Verus

PERSPECTIVES THAT DRIVE ENTERPRISE SUCCESS

AUGUST 2019

Asset/risk allocation

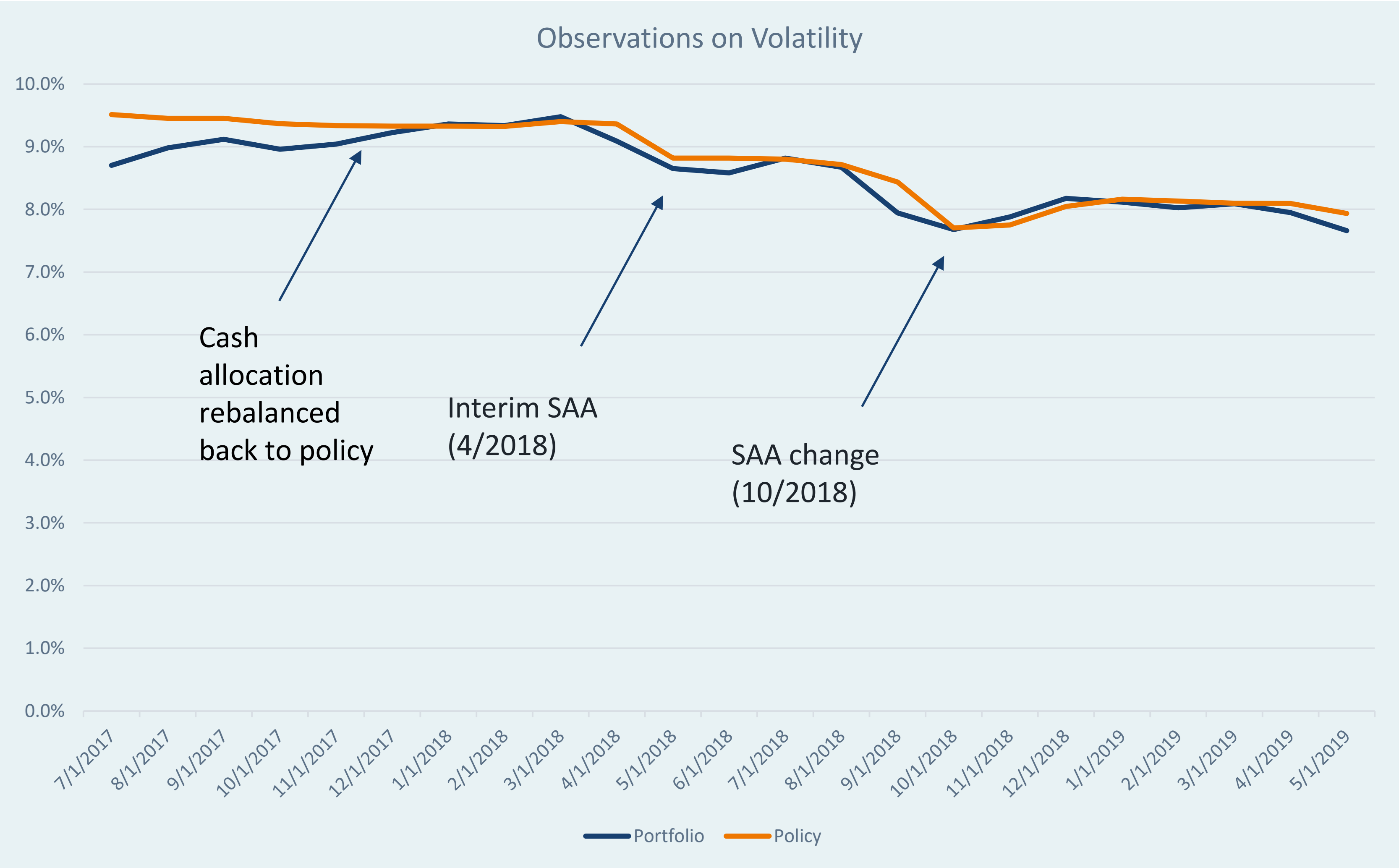
City of San Jose Police & Fire

Summary

The asset mixes considered incrementally increase volatility relative to the current strategic asset allocation. Generally these higher risk mixes allocate more capital to growth assets and less to zero beta assets.

- All mixes analyzed fall within the risk limits defined in the IPS. (Slide 5)
- All the mixes analyzed fall within the CIO operating range identified in the IPS. (Slide 6)
- Increases in volatility are consistent across both Verus and Meketa Capital market assumptions and varying risk models in BarraOne. (Slide 9)
- Using Verus CMAs, we observe similar return efficiency (Sharpe ratios) across the mixes, indicating additional return is mostly achieved by taking higher levels of risk. (Slide 11)
- We see higher levels of equity risk in the incrementally higher risk mixes as well as higher portfolio equity beta. (Slides 11&12)
- In the most severe historic drawdown events, the highest risk mix loses approximately 5% more than the current mix. (Slide 16)

Volatility through time



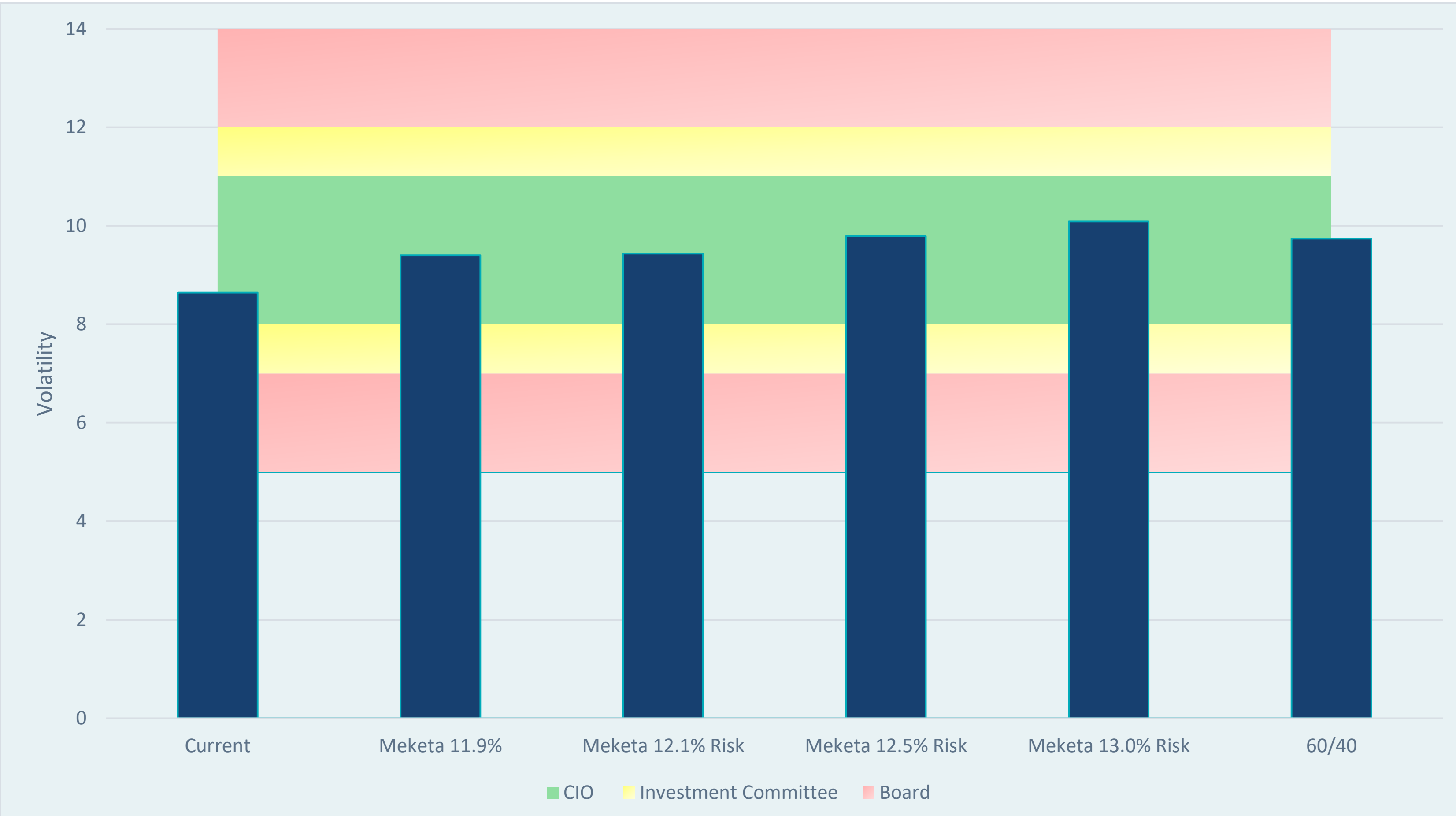
We have observed both portfolio and policy volatility falling over the last year.

This has been driven by both lower market volatility and changes in strategy.

Source: MSCI BarraOne BIM303XL model.

Volatility ranges

Volatility is important because higher/lower levels can have unexpected impacts on contribution rates and funding status



Volatility ranges are measured using the MSCI BarraOne XL risk model. All mixes fall below the 12% limit, and within the CIO operating range

Operating ranges are defined in Appendix C of the IPS

Risk limits

All mixes analyzed fall within the risk limits defined in the IPS

Metric	Measurement	Board Limit	Current	Meketa 11.9% Risk	Meketa 12.1% Risk	Meketa 12.5% Risk	Meketa 13.0% Risk	60/40
Funded ratio	Actuarial funded ratio	60%	Expected to reach 100% in 15 years					
Sponsor contributions	Sponsor contributions in a single year	$335mm	Sponsor contributions are expected to rise to 212M in 2025, then begin to fall					
Interest on UAL	Interest cost of unfunded actuarial liability	$150mm	Interest cost is expected to be 76M in 2018, then begin to fall					
Total fund absolute volatility	Annualized standard deviation of returns of the actual portfolio	12%	8.6%	9.4%	9.4%	9.8%	10.1%	9.7%
Total fund relative volatility	Tracking error of the actual portfolio vs. the strategic asset allocation policy index	4%	Determined by tactical bets, managers selected					
Drawdown exposure	Average of three worst historical scenario drawdown events	-30%	-19%	-20%	-21%	-22%	-23%	-25%
Liquidity	Liquidity Coverage Ratio (LCR) 5-yr projection	1.2	3.0	3.1	3.0	3.1	3.0	3.6

Risk limits are defined in Appendix B of the IPS

Operating ranges

All mixes considered fall within the risk operating ranges defined in the IPS

Metric	CIO	IC	Board	Current	Meketa 11.9% Risk	Meketa 12.1% Risk	Meketa 12.5% Risk	Meketa 13.0% Risk	60/40
Total Portfolio Forecast Risk	8-11%	<8%;11-12%	>12%	8.6%	9.4%	9.4%	9.8%	10.1%	9.7%
Total Portfolio Forecast Beta	0.5-0.8	0.3-0.5; 0.8-1	<0.3;>1	0.6	0.6	0.6	0.6	0.6	0.6
Total Portfolio Duration	0-3 years	3-5 years	>5 years	0.6	0.9	0.9	0.9	0.8	2.9
Total Portfolio Credit Spread Duration	0-3 years	3-5 years	>5 years	0.1	0.2	0.2	0.2	0.2	2.9
Average Drawdown risk	0-25%	25-30%	<-30%	-19.3%	-20.2%	-20.6%	-21.5%	-22.5%	-25.2%

Operating ranges should be revisited when strategy changes are considered.

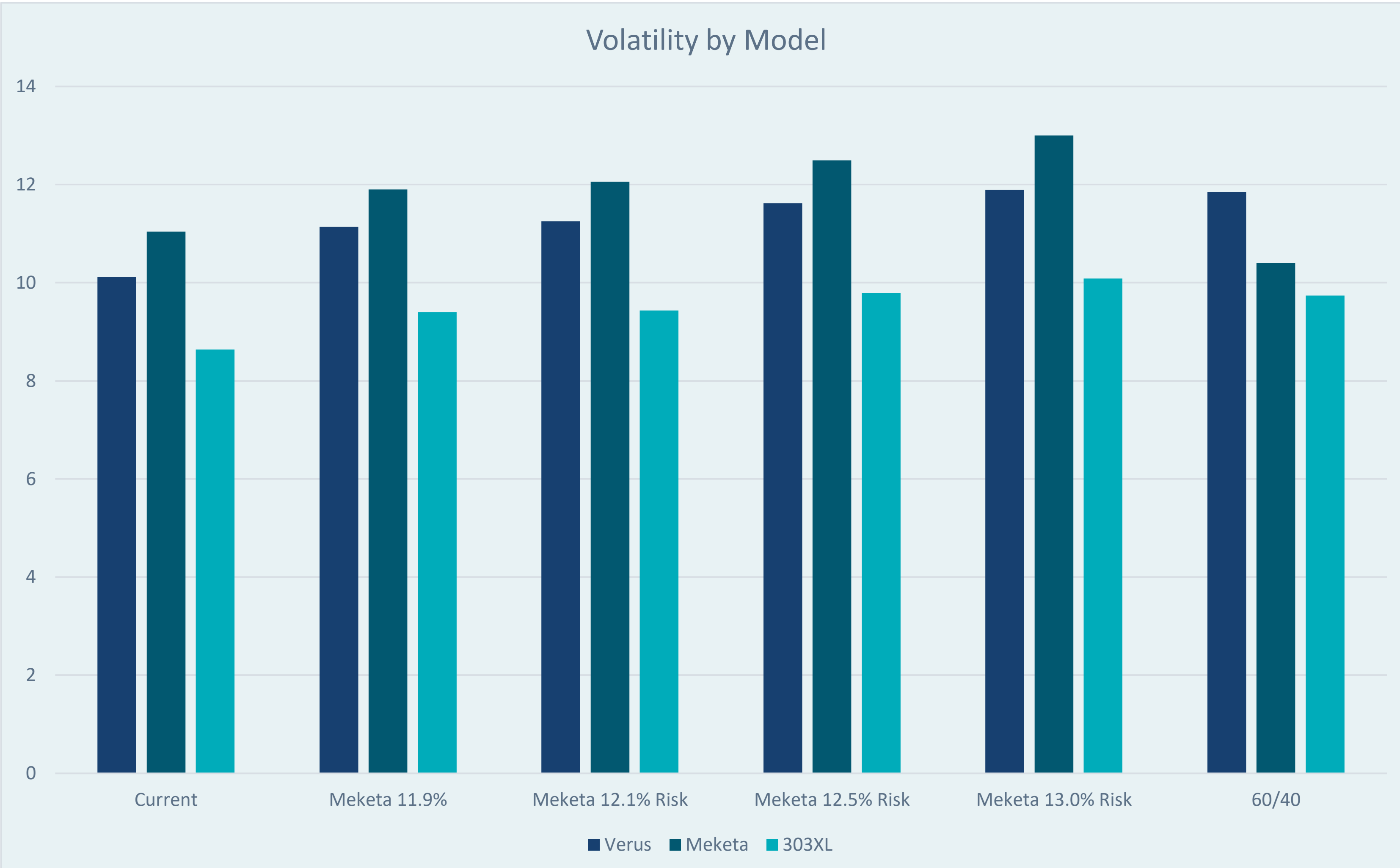
Operating ranges are defined in Appendix C of the IPS

Supporting Anlaysis

Asset mixes

	Current	Meketa 11.9% Risk	Meketa 12.1% Risk	Meketa 12.5% Risk	Meketa 13.0% Risk	60/40
Growth	**56%**	**61%**	**61%**	**64%**	**68%**	**60%**
US Large Cap	10%	10%	10%	10%	11%	0%
US Small Cap	3%	3%	3%	4%	4%	0%
Developed Market Equity (non-US)	8%	10%	10%	12%	12%	0%
Emerging Market Equity	10%	13%	13%	13%	13%	0%
Global Equity	0%	0%	0%	0%	0%	60%
Buyouts	8%	8%	8%	8%	8%	0%
Venture Capital	4%	4%	4%	4%	5%	0%
Value-Added Real Estate	2%	2%	2%	2%	2%	0%
Opportunistic Real Estate	1%	1%	1%	1%	1%	0%
Natural Resources (Private)	3%	3%	3%	3%	5%	0%
Private Debt Composite	4%	4%	4%	4%	4%	0%
Emerging Market Bonds (major)	2%	2%	2%	2%	2%	0%
Emerging Market Bonds (local)	2%	2%	2%	2%	2%	0%
Low Beta	**32%**	**27%**	**27%**	**24%**	**23%**	**0%**
Cash Equivalents	25%	5%	5%	5%	5%	0%
Short-term Investment Grade Bonds	0%	17%	15%	14%	13%	0%
Hedge Funds	7%	5%	7%	5%	5%	0%
Other	**12%**	**12%**	**12%**	**12%**	**9%**	**0%**
Investment Grade Bonds	0%	0%	0%	0%	0%	40%
TIPS	2%	2%	2%	2%	2%	0%
Foreign Bonds	3%	3%	3%	3%	2%	0%
Commodities	2%	2%	2%	2%	0%	0%
Core Private Real Estate	5%	5%	5%	5%	5%	0%

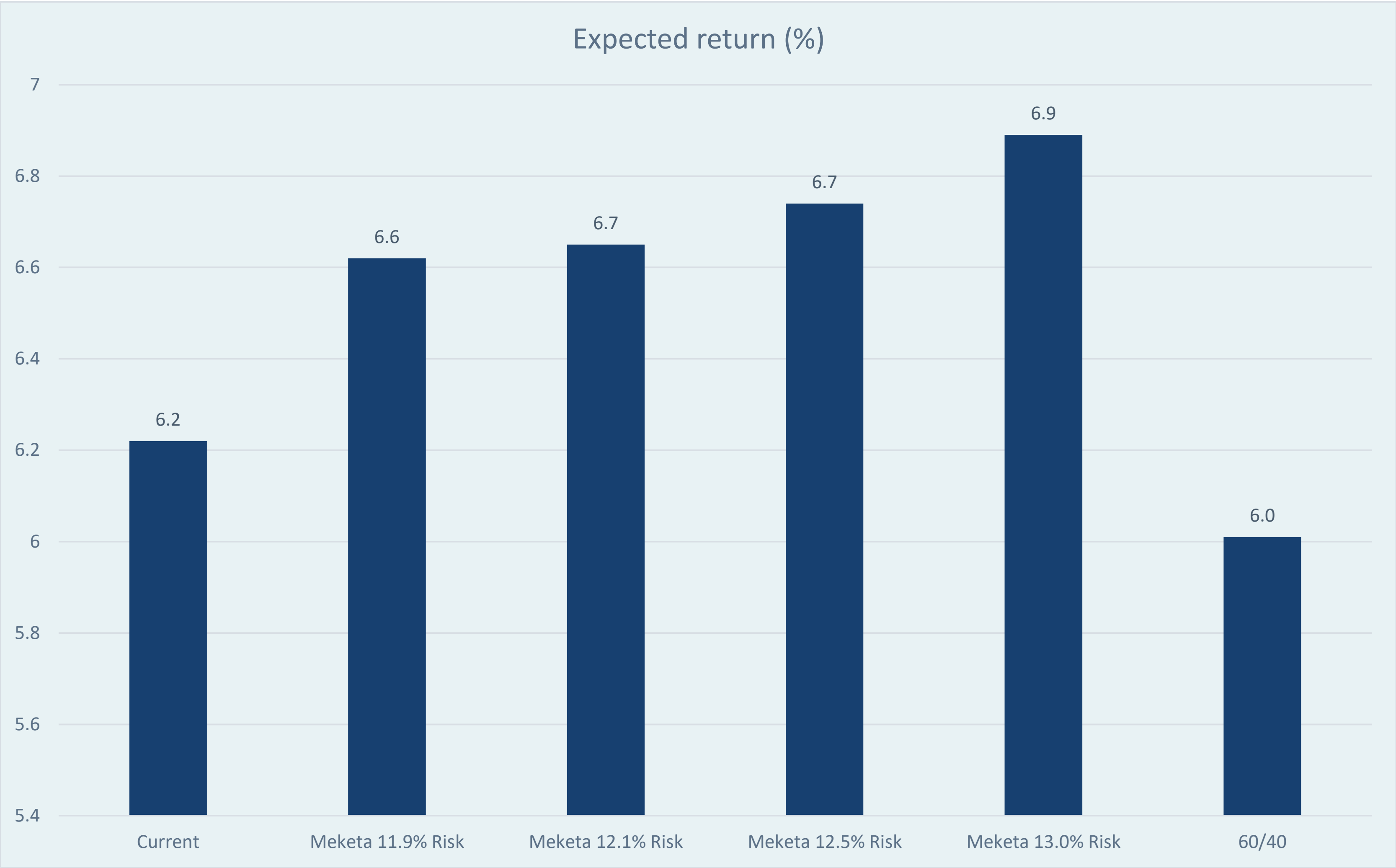
Volatility by model



Various models have different estimates of volatility for the mixes.

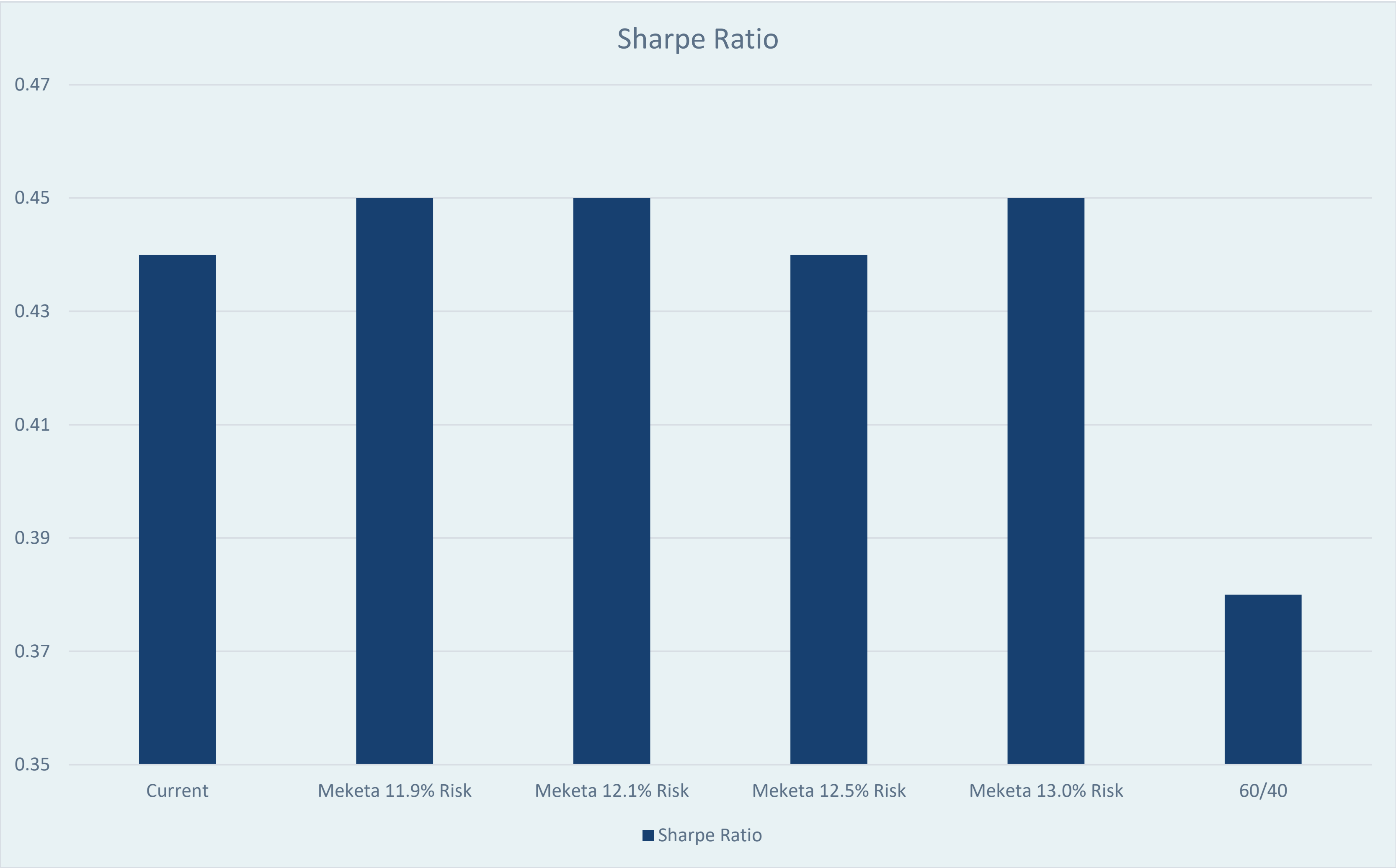
Directionally, the models show similar trends in terms of which mixes contain the most and the least volatility.

Expected return (%)



Expected returns using Verus Capital Market Assumptions

Sharpe Ratio

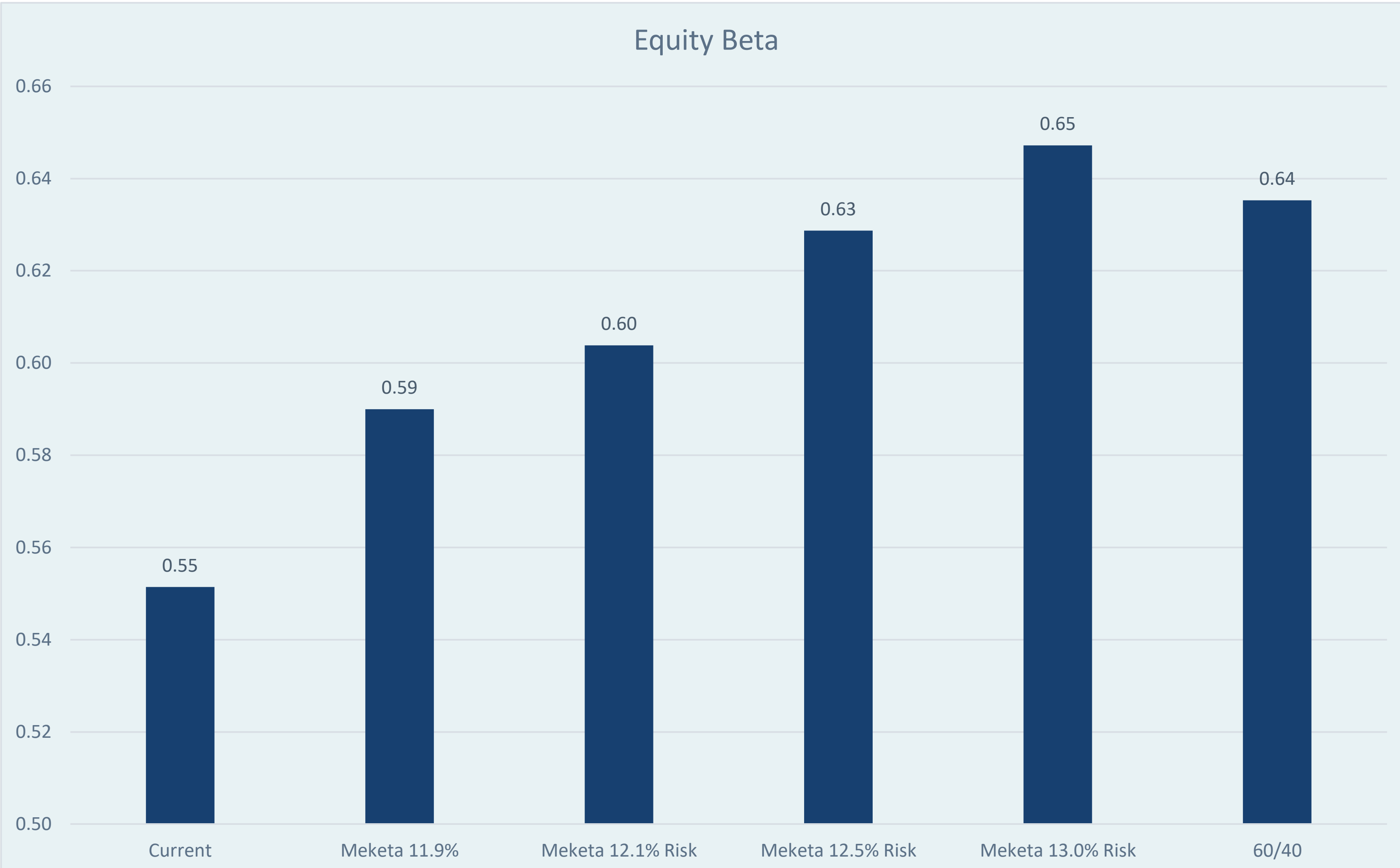


Sharpe Ratios are based on Verus' Capital Market Assumptions of volatility.

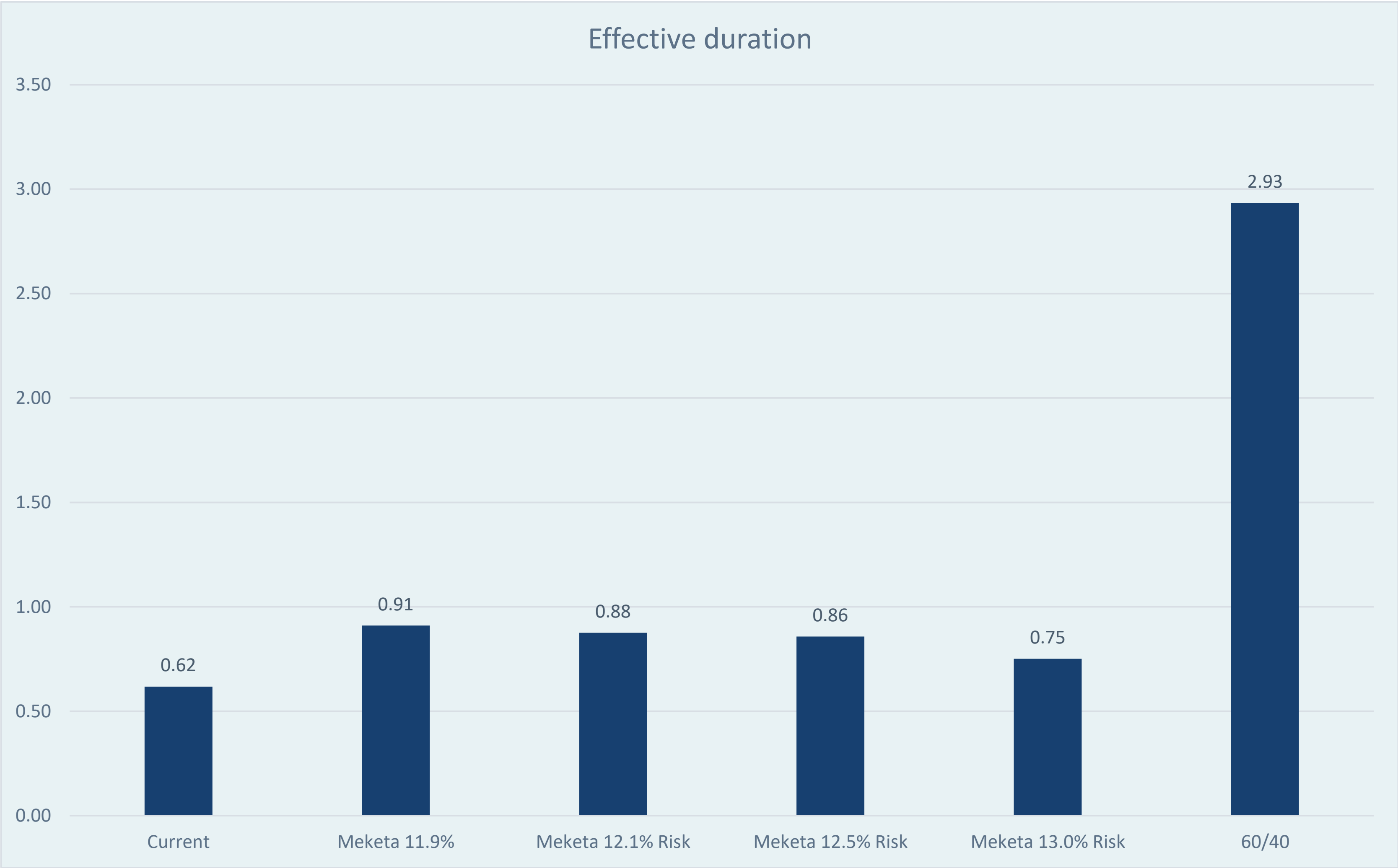
Risk decomposition

The factor risk allocation across the different mixes remains very similar.

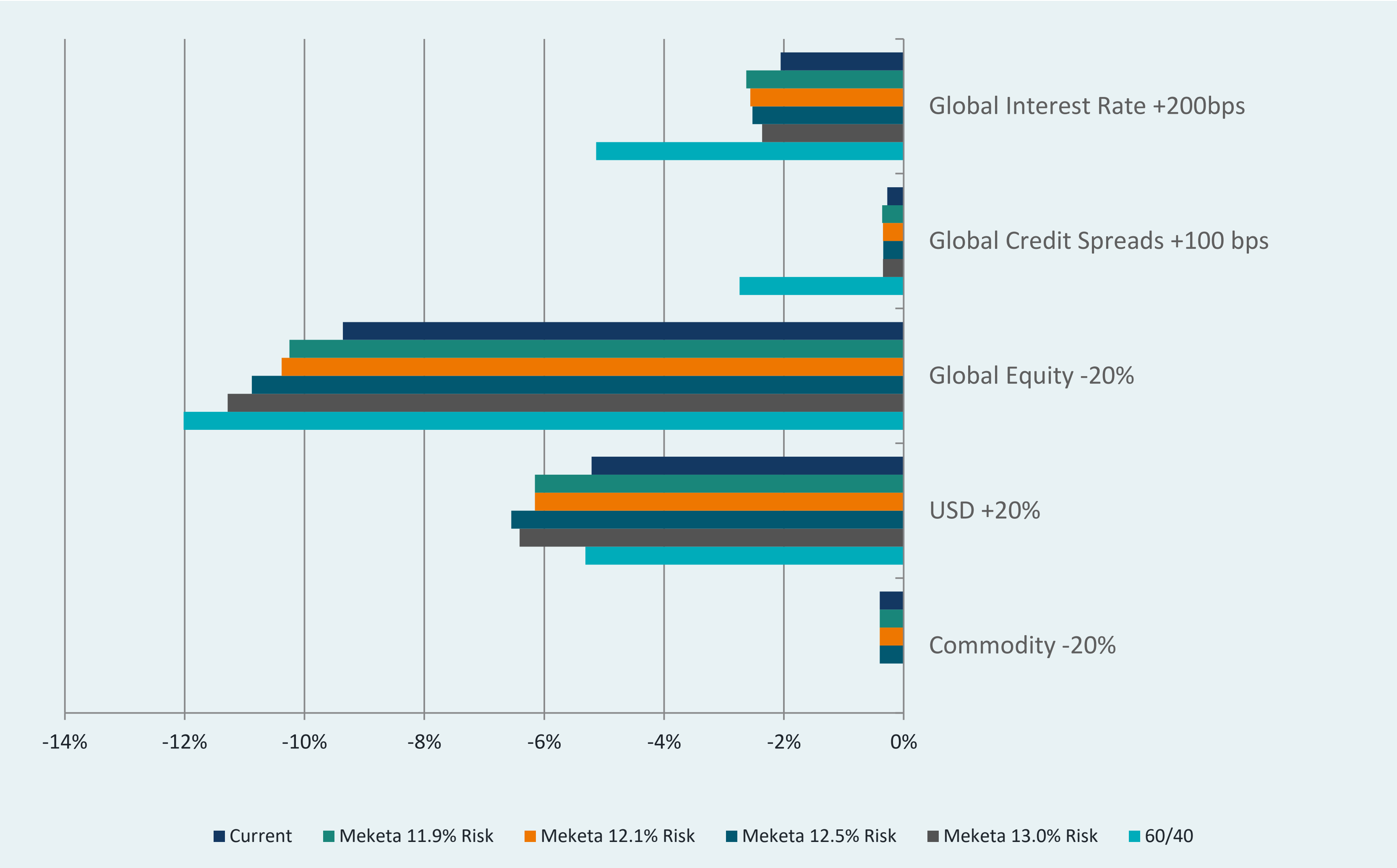
Equity beta


Equity Beta
0.66
0.64
0.62
0.60
0.58
0.56
0.54
0.52
0.50
0.55
0.59
0.60
0.63
0.65
0.64
Current
Meketa 11.9%
Meketa 12.1% Risk
Meketa 12.5% Risk
Meketa 13.0% Risk
60/40

Effective duration

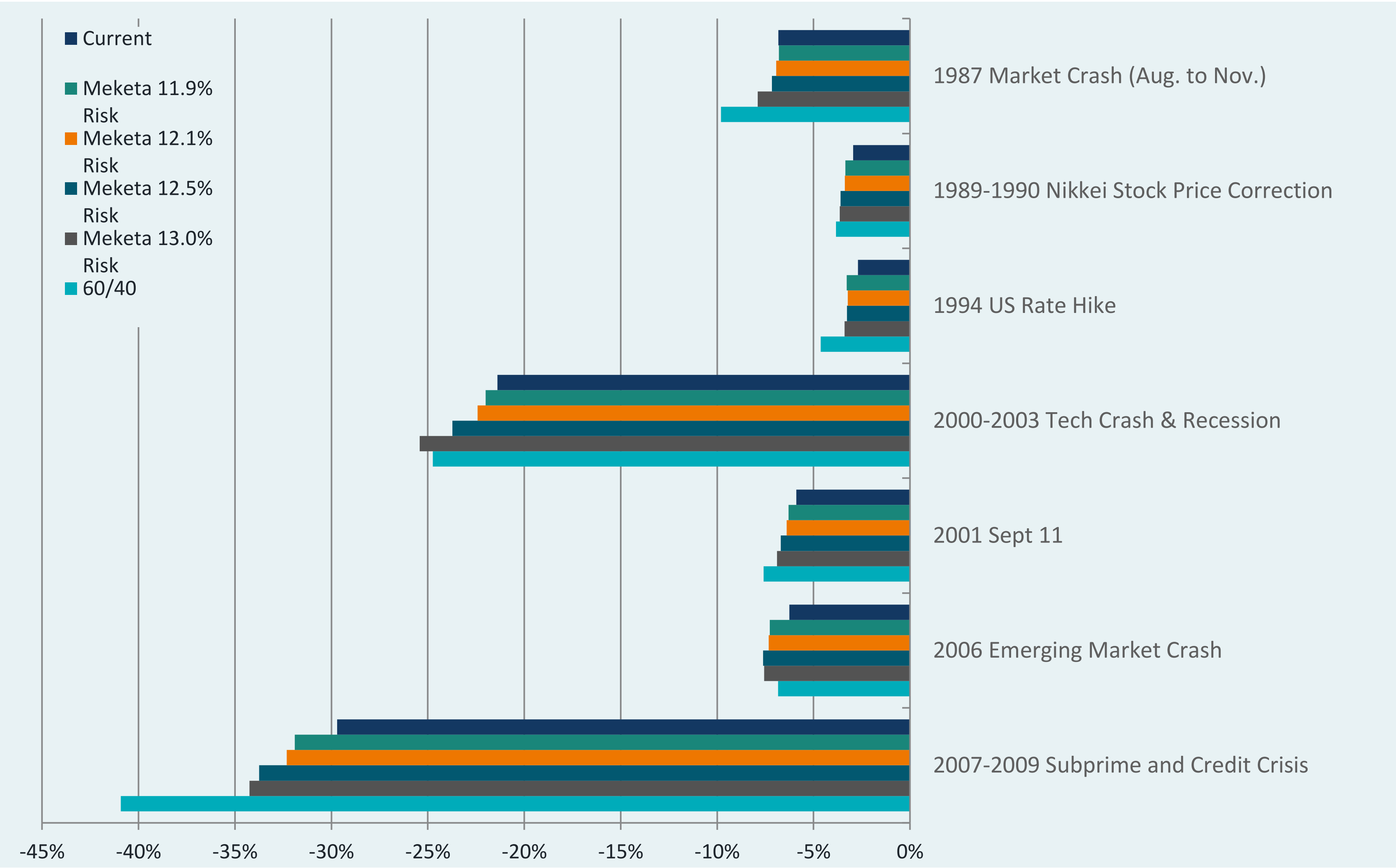


Stress tests



As risk increases in the proposed mixes, the sensitivity to an equity drawdown increases.

Scenario analysis



All mixes fall within the tail risk limit: Average of 3 worst scenarios not to exceed 30%.