Currency Overlay Program

Asset Allocation/Risk Management

September 16, 2013

CalPERS | Investment Office
Asset Allocation

Agenda

- Part I: Executive Summary
- Part II: Benefits of the Program
- Part III: Costs of the Program
- Part IV: Recommendations

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Executive Summary

Background

- Assets have exposure to foreign currency.
- Liabilities are exclusively in U.S. Dollars.
- The Total Fund bears long-term currency risk due to mismatching between assets and liabilities.

Benefits of Program

- The original goal of the Program was to reduce Total Fund volatility.
- Since its inception in July of 1992, there is no statistical evidence that:
  - the Program changed Total Fund volatility; or,
  - the Program improved (or decreased) net return on the Total Fund.

Executive Summary

Costs of the Program

- Introduced large cash flow volatility, which is becoming more challenging given our increasing cash shortfall[1].
- Increased operational complexity and risk.

Staff Recommendation

- Eliminate the passive Currency Overlay Program.

[1]Cash shortfall is calculated by subtracting pension benefit payments and expenses from contributions plus current investment cash income. This shortfall ignores any unfunded commitments from private asset classes.

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Impact on Total Fund's Volatility

The main goal of the Currency Overlay Program was to reduce Total Fund volatility

- Since its inception in July 1992 to June 2013, the Program reduced the Total Fund's return volatility by 9 bps on an annualized basis.

- However, this 9 bps reduction in volatility is not statistically significant.

- In fact, there is no statistically significant difference between the volatility of the two return series (Total Fund with Currency Overlay versus Total Fund without Currency Overlay).

Impact on Total Fund Net Return

Alpha generation is not a goal for the Currency Overlay Program

- Total Fund net return was increased by 2 bps from July 1992 to June 2013 on an annualized basis.
- This 2 bps increase is not statistically significant. The averages of two returns series (Total Fund with Currency Overlay versus Total Fund without Currency Overlay) are not statistically different.
- Additionally, this ignores the cost of liquidity necessary to maintain the Program.

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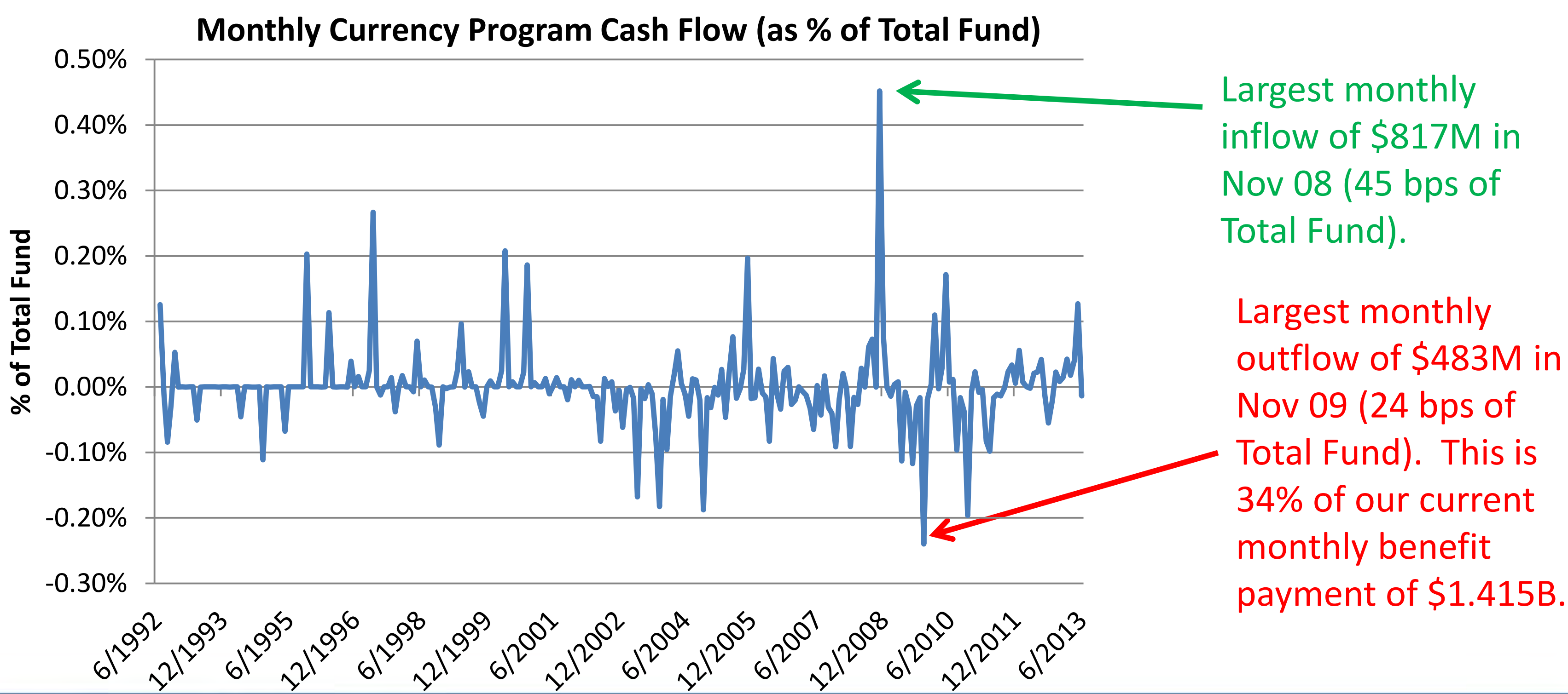
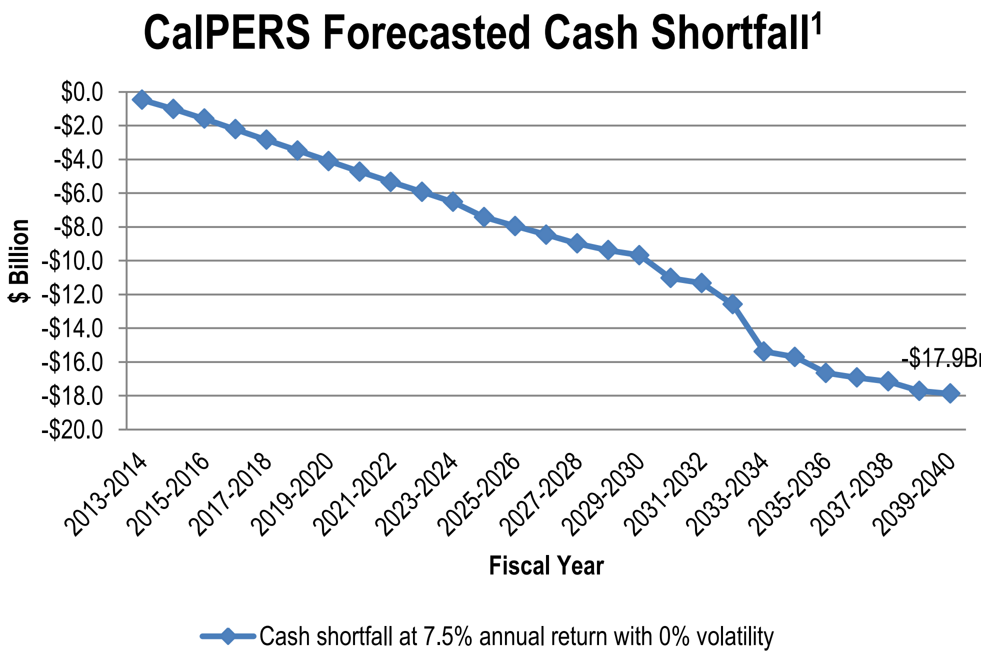
Monthly Cash Flow Volatility

- Forwards are used for currency hedging, and periodic settlements have an unpredictable impact on cash flow.



Cash Flow Volatility is More Challenging with Increasing Cash Shortfall

- Our ability to absorb cash flow volatility is rapidly diminishing.
- It might have been prudent to hedge currency exposure in the 1990s, but not any more.



CalPERS Investment Office Asset Allocation

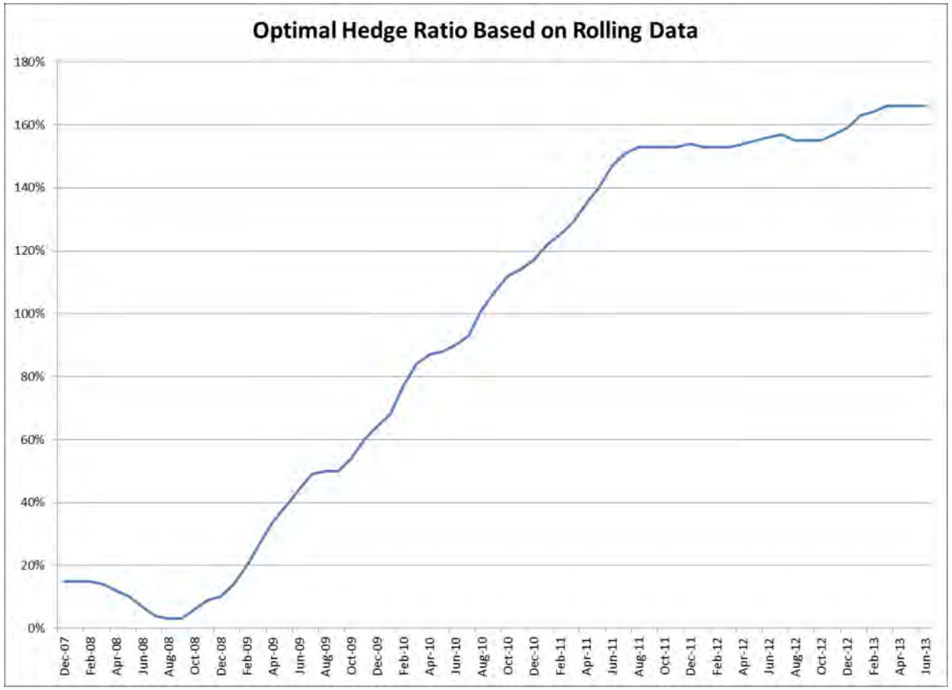
[1] Cash shortfall is calculated by subtracting pension benefit payments and expenses from contributions plus current investment cash income. This shortfall ignores any unfunded commitments from private asset classes.

Optimal Hedge Ratio Estimation in 2008

- A static 15% hedge ratio on the Total Fund foreign currency exposure was approved by the Investment Committee in 2008.
- The methodology was based on the goal of minimizing the Total Fund volatility
  - Analyzed data from December 1994 to December 2007.
  - Assumed Total Fund has 44% foreign currency exposure.
  - Ran 0-100% hedge ratio on Total Fund.
  - Selected the optimal hedge ratio that minimized Total Fund volatility.
  - 15% static hedge ratio was recommended by Staff as optimal.
  - The modeled volatility was reduced by 1.8 bps, from 11.272% (0% hedged) to 11.254% (15% hedged).

Optimal Hedge Ratio Since 2008

- This methodology depends on the sample period used for estimation.
- Applying the same methodology every month afterwards would have led to dramatically different optimal hedge ratios.
- It is difficult to estimate the optimal hedge ratio.



Lack of Consensus on the Optimal Hedge Ratio

Several viewpoints exist

- 100% hedge because foreign currency risk does not offer a commensurate return (Perold and Shulman)[1]
- Hedge ratio should be determined by mean-variance analysis, treating currency as an asset class with zero expected returns, but non-zero expected volatility and correlations with other asset classes (Black; Kinlaw and Kritzman)[1]
- 0% hedge if currency is not considered an asset class and the portfolio wants to take full advantage of diversification (Froot)[1]

[1] References are in the Appendix 1.

Practical Issues with Estimation of Hedge Ratio

Mismatch between currency overlay and real currency exposure of the Total Fund

- Some currency exposure is not hedged because the underlying currency is not readily tradable, such as the Chinese Yuan.
- We are hedging some currencies because they are part of the Total Fund Benchmark although the Total Fund has no actual exposure.
  - For example, we are hedging against the Japanese Yen because it is a component of our Private Equity benchmark. However, our Private Equity portfolios actually have no exposure to the Japanese Yen.
  - Some of our Private Equity managers may have already hedged their foreign currency exposures.

Operational Costs and Risks

There are several key risks and costs associated with the Program

- It introduces cash flow uncertainty which carries increasing risk as the Total Fund experiences increasing cash flow shortfalls.

- It increases operational complexity in benchmark composition and performance attribution.
  - The calculation of the Total Fund with Currency Overlay Benchmark has been inconsistent with industry standards since April 2009.

- It is difficult to accurately estimate the Optimal Hedge Ratio.

Constraints on Limited Staff Resources

The Currency Overlay Program is a constraint on limited staff resources

- It diverts attention of Investment Strategy Group from other pertinent investment decisions.
- Requires designated personnel from Global Fixed Income, Asset Allocation and Risk Management, and Investment Servicing Division, etc.

Peer Practice[1]

CalPERS practice is not consistent with peers

- Fixed Income international exposures are usually managed through active currency management.
- International exposure through Real Assets are usually managed by General Partners and/or on a project-by-project basis, rather than hedged at the aggregate level.
- Policies towards international equity exposures differ.
  - Around 50% - 80% of peers do not have a defined overall passive hedging policy.

[1] Examples of hedging policy from peers are in Appendix 2

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Summary

There are no statistically significant benefits, such as

- Decreases in volatility, and
- Increases in net returns.

There are significant operational costs and risks, such as

- Increases in cash flow volatility at a time when cash shortfall is growing,
- Increases in operational complexity, such as estimating the optimal hedge ratio and vulnerability to mistakes, and
- Increases in requirements of staff resources.

Recommendation

Staff recommends

- Eliminating the passive Currency Overlay Program.
- Continuing to strengthen our expertise in active currency management.
- Monitoring currency exposure at the Total Fund level through risk management tools, such as Barra One.

Appendix 1

- Perold, A. and E. Schulman “The Free Lunch in Currency Hedging: Implications for Investment Policy and Performance Standards”, Financial Analysts Journal, May-June, 1988
- Black, F. “Universal Hedging: Optimizing Currency Risk and Reward in International Equity Portfolios”, Financial Analysts Journal, July-August, 1989
- Kinlaw, W. and M. Kritzman “Optimal Currency Hedging In and Out of Sample”, Journal of Asset Management, April 2009
- Froot, K. “Currency Hedging over Long Horizons”, National Bureau of Economic Research, Cambridge, MA, April 1993

Appendix 2

	Pension Fund	Fund Size ($B)	International %	Hedge Policy
U.S.	California Public Employees' Retirement System	$ 233.9	30.2%	15% of total exposure to international currency
	California State Teachers' Retirement Plan	$ 150.6	16.1%	Stated in 2012 CAFR: The position range shall be 25-50% of the total notional value.[1]
	The New York State Common Retirement Fund	$ 150.6	23.1%	No defined overall hedging policy
	Florida Retirement System Trust Fund	$ 122.7	30.0%	No requirement to hedge exposure though some is hedged
	The Teacher Retirement System of Texas	$ 111.1	22.8%	No defined overall hedging policy
	New York State Teachers' Retirement System	$ 86.0	16.3%	International fixed income has a hedged benchmark while the other international programs seem to have an un-hedged benchmark
	State of Wisconsin Investment Board	$ 78.1	25.0%	Up to 25% of the portfolio reference value
	Ohio Public Employees Retirement System	$ 77.6	21.8%	No defined overall hedging policy
	North Carolina Retirement Systems	$ 74.5	17.0%	No defined overall hedging policy
Intl.	Norges Bank Investment Management	$ 685.7	100.0%	No hedging, international exposure is desired
	Canada Pension Plan Investment Board	$ 102.7	57.0%	Foreign bonds only are hedged
	Caisse de depot et placement du Quebec	$ 75.7	42.6%	Majority of foreign investments of the less-liquid portfolios is hedged
	Ontario Teachers' Pension Plan	$ 60.3	47.0%	No defined overall hedging policy

[1]Known by PCA and CalPERS staff to be 0%.

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