Verus

PERSPECTIVES THAT DRIVE ENTERPRISE SUCCESS

MARCH 24, 2020

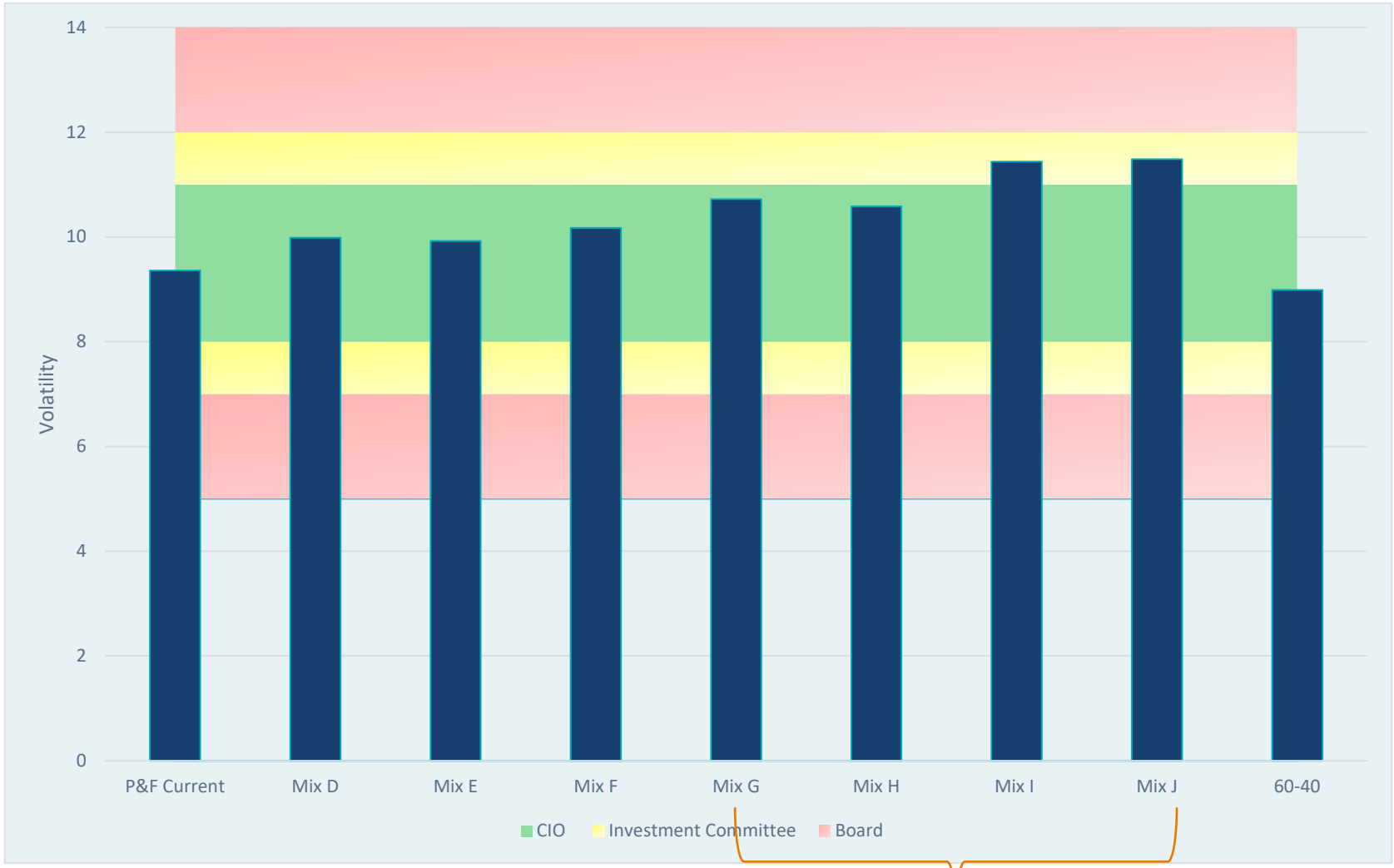
Risk Allocation Study

San Jose Police and Fire Employees' Retirement System

Summary

- At March 18th Special Board meeting, Board expressed preference to adopt Asset Mixes D or E, which exhibit marginally increased volatility relative to current strategic asset allocation
- Board requested that additional high growth asset mixes be evaluated for discussion at March 24th meeting.
  - Generally, these higher risk mixes allocate more capital to growth assets and less to zero beta assets
  - New higher growth mixes analyzed fall either near limit or exceed limit for CIO risk operating zones defined in IPS
  - Increases in volatility remain consistent across both Verus and Meketa Capital market assumptions
  - Expected returns do not change materially for higher growth mixes vs. Mixes D and E or current SAA
  - Return per unit of risk (i.e., Sharpe Ratio) remains consistent across all mixes
  - Increases in volatility come from taking more equity risk. New higher growth mixes exhibit higher equity betas versus current SAA and Mixes D and E
  - Duration risk is not significant risk among mixes considered as it is relatively short across all mixes

Risk operating zones

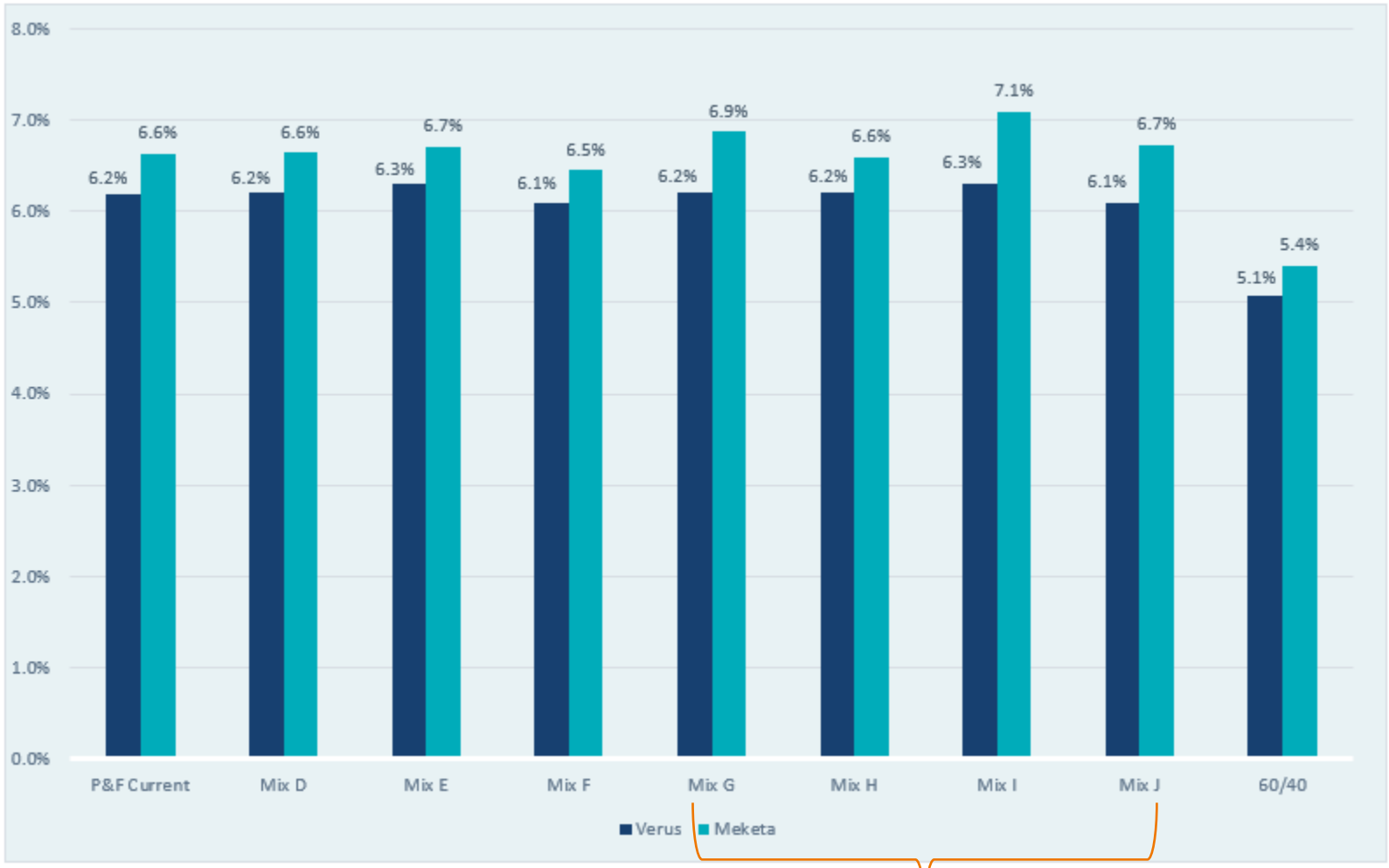


Mixes I and J fall outside of the CIO operating zone for portfolio volatility while Mixes G and H approach edge of zone

Operating zones are defined in appendix C of the Investment Policy Statement.

New higher growth mixes

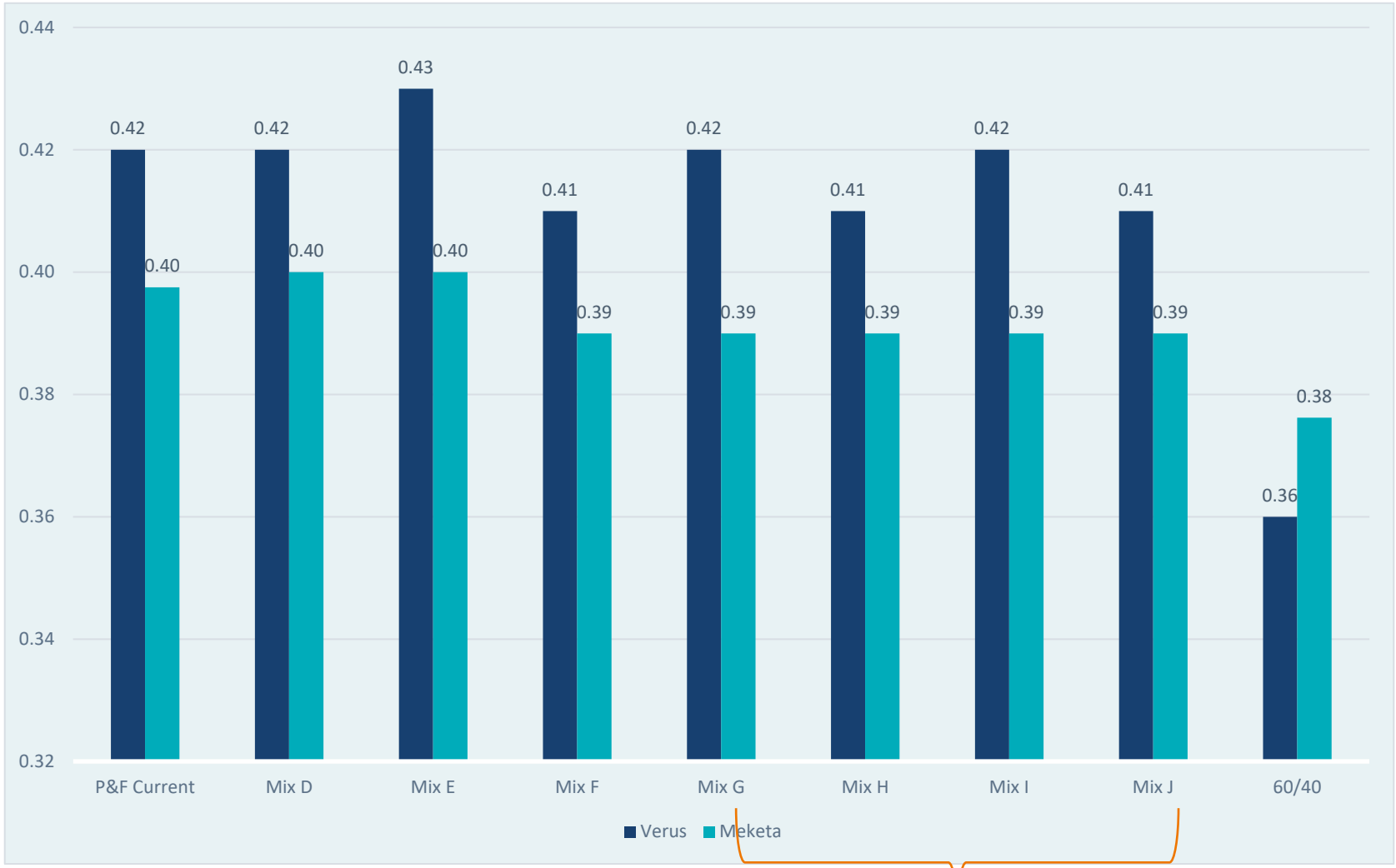
Expected Return (%)



Expected returns are directionally consistent using both Verus and Meketa CMAs

Source: MPI. Based on Verus 2020 CMAs

Sharpe Ratio



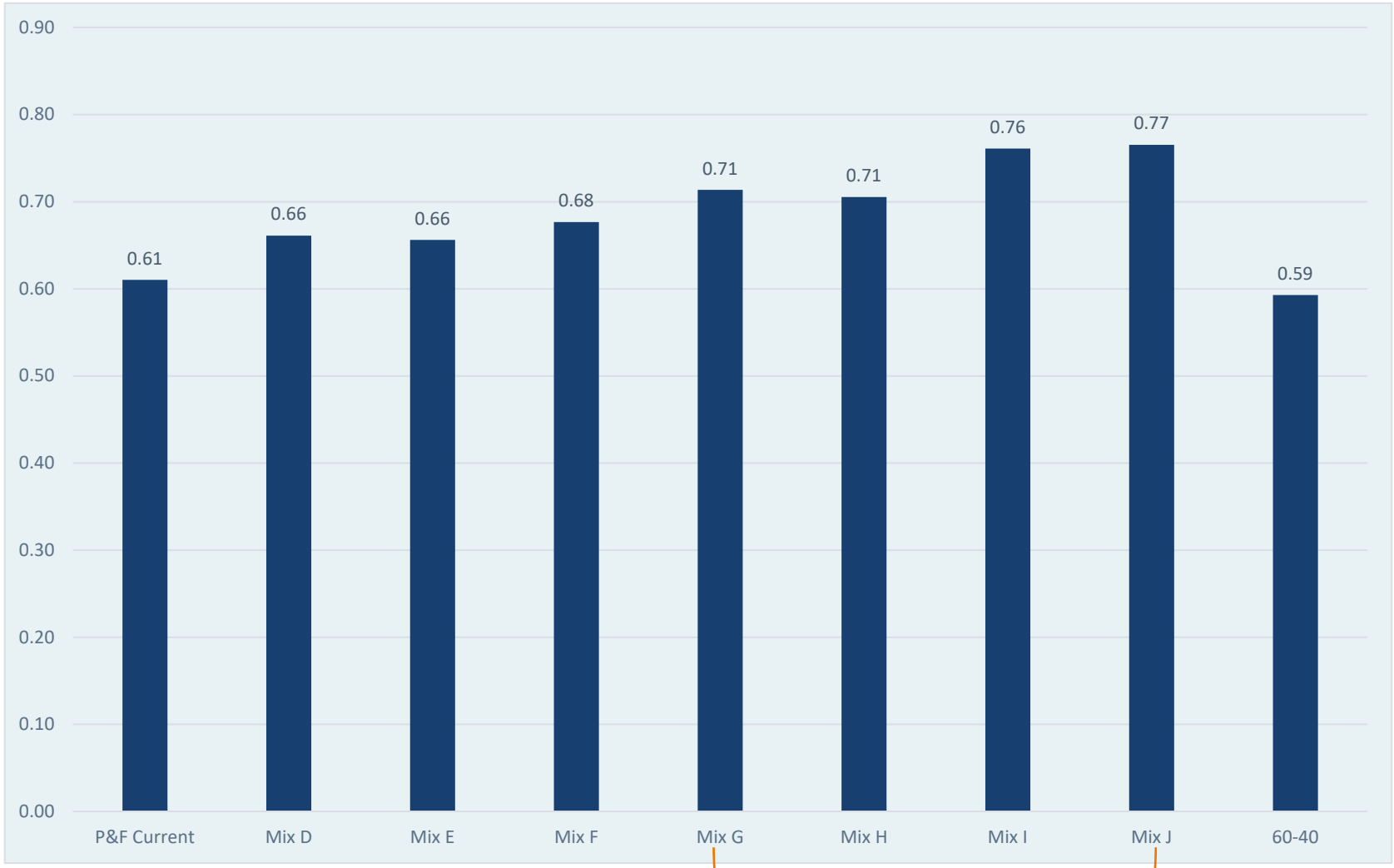
The modestly higher growth portfolios provide slightly higher Sharpe ratios while 60/40 provides the lowest.

We do not see a material difference in results across the remaining portfolio mixes

Source: MPI. Based on Verus 2020 CMAs

New higher growth mixes

Equity beta

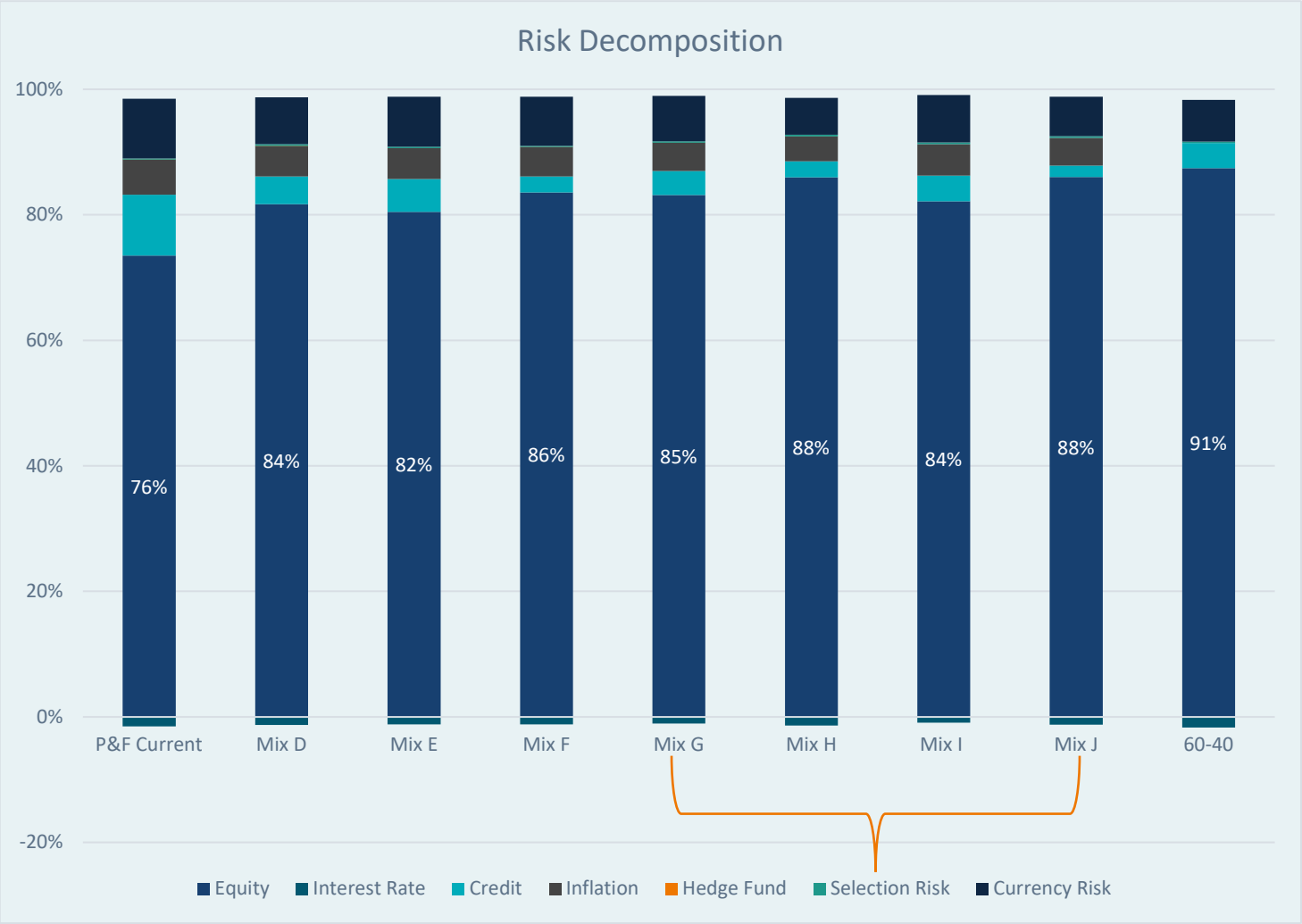


The higher risk mixes have greater sensitivity to broad equity movements

Data from MSCI BarraOne, 303XL model.

New higher growth mixes

Risk decomposition

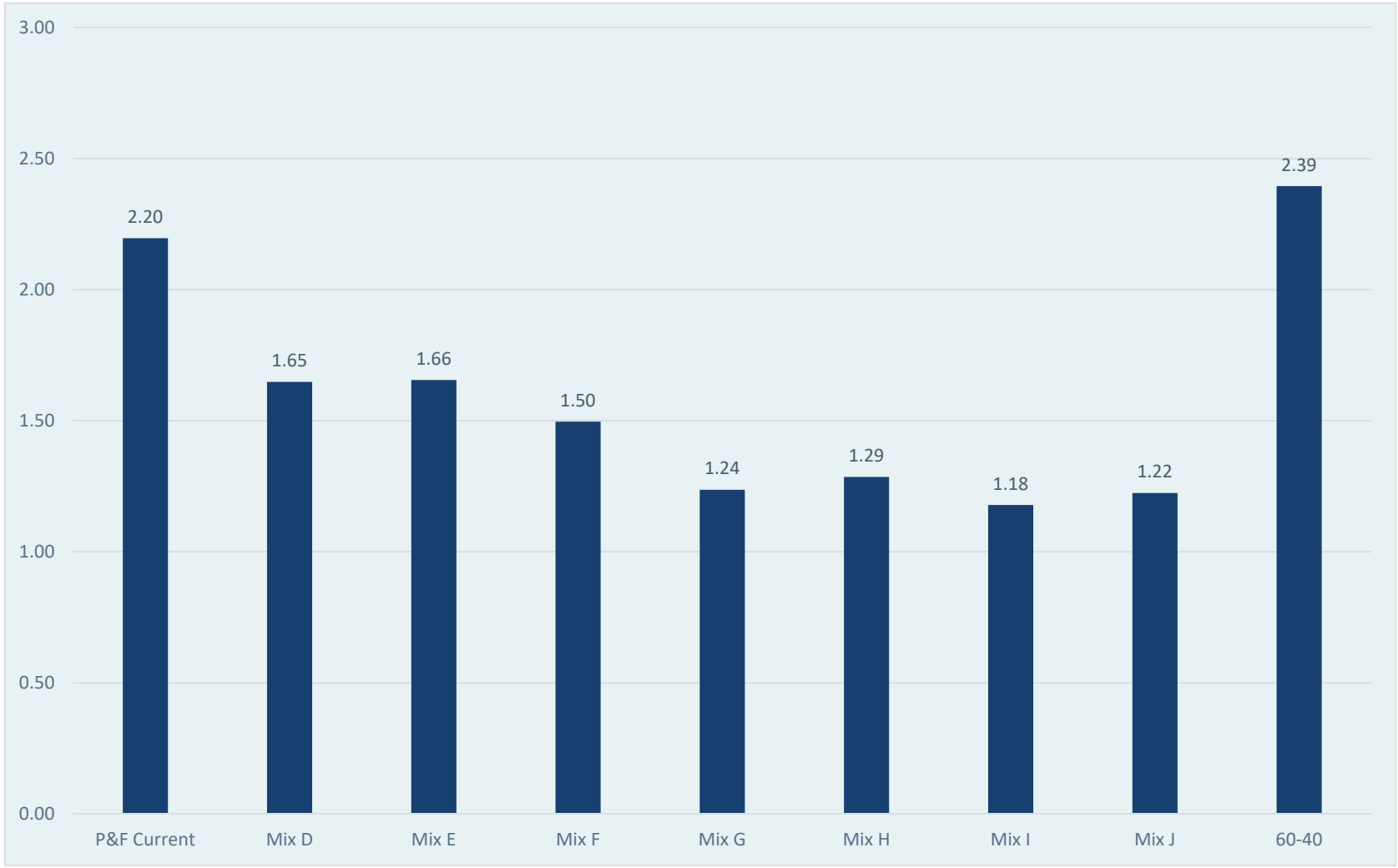


Data from MSCI BarraOne, 303XL model.

New higher growth mixes

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

Effective duration

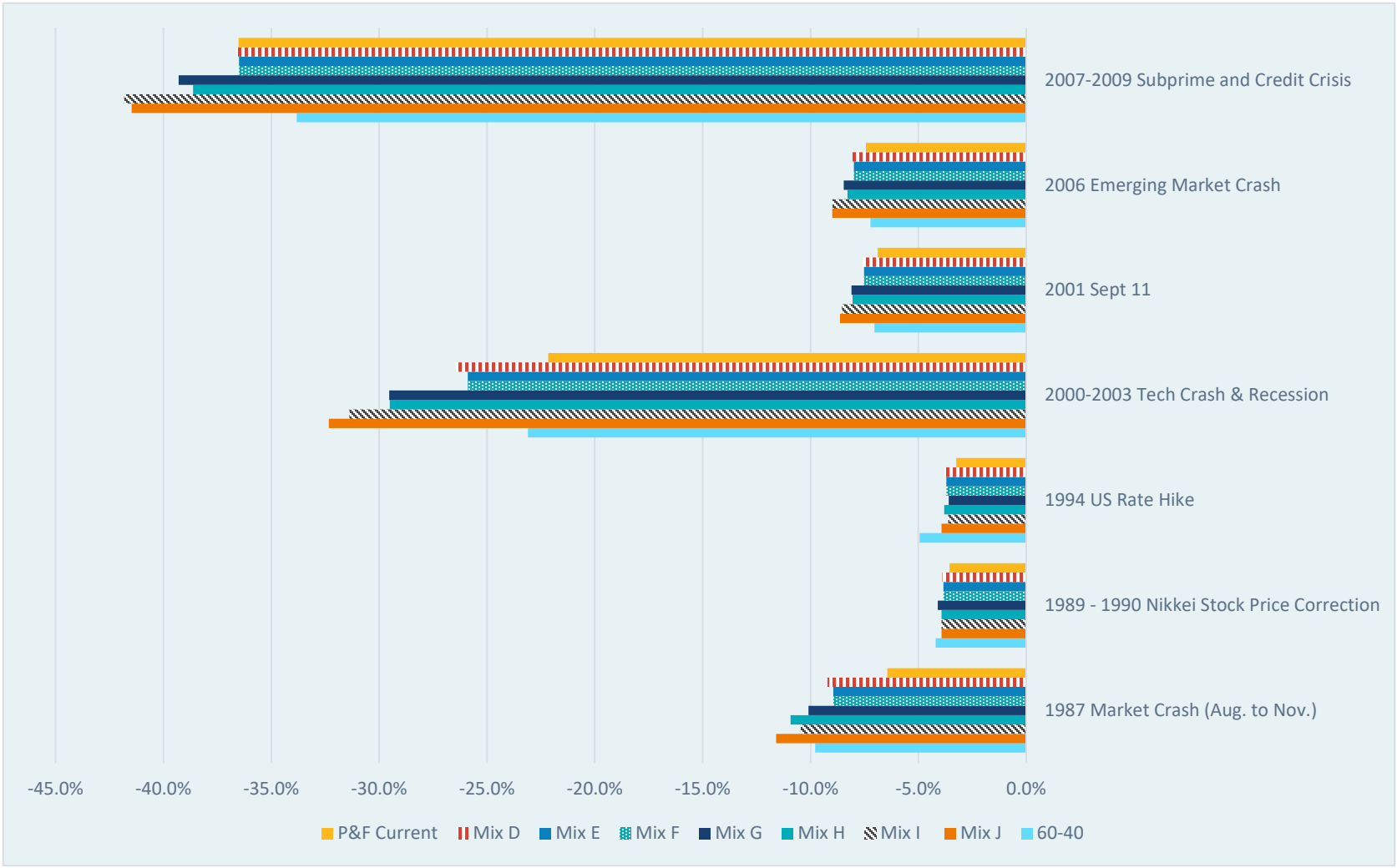


Duration remains low across all the mixes considered.

Data from MSCI BarraOne, 303XL model. As of 7-31 the average peer (defined as DB plans >$1B IF Universe) have a duration of 1.3 years.

New higher growth mixes

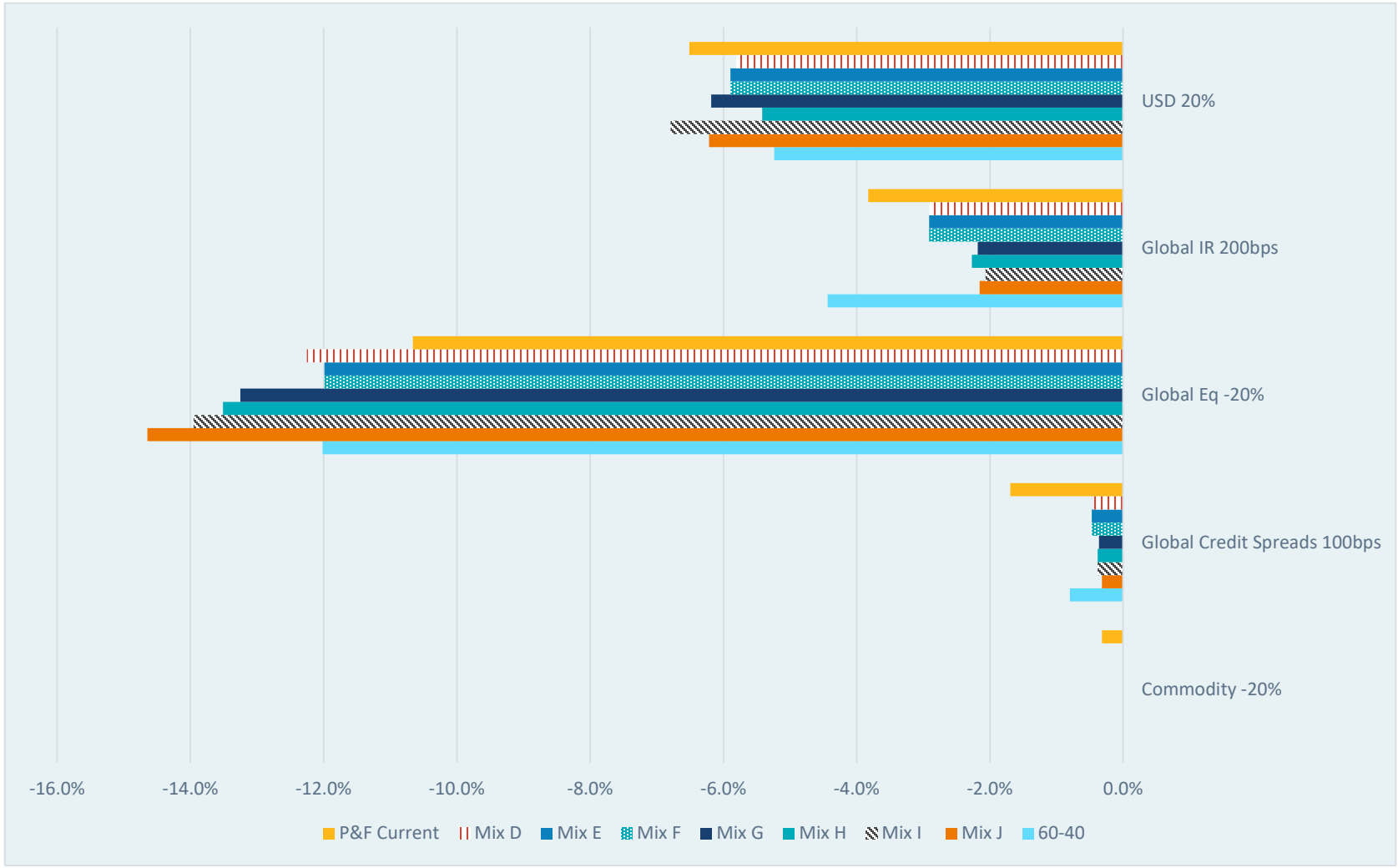
Scenario analysis



We see the largest differences in tail risk in the tech crash and subprime crisis.

Data from MSCI BarraOne, 303XL model.

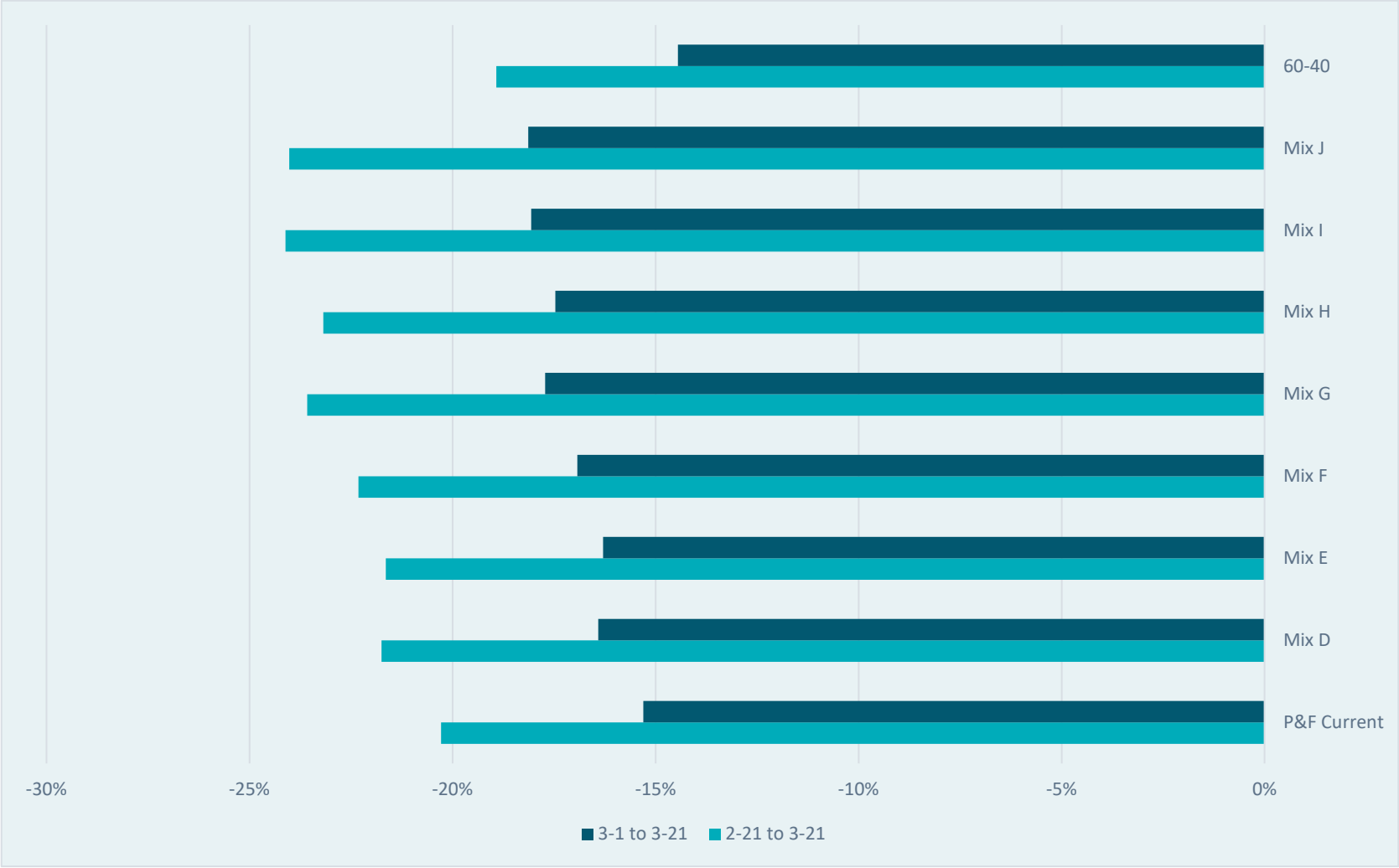
Stress tests



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

Data from MSCI BarraOne, 303XL model.

CV-19 Shock



Although current drawdowns have not reached GFC levels, expectations are that economic conditions will worsen in short term (i.e., next quarter)

Results are similar across all mixes except 60/40 which has much higher bond allocation

Appendix – Asset mixes

	PF Current	Mix D	Mix E	Mix F	Mix G	Mix H	Mix I	Mix J	60-40
Growth	64%	70%	71%	69%	75%	70%	79%	74%	60%
Public Equity	39%	46%	43%	50%	49%	53%	51%	59%	60%
Global Equity	NA	NA	NA	5%	NA	NA	NA	NA	60%
US Equity	14%	23%	21%	23%	25%	30%	26%	33%	0%
Developed Market Equity (non-US)	12%	11%	10%	17%	12%	11%	12%	13%	0%
Emerging Market Equity	13%	12%	12%	5%	12%	12%	13%	13%	0%
Private Markets	22%	19%	22%	16%	21%	17%	23%	15%	0%
Buyouts	8%	6%	7%	7%	8%	7%	8%	6%	0%
Venture Capital	4%	4%	4%	3%	4%	3%	5%	3%	0%
Private Debt	4%	3%	4%	0%	3%	3%	4%	2%	0%
Private Real Estate	3%	3%	3%	4%	3%	2%	3%	2%	0%
Private Real Assets	3%	3%	4%	2%	3%	2%	3%	2%	0%
Emerging Markets Debt	3%	3%	4%	3%	3%	0%	3%	0%	0%
High Yield Bonds	0%	2%	2%		2%	0%	2%	0%	0%
Low Beta	24%	8%	8%	7%	8%	8%	5%	5%	0%
Absolute Return (Hedge Funds)	5%	3%	3%	5%	3%	3%	0%	0%	0%
Short-Term Investment Grade Bonds	14%	0%	0%	0%	0%	0%	0%	0%	0%
Cash Equivalents	5%	5%	5%	1%	5%	5%	5%	5%	0%
Other	12%	22%	21%	25%	17%	22%	16%	21%	40%
Core Real Estate	5%	5%	5%	4%	5%	5%	6%	6%	0%
Commodities	2%	0%	0%	0%	0%	0%	0%	0%	0%
TIPS	2%	2%	2%	0%	2%	2%	2%	2%	0%
Investment Grade Bonds	0%	12%	11%	16%	8%	13%	6%	11%	40%
Foreign Bonds	3%	0%	0%	4%	0%	0%	0%	0%	0%
Long-term Government Bonds	0%	3%	3%	0%	2%	2%	2%	2%	0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Appendix – Scenario data

	1987 Market Crash (Aug. to Nov.)	1989 - 1990 Nikkei Stock Price Correction	1994 US Rate Hike	2000-2003 Tech Crash & Recession	2001 Sept 11	2006 Emerging Market Crash	2007-2009 Subprime and Credit Crisis	Commodity -20%	Global Credit Spreads 100bps	Global Eq -20%	Global IR 200bps	USD 20%
P&F Current	-6%	-4%	-3%	-22%	-7%	-7%	-37%	0%	-2%	-11%	-4%	-7%
Mix D	-9%	-4%	-4%	-26%	-8%	-8%	-37%	0%	0%	-12%	-3%	-6%
Mix E	-9%	-4%	-4%	-26%	-8%	-8%	-36%	0%	0%	-12%	-3%	-6%
Mix F	-9%	-4%	-4%	-26%	-8%	-8%	-36%	0%	0%	-12%	-3%	-6%
Mix G	-10%	-4%	-4%	-30%	-8%	-8%	-39%	0%	0%	-13%	-2%	-6%
Mix H	-11%	-4%	-4%	-30%	-8%	-8%	-39%	0%	0%	-14%	-2%	-5%
Mix I	-10%	-4%	-4%	-31%	-9%	-9%	-42%	0%	0%	-14%	-2%	-7%
Mix J	-12%	-4%	-4%	-32%	-9%	-9%	-41%	0%	0%	-15%	-2%	-6%
60-40	-10%	-4%	-5%	-23%	-7%	-7%	-34%	0%	-1%	-12%	-4%	-5%