

Global Fixed Income, Inflation, and Liquidity Annual Review

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September 18, 2017

Executive Summary - Program Performance

As of June 30, 2017	1-YR	3-YR	5-YR	10-YR	20-YR	Since Inception*
	Net Return	Net Return	Net Return	Net Return	Net Return	Net Return
INCOME (\$62.9 bn)	0.3%	3.5%	3.4%	6.5%	6.7%	7.9%
BENCHMARK	(0.9%)	2.8%	2.5%	5.8%	6.1%	7.2%
Excess Return	1.2%	0.7%	0.9%	0.7%	0.6%	0.7%

As of June 30, 2017	1-YR	3-YR	5-YR	Since Inception**
	Net Return	Net Return	Net Return	Net Return
INFLATION (\$25.3 bn)	(2.7%)	(6.0%)	(2.1%)	0.5%
BENCHMARK	(1.8%)	(6.7%)	(2.7%)	0.1%
Excess Return	(0.9%)	0.7%	0.6%	0.4%

As of June 30, 2017	1-YR	3-YR	5-YR***
	Net Return	Net Return	Net Return
LIQUIDITY (\$15.5 bn)	0.8%	0.7%	0.4%
BENCHMARK	0.5%	0.8%	0.6%
Excess Return	0.3%	(0.1%)	(0.2%)

*The inception date is July 1988 and is based on custodian records

**The inception date is October 2007 and is based on custodian records

***Since inception reporting is omitted as the current Liquidity Program Policy went into effect in July 2011. Historical Liquidity composite returns are available from June 1993.

Executive Summary - Portfolio Positioning

Program/Sector		MV (bn)	%NAV Active	Duration Active	% Duration Active	Yield Active
GFI		\$62.9	N/A	-0.2	N/A	0.1%
DFI		\$56.4	-0.3%	-0.1	0.0%	0.1%
US Government		\$25.2	4.5%	-0.1	5.4%	0.0%
Corporates		\$13.0	-1.5%	0.6	-0.8%	0.1%
Mortgages		\$12.3	-7.4%	0.1	-4.0%	0.2%
Sovereign		\$1.8	0.2%	-0.9	-0.3%	-0.3%
Opportunistic		\$2.3	1.0%	-1.0	-0.3%	-0.5%
Cash Securities		\$1.8	2.9%	0.0	0.0%	1.0%
IFI		\$6.5	0.3%	-0.5	N/A	0.9%

Program/Sector		MV (bn)	% NAV Active	Duration Active	Yield Active
Inflation Assets		\$25.3	N/A	N/A	N/A
Inflation Linked Bonds		\$18.9	-0.4%	0.1	0.4
Commodities		\$6.4	0.4%	N/A	N/A

Program		MV (bn)	%NAV Port	Yield Active
Liquidity		\$15.5	N/A	0.3%
ABS		\$0.5	3.1%	N/A
Non-Dollar-Denominated Securities		\$3.2	20.7%	N/A
CD, CP (Financial)		\$4.4	28.3%	N/A
CP		\$3.6	23.3%	N/A
STIF		\$3.8	24.6%	N/A

Executive Summary - Strategic Initiatives Accomplishments

INITIATIVES	ACCOMPLISHMENTS
Currency Strategy Evaluation	Evaluated the current currency strategy, with a focus on private markets
CalPERS STIF Implementation	Implemented the CalPERS short-term investment fund

Executive Summary - 2017/18 Strategic Initiatives

INITIATIVES	GOALS
Asset Allocation Segment/Benchmark Migration	Develop an implementation plan for migrating to new segments and benchmarks as outlined by TLPM
Opportunistic Private Equity Credit Strategies	Develop a process to assess and act on opportunities to leverage PE credit opportunities. Migrate PE strategies and develop governance framework with TLPM
ESS and Sec Lending Integration	Review current model and governance structure for the Sec Lending program.
Cross-Asset Class Derivatives Management Platform Evaluation	Evaluate centralized platform for derivatives execution (analysis phase to identify requirements).
Data and Corporate Reporting Standards (SASB, IFRS)	Enhance disclosure of ESG considerations in periodic filings globally - SASB and IFRS focus.

Appendix

Global Fixed Income, Inflation, and Liquidity Annual Review

Review Outline

Section	Pages	Investment Beliefs Map									
		1	2	3	4	5	6	7	8	9	10
Executive Summary	2-5										
Program Performance	2		█			█					
Portfolio Positioning	3							█		█	
Strategic Initiatives Accomplishments	4			█				█			█
2017/18 Strategic Initiatives	5			█				█			█
Appendix	6-47										
Review Outline	7										
Investment Beliefs Key	8										
I. Program Overview	9-16										
Program Role	10	█					█			█	
Program Investment Philosophy	11		█		█			█			
Investment Decision Process	12		█					█	█		█
Policy Benchmark	13	█				█					
Program Characteristics	14-16	█				█					
II. Investment Review	17-37										
Past Year Environment Review	18,25,32					█					█
Program Performance	19,26,33		█			█					
Program Cumulative Return	20,27,34		█			█					
Volatility Profile	21,28,35							█		█	
Portfolio Positioning	22,29,36							█		█	
Forward-Looking Commentary	23,30,37		█					█			█
III. Business Review	38-42										
Business Model	39		█		█				█		
Functional Organizational Chart	40					█					█
Staffing Overview	41				█						█
Program Expenses	42								█		
IV. Governance & Sustainability Integration	43-47										
Global Fixed Income ESG Integration	44-47			█				█			█

- 1** Liabilities
- 2** Long-Term Horizon
- 3** Stakeholders
- 4** Three Forms of Capital
- 5** Accountability
- 6** Strategic Allocation
- 7** Risk Reward
- 8** Costs Matter
- 9** Multi-faceted Risk
- 10** Resources/Process

Global Fixed Income, Inflation, and Liquidity Annual Review

Investment Beliefs Key

	Short Name	Investment Belief
1	Liabilities	Liabilities must influence the asset structure.
2	Long-Term Horizon	A long time investment horizon is a responsibility and an advantage.
3	Stakeholders	CalPERS investment decisions may reflect wider stakeholder views.
4	Three Forms of Capital	Long-term value creation requires effective management of three forms of capital: financial, physical, and human.
5	Accountability	CalPERS must articulate its investment goals and performance measure and ensure clear accountability for their execution.
6	Strategic Allocation	Strategic asset allocation is the dominant determinant of portfolio risk and return.
7	Risk Reward	CalPERS will take risk only where we have a strong belief we will be rewarded.
8	Costs	Costs matter and need to be effectively managed.
9	Multi-faceted Risk	Risk of CalPERS is multi-faceted and not fully captured through measures such as volatility or tracking error.
10	Resources / Process	Strong processes and teamwork and deep resources are needed to achieve CalPERS' goals and objectives.

I. Program Overview

Program Roles¹

As defined through the Asset Liability Management Process:

Global Fixed Income (GFI)

Global Fixed Income serves as an economic diversifier to equity risk and a reliable source of income.

- Global Fixed Income accounts for \$62.9 billion or 19.4% of the Total Fund, which is 0.6% below interim Policy target.

Inflation Assets

Inflation Assets provide liquid and strong protection against inflation.

- Inflation Assets accounts for \$25.3 billion or 7.8% of the Total Fund, which is 1.2% below interim Policy target.

Liquidity

Liquidity exhibits safety and capital preservation properties as well as to provide an effective risk protection during financial crisis.

- Liquidity accounts for \$15.5 billion or 4.8% of the Total Fund, which is 0.8% above interim Policy target.

Program Investment Philosophy

- CalPERS' long-term investment horizon
- Active management adds value
- Costs matter
- Active management is human capital intensive

Investment Decision Process

- Primary Drivers and Decisions
 - Assess stage of economic cycle
 - Manage interest rate risk
 - Manage sector risk
 - Security selection
- Weekly senior team meeting
- FI Annual Long-Term Sector Spreads Meetings
- Use of external managers as extension of staff

Policy Benchmarks

Global Fixed Income Policy Benchmark

- 90% Barclays Long Liabilities
- 10% Barclays International Fixed Income Index GDP Weighted ex-U.S.

Inflation Assets Policy Benchmark

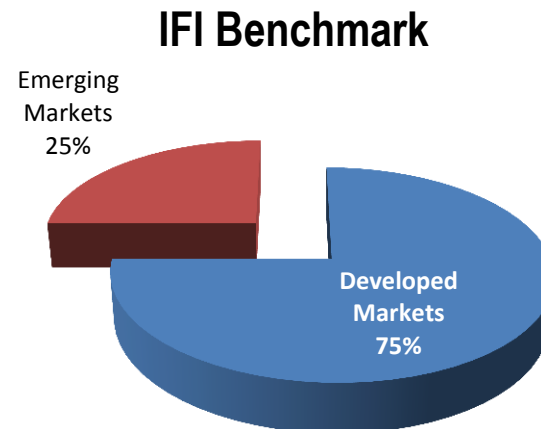
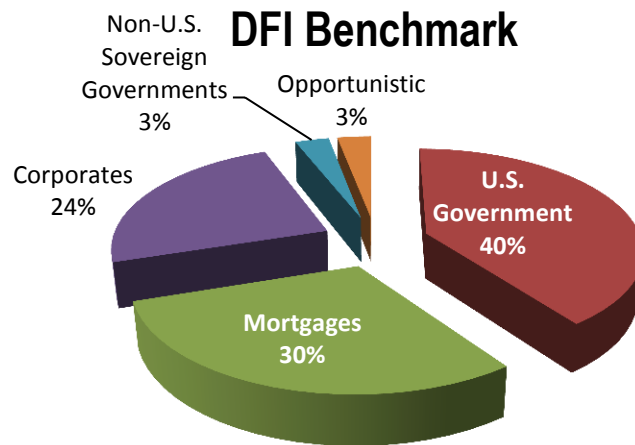
- 75% Global ILB Custom Index
- 25% Standard & Poor's GSCI Total Return Index

Liquidity Policy Benchmark

- 91-Day Treasury Bill

Program Characteristics – Global Fixed Income

- Benchmark:
 - 90% U.S. Fixed Income Securities (DFI)
 - 10% Non-U.S. Fixed Income Securities (IFI).
- 93% of Global Fixed Income is managed internally¹



Program Characteristics – Inflation Assets

- Benchmark:
 - 75% Global Inflation-Linked Bonds (ILB)
 - 25% Commodities
- U.S. inflation-linked bonds (TIPS) comprise 2/3 of ILB and the remaining 1/3 is non-U.S. government ILB
- Commodities benchmark is the GSCI Total Return Index
- 100% internally managed

Program Characteristics – Liquidity

- Benchmark:
 - U.S. Treasury Bills of 91-Day Maturity
- 100% internally managed

II. Investment Review

- a. **Global Fixed Income**
- b. Inflation Assets
- c. Liquidity

Past Year Environment Review – Global Fixed Income

- Trend like US growth (2.1%) but soft inflation (1.6%)
- 10 year bond yields rose into the November 2016 election and ended the year at 2.3% up 84 bps for FY
- The Federal Reserve effects three increases in its target interest rate and gave notice that it would soon start tapering the reinvestment of the securities it bought during QE
- China successfully reflatd its economy, supporting a gain in global trade and activity, as well as risk assets
- The ECB and BoJ continued with their own QE policies although in March the ECB trimmed its asset purchases

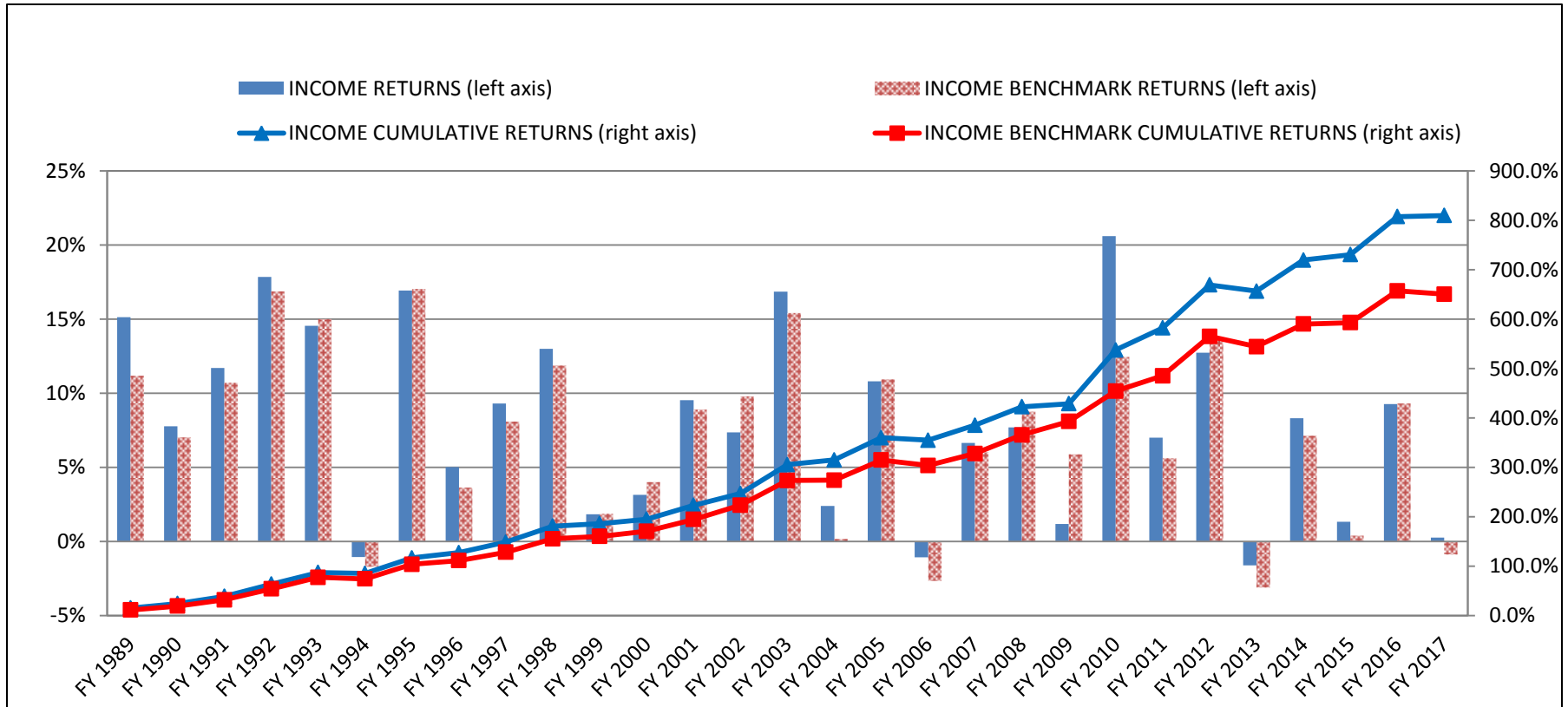
Program Performance Summary - Global Fixed Income

As of June 30, 2017	1-YR	3-YR	5-YR	10-YR	20-YR	Since Inception*
	Net Return	Net Return	Net Return	Net Return	Net Return	Net Return
INCOME (\$62.9 bn)	0.3%	3.5%	3.4%	6.5%	6.7%	7.9%
BENCHMARK	(0.9%)	2.8%	2.5%	5.8%	6.1%	7.2%
Excess Return	1.2%	0.7%	0.9%	0.7%	0.6%	0.7%

- Strong excess return for all periods
- Strong long term absolute return, low 1-year

Program Performance Review –Global Fixed Income

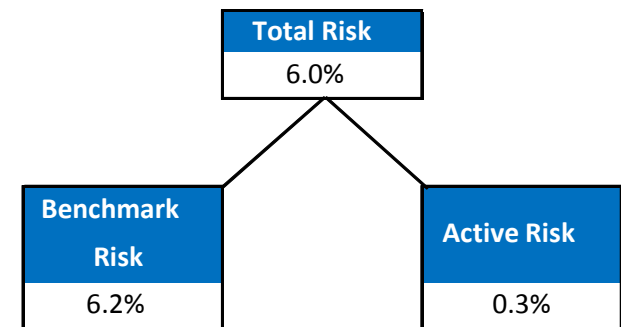
Cumulative Return



Volatility Profile – Global Fixed Income

As of June 30, 2017

- Income Forecast Volatility is 6.0%
- Forecast Tracking Error is 0.3%
- Correlation vs. the entire PERF portfolio is 0.14
- 1-Year Value-at-Risk* is -\$4.2 billion
- 1-Year Expected Shortfall* is -\$5.8 billion



* Adjusted to account for the expected return.

Portfolio Positioning – Global Fixed Income¹

Additional Risk Measures

		%NAV	Duration	% Duration	Yield
Program/Sector	MV (bn)	Active	Active	Active	Active
GFI	\$62.9	N/A	-0.2	N/A	0.1%
DFI	\$56.4	-0.3%	-0.1	0.0%	0.1%
US Government	\$25.2	4.5%	-0.1	5.4%	0.0%
Corporates	\$13.0	-1.5%	0.6	-0.8%	0.1%
Mortgages	\$12.3	-7.4%	0.1	-4.0%	0.2%
Sovereign	\$1.8	0.2%	-0.9	-0.3%	-0.3%
Opportunistic	\$2.3	1.0%	-1.0	-0.3%	-0.5%
Cash Securities	\$1.8	2.9%	0.0	0.0%	1.0%
IFI	\$6.5	0.3%	-0.5	N/A	0.9%

Forward-Looking Commentary – Global Fixed Income

- The US economy is entering its ninth year of expansion yet monetary conditions are still unusually easy
- The Federal Reserve is facing a tighter labor market. Wage growth is steady and household leverage growth is slow, which allows less aggressive monetary tightening
- The size of fiscal stimulus coming out of government programs, if any, should influence whether and by how much longer term interest rates need to rise
- Japan and Europe are likely to persist with stimulatory monetary policy although a key question in China is whether that country takes more steps to address a debt overhang

II. Investment Review

- a. Global Fixed Income
- b. Inflation Assets**
- c. Liquidity

Past Year Environment Review – Inflation Assets

- US inflation and European inflation increased due to rising energy prices and saw stronger prints over the year but remained below 2% policy target
- UK inflation doubled from 1.6% to 3.5% as a result of energy prices and a sharply weaker pound post-Brexit
- Real yields rose following the US election
- Oil prices rose sharply after the US election but were unable to sustain this gain and ended the year \$2 below the start

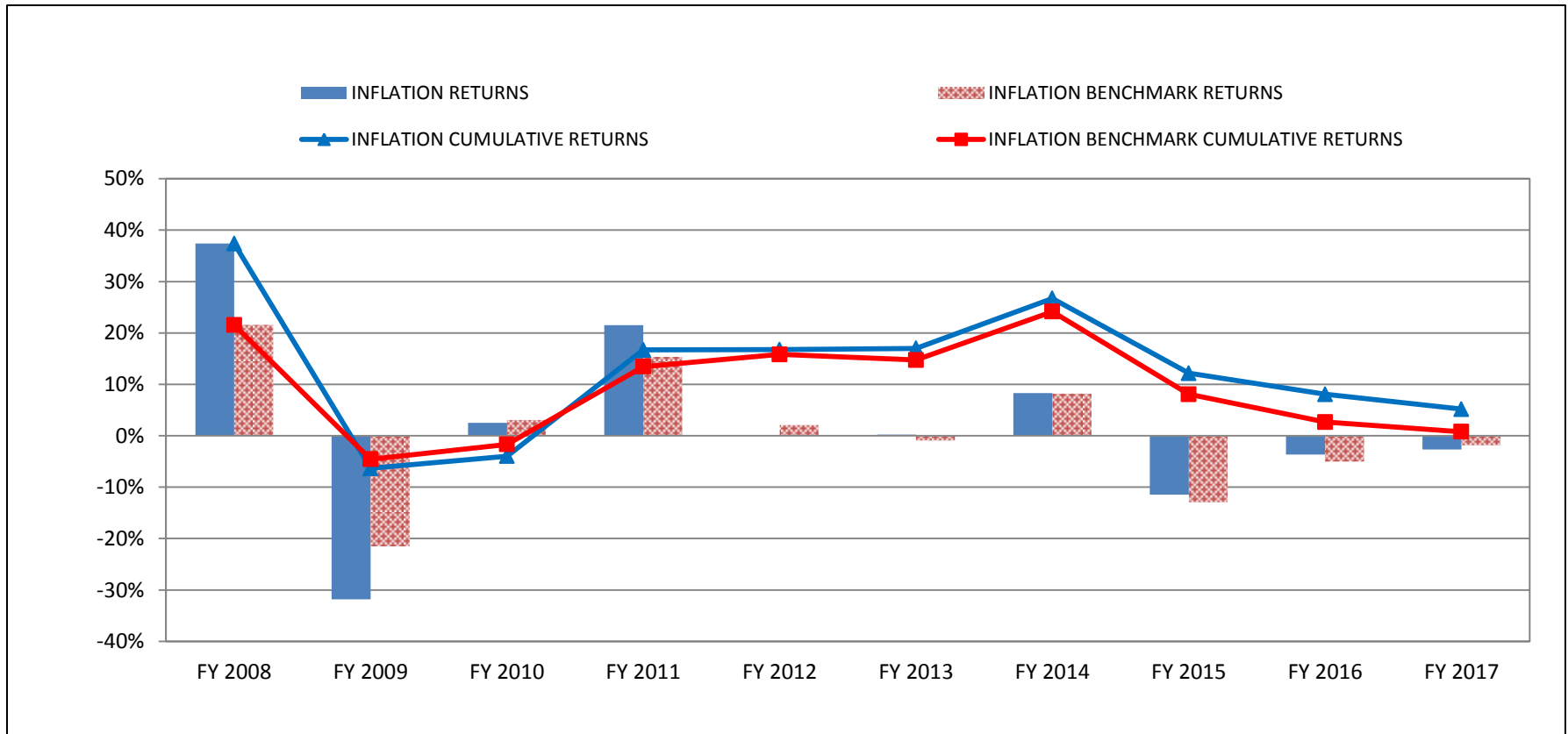
Program Performance Review – Inflation Assets

	1-YR	3-YR	5-YR	Since Inception**
As of June 30, 2017	Net Return	Net Return	Net Return	Net Return
INFLATION (\$25.3 bn)	(2.7%)	(6.0%)	(2.1%)	0.5%
BENCHMARK	(1.8%)	(6.7%)	(2.7%)	0.1%
Excess Return	(0.9%)	0.7%	0.6%	0.4%

- Weak absolute returns
- Rising real yields, especially after the US election, led to negative returns in inflation-linked bonds
- Negative performance of FY driven by retracement of prior gains on commodity options at the start of the year
- Strong long term excess return

Program Performance Review – Inflation Assets

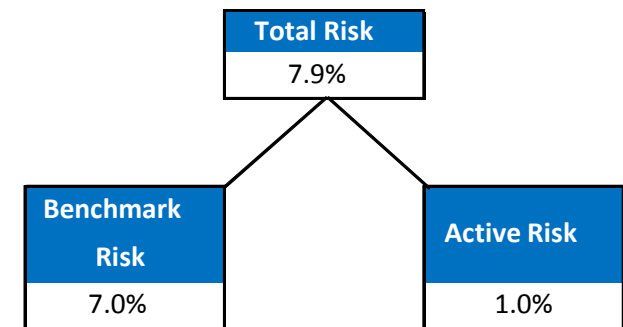
Cumulative Return



Volatility Profile – Inflation Assets

As of June 30, 2017

- Inflation Forecast Volatility is 7.9%
- Forecast Tracking Error is 1.0%
- Correlation vs. the entire PERF portfolio is 0.55
- 1-Year Value-at-Risk* is -\$2.5 billion
- 1-Year Expected Shortfall* is -\$3.3 billion



* Adjusted to account for the expected return.

Portfolio Positioning – Inflation Assets¹

Additional Risk Measures

		% NAV	Duration	Yield
Program/Sector	MV (bn)	Active	Active	Active
Inflation Assets	\$25.3	N/A	N/A	N/A
Inflation Linked Bonds	\$18.9	-0.4%	0.1	0.4
Commodities	\$6.4	0.4%	N/A	N/A

Forward-Looking Commentary – Inflation Assets

- US inflation to remain above 1% but unlikely to move significantly beyond 2%
- European inflation to remain stable while UK disinflation brings inflation down from elevated levels
- Real yields may edge higher across developed markets as central banks begin normalizing policy rates and the US moves to late cycle
- The commodity market outlook is currently unclear and will depend on global economic growth, US/China infrastructure investment and an ability by global commodity producers to control excessive supply

II. Investment Review

- a. Global Fixed Income
- b. Inflation Assets
- c. Liquidity**

Past Year Environment Review – Liquidity

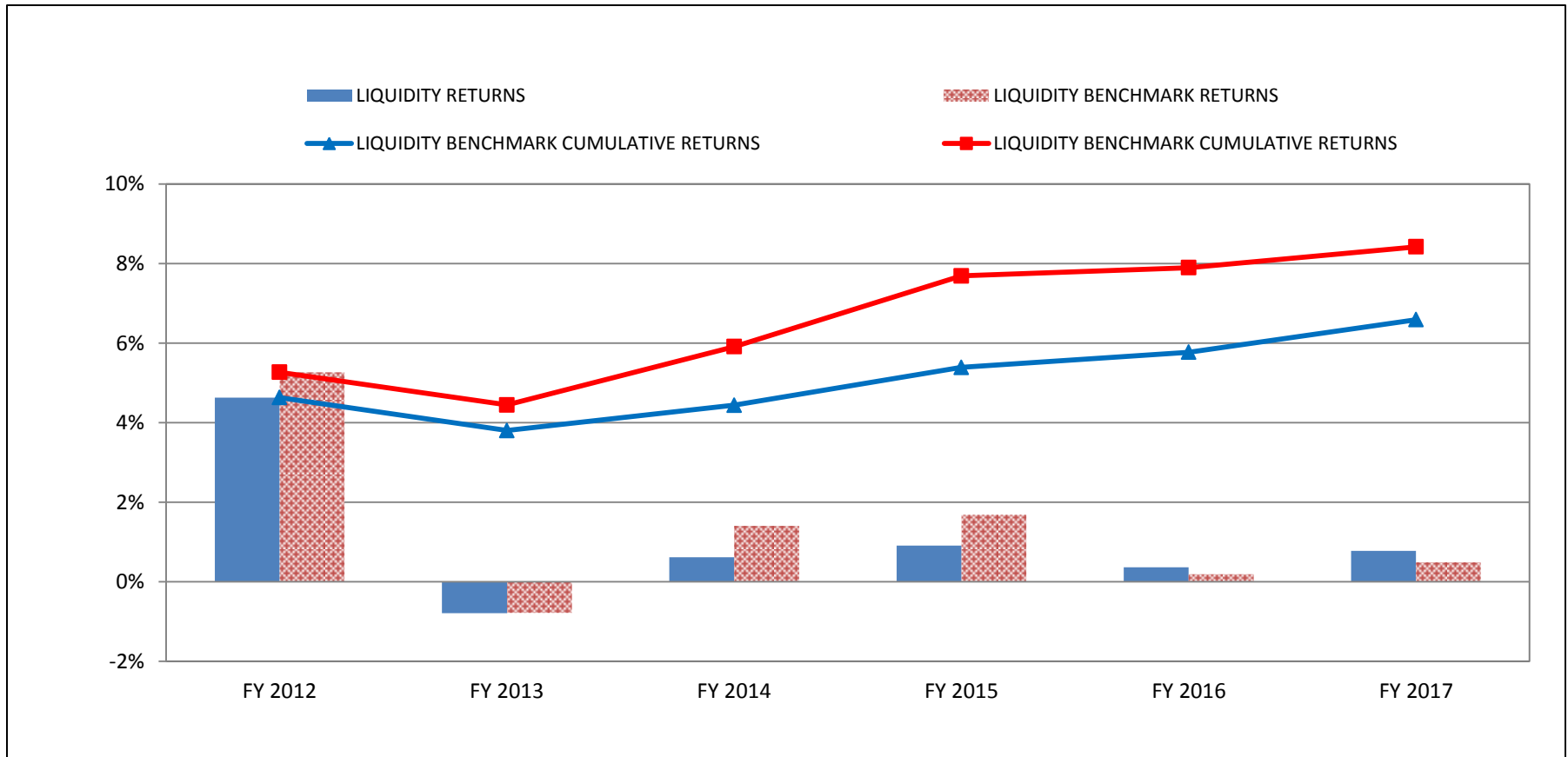
- The US Federal Reserve raised the Fed Funds rate three times in view of realized and expected labor conditions and inflation expectations
- Money Market Reform prompted a \$663 Billion shift out of Prime Money Market Funds into Money Market Funds invested solely in government securities

Program Performance Review – Liquidity

As of June 30, 2017	1-YR	3-YR	5-YR***
	Net Return	Net Return	Net Return
LIQUIDITY (\$15.5 bn)	0.8%	0.7%	0.4%
BENCHMARK	0.5%	0.8%	0.6%
Excess Return	0.3%	(0.1%)	(0.2%)

- Low absolute and relative return
- Role of low-risk profile and high liquidity results in limited opportunities for excess return

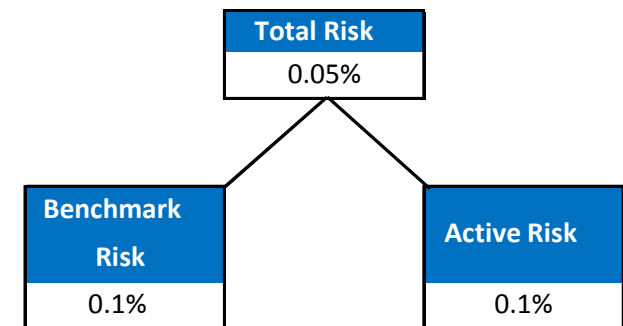
Program Performance Review – Liquidity Cumulative Return



Volatility Profile – Liquidity

As of June 30, 2017

- Liquidity Forecast Volatility is 0.05%
- Forecast Tracking Error is 0.1%
- Correlation vs. the entire PERF portfolio is 0.36
- 1-Year Value-at-Risk* is \$0.3 billion
- 1-Year Expected Shortfall* \$0.3 billion



* Adjusted to account for the expected return.

Portfolio Positioning – Liquidity¹

Additional Risk Measures

		%NAV	Yield
Program	MV (bn)	Port	Active
Liquidity	\$15.5	N/A	0.3%
ABS	\$0.5	3.1%	N/A
Non-Dollar-Denominated Securities	\$3.2	20.7%	N/A
CD, CP (Financial)	\$4.4	28.3%	N/A
CP	\$3.6	23.3%	N/A
STIF	\$3.8	24.6%	N/A

Forward-Looking Commentary – Liquidity

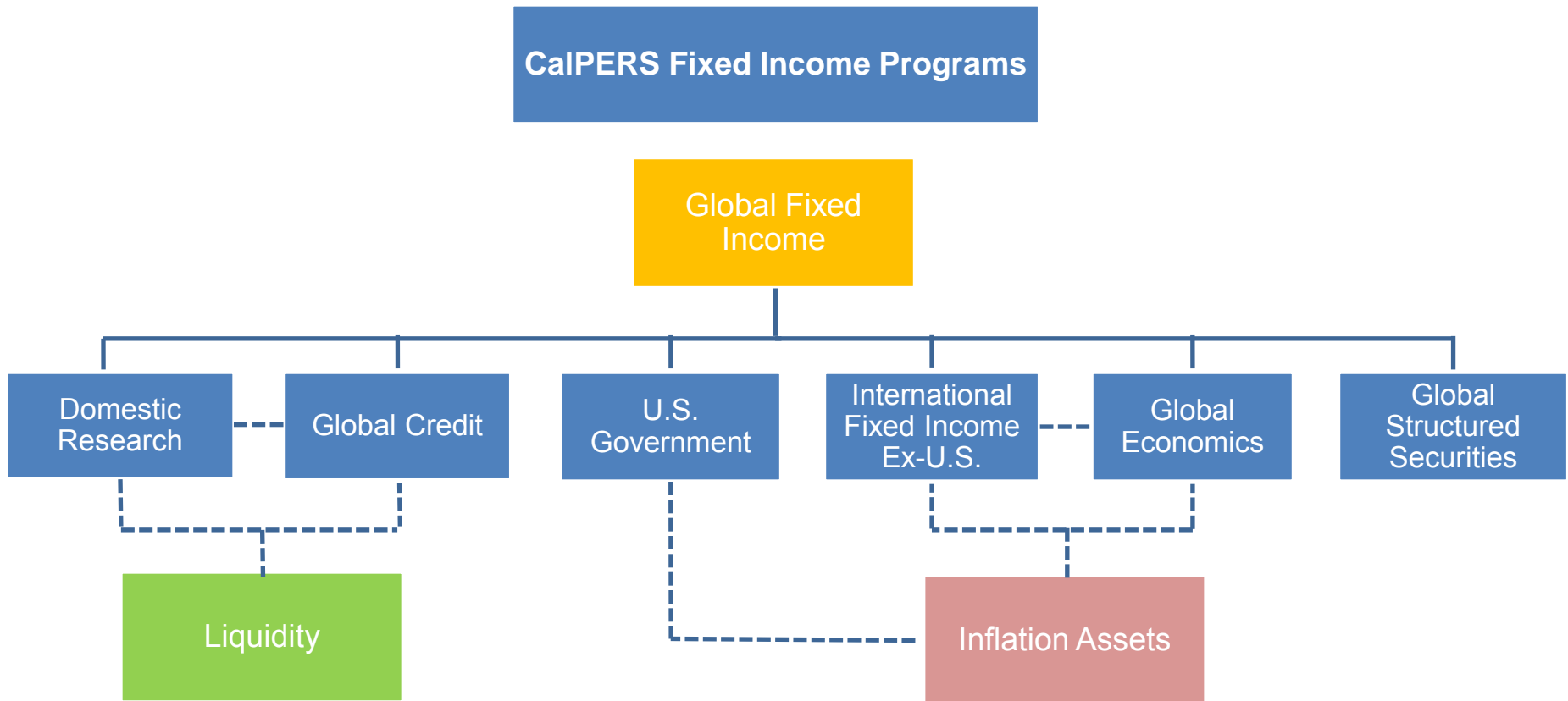
- Federal Reserve policy remains accommodative and it is expected that rate hikes will occur gradually as inflation approaches 2%
- The Federal Reserve is expected to begin to normalize its balance sheet over the coming year. This may steepen yield curves and potentially draw investments out of the money markets

III. Business Review

Business Model

- Long-term investor
- Shifting risks within an economic cycle
- Keep costs low
- Ability to attract and retain investment professionals

Functional Organizational Chart



Staffing Overview

TOTAL PROGRAM ¹

- 46 total positions within Fixed Income compared to 53 positions in FY 2015-16

STAFFING UPDATES ¹

- Hired 3 IOs, 3 IMs, and 1 SC
- Lost 1 IO and 1 SC
- Promoted 3 AIMs and 1 IO
- Transferred/Promoted 1 MID and 1 ID to new Opportunistic Strategies Unit
- Transferred 1 ID, 2 IOs, 1 AA, 1 ES, 1 AGPA, 1 OT, 1 SC to new Public Assets Administrative Support Unit

CURRENT VACANCIES ²

- 1 ID
- 1 AIM
- 4 IOs

Program Expenses

Expense Category	2016-17			FY 2015-16		
	AUM (\$billions)	Fees Paid (\$millions)	Fees Paid ¹ (BPS)	AUM (\$billions)	Fees Paid (\$millions)	Fees Paid ¹ (BPS)
Internal Management	\$99	\$10	1	\$76	\$12	2
External Management ²	\$5	\$14	28	\$6	\$13	20
Consultants Expense	N/A	\$0	0	N/A	\$0	0
Technology & Operating Expense	N/A	\$11	1	N/A	\$10	1
Total Program	\$104	\$35	3	\$82	\$35	4

IV. Governance & Sustainability Integration

The Six UN PRI Principles

- 1 *We will incorporate ESG issues into investment analysis and decision-making processes.*
- 2 *We will be active owners and incorporate ESG issues into our ownership policies and practices.*
- 3 *We will seek appropriate disclosure on ESG issues by the entities in which we invest.*
- 4 *We will promote acceptance and implementation of the principles within the investment industry.*
- 5 *We will work together to enhance our effectiveness in implementing the Principles.*
- 6 *We will each report on our activities and progress towards implementing the Principles.*



Global Fixed Income ESG Integration

Principle 1: *We will incorporate ESG issues into investment analysis and decision-making processes.*

Global Fixed Income Actions:

Policy required: Exclude tobacco bonds from portfolios

- Use ESG-related tools, metrics, and analyses
 - Use MSCI ESG scores to assess ESG related risks in our Internal Credit portfolios
 - Use MSCI carbon data to complete Carbon Footprint comparison of Internal Credit Portfolio relative to our benchmark
 - Use Covenant Review to provide insight into understanding Bondholder rights stated in Bond Indentures
- Assess the capabilities of internal and external investment managers to incorporate ESG issues
 - Quarterly review of our Internal Credit portfolio positions to ESG scores
 - Utilize various social measures for Internal Sovereign portfolios – Corruptions, Transparency, Inequality Indices
 - Completed survey of External Manager integration of ESG into their research and portfolio process
- Ask investment service providers to integrate ESG factors into evolving research and analysis
 - Barclays Research: Governance scores have strongest link to performance

Global Fixed Income ESG Integration

Principle 1: We will incorporate ESG issues into investment analysis and decision-making processes.

Global Fixed Income Actions (continued):

Specific portfolio decisions and engagements

- Sold Viacom and CBS bonds without change of control language where Governance event risk was identified
- Engaged General Electric with other bondholders due to concerns about fair treatment and valuation on preferred securities exchange
- Reduced exposure to South Africa, Malaysia, and Turkey due to financial risks associated with high corruption and low Transparency Scores
- Engaged with BHP on their governance of and financial risks associated with Samarco – Brazilian mining accident that resulted in environmental damage and civilian deaths

Principle 3: We will seek appropriate disclosure on ESG issues.

Global Fixed Income Actions:

- Contributed to SASB assessment of various industry disclosure practices

Global Fixed Income ESG Integration | Looking Forward

Survey Summary

Surveyed

- 4 High Yield Credit Managers
- 5 International Fixed Income Managers
 - 8 of 9 are UNPRI Signatories
 - All 9 are considering ESG factors in their investment process



Conclusions Drawn

- As signatories the Managers are moving toward UNPRI integration requirements
- Some have more formalized organizational structure and roles to implement the integration process

Next Steps

- Complete Carbon Footprint of Internal Corporate Fixed Income portfolios
- By year end 2017, update Global Fixed Income manager investment guidelines to include requirements to incorporate ESG factors into investment process