachers' Retirement Sys	Albany, NY	125.6	Kansas Public Employees Retirement Sys	Topeka, KS	21.2
State of Wisconsin Investment Board	Madison, WI	116.5	State Univ. Retirement Sys of Illinois	Champaign, IL	20.3
Washington State Investment Board	Olympia, WA	107.5	Idaho Public Employee Retirement Sys	Boise, ID	19.6
Ohio Public Employees Retirement Sys	Columbus, OH	104.2	Hawaii Employees Retirement Sys	Honolulu, HI	18.1
Virginia Retirement Sys	Richmond, VA	85.5	Nebraska Investment Council	Lincoln NE	17.6
New Jersey Division of Investment	Trenton, NJ	79.7	Orange County Employees Retirement System	Santa Ana, CA	17.3
Massachusetts PRIM	Boston, MA	79.1	West Virginia Investment Mgmt Board	Charleston, WV	16.8
Michigan State Retirement Systems	East Lansing, MI	77.7	Maine Public Employees Retirement System	Augusta, ME	15.4
Minnesota State Board of Investments	St. Paul, MN	74.2	Ohio School Employees Retirement Board	Columbus, OH	15.2
Oregon Public Employees' Retirement Fund	Tigard, OR	71.8	New Mexico Educational Retirement Board	Santa Fe, NM	13.2
State Teachers Retirement Sys of Ohio	Columbus, OH	71.5	South Dakota Investment Council	Sioux Falls, SD	12.8
Alaska Permanent Fund Corporation	Juneau, AK	65.2	Montana Board of Investments	Helena, MT	12.2
Maryland State Retirement Agency	Baltimore, MD	56.1	Municip. Employees' Retirement Sys of MI	Lansing, MI	10.8
Tennessee Consolidated Retirement Sys	Nashville, TN	55.2	Wyoming Retirement Sys	Cheyenne, WY	9.0
CO Public Employees' Retirement Assoc.	Denver, CO	52.0	Missouri State Employees' Retirement Sys	Jefferson City, MO	8.3
Nevada Public Employees' Retirement Sys	Carson City, NV	47.0	MO Local Gov't Employees Retirement Sys	Jefferson City, MO	7.0
Missouri Public School Retirement Sys	Jefferson City, MO	46.9	Fire & Police Pension Assoc. of CO	Greenwood Village, CO	5.7
Arizona State Retirement Sys	Phoenix, AZ	42.7	Municip. Fire & Police Retire. Sys of IA	Des Moines, IA	2.7
Utah State Retirement Systems	Salt Lake City, UT	35.6	Utah School & Institutional Trust Funds Office	Salt Lake City, UT	2.6
Iowa Public Employees' Retirement Sys	Des Moines, IA	35.5	Idaho Endowment Investment Board	Boise, ID	2.6
Texas County and District Retirement Sys	Austin, TX	33.7	Wisconsin Dept of Employee Trust Funds	Madison, WI	
Indiana Public Employees Retirement Fund	Indianapolis, IN	31.9	North Dakota Retirement and Investment Office	Bismark, ND	
Texas Municipal Retirement Sys	Austin, TX	31.5			

HighQ	$74.2
Median	**31.9**
LowQ	16.8

Public Funds with AUM <$35B

Dallas ERF's Public Pension Fund Comparator Group			
	12/31/19 AUM		12/31/19 AUM
Texas County and District Retirement Sys	$33.7	West Virginia Investment Mgmt Board	$16.8
Indiana Public Employees Retirement Fund	31.9	Maine Public Employees Retirement System	15.4
Texas Municipal Retirement Sys	31.5	Ohio School Employees Retirement Board	15.2
PA State Employees' Retirement Sys	31.0	New Mexico Educational Retirement Board	13.2
Employees Retirement Sys of Texas	29.4	South Dakota Investment Council	12.8
Alaska Retirement Management Board	27.9	Montana Board of Investments	12.2
New Mexico State Investment Council	27.4	Municip. Employees' Retirement Sys of MI	10.8
Louisiana Teachers' Retirement Sys	21.5	Wyoming Retirement Sys	9.0
Kansas Public Employees Retirement Sys	21.2	Missouri State Employees' Retirement Sys	8.3
State Univ. Retirement Sys of Illinois	20.3	MO Local Gov't Employees Retirement Sys	7.0
Idaho Public Employee Retirement Sys	19.6	Fire & Police Pension Assoc. of CO	5.7
Hawaii Employees Retirement Sys	18.1	Municip. Fire & Police Retire. Sys of IA	2.7
Nebraska Investment Council	17.6	Utah School & Institutional Trust Funds Office	2.6
Orange County Employees Retirement System	17.3	Idaho Endowment Investment Board	2.6

HighQ	$23.0
Median	**17.1**
LowQ	10.3
Dallas ERF	**$3.7**

Private Sector Firms

All Private Sector				
		12/31/19 AUM ($Billions)		
	# Firms	LowQ	Median	HighQ
Investment Mangement Firms	162	$14.9	$53.1	$218.6
Banks (Investment Management Department)	24	15.8	38.6	88.6
Insurance Companies (Investment Management Departments)	39	26.1	63.1	97.3
Endowments & Foundations	54	1.9	3.3	7.2
Corporate Plan Sponsors	11	1.7	6.0	17.6
Total	**290**	**$7.0**	**$28.4**	**$101.2**