CalPERS

Investment Committee
Agenda Item 5a

April 16, 2018

Item Name: Affiliate Trust Asset Allocation Review: Supplemental Income Plans

Program: Trust Level Portfolio Management & Affiliate Investment Programs

Item Type: Action

Recommendation
Approve recommended asset allocation Glide Path for CalPERS Supplemental Income Plans.

Executive Summary
Staff engaged the consulting services of RVK, Inc. (RVK) to review and refresh the asset allocation Glide Path for CalPERS Supplemental Income Plans (CalPERS SIP) to be compatible with the changing characteristics of the plan participants and financial market conditions. After careful analyses and discussions with RVK, Staff recommends refreshing the existing asset allocation Glide Path to focus more on asset accumulation at the expense of a slight increase in risk, as proposed by RVK to improve overall expected retirement outcomes for CalPERS SIP participants. Staff will make the corresponding changes to the affected investment policies via the administrative policy change process pending approval by Investment Committee. An Opinion letter from Wilshire Associates, Inc. follows as Attachment 2.

Strategic Plan
The refresh of the asset allocation Glide Path for CalPERS SIP supports CalPERS Strategic Plan goal to strengthen the long-term sustainability of the pension fund. Although CalPERS SIP is separate from the Public Employees' Retirement Fund (PERF), its prudent management seeks to improve the retirement outcomes for SIP plan participants, who may or may not be members of the PERF.

Investment Beliefs
This agenda item is consistent with the following CalPERS Investment Beliefs:

- Investment Belief 1. Liabilities must influence the asset structure. The review and refresh of the asset allocation Glide Path is based on the replacement income goal of the SIP participants.

- Investment Belief 2. A long investment horizon is a responsibility and an advantage. The Glide Path is designed according to the risk/return trade-off during the whole life cycle of a representative full-career participant.

- Investment Belief 7. CalPERS will take risk only where we have a strong belief we will be rewarded for it. Both short-term and long-term risks are evaluated in every step of the Glide Path design process.

- Investment Belief 9. Risk to CalPERS is multi-faceted and not fully captured through measures such as volatility or tracking error. In this analysis, RVK evaluated additional risk measures, such as probability of replacement income shortfall, and the median additional suggested contribution.

Background

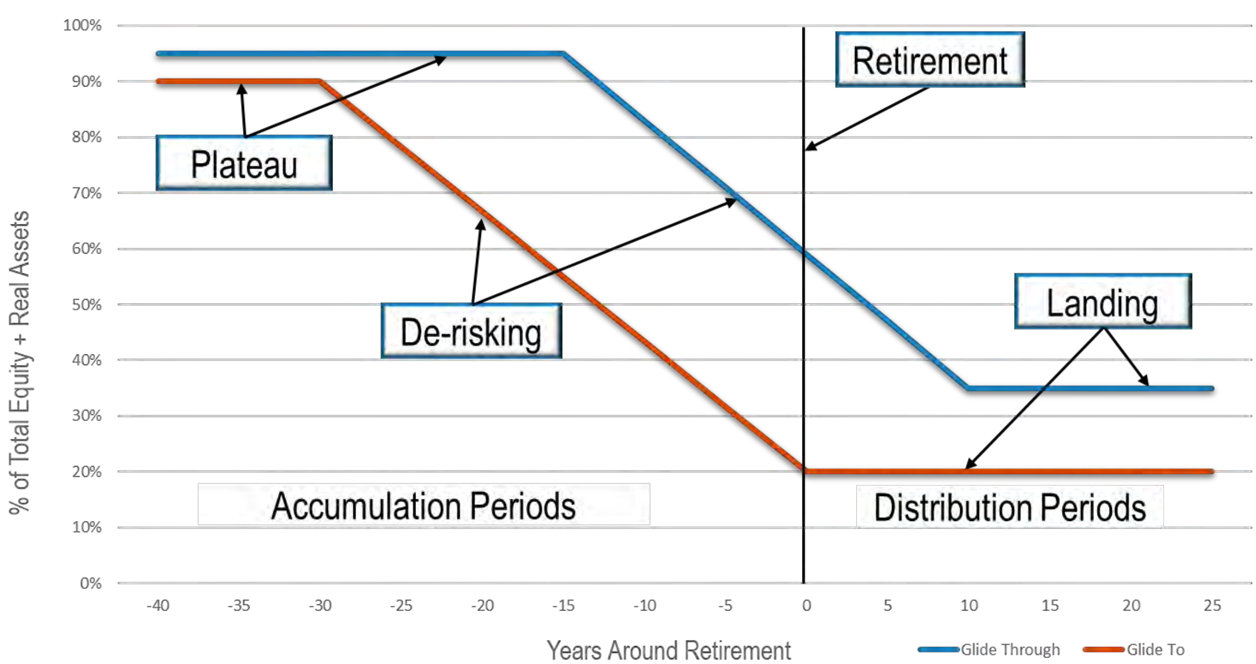
The CalPERS SIP consists of the CalPERS 457 Plan, the Placer County 401(k) Plan, and the Supplemental Contributions Program. Staff has been working with RVK to conduct a periodic review of the SIP program. Staff is presenting the results of the investment portion, which comprises the following components:

1. A review and recommendation to update the asset allocation and Glide Path for the Target Retirement Date funds, based on participant demographic data. This agenda item 5a is focused on this component, as this modification will have a broad impact on the program.

2. A review and affirmation of the current capital preservation and fixed income options. Evaluating product offerings in the market to determine suitability is appropriate, but may not result in a modification. After evaluation, it was concluded that additional options would move away from index management, introduce added risk and complexity to the program, and increase cost to participants.

Analysis

Basic Elements of a Glide Path



As evidenced by the above graph and Slide 13, in Attachment 1, the main goal of a Glide Path is to afford a disciplined approach to adjust asset allocation as the plan participant goes through his/her life cycle. There are two distinctive periods during a typical participant's life: the Accumulation Period when participants work and save to accumulate financial capital and the

Distribution Period when participants retire and withdraw financial capital. Finance theory indicates that participants have higher risk tolerance and gain more utility from higher exposure to growth risk when their human capital is much higher than their financial capital at the early stages of the Accumulation Period. This is the Plateau phase where there is higher allocation to risky assets (Total Equity plus Real Assets). Subsequently, human capital decreases and financial capital increases relatively as participants gradually approach retirement. Accordingly, the Glide Path diligently reduces exposure to risky assets in a risk-controlled framework, forming the De-risking phase. In the end, the Glide Path ends up at the Landing phase when human capital has been depleted and participants are less risk tolerant and gain more utility from having higher liquidity in their financial assets, thus there is lower allocation to risky assets. A design question arises: is it optimal to glide to the Landing phase at the point of retirement ("Glide To" approach) or glide through the point of retirement and land sometime after ("Glide Through" approach)? This choice will lead to different lengths of the Plateau phase. RVK resolves this question by analyzing the demographics of CalPERS SIP participants.

RVK's Glide Path Design epitomizes the principle of building efficient portfolios on the risk/return trade-off of the Accumulation plus Distribution Periods, instead of any static point in time.

RVK's analysis utilizes these component parts:

- Inflation expectations from an RVK macro economic forecast
- Capital market assumptions from CalPERS 2017 ALM
- Salary growth from CalPERS 2017 experience study
- Estimated participant contributions from 2016 CalPERS 457 plan data
- Household life expectancy from the Society of Actuaries Mortality Tables

The Analysis projects Income Adequacy during the Distribution Periods by modeling an average annual income replacement goal, household income sources and annual plan distributions. Additional inputs to the analysis are derived from CalPERS data, public governmental information, and recognized retirement studies.

After completely modeling out the Accumulation and Distribution periods, an RVK stochastic optimization process identifies potential Glide Paths by either maximizing the median replacement income without significantly increasing market risk or minimizing market risk without significantly decreasing median replacement income based on each run of 2,000 iterations. In addition to the above two measures, annualized return before distribution, 5th percentile return before distribution, 1-year or 5-year 5th percentile returns right after the start of distribution, and probability of no shortfall are all constantly monitored during each iteration to prevent (mitigate) deterioration. After each run, the optimizer modifies the Glide Path according to feedback from those measures. Other design features are built according to the demographics of the CalPERS SIP participants.

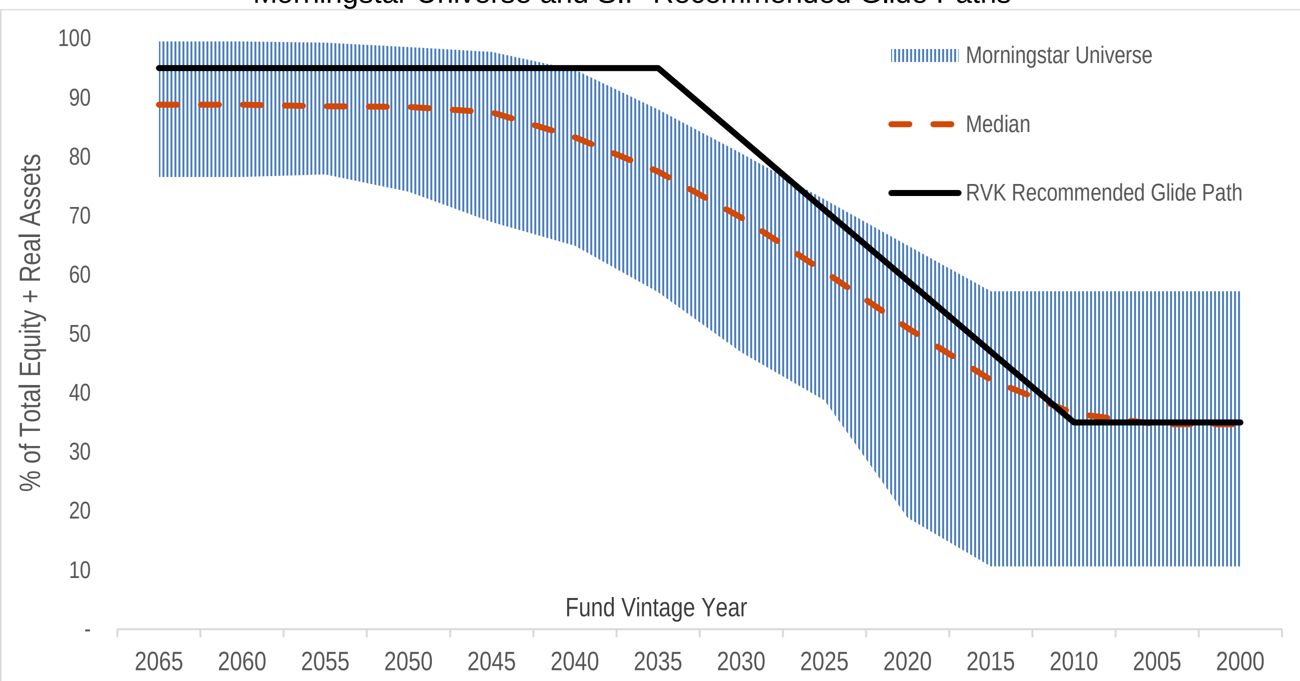
One of the most significant demographic characteristics is the distribution pattern shown on Slide 17 in Attachment 1. Firstly, Row A indicates that the majority of plan participants make no distributions before age 70, however, 31% of plan participants are taking distributions after age 65. Secondly, it is important to distinguish between two types of Fully Depleted Participants: Row C (Rollover) and Row D (Full Cash Distributions). Research indicates that participants who opt to rollover their assets into a different plan tend to remain invested, including a significant equity allocation. Thus a more encompassing measure of participants retaining investment exposure, including a portion in "Risky" assets such as equity, is the summation of Rows A+B

(Participants remaining in the plan) and C (Rollover). The indicated investment desire derived from the data suggests that the “Glide Through” path is a better fit than the “Glide To” alternative Incorporating those inputs and design choices, the RVK optimization and post-optimization analyses propose a new Glide Path as shown on Slide 20. The recommended Glide Path is shown relative to the Morningstar universe of Glide Paths on slide 21. The marginally higher allocation to equity and real assets through the accumulation and de-risking phases is believed warranted due to:

1. The Morningstar universe is composed of mostly off-the-shelf products that are not tailor-made according to the specific demographics of their participants.

2. Many funds within the Morningstar universe have an active component, where either the weights or the underlying portfolio or both are actively managed. Comparatively, CalPERS SIP is passively managed.

Morningstar Universe and SIP Recommended Glide Paths



The projected outcome for the median full-career participant is displayed on Slide 22. Although the median 457 plan participant can expect 5.8% replacement income to help them reach income replacement goals in their retirement years, there is still a relatively high probability (71%) that they will experience shortfalls. RVK’s analysis indicates that annual contributions, especially during early working years, and retirement age are the two most important contributors to retirement income adequacy. In particular, their analysis suggests that should participants increase their contributions by 1.5% per year, shortfall risk (or the probability that participants will deplete their account balances in retirement and are left to rely on CalPERS pension or other income sources) will be reduced to 50%. These projected outcomes compare favorably to those projected based on the current Glide Path as displayed on Slide 23.

Budget and Fiscal Impacts
Not Applicable.

Benefits and Risks
The benefits of approving the recommended Glide Path include:

1. Guide the scheduled Glide Path re-balancing on October 1st, 2018

2. Improve retirement outcome for CalPERS SIP participants based on current, well-researched assumptions and projections

The risks of approving the recommended Glide Path include:

1. The actual realization of future uncertainties may deviate significantly from model projections

Attachments
Attachment 1 – Affiliate Trust Asset Allocation Review: Supplemental Income Plans
Attachment 2 – Opinion Letter from Wilshire Associates

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Dan Bienvenue
Managing Investment Director
Global Equity

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Eric Baggesen
Managing Investment Director
Trust Level Portfolio Management

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Theodore Eliopoulos
Chief Investment Officer

Affiliate Trust Asset Allocation Review
Supplemental Income Plans

Trust Level Portfolio Management

Global Equity, Affiliate Investment Program

4/16/2018

Affiliate Trust Asset Allocation Review: Investment Committee (IC) Engagements in 2018

Monday, April 16th
Investment Committee

Asset Allocation Review:
- Supplemental Income Plans (SIP)

Monday, May 14th
Investment Committee

Asset Allocation Review
- Judges' Retirement Fund (JRS)
- Judges' Retirement Fund II (JRS II)
- Legislators' Retirement Fund (LRS)
- California Employers' Retiree Benefit Trust Fund (CERBT)

Monday, June 18th
Investment Committee

Asset Allocation Review:
- Health Care Fund (HCF)
- Long-Term Care Fund (LTC)

Agenda

- Overview of CalPERS Supplemental Income Plans
- Introduction to Glide Path Design
- Review of CalPERS Glide Path Design
- Glide Path Recommendation
- Appendix

Overview of CalPERS Supplemental Income Plans

Program Overview as of 12/31/17

Program	Purpose	Assets	Participants	Employers
Public Employees' Deferred Compensation	Pre-tax retirement savings	$1.5B	27,483	791
Placer County 401(k)	Pre-tax retirement savings	$42M	1,434	1
Supplemental Contributions Program	After-tax retirement savings, tax deferred	$115M	7,455	1
Program Totals		$1.66B	36,672	793

Investment Menu Design

Tier I
Target Date Funds

- Custom, age-based funds with asset allocation managed throughout career

Tier II
Core Funds

- Six market index funds across asset classes, participant manages allocation

Tier III
Self-managed account

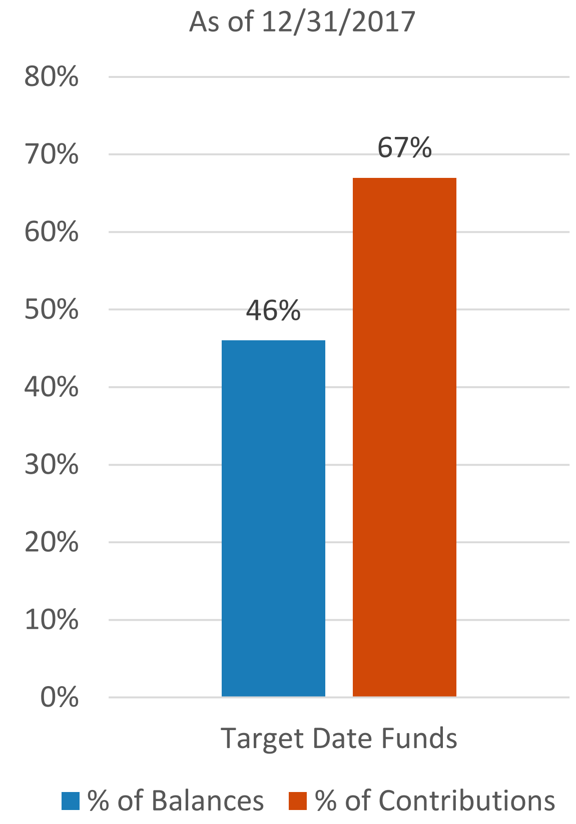
- Mutual funds and certificates of deposit offered via brokerage account

Investment Fund Lineup

	Asset Class	Investment Funds
Tier 1	Age-based asset allocation	Target Retirement Date Funds Ten funds: 2055 – Income Fund
Tier 2	U.S. Equity	Russell All Cap Equity Index Fund
	International Equity	Global All Cap Equity Index Fund
	U.S. Fixed Income	U.S. Bond Index Fund
	U.S. Fixed Income	U.S. Short-Term Govt/Credit Bond Index Fund
	Real Assets	Real Asset Fund
	Capital Preservation	Short-Term Investment Fund
Tier 3	Various	Self-Managed Account: Mutual Funds, Certificates of Deposit

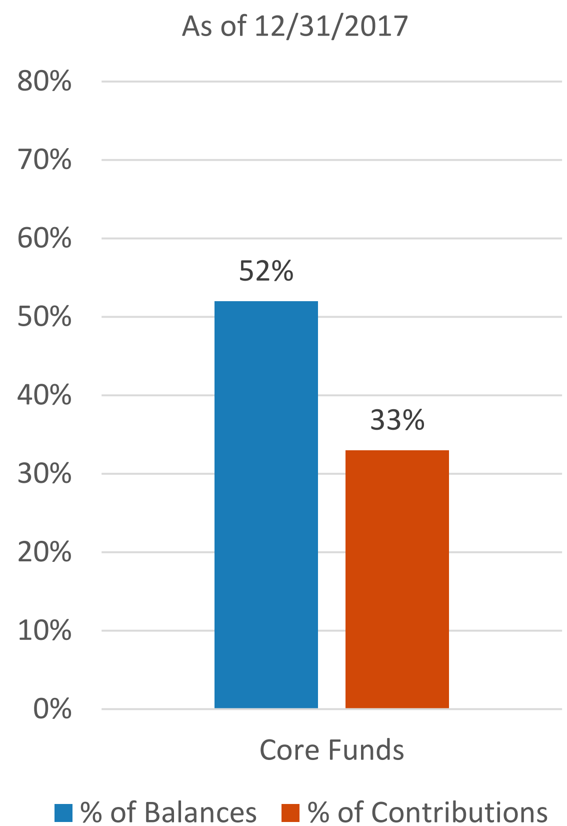
Tier I: Target Retirement Date Funds (TDFs)

- Participant selects fund nearest retirement date, allocation managed throughout career
  - Investments utilize broad market index funds
  - Glide path customized based on demographics
  - Rebalanced using disciplined process
- Participant usage trending upward
  - 60% invested 100% in TDFs
  - 46% balances
  - 67% contributions
- Qualified Default Investment Alternative
- 2060 TDF can be added



Tier II: Core Funds

- Participant selects individual fund(s) and manages allocation
  - Investments utilize broad market index funds
  - No glide path
  - Participant rebalances
- Participant usage trending downward
  - 52% balances
  - 33% contributions



Tier III: Brokerage Account

- Employers may choose to contract for this option
- Participant selects individual fund(s) and manages allocation
  - Investments utilize mutual funds & certificates of deposit
  - Higher fees for mutual funds
  - Participant rebalances
- Participant usage in line with industry
  - 2% balances
  - 0% contributions

SIP Plan Investment Review

2013 Results

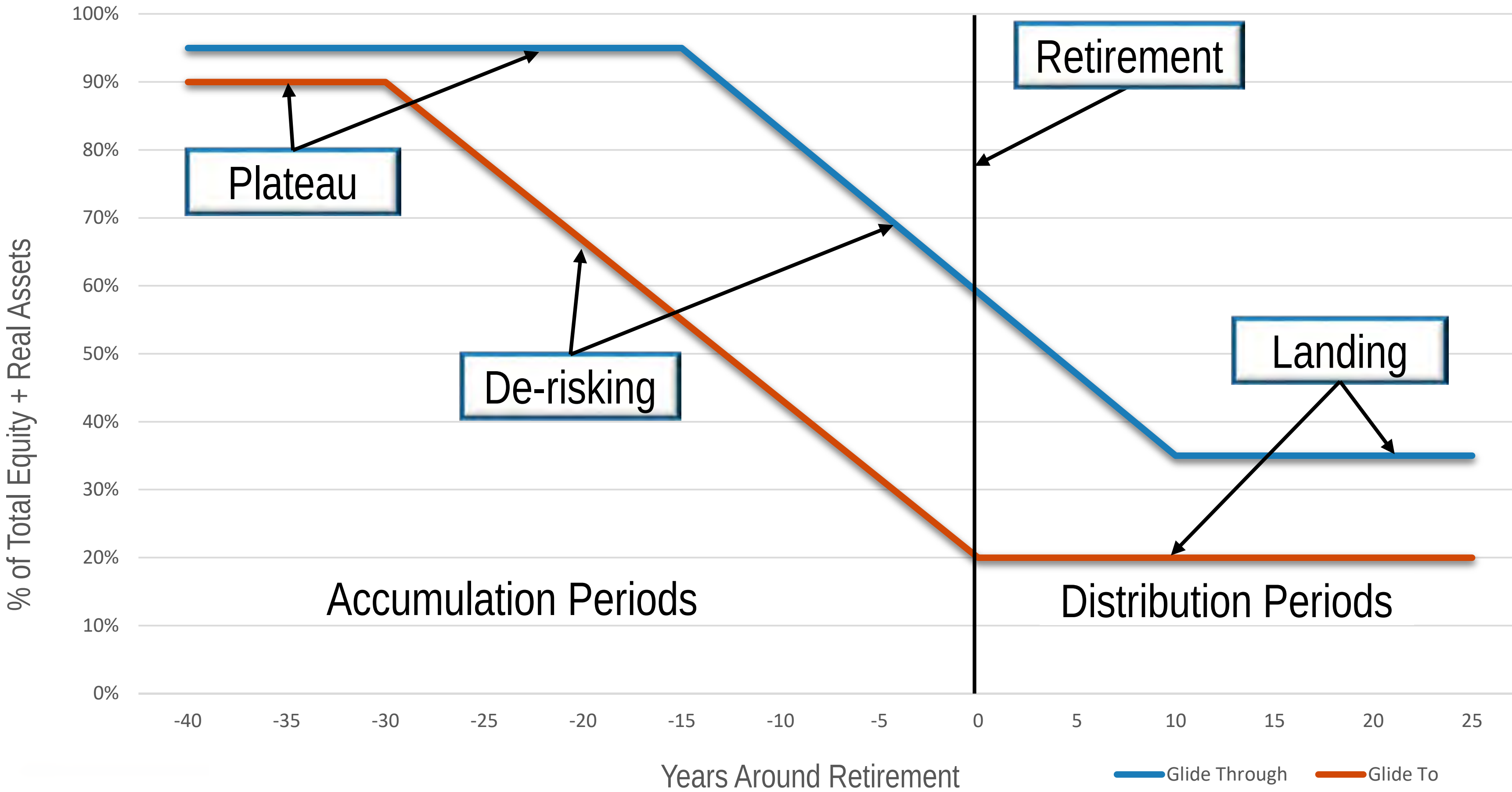
- Simplified lineup, reduced funds from 24 to 16
- Moved from active to index, closed balanced funds
- Updated glide path based on participant demographics
- Opened 2055 Target Retirement Date Fund

2018 Focus

- Evaluate capital preservation and fixed income options
- Review and refresh the glide path
- Add 2060 Target Retirement Date Fund

Introduction to Glide Path Design

Basic Elements of A Glide Path



Utility of a Glide Path Design

- Affords a disciplined approach to adjust asset allocation as the plan participant goes through his/her life cycle

- Accruing wealth during the accumulation (Plateau followed by De-risking) years while maximizing the opportunity for income during distribution years, all within a risk-controlled framework

- Efficient portfolios built on risk/return trade-off of the whole accumulation plus distribution period, instead of any static point of time

RVK Glide Path Design

Project Balance Accumulation

- Inflation Rates
- Investment Returns
- Salary Growth
- Participant Contributions

Project Income Adequacy

- Annual Income Replacement Goal
- Household Income Sources
- Annual Plan Distributions
- Household Life Expectancies

Repeat 2,000 times & Rank

- Maximizing Replacement Income
- Minimizing Market Risk

Change Glide Path Design (Feedback)

Review of CalPERS Glide Path Design

Distribution in Retirement Phase

		Age Group						
	Distribution Type	50-55	55-60	60-65	65-70	70-75	>=75	>=65
A	No Distributions[1]	95%	94%	89%	85%	56%	14%	69%
B	Partial Distributions	2%	3%	5%	7%	35%	80%	23%
A+B	Participants Remaining in Plan	97%	97%	94%	93%	91%	94%	92%
C	Rollover[2]	1%	2%	3%	5%	5%	1%	4%
D	Full Cash Distribution	1%	2%	2%	3%	3%	5%	3%
A+B+C	Participants Fully Invested	99%	98%	98%	97%	97%	95%	97%
C+D	Fully Depleted Participants[3]	3%	3%	6%	7%	9%	6%	8%

During 2016:

1. The majority of plan participants make **no distributions before age 70**; however, 31% of plan participants are making distributions after age 65.
2. A high percentage of all depletions was due to account rollovers. Research shows that median equity allocation of traditional rollover IRAs is greater than 50%.
3. Only a small percentage of participants take a full distribution at retirement, suggesting **a "through" glide path is appropriate.**

Inputs to SIP Glide Path Design

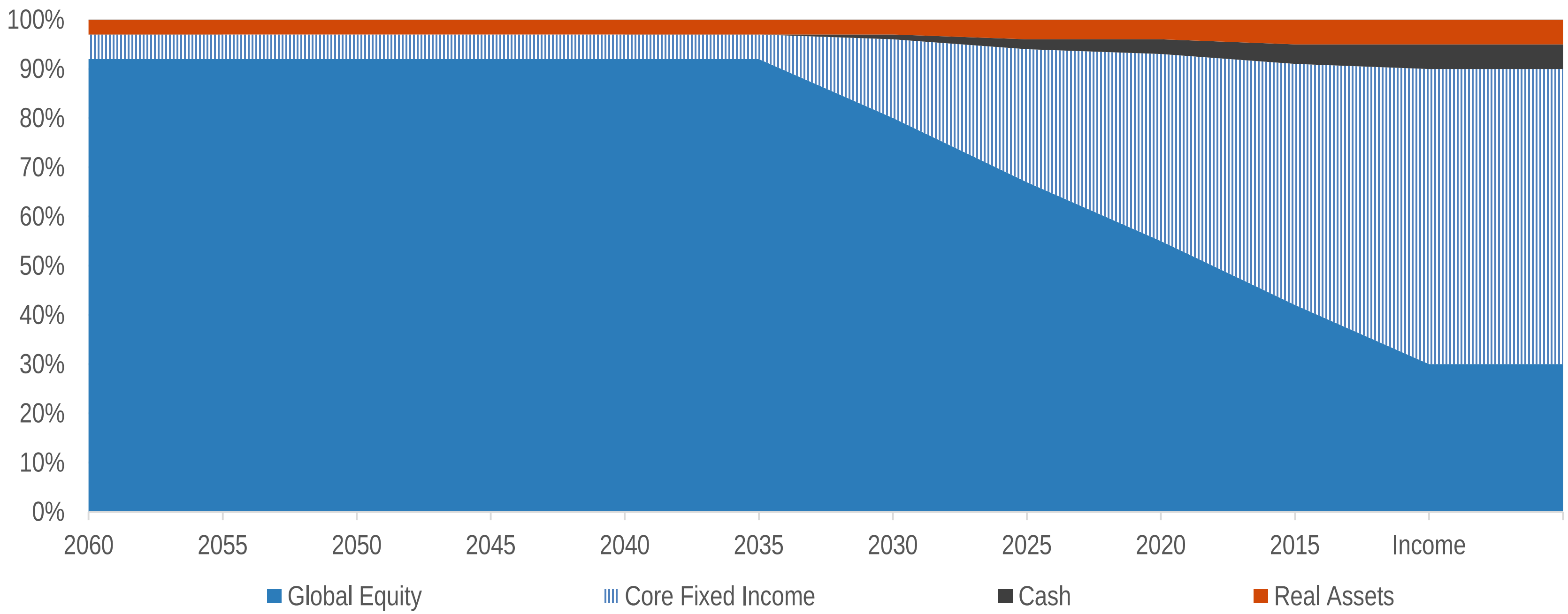
23 Starting Age	Two members Household Size	58 Retirement Age	65 Age Withdrawals Start
$1,800 Beginning Balance	81% Income Replacement Goal	1.8% - 3.2%[1] Annual Contribution	36+ Years[2] Projected Period

1 Contribution rates used are consistent with median age group contribution rates for CalPERS 457 Plan working participants in CY 2016. Data sourced from Voya.

2 The projection period starts at age 23 to retirement at age 58, afterwards projected years in retirement are based on the projected household mortality.

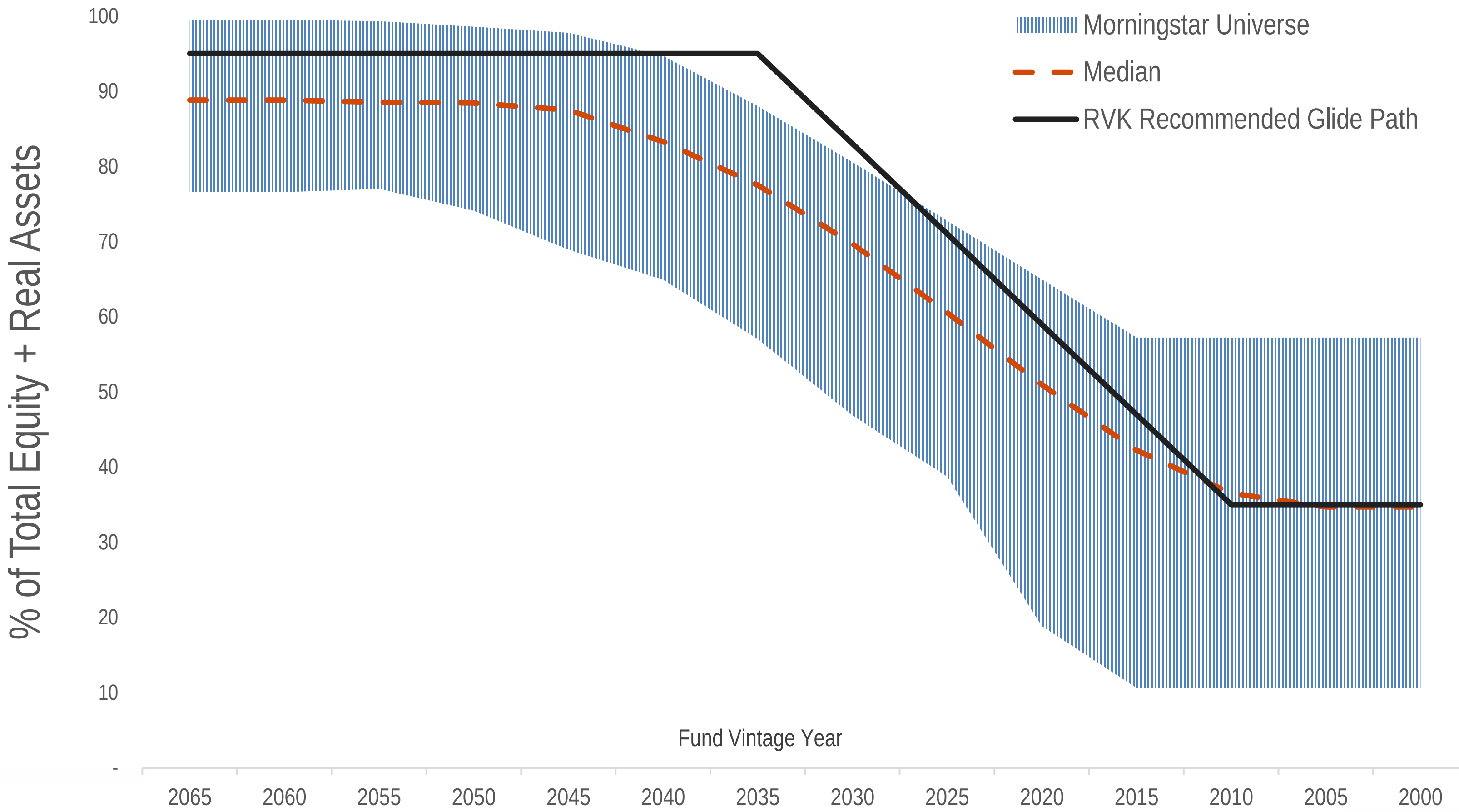
Glide Path Recommendation

SIP Recommended Asset Allocation



	2060	2055	2050	2045	2040	2035	2030	2025	2020	2015	Income
Global Equity	92%	92%	92%	92%	92%	92%	80%	67%	55%	42%	30%
Real assets	3%	3%	3%	3%	3%	3%	3%	4%	4%	5%	5%
Core fixed income	5%	5%	5%	5%	5%	5%	16%	27%	38%	49%	60%
Cash	0%	0%	0%	0%	0%	0%	1%	2%	3%	4%	5%

Morningstar Universe and SIP Recommended Glide Path



SIP Recommended Glide Path Median Income Projections[1]

6.0% Annualized Return Before Distribution	13.6% Annualized Volatility Before Distribution
$285,970 Ending Balance	76% Replacement Rate
71% Probability of Shortfall	14 Years Before Drawdown[2]
1.5% Additional Contribution (50% probability of shortfall)	5.8% 457 Replacement Rate

1 RVK Retirement Income Model was used to estimate future retirement outcomes of the median CalPERS 457 plan participant, based on their typical saving and spending patterns, and expected income sources.

2 In case of shortfall, years before drawdown represents the number years the median participant can draw on their CalPERS 457 Plan balance to meet any income shortfall.

SIP Current Glide Path Median Income Projections[1]

5.1% Annualized Return Before Distribution	10.4% Annualized Volatility Before Distribution
$212,765 Ending Balance	73% Replacement Rate
83% Probability of Shortfall	13 Years Before Drawdown[2]
3.6% Additional Contribution (50% probability of shortfall)	4.3% 457 Replacement Rate

1 RVK Retirement Income Model was used to estimate future retirement outcomes of the median CalPERS 457 plan participant, based on their typical saving and spending patterns, and expected income sources.

2 In case of shortfall, years before drawdown represents the number years the median participant can draw on their CalPERS 457 Plan balance to meet any income shortfall.

Implementation Steps

- Update Investment Policy
- Participant & Employer Communications
- Open 2060 Fund
- New Glide Path effective October 1st, 2018

Appendix

SIP Capital Market Assumptions

Asset Class	SIP Benchmark	Arithmetic Return	Geometric Return	Volatility	Correlations			
					Global Equity	Real Assets	Fixed Income	Liquidity
Global Equity	Global Equity Composite[1]	8.1	6.8	17.0	1.0	0.8	0.0	0.0
Real Assets	Real Asset Composite[2]	5.5	4.7	12.8	0.8	1.0	0.1	-0.05
Fixed Income	Barclays U.S. Aggregate	2.6	2.5	5.0	0.0	0.1	1.0	0.4
Liquidity	BofA Merrill Lynch 3-Month US Treasury Bill	2.0	2.0	1.0	0.0	-0.05	0.4	1.0

1 Global Equity Composite is composed of 52% Russell 3000 Index and 48% MSCI ACWI ex-USA IMI .
2 Real Asset Composite is composed of 25% Bloomberg Roll Select Commodity, 25% S&P Global Large/ Mid cap Commodity and Resources, 15% Dow Jones US select REIT, 10% Bloomberg US TIPS, and 25% S&P Global Infrastructure.

Wilshire

Steven J. Foresti
Chief Investment Officer, Wilshire Consulting

Thomas Toth
Managing Director, Wilshire Consulting

March 27, 2018

Mr. Henry Jones
Chair of the Investment Committee
California Public Employees' Retirement System
400 Q Street
Sacramento, CA 95814

Re: Supplemental Income Plans (SIP) Asset Allocation Glidepath

Dear Mr. Jones:

You requested Wilshire's opinion as it relates to Staff's recommended asset allocation glidepath for the Supplemental Income Plans (SIP). As of December 2017, the CalPERS SIP had approximately $1.7B in assets, which includes the CalPERS 457 Plan ($1.5B), the Placer County 401(k) Plan ($42MM) and the Supplemental Contributions Program ($115MM).

The Process

Staff engaged an external consultant to conduct glidepath analysis for the SIP program. Wilshire believes that the methods, inputs and data used to perform the evaluation are appropriate and reasonable. For example, the asset class assumptions used in the process were consistent with those approved and utilized within the PERF's recent ALM review (the only exception was within the Real Assets segment to accommodate the SIP's requirement of utilizing marketable securities). Demographic and participant behavior data were incorporated through the modeling and/or gathering of elements such as salary growth, contribution rates, income replacement goals, sources of household income, plan distributions, and life expectancies. The importance of liability information with the analysis is consistent with Investment Belief 1 (i.e. liabilities must influence the asset structure).

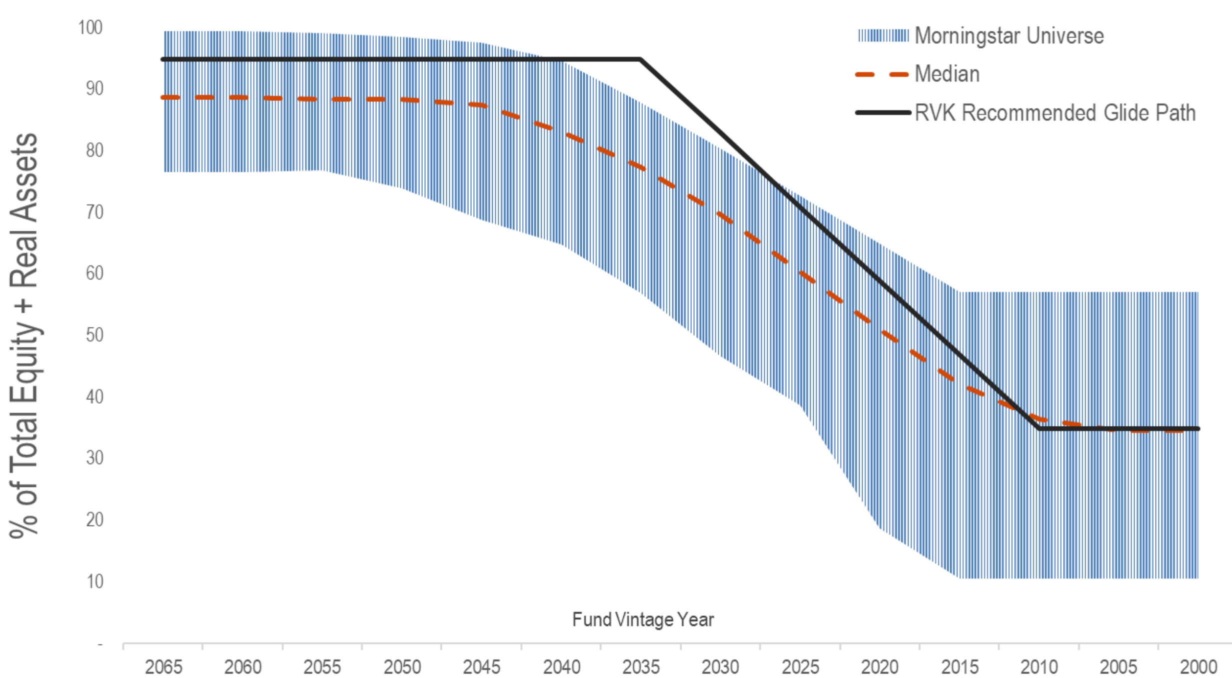
W Wilshire

In evaluating the appropriateness of various glidepath options, Staff and the external consultant primarily focused on trade-offs between the competing goals of maximizing the expected median replacement income and minimizing market risk. However, as can be seen on slide 22 of Staff's presentation deck (attachment 1 of this agenda item), other estimates such as ending balance, replacement rate, probability of shortfall, years before drawdown, required additional contribution, etc. were also factored into the glidepath analysis. The consideration of this wide variety of risk metrics is both important to understanding glidepath characteristics and consistent with Investment Belief 9 (i.e. Risk to CalPERS is multi-faceted and not fully captured through measures such as volatility or tracking error).

Glidepath Selection

The proposed glidepath, which is reflected on slides 20 and 21 of attachment 1 and pasted below, reflects Staff's and their external consultant's recommended glidepath based on their assessment of the various risk trade-offs referenced above.

Morningstar Universe and SIP Recommended Glide Paths



As noted in Staff's letter, the recommended glidepath reflects both higher expected return and risk than the SIP's current glidepath. While such an increase in risk taking may be perfectly appropriate and consistent with the SIP's underlying demographic and behavioral changes, Wilshire specifically highlights several observations to ensure that the Investment Committee is comfortable with the risk characteristics embedded in the proposed changes:

1. The glidepath's starting risk level, during the "accumulation plateau" phase that proceeds de-risking, is near the top of the Morningstar Universe.

2. The "accumulation plateau" extends the starting risk allocation further along the glidepath (i.e. ~ 10 years).

3. The interaction of characteristics 1 & 2 above lead the glidepath to exceed the risk levels of the Morningstar Universe immediately before and in the early stages of its de-risking path. However, it should be noted that the proposed glidepath has a steeper de-risking pace than does the Morningstar Universe, so returns to be well-within the universe at the landing phase.

Should you require anything further or have any questions, please do not hesitate to contact us.

Best regards,

Steven J. Foresti　　　　Thomas Toth