ITEM 10

For Agenda of:
January 18, 2017

January 13, 2017

TO: President and Members
Board of Retirement

FROM: Steve Davis
Chief Investment Officer

SUBJECT: Asset Liability Modeling Analysis and Recommended Asset Allocation

RECOMMENDATION:

That your Board approve the asset allocation model recommended by Verus and Staff as a result of the asset liability modeling study.

INTRODUCTION:

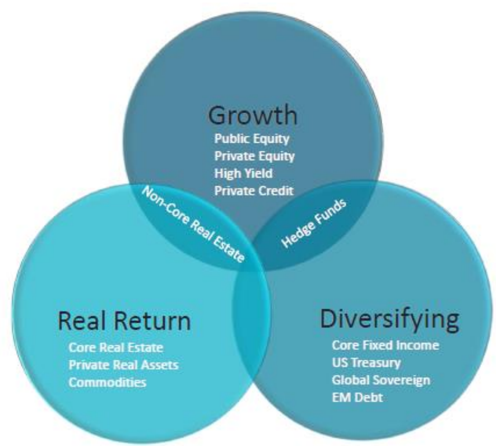
Over the past several months, SCERS has been working on an asset liability modeling ('ALM') study. This process has involved several steps including: (1) The identification of the objectives of the ALM study; (2) An Enterprise Risk Tolerance analysis and discussion with the Board, which helped to identify and prioritize investment-related objectives, principles and risks, and that included a survey which SCERS' Board completed, the results of which played a significant role in design of SCERS' recommended strategic asset allocation; (3) Education by SCERS' general investment consultant Verus Advisory ('Verus') and SCERS' investment staff ('Staff') on the various approaches to asset allocation, and the identification of various approaches to identifying risk within a portfolio; and (4) The modeling of asset mixes against SCERS' liabilities.

At the December Board meeting, Verus and Staff presented asset class mixes that were similar to the type of portfolio that would be recommended to SCERS' Board at a future meeting. As you recall, the mixes presented at the December meeting fell between SCERS' current portfolio and the Verus Risk Diversified Portfolio model.

The over-arching goal of the ALM study has been to develop an asset allocation for SCERS' investment program for the next five to seven years that will enable SCERS to achieve its key plan objectives. At the January Board meeting, Verus and Staff will be presenting a recommended asset allocation.

ASSET CLASS FRAMEWORK:

Before the recommended portfolio is presented, it should be noted that one of the most significant changes in the recommended portfolio is the method by which the asset allocation is being presented, and how SCERS defines and explains the asset allocation structure. This includes viewing the portfolio through a functional asset class framework, rather than by conventional asset classes.



Within the functional asset class framework, segments of SCERS' current asset allocation were re-grouped and re-classified in order to better identify the risk factors that particular segments are exposed to, and the roles that various segments play within SCERS' overall portfolio. The regrouping blends traditional and alternative asset classes, and relabels exposures at the asset class level, by linking asset classes that are exposed to similar economic environments and risk factors, and which would be expected to have similar roles and outcomes in a portfolio. The functional regrouping takes a simplified approach at the asset class level, by breaking the portfolio into three segments, with greater complexity reserved at the sub-asset class level. The simplified asset classes are: (1) Growth; (2) Diversifying; and (3) Real Return.

The Growth asset class includes public equities and private equity, as these segments are exposed to the equity risk factor and tend to perform best in a high growth and low/moderate inflationary environment. In contrast, they tend to perform poorly during recessionary periods, when GDP growth is contracting, or during certain periods when unexpected inflation arises. It also includes the growth-oriented absolute return strategies that have a higher correlation and beta to equity markets and tend to perform better in a growth-oriented market. The Growth asset class also includes the return-oriented segments of fixed income, including high yield credit and private credit. You will recall that Growth assets tend to comprise the dominant allocation within most institutional investment portfolios.

Private credit represents a new dedicated allocation within the asset allocation. It is defined as private non-bank loans to entities, usually small businesses. Private credit returns are achieved by providing capital at predetermined yields, and generating contractual streams of cash flows. With banks exiting the space subsequent to regulation coming out of the global financial crisis, it has created opportunities for institutional investors to be the primary source of capital in the segment. SCERS currently allocates to private credit funds within its private equity portfolio, and private credit funds currently comprise approximately 1% of SCERS' total portfolio. However, private credit has a different risk and return profile than private equity. While private equity is more about multiples of returns and outsized returns over public equities, private credit is more about cash flows and certainty of returns. Therefore, it warrants a separate allocation with a different benchmark. Verus and Staff still view private credit as belonging in the Growth asset class as its success is ultimately tied to a stronger growth environment, however it does serve as a diversifier within the Growth segment due to its expected lower downside and attractive cash flow component.

The Diversifying asset class includes those segments of the portfolio which are expected to protect capital during dislocated market environments. Strategies within this segment are expected to generally perform better than the growth segments of SCERS' portfolio, such as public equities, when broad financial markets experience distress. This could include having a positive profile when growth markets are negative, or at a minimum, experiencing significantly less muted downside returns. Diversifying assets can still experience periods of negative returns, however, they are expected to have a positive return profile over longer periods of time. For SCERS' portfolio, diversifying assets include diversifying absolute return strategies that tend to have low or negative correlations to the equity markets, and tend to have positively skewed distribution return profiles (lower probability of large negative outcomes), and a smaller degree of kurtosis (smaller/narrower left tails). The Diversifying asset class also includes the diversifying fixed income strategies, such as dedicated allocations to U.S. Treasuries, core and core plus fixed income strategies, as well as diversified global fixed income strategies. These strategies generally have meaningful exposure to government securities, including U.S. Treasuries and government agency bonds, and exposure to high quality corporate credits, as well as some currency exposure.

The Real Return asset class addresses a combination of objectives for SCERS' overall portfolio, including: (1) Inflation hedge; (2) Moderate generator of cash flows; and (3) Diversifier to other segments of SCERS' portfolio. The asset class includes a combination of real estate exposure, private real assets exposure (energy; infrastructure; natural resources), and commodities.

For your reference, a more detailed discussion related to the functional asset class framework can be found within the materials for recent Board meetings, in particular the September 2016 meeting.

ASSET CLASS MIXES:

As you recall, at the December Board meeting, Verus and Staff communicated that the recommended asset allocation would fall between SCERS' current asset allocation and the Verus Risk Diversified portfolio. As you recall, the Verus Risk Diversified portfolio was introduced at the November 2016 Board meeting, and represents more balanced exposure across risk factors. It includes significantly less exposure to public equities than SCERS' current asset allocation, and increased exposures to fixed income markets, particularly U.S. Treasuries, and to the Real Return asset class. At the December Board meeting, several asset allocation mixes were presented with this intent. These mixes will again be presented to help SCERS' Board see the differences between SCERS' current asset allocation and the asset allocation mix options.

For your reference, a more detailed discussion related to the asset class mixes can be found within the materials for the November and December 2016 Board meetings.

One minor change was made to the asset allocation mixes subsequent to the December Board meeting. Verus, Cliffwater and Staff re-evaluated the capital market assumption for private real assets that had been used in prior modeling, given that it looked especially attractive on a risk-adjusted basis, and also in the context of the types of private real assets strategies that SCERS expects to target going forward, which will most likely favor infrastructure over energy opportunities. As you will recall, Cliffwater's capital market assumptions for the various components of private real assets (energy; infrastructure; timber/agriculture) were used and provided to Verus, which Verus used to calculate an overall private real assets capital market assumption.

Verus recalculated the capital market assumption for private real assets, by slightly adjusting the mix (increasing infrastructure relative to energy). The recalculated expected return and standard deviation for private real assets is now 8.7% and 14.4%, respectively, versus the prior figures that were presented to SCERS' Board of 9.0% and 15.7%. The resulting impact that the adjustment had on the asset allocation mixes that were evaluated is minimal. Using the adjusted private real assets assumption, Mix 2 has the same expected return of 7.2%, but a slightly lower standard deviation of 10.5% (down from 10.6%), while Mix 3's 7.3% return and 10.4% standard deviation did not change. Mix 1 did not change either.

In evaluating the asset class mixes, the key trend across the presented mixes is the decreasing levels of exposure to the Growth segment and increasing levels of exposure to the Diversifying and Real Return segments. Each of the mixes has varying differences in the composition of exposure to segments within each asset class. While the quantitative metrics associated with the investment model forecasts are important in evaluating the asset allocation mixes, the ultimate decision around a recommended portfolio is to identify an asset allocation that assists SCERS to achieve its most important plan objectives, and which can also be practically implemented.

	Policy	Mix 1	Mix 2	Mix 3
Asset Class				
US Equity	22.5%	21.0%	21.0%	19.0%
International Equity	17.5%	17.0%	16.0%	15.0%
Emerging Equity	5.0%	5.0%	4.0%	4.0%
Private Equity	10.0%	9.0%	9.0%	8.0%
Public Credit	2.0%	2.0%	2.0%	
Private Credit		2.0%	4.0%	4.0%
CW-Growth Oriented Absolute Return/HF*	6.0%	6.0%	3.0%	6.0%
Growth	**63.0%**	**62.0%**	**59.0%**	**56.0%**
Core/Core Plus Fixed Income	15.0%	10.0%	10.0%	8.0%
US Treasury		5.0%	5.0%	5.0%
Global Sovereign ex US	2.0%		2.0%	
EM Debt	1.0%	2.0%	1.0%	3.0%
CW-Diversifying Absolute Return/HF*	4.0%	6.0%	7.0%	7.0%
Absolute Return/HF				
Diversifying	**22.0%**	**23.0%**	**25.0%**	**23.0%**
Real Estate	7.0%	7.0%	7.0%	9.0%
CW-Private Real Assets*	6.0%	6.0%	7.0%	9.0%
Commodities	2.0%	2.0%	2.0%	3.0%
Real Return	**15.0%**	**15.0%**	**16.0%**	**21.0%**
Opportunities**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Reviewing the asset allocation mixes more closely, Mix 1 has many of the attributes of a preferred portfolio, with a similar expected return to SCERS' current portfolio and a lower standard deviation and range of outcomes. However, it looks very similar to SCERS' current asset allocation, and does not move SCERS far enough toward greater risk diversification.

	Policy	Mix 1	Mix 2	Mix 3
Mean Variance Analysis				
Forecast 10 Year Return	7.3%	**7.2%**	**7.2%**	**7.3%**
Standard Deviation	11.4%	10.9%	10.5%	10.4%
Return/Std. Deviation	0.64	0.66	0.69	0.70
Sharpe Ratio	0.51	0.52	0.55	0.56

Mix 3 has the highest Sharpe Ratio of the portfolios presented, at 0.56, with an expected return of 7.3% and an expected standard deviation of 10.4%. In other words, it looks like the most attractive asset allocation on paper. However, when evaluating the practicalities of implementing an asset allocation, Mix 3 is less attractive. First, Mix 3 significantly increases the allocation to Real Return (21.0%), by 6.0% over SCERS' current asset allocation of 15.0%. The higher allocation to Real Return is not practical in Staff and SCERS' Consultants view, as we do not foresee enough investment opportunities in real estate and private real assets to invest at these levels. Also, you will recall that the proxy used by SCERS' Overlay Program to cover the shortfall to a target allocation level in the real assets/real return space is not optimal. Second, the increase in the allocation to the Real Return asset class would decrease the liquidity profile of SCERS' plan to a level that Verus and Staff are not comfortable with.

Mix 2 offers an expected return of 7.2%, which is similar to that of SCERS' current policy portfolio, but with a meaningfully reduced standard deviation (10.5% versus 11.4%) and range of outcomes. This equates to the second highest Sharpe Ratio among the asset allocation mixes, at 0.54. From a practical standpoint, it offers a nice blend of increasing the diversification of SCERS' portfolio, by expanding into segments (at reasonable levels) that Staff and SCERS' investment consultants believe offer attractive risk adjusted returns and cash flows, while not increasing the illiquidity of SCERS' portfolio to a level that introduces significant risks.

RECOMMENDED ASSET ALLOCATION:

The recommended asset allocation is Mix 2. Below is a comparison of Mix 2 and SCERS' current asset allocation.

Asset Class	SCERS' Current Policy	Mix 2	Changes
Growth	63.0%	59.0%	-4.0%
Public Equities	45.0%	41.0%	-4.0%
Private Equity	10.0%	9.0%	-1.0%
Public Credit	2.0%	2.0%	0.0%
Private Credit	0.0%	4.0%	4.0%
Growth Oriented Absolute Return	6.0%	3.0%	-3.0%
Diversifying	22.0%	25.0%	3.0%
Core/Core Plus Fixed Income	15.0%	10.0%	-5.0%
U.S. Treasury	0.0%	5.0%	5.0%
Global Fixed Income	3.0%	3.0%	0.0%
Diversifying Absolute Return	4.0%	7.0%	3.0%
Real Return	15.0%	16.0%	1.0%
Real Estate	7.0%	7.0%	0.0%
Private Real Assets	6.0%	7.0%	1.0%
Commodities	2.0%	2.0%	0.0%
Opportunities	0.0%	0.0%	0.0%
	100.0%	100.0%	

The key changes between the recommended asset allocation and SCERS' current asset allocation are as follows:

Growth:

- Reduced overall allocation to Growth from 63% to 59%.
  - Public equities decrease from 45% to 41%.
  - Private equity decreases from 10% to 9%.
  - A dedicated 4% allocation to private credit is added (over time).
  - Public credit (high yield bonds) remains at a 2% allocation.
  - Growth-oriented absolute return decreases from 6% to 3%.

Diversifying:

- Increased overall allocation to Diversifying from 22% to 25%.
  - Traditional fixed income remains at a 15% allocation.
    - Core/core plus fixed income decreases from 15% to 10%.
    - A dedicated 5% allocation to U.S. Treasuries is added.
    - Global fixed income remains at a 3% allocation.
  - Diversifying absolute return increases from 4% to 7%.

Real Return:

- Increased overall allocation to Real Return from 15% to 16%.
  - Private real assets increases from 6% to 7%.
  - Real estate remains at a 7% allocation.
  - Commodities remains at a 2% allocation.

The recommended portfolio has several key attributes that can potentially help SCERS achieve many of the plan objectives that were identified by SCERS' Board during the ALM process. As you will recall, the key objectives that came out of the enterprise risk tolerance ('ERT') survey and ALM study were the following: (1) Minimizing deterioration in SCERS' funded ratio and ensuring the sustainability of SCERS' plan; (2) Increasing investment portfolio diversification by maintaining a portfolio that performs better across different economic environments and risk factors; (3) Avoiding loss of capital during down markets; and (4) Improving investment cash flows to meet increasing benefit payment obligations. For your reference, a more detailed discussion related to the ERT survey can be found within the materials for the July 2016 Board meeting.

The recommended asset allocation moves SCERS further toward achieving these objectives. It is a more risk balanced portfolio than the current policy portfolio with a similar expected return profile. It has a lower standard deviation, and narrower range of potential outcomes, making it less susceptible to negative returns during down markets. It also increases diversification, especially to investment strategies with low and negative correlations to equity markets. In addition, it has the potential to produce greater cash flows for SCERS' plan with a dedicated private credit allocation and an increased allocation to private real assets, which is important in an environment where cash flows are necessary to meet increasing benefit payment obligations.

LIQUIDITY:

The recommended asset allocation is moderately less liquid than SCERS' current policy portfolio, as it increases SCERS' allocation target to the private markets (private equity; private credit; private real assets; real estate (closed-end funds)) by 4%. However, the liquidity analysis that was conducted and presented at the December Board meeting demonstrated that SCERS' overall liquidity profile for the current asset allocation is healthy, and would remain reasonable for the recommended asset allocation both in a normal environment and a stressed market environment. Mix 3, which looks attractive on paper, would increase SCERS exposure to the private markets by 7%, and move SCERS' liquidity profile to a less healthy level.

NEXT STEPS:

Once an asset allocation model is approved by SCERS' Board, there are several subsequent projects that will need to be completed.

First, sub-asset class structures will need to be developed for new segments of the portfolio, such as private credit, while other sub-asset class structures will need to be revised for carry over segments of the portfolio, such as absolute return. This will include creating individual asset class investment policy statements ('IPS') for new sub-asset classes of the portfolio, and revising existing investment policy statements for those sub-asset classes undergoing changes. In addition, existing strategies will need to be placed and/or moved within the new asset allocation structure.

Second, an implementation plan will need to be developed that will present the approach and timeline for executing on the new asset allocation.

Third, all of SCERS' benchmarks, including those at the policy index, asset class and sub-asset class levels will need to be evaluated and/or re-formulated.

Fourth, a new investment policy statement ('IPS') will need to be developed that covers SCERS' overarching asset allocation and portfolio. The existing broad portfolio IPS is outdated, even related to SCERS' current asset allocation.

These projects will be performed over the next several months.

CONCLUSION:

It should be noted that the expected return (7.2%) of the recommended asset allocation falls short of SCERS' current 7.5% actuarial rate of return. While, the expected return is slightly below the target rate of return, we know that the actual range of outcomes can vary significantly from what is 'expected'.

Verus and Staff continue to believe that the ALM process should not be to identify a target rate of return and then construct a portfolio designed to reach that return. Instead, Verus and Staff believe that the process should identify a portfolio designed to meet SCERS' plan objectives, such as reducing volatility, improving funding status and better protecting against significant drawdowns, and then determining a reasonable and realistic expected investment return for such a portfolio. This is illustrated with the recommended asset allocation. Verus and Staff understand that a lower investment return assumption will result in increased contribution rates. While increased contribution rates would carry some 'pain', Verus and Staff believe that a portfolio designed to achieve the risk objectives identified by your Board, with a realistic investment return assumption for that portfolio, will result in less pain over time, and be more prudent from a fiduciary perspective.

Verus and Staff believe that the recommended asset allocation meets many of the objectives that have been identified during the ALM study. It is a more risk balanced asset allocation than the current policy asset allocation with a reasonable return profile. It has a lower standard deviation, and narrower range of potential outcomes, making it less susceptible to negative returns during down markets. It also should produce greater cash flows for SCERS' plan, in an environment where cash flows are necessary to meet benefit payment obligations and to ensure plan sustainability. The recommended asset allocation is moderately less liquid than SCERS' current policy asset allocation, however, Verus and Staff believe that through the robust liquidity analysis performed as part of the ALM process, SCERS' overall liquidity profile would remain reasonable for the recommended asset allocation.

We would be happy to address any questions.

Respectfully submitted,

Steve Davis
Chief Investment Officer

Concur:

Richard Stensrud
Chief Executive Officer

Attachments

Memorandum

To: SCERS Board

CC: Richard Stensrud, Steve Davis

From: Verus

Date: January 18, 2017

RE: Asset Allocation Recommendation

Summary

Pursuant to the Asset Liability Study conducted in 2016, this memo outlines Verus and Staff's recommendation to update SCERS's Asset Allocation.

SCERS current and target asset allocations under consideration are below:

	Policy	***Mix 1***	***Mix 2***	***Mix 3***
Asset Class				
US Equity	*22.5%*	*21.0%*	*21.0%*	*19.0%*
International Equity	*17.5%*	*17.0%*	*16.0%*	*15.0%*
Emerging Equity	*5.0%*	*5.0%*	*4.0%*	*4.0%*
Private Equity	*10.0%*	*9.0%*	*9.0%*	*8.0%*
Public Credit	*2.0%*	*2.0%*	*2.0%*	
Private Credit		*2.0%*	*4.0%*	*4.0%*
*CW-Growth Oriented Absolute Return/HF**	*6.0%*	*6.0%*	*3.0%*	*6.0%*
Growth	***63.0%***	***62.0%***	***59.0%***	***56.0%***
Core/Core Plus Fixed Income	*15.0%*	*10.0%*	*10.0%*	*8.0%*
US Treasury		*5.0%*	*5.0%*	*5.0%*
Global Sovereign ex US	*2.0%*		*2.0%*	
EM Debt	*1.0%*	*2.0%*	*1.0%*	*3.0%*
*CW-Diversifying Absolute Return/HF**	*4.0%*	*6.0%*	*7.0%*	*7.0%*

Absolute Return/HF				
Diversifying	***22.0%***	***23.0%***	***25.0%***	***23.0%***
Real Estate	*7.0%*	*7.0%*	*7.0%*	*9.0%*
*CW-Private Real Assets**	*6.0%*	*6.0%*	*7.0%*	*9.0%*
Commodities	*2.0%*	*2.0%*	*2.0%*	*3.0%*
Real Return	***15.0%***	***15.0%***	***16.0%***	***21.0%***
Opportunities*	***0.0%***	***0.0%***	***0.0%***	***0.0%***
Total	***100.0%***	***100.0%***	***100.0%***	***100.0%***

Cliffwater assumptions were used for Real Assets and Hedge Funds

*****Opportunities has a target of 0%, but can range between 0% and 5%, and is sourced from the asset class with the closest risk and return profile***

Asset Liability Modeling Process

The ALM study was introduced to the Board in September. The Board was educated as to how Verus developed its Capital Market Expectations, and how the ALM Process works. Later, Staff and Verus introduced the concept of viewing the portfolio from a risk perspective, as well as the role of asset classes for economic diversification. Staff and Verus presented how functional labels worked to provide additional transparency within the portfolio. Asset classes were rearranged by their functional attributes, namely Growth, Diversifying, and Real Return exposures for the portfolio.

As part of the education sessions, a questionnaire was sent to the Board. The questionnaire was intended to gain perspective into each Board member's risk tolerance and comfort with the current portfolio risks. Verus compiled the resulting distribution of risk tolerances, and presented the results to the Board for discussion and debate. The discussion provided guidance to lower Growth assets, maintain the sustainability of the Fund, minimize loss, and attain true portfolio diversification. It was noted that target risk and return levels will vary depending on the time period and market environment. This points against targeting the actuarial rate of return. With this information Verus and Staff created asset allocation options to present to the Board.

Each asset mix was analyzed for its risks and returns. The mixes were run through ProVal to simulate their effects on liabilities, funded status, and employer contributions. Verus also conducted a liquidity analysis on all of the proposed mixes. All the mixes presented had attractive attributes, and all analysis was presented to the Board in December. With the input from the Board, Verus and Staff discussed key considerations for each mix (outlined below), and are providing a joint recommendation for the mix which we believe best suits the Plan's objectives.

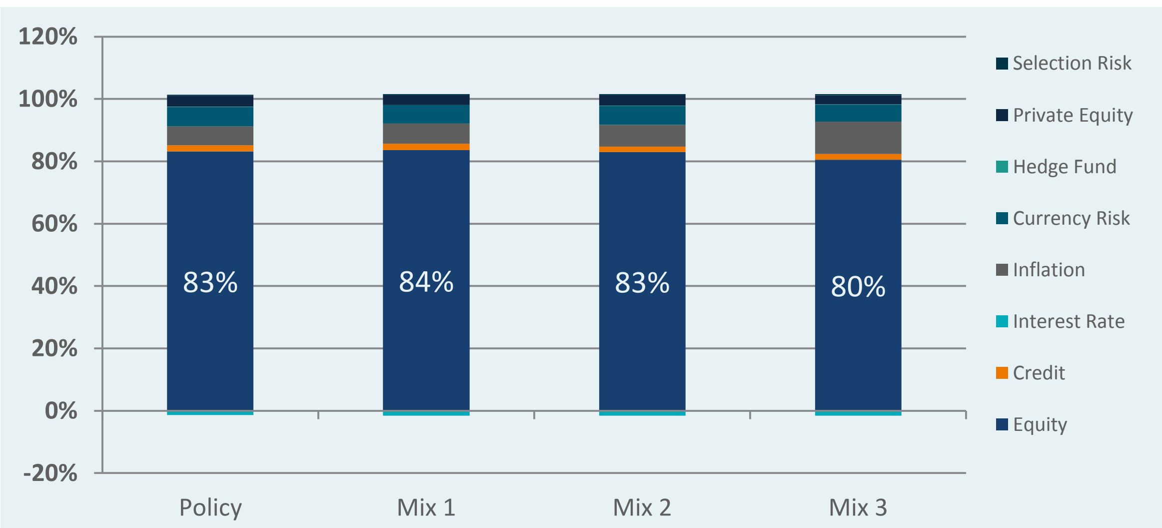
Key Considerations

The options presented to the Board have similar risk & return characteristics to the current Policy as seen below:

	Policy	Mix 1	Mix 2	Mix 3
Forecast 10 Year Return	**7.3%**	**7.3%**	**7.2%**	**7.3%**
Standard Deviation	11.4%	10.9%	10.6%	10.4%
Return/Std. Deviation	0.64	0.67	0.68	0.70
Sharpe Ratio	0.51	0.53	0.54	0.56

Verus and staff considered how the proposed mixes would impact the portfolio using the functional labels shown in the summary table. Mix 2 and Mix 3 both lower the capital allocation to growth assets and add to diversifying and real return assets, respectively.

Barra risk analysis provided greater insight into the specific risks of the portfolio. Mix 3 showed slightly less equity risk and more inflation risk given the increase to real return assets. Mix 2 had a similar equity risk profile compared to the current Policy but a lower capital allocation to equities. In general, lowering growth assets (equities) was a stated objective, so we further analyzed mixes 2 and 3 by performing a liquidity analysis.



The liquidity analysis took a very conservative approach, and considered all Private Equity, Private Credit, Real Estate and Absolute Return/Hedge Fund investments to be illiquid. In other words, only public markets assets were considered as liquid assets for purposes of our modeling. Using this approach, the current SCERS policy has a target of 33% illiquid assets in the form of Private

Equity, Absolute Return/HF, Real Estate, and Private Real Assets. Mix 3 adds 10% into illiquid assets vs the current policy; Illiquid assets would account for 43% of the portfolio. Mix 2 offers a better liquidity profile with 37% of the portfolio in illiquid asset classes, while maintaining a similar expected risk/return profile.

It is important to note that, in reality, Absolute Return/HF and Real Estate vehicles offer differing degrees of liquidity. Many of SCERS' hedge fund investments offer daily, monthly or quarterly liquidity. Moreover, SCERS' open-end real estate funds, which comprise the bulk of the Plan's core real estate exposure, offer the ability for SCERS to redeem their investments on a quarterly basis. Accounting for these differences, the current policy has 21% in illiquid assets, Mix 2 has 25% in illiquid asset, and Mix 3 has 27% in illiquid assets.

Recommendation

With the consideration of where we are in the economic cycle and taking a forward-looking view towards asset allocation, Verus and Staff recommend Mix 2 for SCERS's new asset allocation. Both Mix 2 and Mix 3 had very attractive attributes and met the risk tolerance goals of SCERS. The recommendation for Mix 2 slightly increases the illiquidity of the portfolio, but by less than Mix 3. It also accomplishes the goal of lowering the portfolio's capital allocation to equities, while increasing diversifying assets. Additional diversification comes from reallocating Hedge Funds (from growth assets to diversifying assets) to provide more diversification and less portfolio beta.

Verus

PERSPECTIVES THAT DRIVE ENTERPRISE SUCCESS

JANUARY 2017

Asset / Liability Study

Sacramento County Employees’ Retirement System

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SEATTLE 206-622-3700
LOS ANGELES 310-297-1777
SAN FRANCISCO 415-362-3484

I. ALM Process Recap

ALM Process

— Review past Asset Liability Study and its objectives

— Provide background on fundamental and functional classifications and Capital Market Assumptions

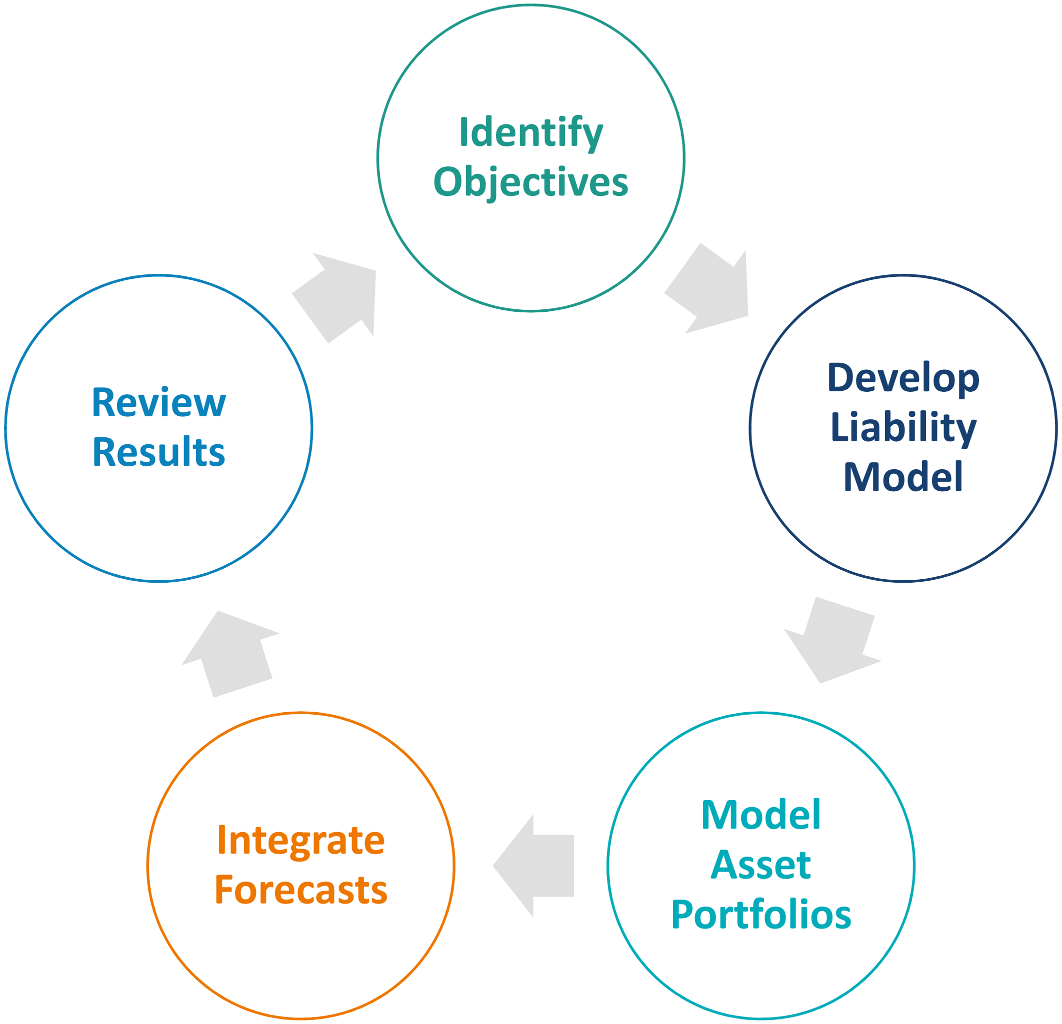
— Survey the Board to understand its risk tolerance, and lead Board discussion on results

— Incorporating Board input, create mixes that address Board's input

— Analyze the mixes risks using Barra, how they affect liabilities, and liquidity of the portfolio

— Provide a recommendation for the new policy asset allocation

Asset-liability modeling process



Functional Labels

- **Segments of the asset allocation re-grouped and re-classified**
  - Assists in improving diversification across risk factors and exposure to economic environments
  - Better identifies the roles that various segments play in SCERS' portfolio
- **Blends traditional and alternative asset classes**
- **Simplified approach at asset class level**
  - Growth
  - Diversifying
  - Real Return

II. Key Considerations

10 year return & risk assumptions

Asset Class	Ten Year Return Forecast Geometric	Standard Deviation Forecast
Equities		
US Large	5.9%	15.1%
US Small	5.2%	19.8%
International Developed	9.2%	18.5%
International Small	8.6%	19.7%
Emerging Markets	11.3%	23.6%
Global Equity	7.7%	16.9%
Private Equity	8.2%	23.7%
Fixed Income		
Cash	2.0%	0.6%
US TIPS	2.7%	6.3%
US Treasury	2.3%	6.5%
Global Sovereign ex US	2.6%	7.8%
Core Fixed Income	3.2%	3.2%
Core Plus Fixed Income	4.2%	6.0%
Short-Term Gov't/Credit	2.5%	1.3%
Short-Term Credit	2.9%	2.2%
Long-Term Credit	4.2%	10.5%
High Yield Corp. Credit	7.1%	10.6%
Bank Loans	4.1%	8.1%
Global Credit	2.4%	6.9%
Emerging Markets Debt (Hard)	6.4%	8.8%
Emerging Markets Debt (Local)	6.8%	12.9%
Private Credit	9.1%	10.9%
Other		
Commodities	4.0%	18.2%
Hedge Funds	6.0%	9.0%
Hedge Funds (Fund of Funds)	5.0%	9.0%
Core Real Estate	4.7%	13.2%
Value-Add Real Estate	6.7%	23.3%
Opportunistic Real Estate	8.7%	33.2%
REITs	4.7%	26.4%
Risk Parity	7.0%	10.0%
Inflation	2.0%	1.5%*
Cliffwater Growth Oriented HF	6.7%	7.4%
Cliffwater Diversifying Oriented HF	4.9%	5.3%
Cliffwater Private Real Assets	8.7%	14.4%

Investment models

	Policy	Mix 1	Mix 2	Mix 3
Asset Class				
US Equity	22.5%	21.0%	21.0%	19.0%
International Equity	17.5%	17.0%	16.0%	15.0%
Emerging Equity	5.0%	5.0%	4.0%	4.0%
Private Equity	10.0%	9.0%	9.0%	8.0%
Public Credit	2.0%	2.0%	2.0%	
Private Credit		2.0%	4.0%	4.0%
CW-Growth Oriented Absolute Return/HF*	6.0%	6.0%	3.0%	6.0%
Growth	**63.0%**	**62.0%**	**59.0%**	**56.0%**
Core/Core Plus Fixed Income	15.0%	10.0%	10.0%	8.0%
US Treasury		5.0%	5.0%	5.0%
Global Sovereign ex US	2.0%		2.0%	
EM Debt	1.0%	2.0%	1.0%	3.0%
CW-Diversifying Absolute Return/HF*	4.0%	6.0%	7.0%	7.0%
Absolute Return/HF				
Diversifying	**22.0%**	**23.0%**	**25.0%**	**23.0%**
Real Estate	7.0%	7.0%	7.0%	9.0%
CW-Private Real Assets*	6.0%	6.0%	7.0%	9.0%
Commodities	2.0%	2.0%	2.0%	3.0%
Real Return	**15.0%**	**15.0%**	**16.0%**	**21.0%**
Opportunities**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Cliffwater assumptions were used for Real Assets and Hedge Funds

*****Opportunities has a target of 0%, but can range between 0% and 5%, and is sourced from the asset class with the closest risk and return profile***

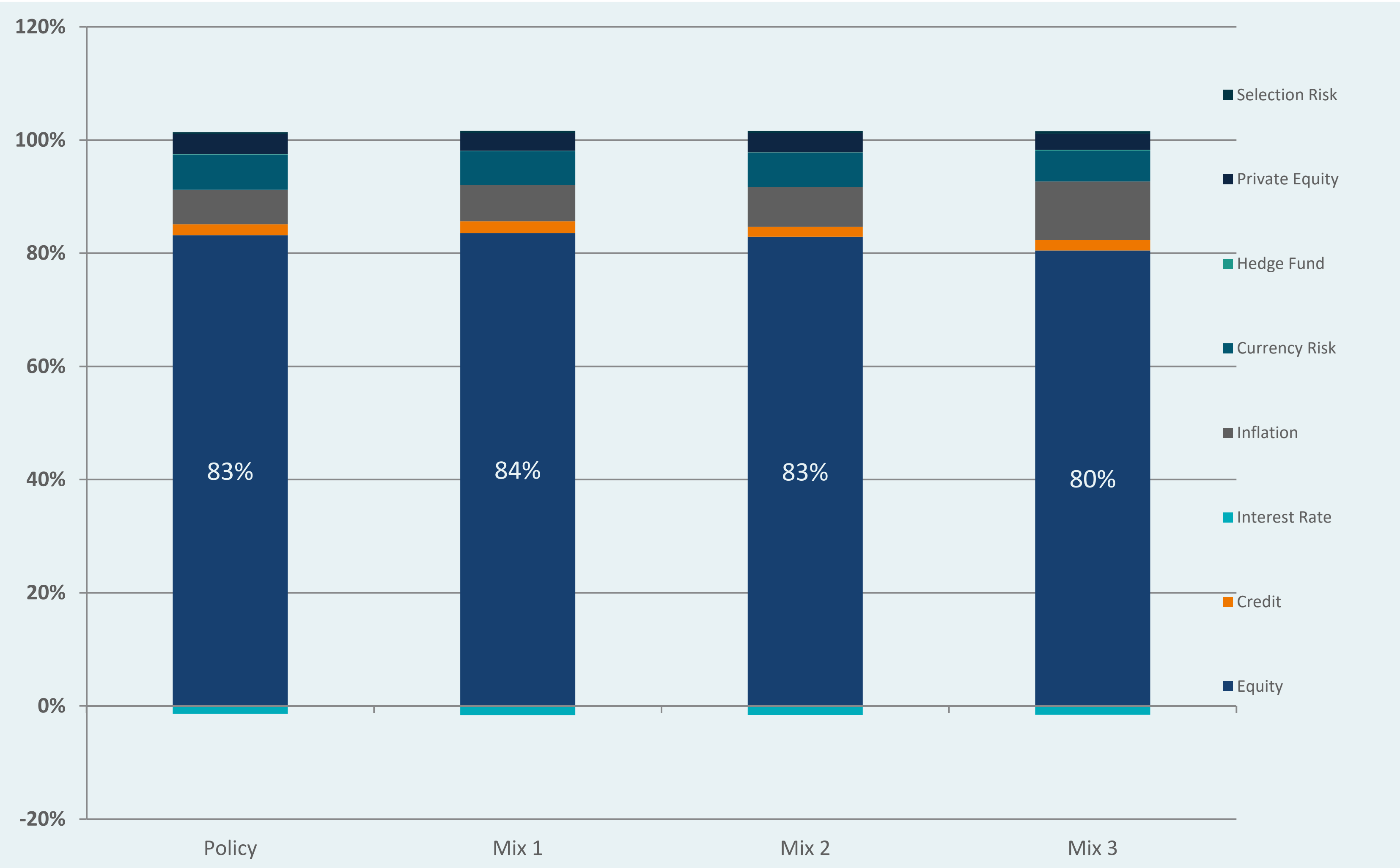
Investment model forecasts

	Policy	Mix 1	Mix 2	Mix 3
Mean Variance Analysis				
Forecast 10 Year Return	7.3%	**7.2%**	**7.2%**	**7.3%**
Standard Deviation	11.4%	10.9%	10.5%	10.4%
Return/Std. Deviation	0.64	0.66	0.69	0.70
Sharpe Ratio	0.51	0.52	0.55	0.56

***Cliffwater assumptions were used for Real Assets and Hedge Funds**

Risk/Return Analysis done in ProVal

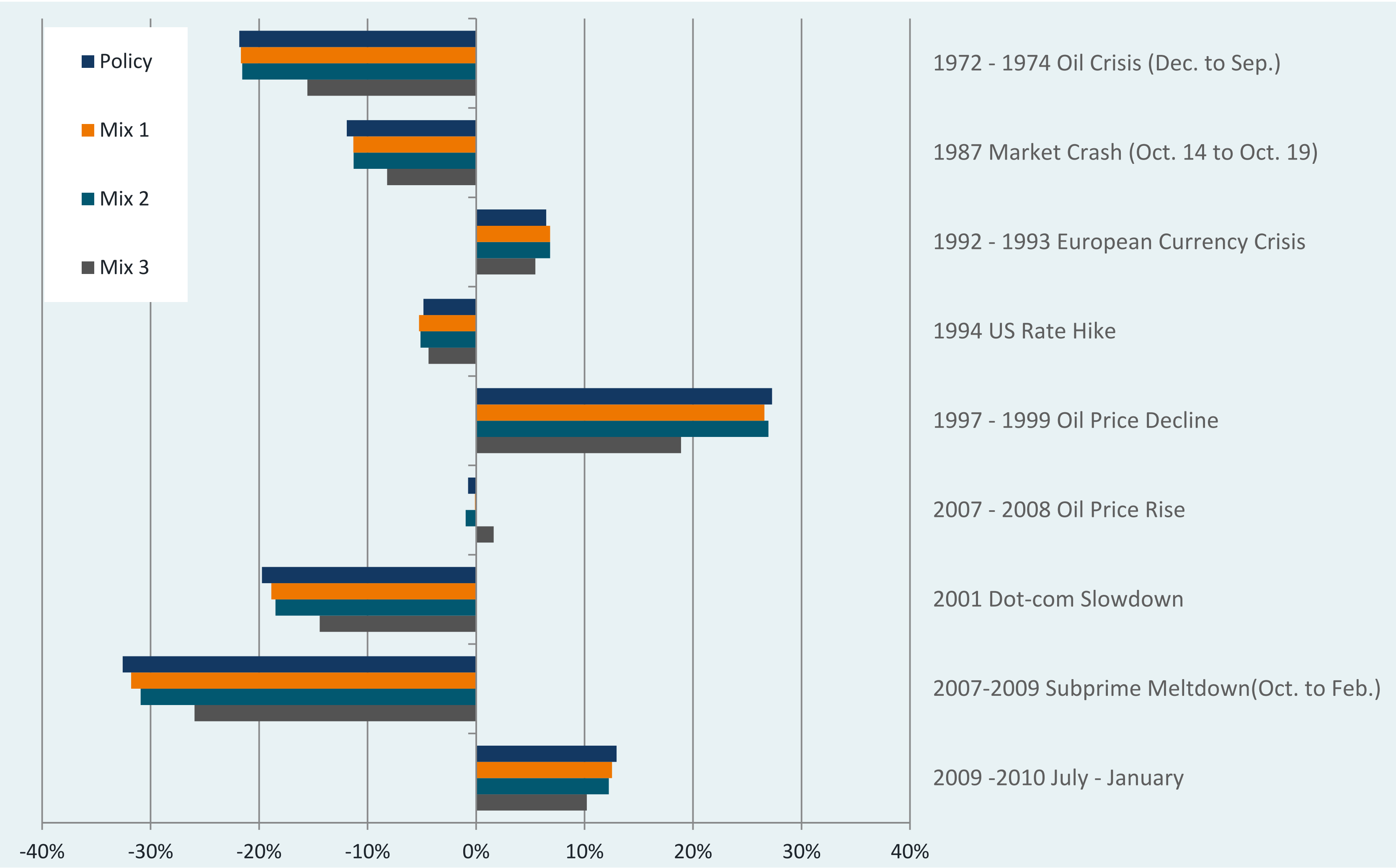
Risk decomposition



Source: MSCI BARRA

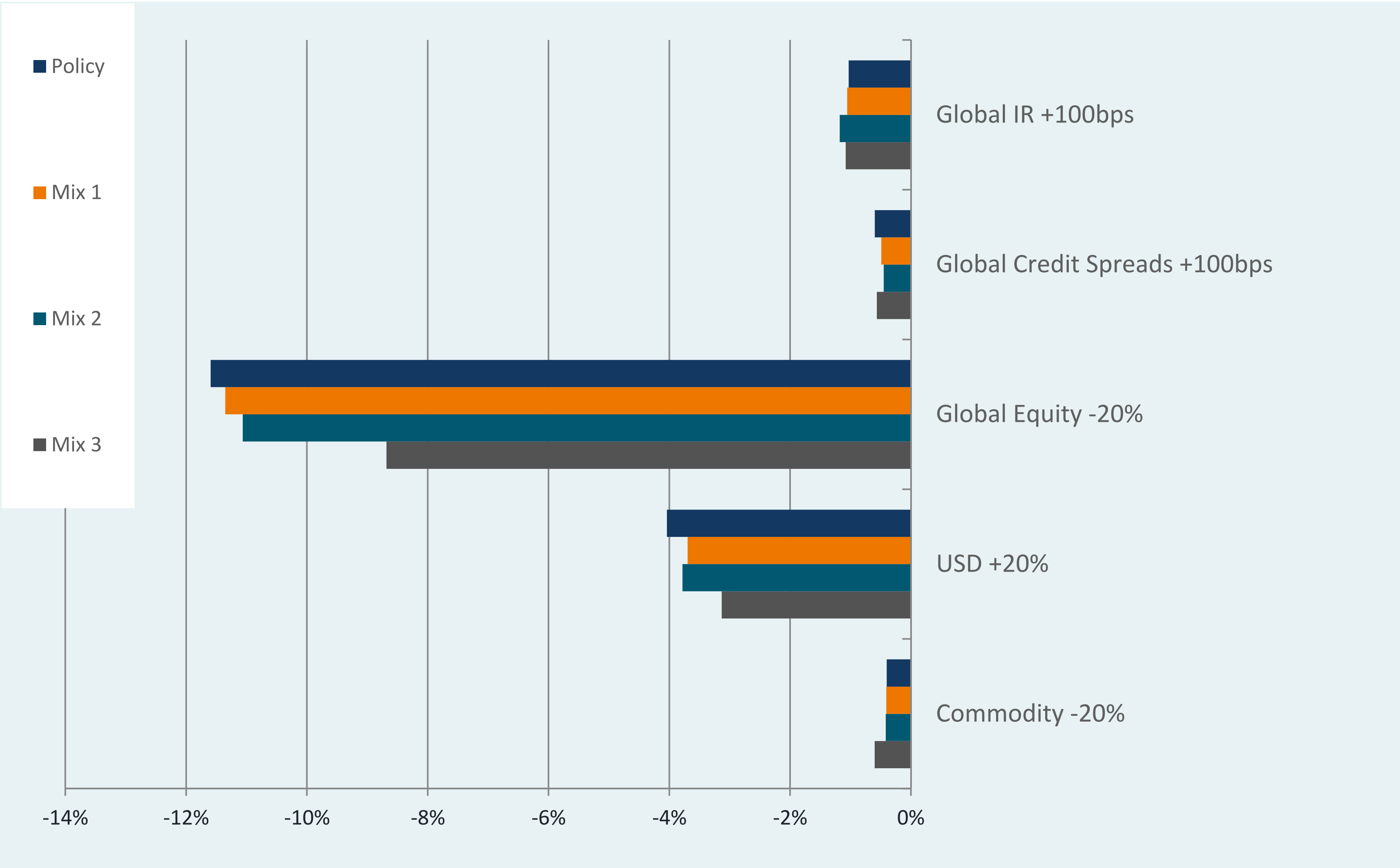
Note: Selection Risk is the risk attributable to unassigned factors

Scenario Analysis



Source: MSCI BARRA

Stress tests



Source: MSCI BARRA

Liquidity

— Verus and Cliffwater have forecasted 200-300bps in excess return for illiquidity in certain asset classes which for Plans that can afford to assume less liquidity is an attractive trade

— Investments in absolute return funds and real estate also provide an important diversification element that contributes to a better risk-adjusted return to the total Plan

— We also chose to be conservative when defining an illiquid asset class. For example, much of SCERS' absolute return portfolio offers monthly or quarterly liquidity. Core real estate is accessed primarily through open-end funds which have a higher liquidity structure than closed-end funds found in private equity or value-add real estate

Liquidity

— Mix 2 increases illiquid assets by 4% versus current policy

— Mix 3 increases illiquid assets by 7%, bringing the total percentage of illiquid assets in the portfolio to 43%

— Mix 2 moves the SCERS portfolio more towards the risk diversified approach without giving up substantial liquidity, a concern for both Staff and Verus

III. Recommendation

Recommendation

— After thorough review, Verus and Staff recommend adopting Mix 2 as it moves SCERS further toward achieving identified Plan objectives, and provides sufficient liquidity to survive market stress

Asset Class	SCERS' Current Policy	Mix 2	Changes
Growth	**63.0%**	**59.0%**	**-4.0%**
Public Equities	45.0%	41.0%	-4.0%
Private Equity	10.0%	9.0%	-1.0%
Public Credit	2.0%	2.0%	0.0%
Private Credit	0.0%	4.0%	4.0%
Growth Oriented Absolute Return	6.0%	3.0%	-3.0%
Diversifying	**22.0%**	**25.0%**	**3.0%**
Core/Core Plus Fixed Income	15.0%	10.0%	-5.0%
U.S. Treasury	0.0%	5.0%	5.0%
Global Fixed Income	3.0%	3.0%	0.0%
Diversifying Absolute Return	4.0%	7.0%	3.0%
Real Return	**15.0%**	**16.0%**	**1.0%**
Real Estate	7.0%	7.0%	0.0%
Private Real Assets	6.0%	7.0%	1.0%
Commodities	2.0%	2.0%	0.0%
Opportunities	**0.0%**	**0.0%**	**0.0%**
	100.0%	100.0%	

Next Steps

— Development of sub-asset class structures

— Provide Implementation recommendations and timeline

— Conduct a benchmark review for each portfolio component, aggregate asset classes and the total Fund

— Draft a new Investment Policy Statement for the broad portfolio
    — Revise individual asset class IPS’