



**PERSPECTIVES
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MARCH 17, 2022

Risk Allocation Study

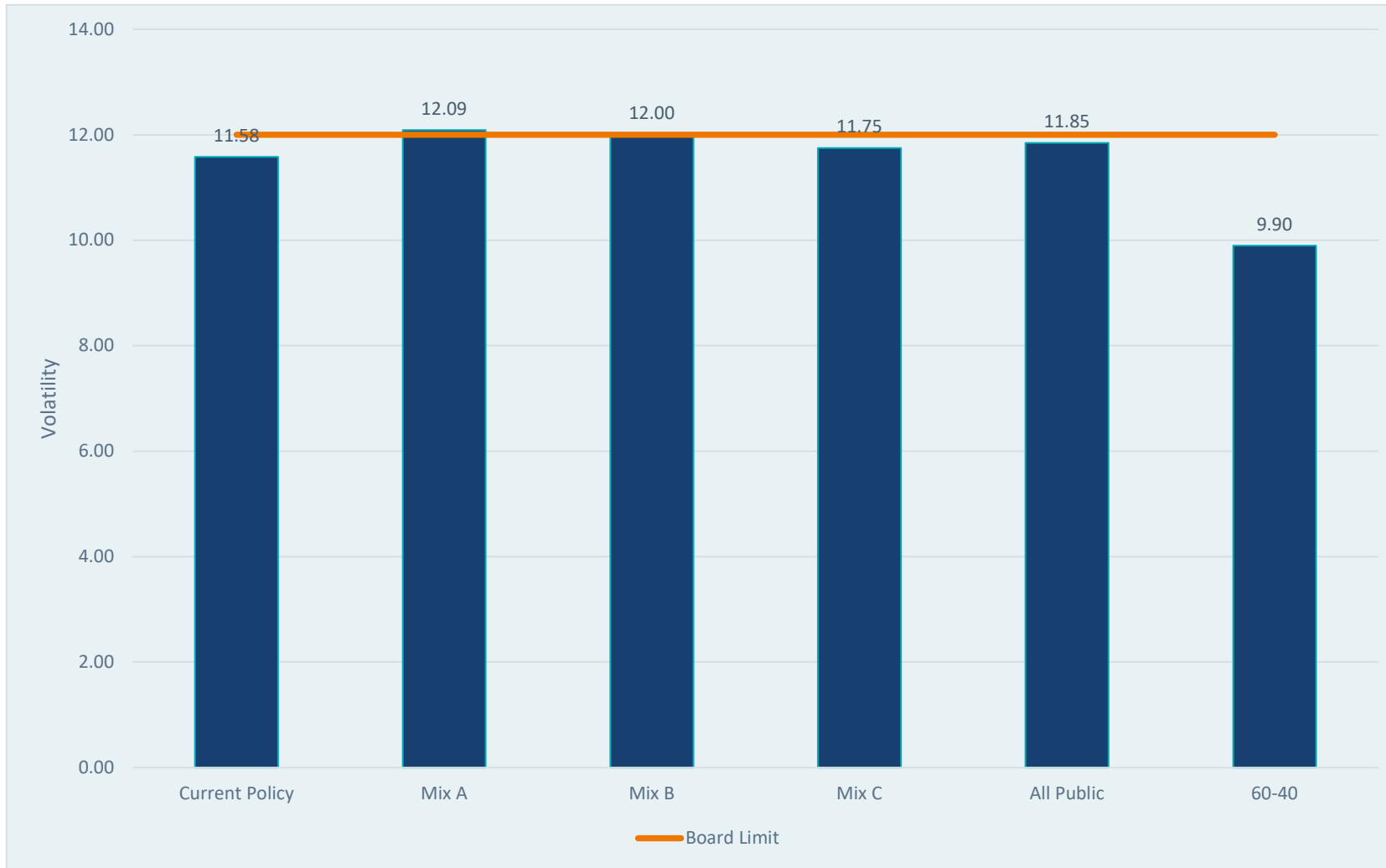
City of San Jose Federated Employees' Retirement System

Summary

Analyzing the mixes being considered, we observe:

- The proposed asset allocation changes are minor across asset classes
- 1 of the 6 mixes fall outside the board limit for volatility as defined in IPS
- Equity market sensitivity (beta) ranges from 0.59 to 0.72
- Similar risk allocation profiles, with equity factors largely driving overall portfolio risk
- Duration risk is not significant risk among mixes considered as it is relatively short across all mixes
- If the Fed struggles with the timing of rate rises and tapering asset purchases, we could see the portfolio decline more than 10%
- We observe similar performance across asset mixes in most historic scenarios and stress tests

Risk operating zones

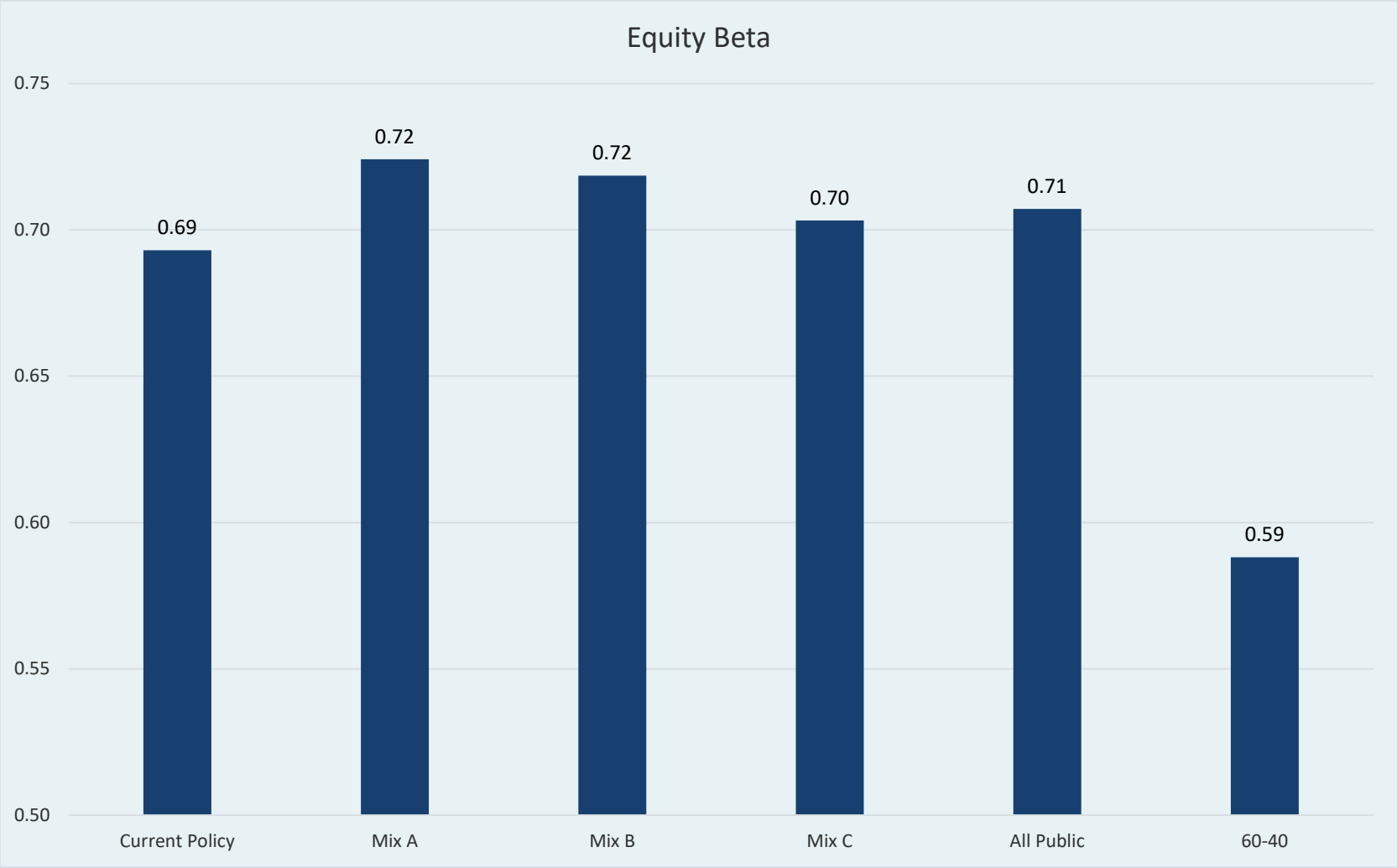


Mix A falls just slightly outside of Board limit for portfolio volatility.

Mix B is at limit.

Operating zones are defined in appendix C of the Investment Policy Statement. Data from MSCI BarraOne, MAC.XL model. All Public allocation provided by Meketa

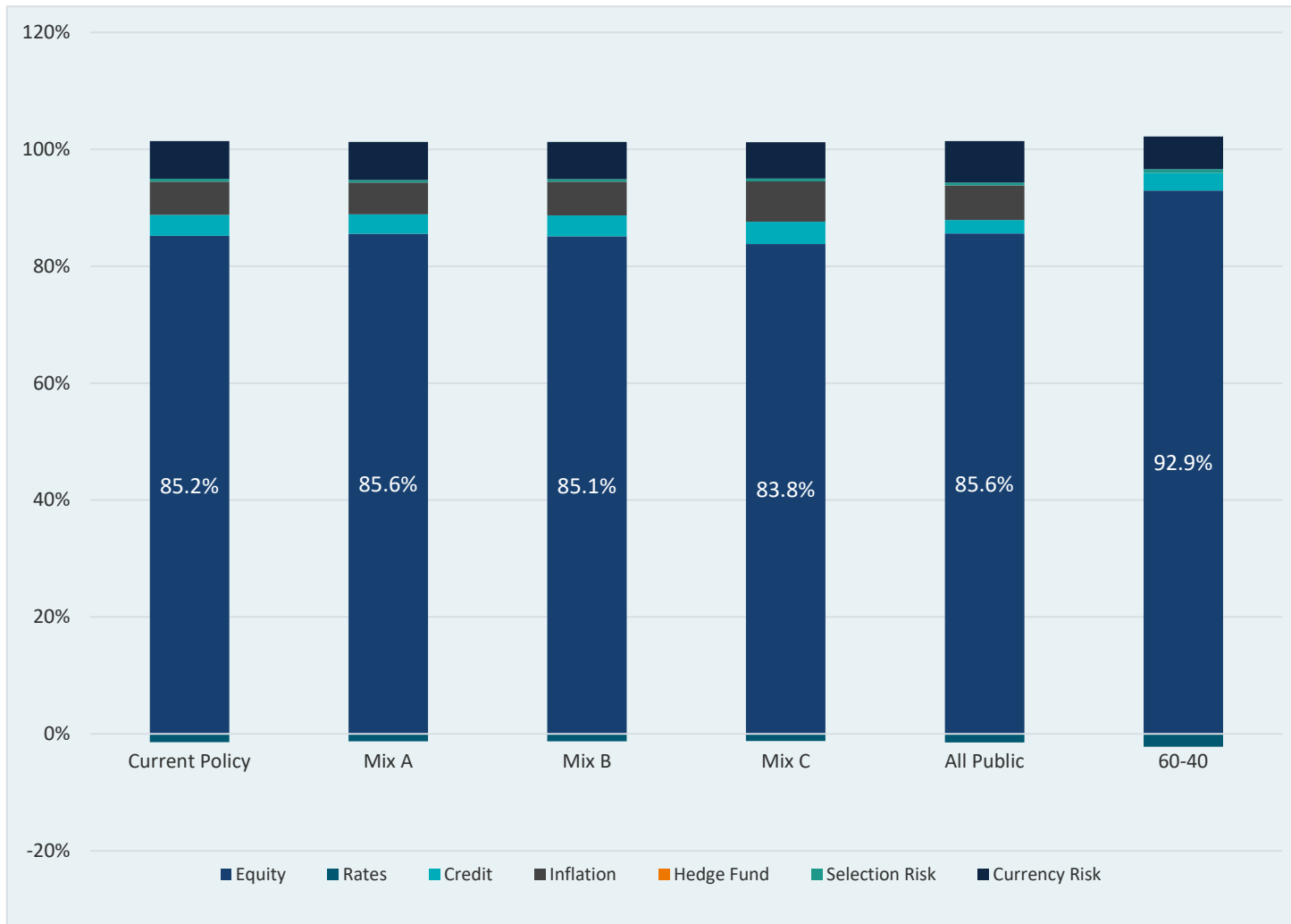
Equity beta



Equity beta is similar across these mixes, ranging from 0.68 to 0.72

Data from MSCI BarraOne, MAC.XL model. All Public allocation provided by Meketa

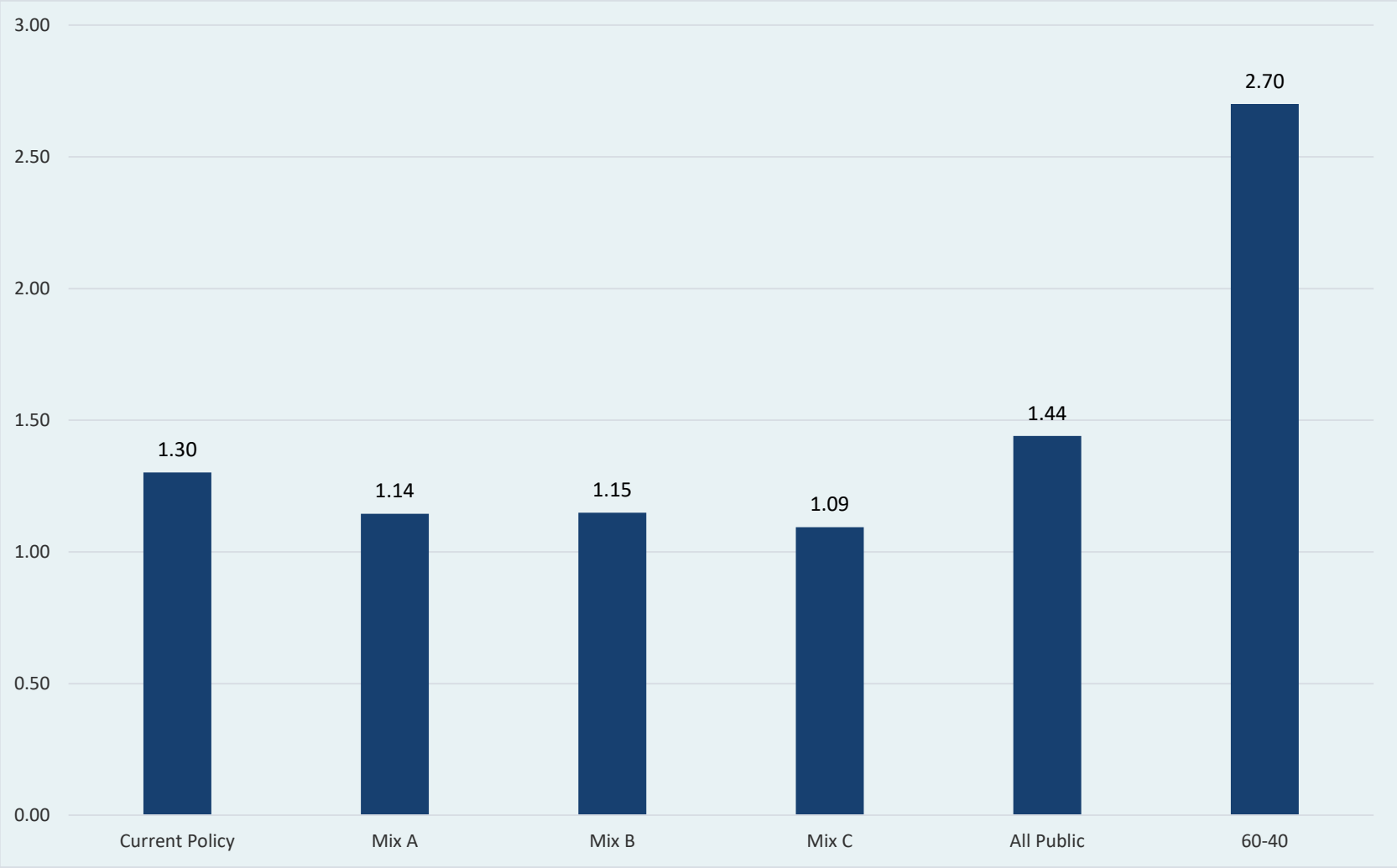
Risk decomposition



Equity factor risk remains largest contributor to volatility across all mixes considered. We see marginal differences in credit, inflation, and currency factors.

Data from MSCI BarraOne, MAC.XL model. All Public allocation provided by Meketa

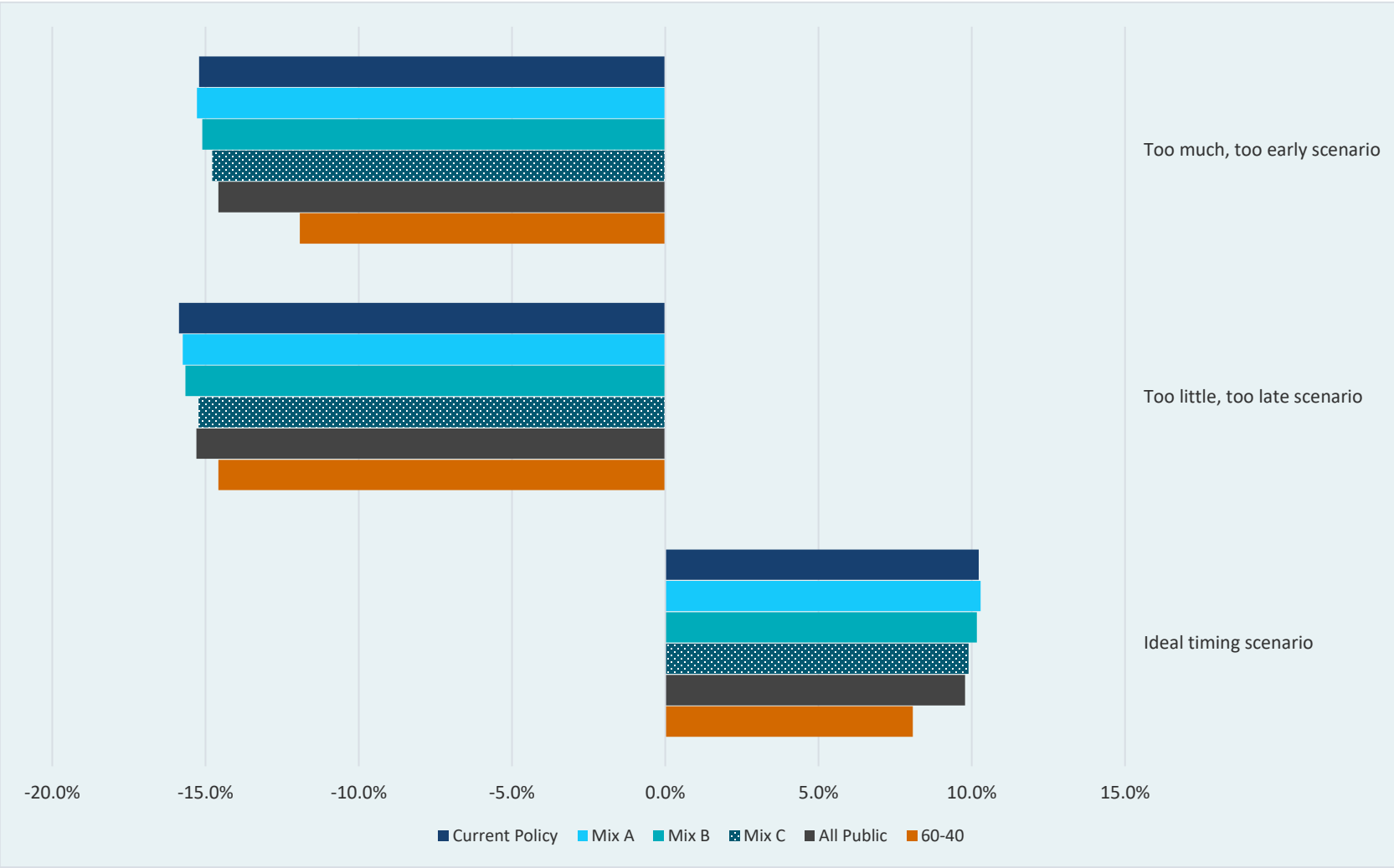
Effective duration



Duration risk (i.e., interest rate sensitivity) remains low across all mixes considered.

Data from MSCI BarraOne, MAC.XL model. All Public allocation provided by Meketa

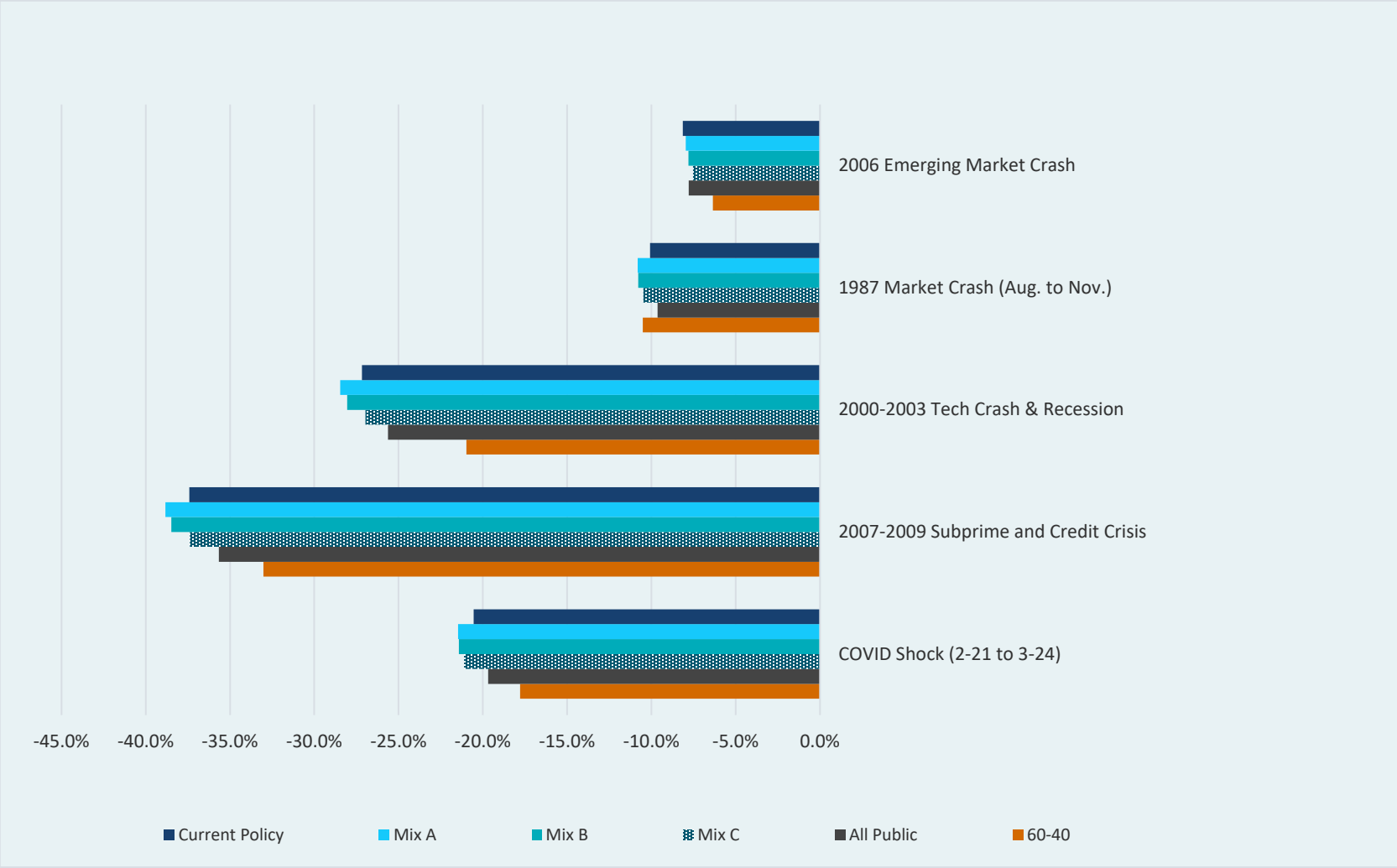
Fed rate hike scenarios



If Fed can successfully navigate timing of raising rates and tapering asset purchases, we could experience positive returns.

Data from MSCI BarraOne, MAC.XL model. All Public allocation provided by Meketa

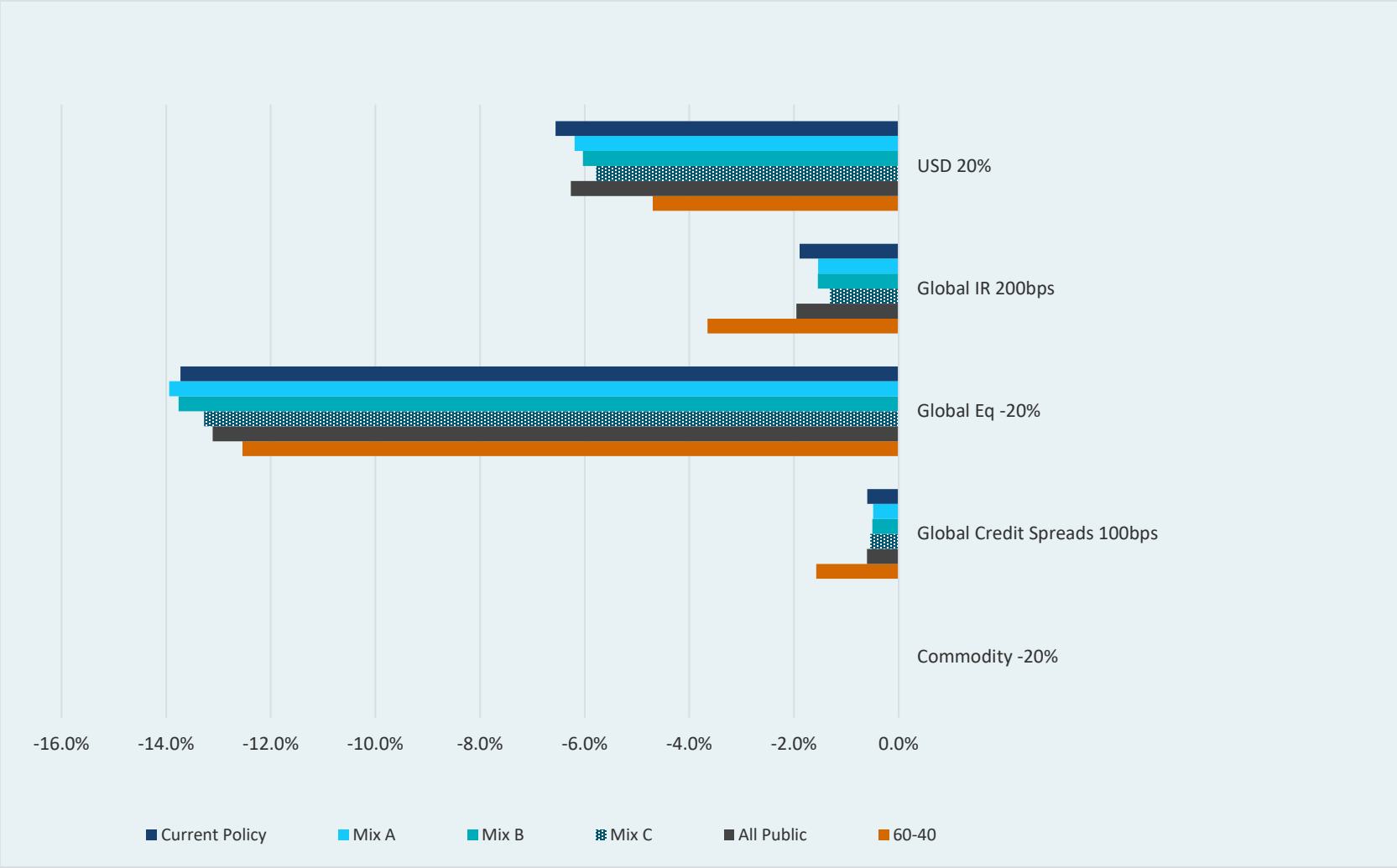
Historical scenarios



We observe similar performance in historic scenarios with 60-40 mix performing best given relatively high fixed income exposure.

Data from MSCI BarraOne, MAC.XL model. All Public allocation provided by Meketa

Stress tests



Of stress tests considered, global equities falling 20% is most severe, followed by U.S. Dollar appreciating 20%.

Commodity risk is essentially non-existent.

Data from MSCI BarraOne, MAC.XL model. All Public allocation provided by Meketa

Appendix

Rate hike scenarios

Ideal timing: Markets perceive that the Fed tapers asset purchases and hikes rates at the right time to keep inflation controlled while helping economic growth remain stable and robust. Investors are confident, equities gain, and long-term rates increase slightly. Emerging markets benefit from strong U.S. growth.

Too much, too early: Markets believe that policy actions occur too early and are overaggressive. Short- and long-term economic growth are negatively impacted, and market-implied inflation expectations drop. Equities fall, the yield curve flattens and the slowdown in the U.S. growth hurts emerging markets.

Too little, too late: Markets perceive that the policy path is too slow, which brings inflation worries to the forefront. While short-term growth is steady, long-term forecasts are hit. Higher inflation and a diminished growth outlook increase equity risk premia. Equities decline, while long-term interest rates pick up, resulting in a positive bond-equity correlation.

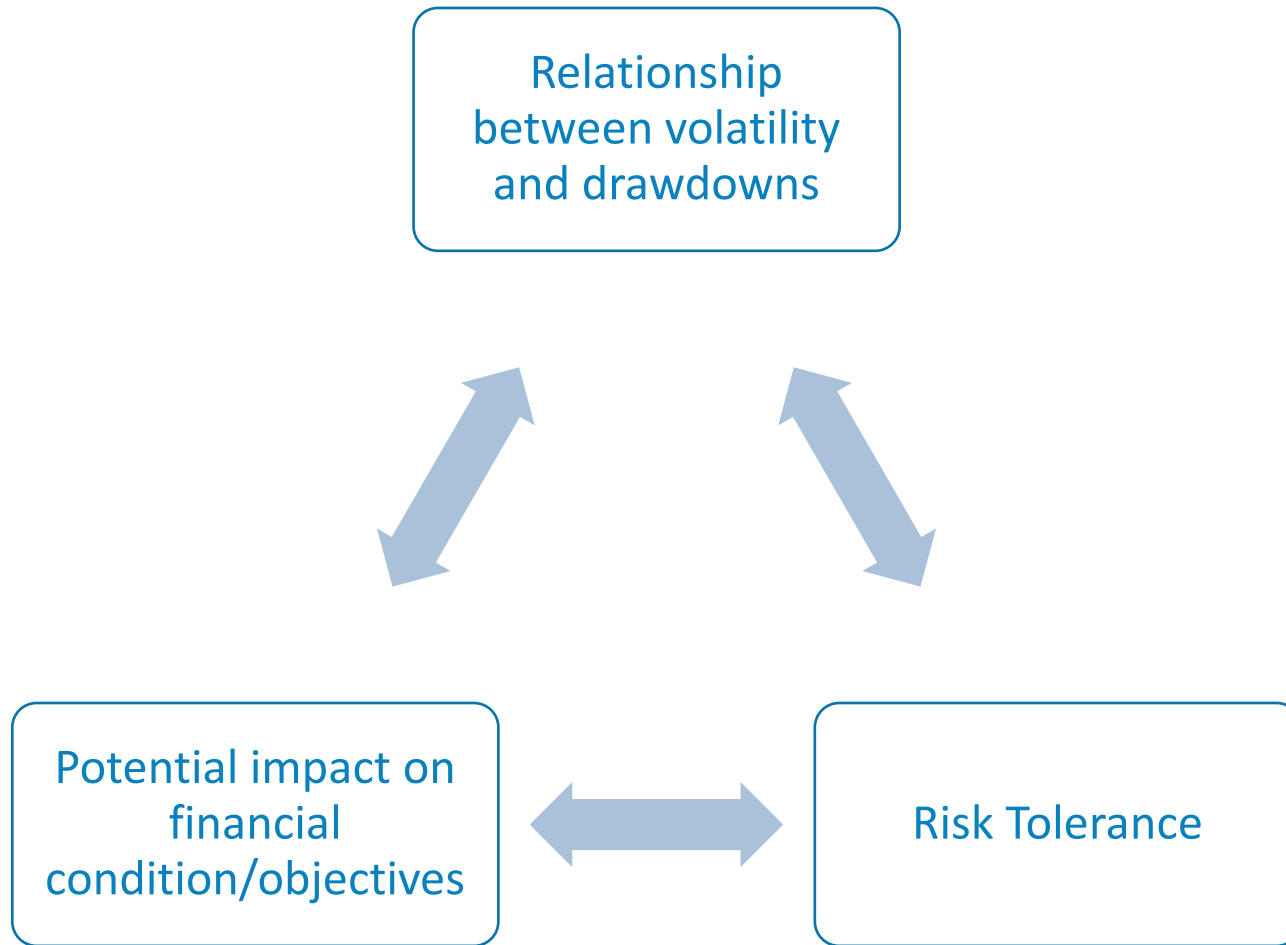
Scenario	Ideal Timing	Too Much, Too Early	Too Little, Too Late
BEI-Rate Shocks (basis points)	Two-year: -15	Two-year: -85	Two-year: +165
	10-year: +5	10-year: -65	10-year: +115
Treasury-rate Shocks (basis points)	Two-year: +30	Two-year: +30	Two-year: +30
	10-year: +20	10-year: -40	10-year: +160
US Credit-Spread Shocks (basis points)	Investment Grade: -15	Investment Grade: +40	Investment Grade: +45
	High Yield: -40	High Yield: +150	High Yield: +190
US Equity Return (nominal)	13%	-17%	-18%
EM Equity Return (nominal, in local currency)	20%	-25%	-23%
EUR/USD Shocks	0%	-7%	10%

Source: MSCI

Appendix – Asset mixes

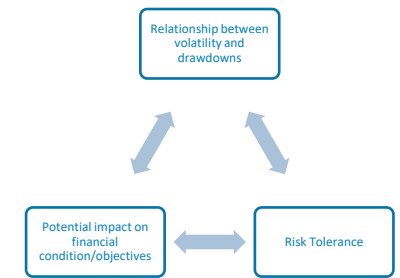
	Current Policy	Mix A	Mix B	Mix C	All Public	60/40
Growth/Equity	61%	64%	63%	59%	64%	60%
US Equity	25%	27%	25%	23%	37%	0%
Developed Market Equity (non-US)	12%	13%	12%	12%	15%	0%
Emerging Market Equity	12%	12%	12%	11%	12%	0%
Global Equity	0%	0%	0%	0%	0%	60%
Buyouts	8%	8%	9%	8%	0%	0%
Venture Capital	4%	4%	5%	5%	0%	0%
Credit	8%	8%	8%	9%	5%	0%
High Yield Bonds	2%	2%	2%	2%	2%	0%
Private Debt	3%	3%	3%	4%	0%	0%
Emerging Market Bonds (major)	1.5%	1.5%	1.5%	1.5%	1.5%	0%
Emerging Market Bonds (local)	1.5%	1.5%	1.5%	1.5%	1.5%	0%
Rate Sensitive	17%	14%	14%	15%	20%	40%
Cash Equivalents	5%	5%	5%	5%	5%	0%
Investment Grade Bonds	8%	5%	5%	6%	11%	40%
Long-term Government Bonds	2%	2%	2%	1%	2%	0%
TIPS	2%	2%	2%	3%	2%	0%
Real Assets	11%	11%	12%	14%	11%	0%
Core Private Real Estate	5%	5%	5%	6%	0%	0%
Value-Added Real Estate	2%	2%	2%	2%	0%	0%
Opportunistic Real Estate	1%	1%	2%	2%	0%	0%
Natural Resources (Public)	0%	0%	0%	0%	3%	0%
Natural Resources (Private)	2%	2%	2%	3%	0%	0%
Infrastructure (Core Private)	1%	1%	1%	1%	0%	0%
REITs	0%	0%	0%	0%	8%	0%
Other	3%	3%	3%	3%	0%	0%
Hedge Funds	3%	3%	3%	3%	0%	0%
TOTAL	100%	100%	100%	100%	100%	100%

Determining risk limits



The board has used the following framework to determine the appropriate level of portfolio volatility

Volatility, drawdowns and risk tolerance



Risk Tolerance

← Aggressive

→ Conservative

Portfolio Volatility	95% VaR	95% CVaR	99% VaR	99% CVaR	Average 3 worst scenarios
8% Risk	-14%	-17%	-18%	-20%	-19%
9% Risk	-15%	-18%	-19%	-22%	-21%
10% Risk	-16%	-19%	-21%	-24%	-23%
11% Risk	-18%	-22%	-24%	-27%	-28%
12% Risk	-20%	-25%	-27%	-31%	-32%
13% Risk	-22%	-28%	-30%	-34%	-36%
14% Risk	-24%	-29%	-31%	-36%	-39%
15% Risk	-25%	-31%	-33%	-38%	-40%

Risk Tolerance

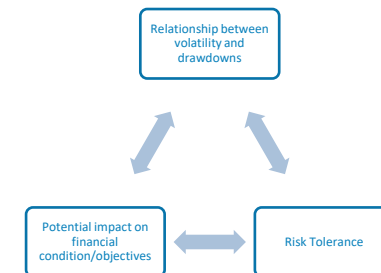
↑ Conservative

↓ Aggressive

The board's risk tolerance determines the appropriate level of risk and how expected drawdowns will be estimated

Actuarial projections

Potential impact on financial condition/objectives



Based on discussions with Verus and Cheiron the board determined there were three actuarial metrics to include in the formulation of their risk limits: Funded Ratio, City Contributions, and Interest cost. Applying drawdowns in 5% increments ranging from 20% to 40%, we can determine the impact on the three metrics.

		Funded Ratio	City Contributions	Interest Cost	Funded Ratio change	City Contributions change	Interest Cost Change
		Single Year	Baseline	74%	\$ 225	\$ 75	0%
	-20%	63%	\$ 341	\$ 125	-11%	\$ 116	\$ 50
	-25%	60%	\$ 362	\$ 135	-14%	\$ 137	\$ 60
	-30%	57%	\$ 382	\$ 146	-17%	\$ 157	\$ 71
	-35%	54%	\$ 402	\$ 156	-21%	\$ 177	\$ 81
	-40%	49%	\$ 422	\$ 166	-25%	\$ 197	\$ 91

The Single Year table identifies the maximum or minimum for each category.

		Funded Ratio	City Contributions	Interest Cost	Funded Ratio change	City Contributions change	Interest Cost Change
		10-year (cumulative)	Baseline	89%	\$ 2,130	\$ 597	0%
	-20%	75%	\$ 2,815	\$ 1,087	-14%	\$ 685	\$ 490
	-25%	73%	\$ 2,961	\$ 1,169	-16%	\$ 831	\$ 571
	-30%	71%	\$ 3,107	\$ 1,250	-18%	\$ 978	\$ 653
	-35%	69%	\$ 3,261	\$ 1,329	-20%	\$ 1,131	\$ 732
	-40%	67%	\$ 3,415	\$ 1,408	-22%	\$ 1,285	\$ 810

The 10-year Cumulative table identifies the end of period financial situation and total dollar amount for each category

Source: Actuarial metrics provided by Cheiron. Dollar amounts in millions

Appendix - Downside measures

We have discussed three methods of determining downside risk (or tail risk) for the investment portfolio.

Value at risk (VaR): VaR calculates the maximum loss expected over a 1-year period given a specified degree of confidence

Conditional Value at Risk (CVaR): CVaR measures the expected loss if VaR is exceeded. It takes the average of the tail observations

Average of three worst historical scenarios: We simulate the portfolio through historic scenarios to determine the three worst periods and take the average of those scenarios.

Risk Metric	Description
95% VaR	(95% Confidence) We don't expect the worst annual loss to exceed
99% VaR	(99% Confidence) we don't expect the worst annual loss to exceed
95% CVaR	(95% Confidence) If VaR is exceeded, the average expected loss
99% CVaR	(99% Confidence) If VaR is exceeded, the average expected loss
Avg. Scenario Drawdown	The average of the three worst historic scenarios measured in BarraOne

There are three methods to calculate VaR: Historic, Parametric, and Monte Carlo. VaR calculations are conducted in BarraOne using Monte Carlo VaR.