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August 31, 2018

Mr. Henry Jones
Chairman of the Investment Committee
California Public Employees' Retirement System
400 P Street, Suite 3492
Sacramento, CA 95814

Re: Internal Fixed Income Annual Review

Dear Mr. Jones:

Wilshire conducted an on-site review of the internal fixed income team's personnel, investment process, and resources. The CalPERS Global Fixed Income (GFI) Programs are designed to diversify equity risk for the total fund and provide current income and liquidity. The Programs are actively managed with 93% of the $79.1 billion in assets managed internally by staff, and the remaining 7% outsourced to external managers.

The review process included discussions with senior staff members of each fixed income segment within the GFI Programs. Review topics included Program investment process, personnel and resource management, as well as investment process and risk management processes.

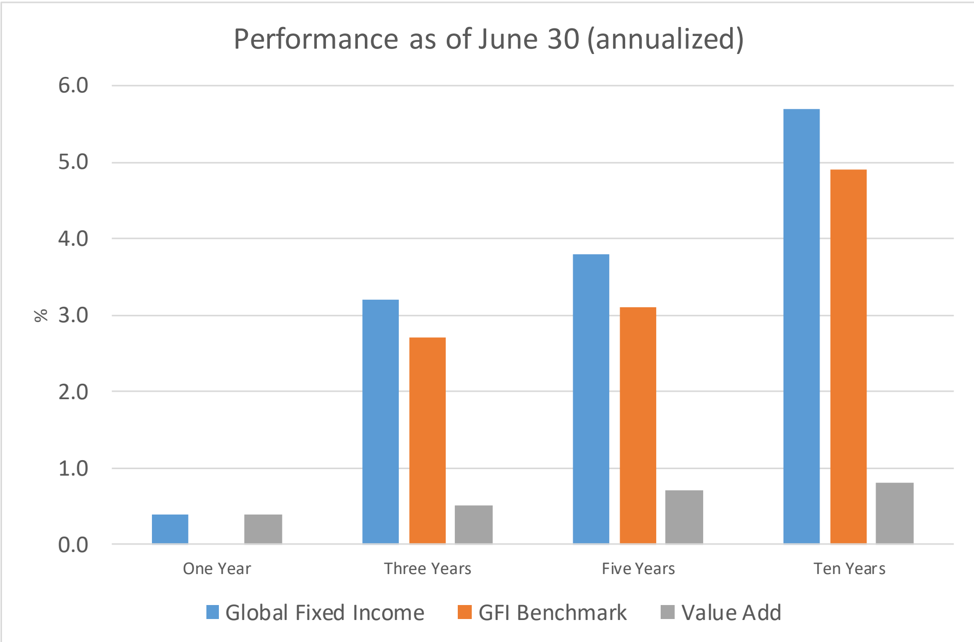
<u>Summary</u>

We believe the Global Fixed Income program is managed in an effective and risk-conscious manner, leveraging the deep expertise of the senior management team.

With the retirement of the long time MID-Fixed Income, there is an elevated level of uncertainty reflected in the Wilshire evaluation, but this should not be interpreted as a lack of confidence in the team in place. Rather, Wilshire would like to see stability at the MID level in order to ensure continuity of success for the overall GFI investment process.

The investment approach is consistent with its key strategic objective of providing income, stability, and diversifying equity risk within the Total Fund. At the same time, the program has added alpha consistently through both sub-sector relative value decisions and tactical positioning. Drawing upon extensive macroeconomic and market analysis, along with judicious awareness of the current extended credit cycle, the GFI portfolios have taken advantage of alpha generating opportunities across different markets, while maintaining relatively prudent risk positioning. Exhibit One shows the Program's historical performance relative to its benchmark, and Exhibit Two shows the stability of the GFI return profile in comparison to that of the Global Equity Program over time.

Exhibit One



The CalPERS GFI program has generated positive value-add across all periods, and has added 40 bps over the benchmark for the most recent one-year period. As noted in previous discussions, the Program will face the challenge of managing duration risk in a rising rate environment. This risk manifest itself over the last year and will continue to impact fixed income returns in the coming years should higher interest rates result from continued economic growth and an acceleration in inflation. Each of the underlying components of the fixed income portfolio (Structured Securities, Credit, Treasuries, Sovereign, International) has outperformed over one, three, and five years with the exception of International which underperformed over the last year. The Inflation portfolio has also outperformed, with commodities in particular showing strong performance over the last year.

The 12-month rolling returns shown in Exhibit Two, as well as the 3-year rolling correlations with the Global Equity Program shown in Exhibit Three, demonstrate the stability the GFI portfolio has provided in diversifying equity returns over different market cycles throughout the past 20 years.

Exhibit Two

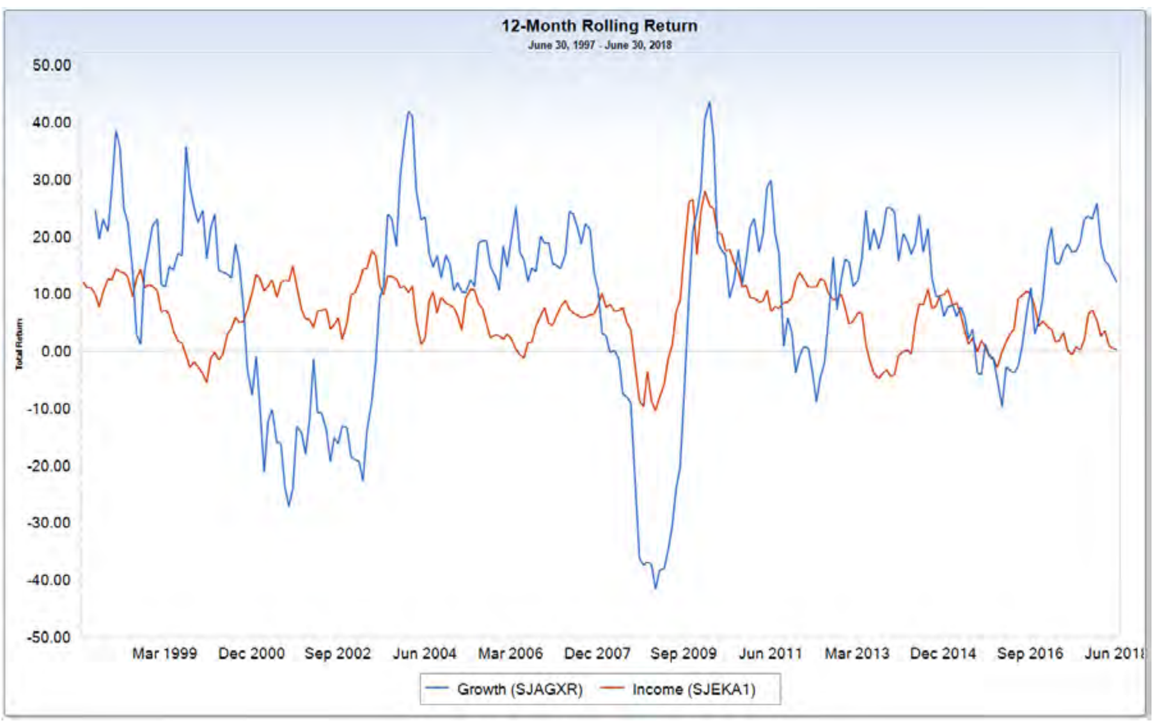
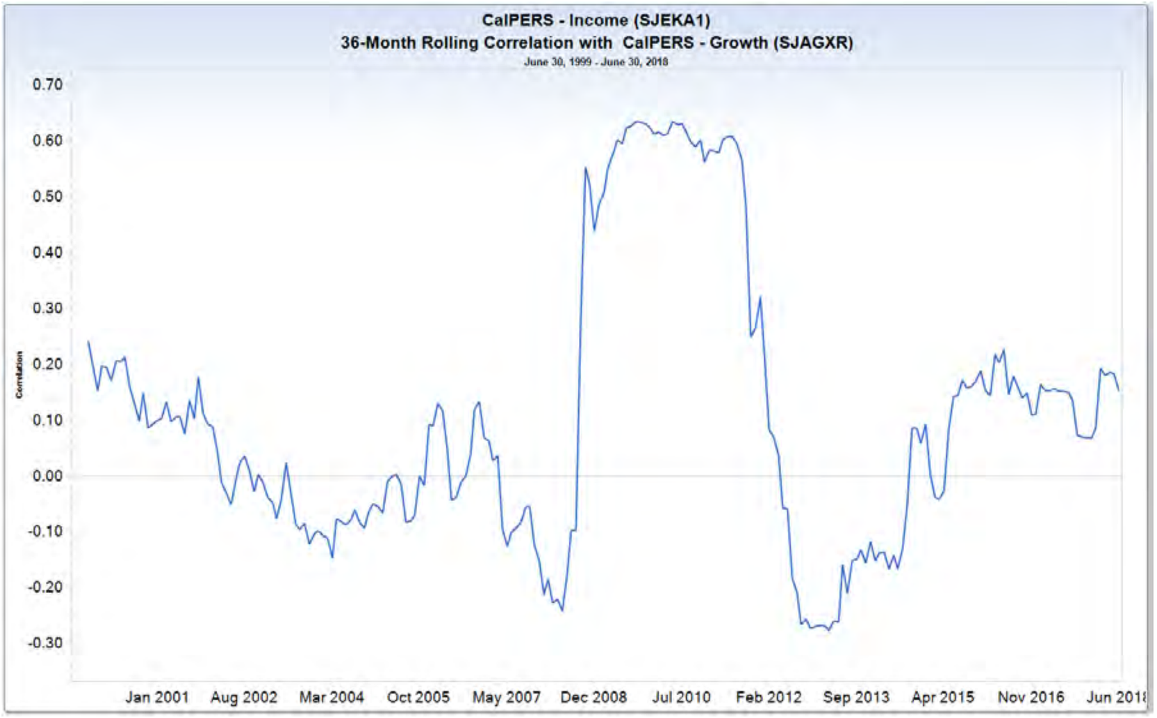


Exhibit Three



The remainder of this report provides Wilshire's thoughts, scoring, and rationale on the Global Fixed Income Program.

Scoring

Wilshire continues to rate the GFI Program highly, ranking the overall Program in the third decile relative to other asset managers. The Programs' ability to gather, process and implement portfolio strategies are significant positives, as is the high quality and experience of the senior management team. Lack of equity ownership and competitive compensation remain a detractor to the overall score, as do recruiting challenges and the concomitant time it takes to fill open positions. The retirement of the MID-Fixed Income does introduce some level of uncertainty into the investment process despite being anticipated well in advance. This uncertainty is reflected in Wilshire's evaluation score, although the expectation is that this will moderate over time.

CalPERS Global Fixed Income	Tier	Letter
Total Qualitative Score	3rd	B

	Weight	Tier	Letter
Organization	**20%**	**5th**	**C**
FIRM	***50%***	**7th**	**D**
Quality and Stability of Senior Management			
Quality of Organization			
Ownership/Incentives			
TEAM	***50%***	**3rd**	**B**
Stability of Investment Professionals			
Quality of Team			
Commitment to Improvement			
Information Gathering	**20%**	**1st**	**A**
Information Resources			
Depth of Information			
Breadth of Information			
Forecasting	**20%**	**2nd**	**A**
Clear & Intuitive Forecasting Approach			
Repeatable Process			
Strength, Clarity, and Intuitiveness of Valuation Methodology			
Forecasting Success			
Unique Forecasting Approach			
Portfolio Construction	**20%**	**2nd**	**A**
Risk Budgeting/Control			
Defined Buy/Sell Discipline			
Consistency of Portfolio Characteristics			
Implementation	**10%**	**3rd**	**B**
Resources			
Liquidity			
Compliance/Trading/Monitoring			
Attribution	**10%**	**3rd**	**B**
Depth of Attribution			
Integration of Attribution			

Discussion

Organization - Firm

In evaluating the quality of a manager's organization, Wilshire assesses factors contributing to the stability of the organization and the alignment of incentives between the team and the organization's long-term objectives. The score reflects the level of turnover at key management positions, with the impending departure of the CIO and a new COIO. Scoring in this area can improve as continuity increases. CalPERS faces some unique organizational risks that for-profit enterprises have greater flexibility in managing. There is a lack of long-term "ownership" opportunities such as direct ownership, phantom stock and other incentive-based compensation packages. These long-term forms of incentives are common within private sector investment organizations and can serve as significant retention incentives. The absence of such compensation tools can expose the organization to the increased risk of losing intellectual capital at both the Investment Office (INVO) Senior Staff level and the senior management level within Global Equity to asset managers and other financial institutions. Ensuring that CalPERS as an organization has the tools necessary to recruit and retain qualified, diverse candidates should be a strong focus in line with Investment Belief #10 - Resources and Process. CalPERS as an organization, is clearly aware of this as evidenced by the ongoing discussion over incentive packages and the willingness to consider changes to recruit and retain investment talent.

<u>Organization - Team</u>

The Global Fixed Income MID retired this year, and the ID-Structured Securities has been named the interim MID while a search is conducted. To date, that search has not officially started. This change has resulted in a shift in the way the aggregate fixed income portfolio is managed. The current team is taking a more collaborative approach to portfolio construction with input provided by sector ID's in their areas of expertise. Previously, the sub-sectors IDs determine the positioning of the respective strategies within their respective guidelines, while the MID adjusted aggregate exposures. The net result is that cross sector tilts (for example, being overweight Structured product and underweight Credit) are going to be utilized only when the team expects outsized compensation, while they will avoid more frequent tilts with lower levels of expected active return.

The sub-sectors are divided based on the systematic nature of fixed income risk, such as credit (corporate), structured products (mortgage-backed, asset-backed, etc.), and global governments ex-U.S / FX and inflation. Staff in charge of the strategies are highly knowledgeable and manage their respective sectors of the portfolio against appropriate benchmarks. There are also a number of external managers who provide direct investment management and act as strategic partners to provide research and insight, supplementing the work performed by Staff.

While the change in leadership was anticipated well in advance, the retirement of the MID-Fixed Income cannot help but introduce some level of uncertainty into the investment process. The lack of significant progress in naming a permanent successor adds to the uncertainty. The presence of senior staff members with deep investment expertise, as well as the management skills developed within the CalPERS culture is however a strong plus in maintaining stability through the transition. The experience level of the senior fixed income staff (AIM's and above) is exceptionally high with an average of over 20 years' experience, while the ID's and MID average over 30 years' experience. This provides a level of assurance that the successful implementation of the global fixed income program will continue, but Wilshire would like to see more evidence of this continuity in order to increase the evaluation score.

The impact on mid-level staff and a potential increase in turnover as with any significant organizational changes could be a challenge. Turnover in the mid to junior level staff is exacerbated by a relatively structured career path and promotion system. Staff is clearly cognizant of this issue and has structured the team with layers of expertise for coverage of critical investment functions. A further mitigating factor is the availability of internal opportunities within other INVO groups for those looking to make a transition within the CalPERS organization. The creation of the AIM position has also been a very positive development in the effort to retain senior talent. Recruiting efforts have been focused on attracting a more diverse pool of candidates to fill open positions, particularly at the senior level, which Wilshire views positively and believes further broadens the pool of top tier talent for consideration.

Total Fund level initiatives continue to be an area of cross-division cooperation and commitment. Senior GFI staff members continue to dedicate a meaningful amount of time contributing to various sub-committees designed to increase the knowledge base necessary for implementing the strategic plan, as well as to find ways to improve Total Fund performance. Staff's participation in these cross-functional initiatives provides important insights and is a reflection of their dedication to the success of the plan. This additional demand on the staff's time reinforces the need for efficient resource management, particularly with respect to recruiting and retaining talent for the organization.

<u>Information Gathering</u>

Staff leverages a network of managers and financial institutions, as well as the internal economic research team to gather the necessary information relevant to the GFI portfolios. The sector specialists covering the sub-sectors - sovereign bonds, structured securities, corporate bonds, and commodities – leverage the research and quantitative analyses generated both internally and externally to formulate investment strategies. These strategies are shared in regular meetings, along with the macro outlook impacting the overall financial markets. Given the secular appreciation of the equity market and concerns over valuation levels in the market, the GFI portfolio has been opportunistic in finding alpha opportunities within the low yield, low volatility environment.

On environmental, social and governance (ESG) related initiatives, the GFI team continues to make progress in integrating relevant indicators to better identify and manage ESG related risks in internal credit portfolios. Staff holds quarterly ESG reviews of the portfolio and provided numerous examples of investment actions that incorporated ESG factors in the analysis around risk and return. For example, staff studied utilization of social indicators such as corruption, transparency and inequality for sovereign portfolios, which led them to take active over and underweight positions in certain countries. Staff is also continuing its work to measure the carbon footprint of the internal credit portfolio relative to the benchmark, as well as monitoring the green bond space for opportunities. The team has updated the high yield manager guidelines to incorporate ESG factors into the investment process, and is now working on incorporating those factors in the international fixed income manager guidelines.

Forecasting

The key themes developed through the qualitative and quantitative analyses conducted within each segment are shared in weekly strategy and research meetings. Enhanced staffing focused on quantitative analysis is expected to contribute to a more systematic approach in managing risks and finding relative value opportunities.

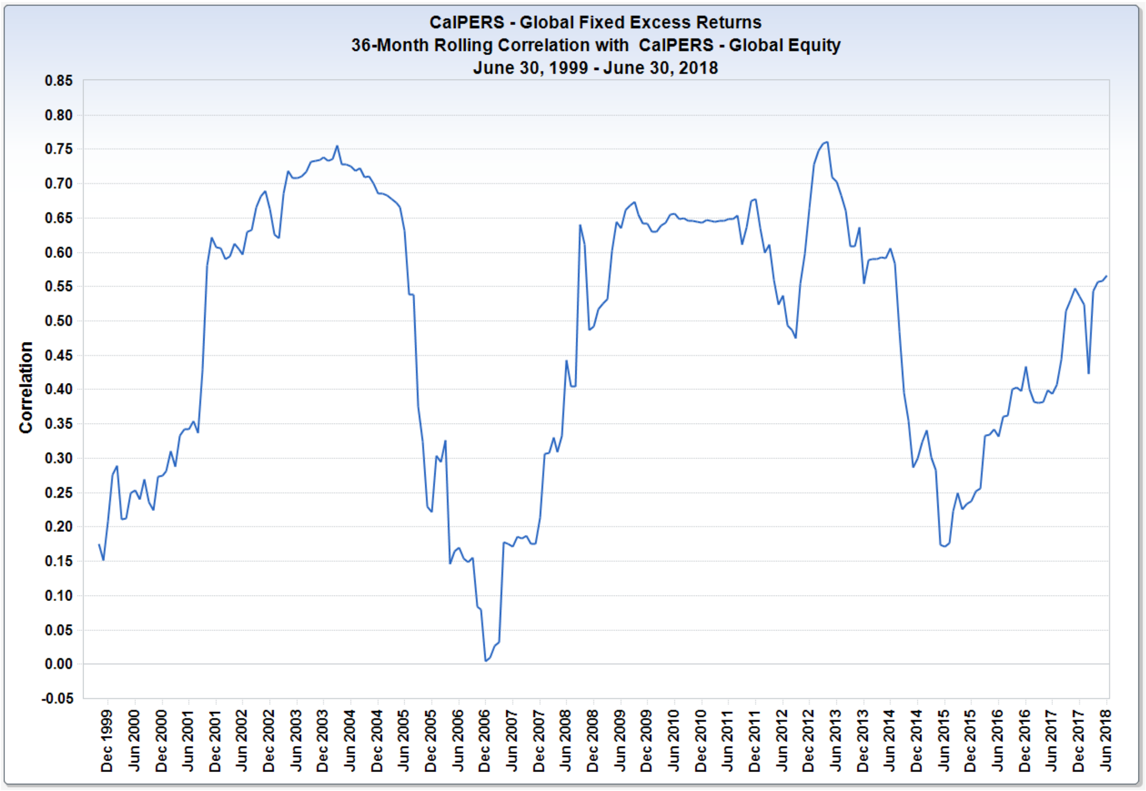
Over the past year, duration has been managed relatively conservatively, as opportunities for value-add have been driven more by sector relative value decisions. The portfolio has a higher quality bias and minimal directional exposure with respect to both interest rate and credit spread active risks. Investment grade corporate bonds lagged other segments of the GFI portfolio during the fiscal year, while non-investment grade bonds posted stronger returns. Mortgage-backed structured products have been maintained close to benchmark exposure, and were one of the better performing sectors in fixed income over the last fiscal year. As the interest rate environment changes going forward, the liquid nature of these securities will allow them to be utilized as an additional duration management tool, while providing some yield pickup compared to Treasuries.

Portfolio Construction

The GFI portfolio is constructed to reflect the relative value opportunities across the underlying sub-sectors. These portfolio decisions have been managed with a consistent approach, and take into account liquidity and market capacity considerations. The interim MID-Fixed Income ultimately has responsibility for managing the total interest rate and credit spread exposure to the desired profile, and is taking a more collaborative approach in portfolio construction through solicitation of opinions from the broader team. While this could positively impact performance and risk management, there exists the potential for slower decision-making and a reduction in value add from sector allocation decisions.

Guidelines permit varying the duration of the portfolio by -50%/+10% versus the benchmark per policy in order to protect against the rising interest rate risk of the portfolio, but this level of deviation has not been present over the last year. Each sub-sector ID monitors the risks relative to the respective index, within the guidelines of the Fixed Income Policy with respect to the credit spread, interest rate and portfolio concentration risks.

The allocation to interest rate risk and credit risk contribute to the diversification provided by the GFI portfolio versus global equity market performance. As spread products such as corporate bonds (investment grade and high yield alike) are driven by the credit worthiness of the issuer, the return drivers of these segments are more highly correlated to the equity markets in comparison to government issued bonds and, to a lesser extent, structured products.



With respect to liquidity management, staff has reduced reliance on third party for cash management, and effectively consolidated the management of all short-term investment funds. This has increased the efficiency of the portfolio, as well as added value through streamlining the management process across asset classes.

Overall, the portfolio construction approach is very well aligned with Investment Beliefs #1 – Liabilities, #2 – Long-Term Horizon, and #7 – Risk vs. Reward. While the portfolio construction continues to receive a high overall score, it has been tempered this year given the shift in philosophy until we can observe concrete results over time.

Implementation and Attribution

The GFI Programs utilize third-party portfolio management and trading platforms, and are evaluating additional platforms to improve efficiency across different fixed income instruments. The team is pushing to enhance transparency across the GFI portfolio and improve internal reporting and attribution. They are well aware of the re-investment requirement for improving system capabilities and supplementing them when necessary with outside input and expertise. The enhancement of internal systems continues to be a focus for certain team members and ensures that new capabilities keep pace with the additional workload being undertaken by the internal team, a process which Wilshire fully supports.

Currently trading responsibilities are shared with ESS, with trading associated with the Structured Securities, Credit and Cash portfolios remaining within GFI. Wilshire recognizes that synergistic opportunities can be harvested when the execution teams have the expertise and market knowledge of the instruments being traded. Wilshire is also supportive of the continue evaluation of further cross asset class coordination possibilities. The realignment of the trading room configuration to place the Credit and Cash traders next to ESS is a positive direction and an area for monitoring to ensure that efficiency is improved without a degradation in information flow.

Operational and compliance risk is also present in the internal fixed income portfolio, as it would be for any external manager. CalPERS has both enterprise and investment compliance teams, as well as a risk management group, and they are collectively tasked with monitoring portfolios risks across asset classes. Given the size and complexity of the CalPERS portfolio, ensuring that the risk management group remains adequately staffed is important.

Conclusion

In brief, we believe that Staff has demonstrated the ability to both effectively and efficiently manage CalPERS' fixed income portfolios. The investment philosophy is appropriate for CalPERS' needs and provides both cash yield and diversification benefits to the Total Fund. There are sufficient investment risk controls in place to mitigate many of the risks of managing fixed income portfolios. **Utilizing our standard manager research scoring framework, Wilshire's score on the program is in the 3rd decile, which is a moderate decrease from last year's evaluation in reflection of the change in leadership. While lower, it continues to reflect the strong team in place and clear success at managing the portfolio as charged.** The main challenges are largely related to organizational-level issues, such as a lack of long-term retention incentives. Wilshire's future reviews will focus on the successful transition of the Program leadership and how it translates to performance in practice.

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

Best regards,

Thomas Toth
Managing Director

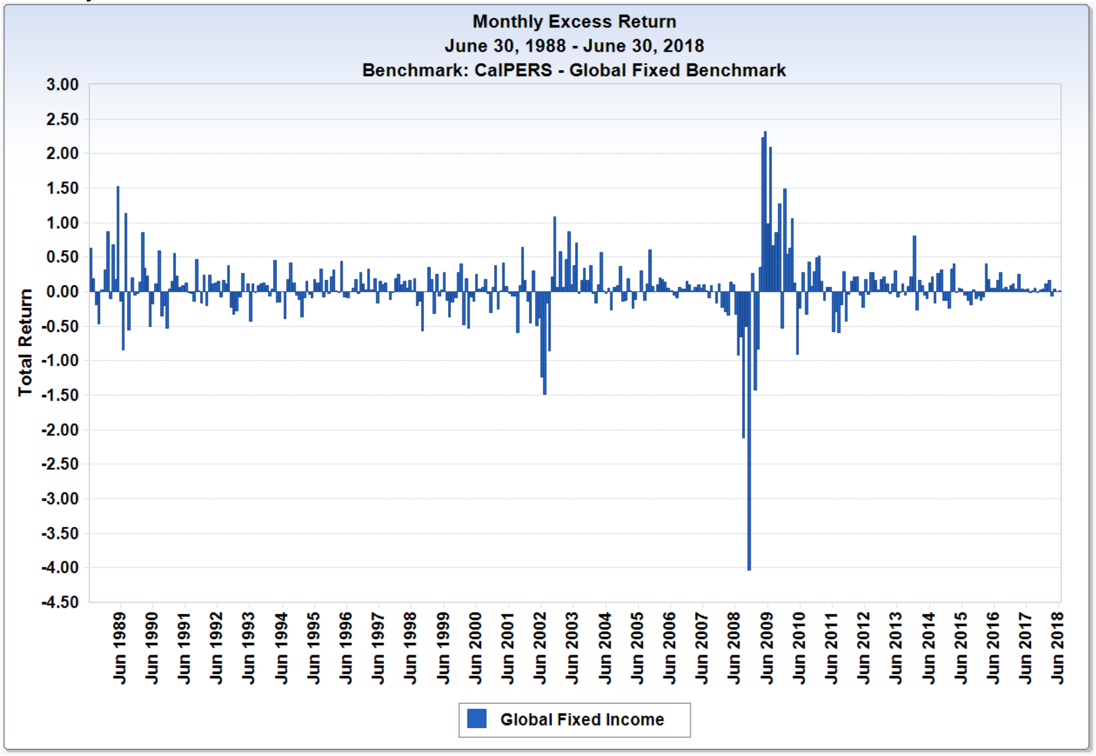
Rose Dean
Managing Director

Performance Appendix

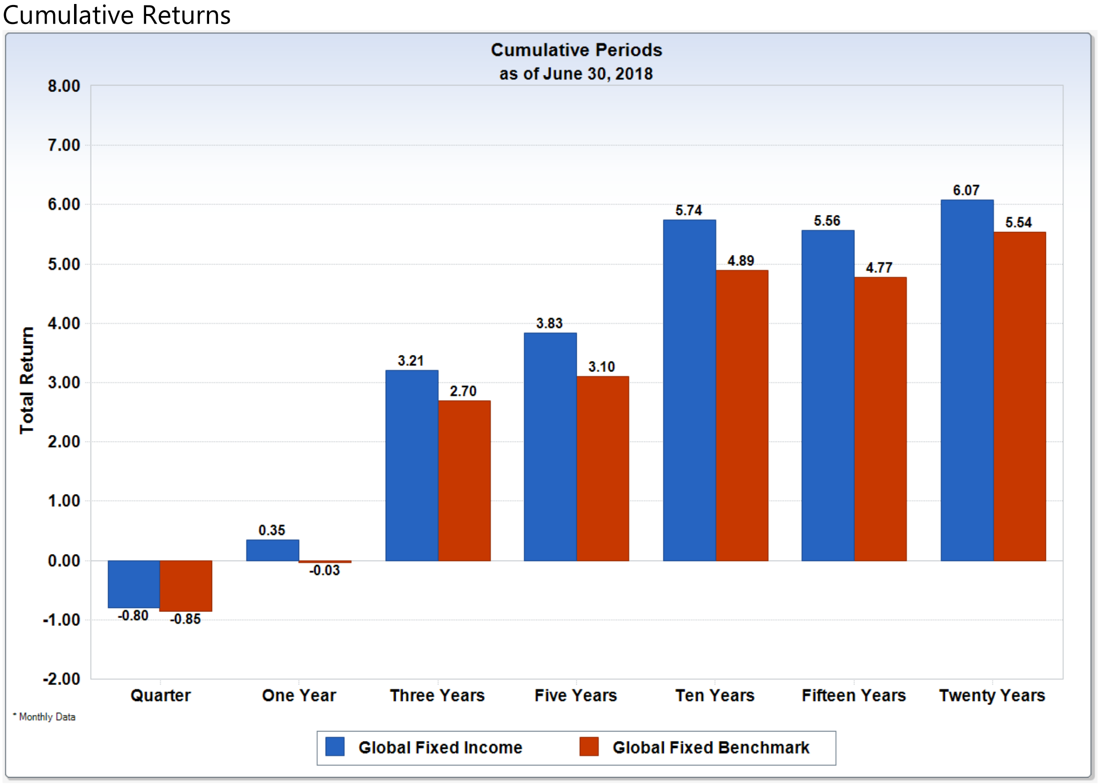
	Market Value	Qtr	1-Year	3-Year	5-Year	10-Year	Date
INCOME	**79.1**	**-0.8%**	**0.4%**	**3.2%**	**3.8%**	**5.7%**	**6/88**
Income Policy Benchmark		-0.9%	0.0%	2.7%	3.1%	4.9%	
Value Added		0.1%	0.4%	0.5%	0.7%	0.8%	
U.S. Income	**72.4**	**-0.3%**	**0.3%**	**3.3%**	**4.2%**	**6.1%**	**12/95**
Mortgage Bonds	15.3	0.3%	0.9%	2.2%	3.7%	4.7%	12/82
Long Duration Mortgages	4.0	0.0%	0.6%	2.9%	3.6%	6.1%	6/05
Corporate Bonds	13.1	-1.9%	-1.1%	4.6%	5.4%	7.6%	3/02
U.S. Government	29.1	0.4%	0.6%	3.0%	3.4%	4.8%	1/00
Sovereign Bonds	2.4	-2.1%	-0.6%	3.0%	4.5%	-.-%	7/09
Long Duration Corporates	2.7	-2.0%	-2.1%	3.9%	3.3%	8.3%	9/05
Internal High Yield Bonds	3.7	1.0%	4.6%	8.4%	9.3%	10.0%	9/99
External High Yield	1.9	0.8%	4.1%	5.7%	5.8%	6.3%	3/02
Non-U.S. Income	**6.6**	**-6.0%**	**1.5%**	**2.7%**	**0.6%**	**2.3%**	**3/89**
Custom Benchmark		-5.6%	1.7%	2.4%	0.0%	1.3%	
Value Added		-0.4%	-0.2%	0.3%	0.6%	1.0%	
Internal Active Short Term	2.6	0.5%	1.6%	1.0%	0.7%	-.-%	3/11
Custom Benchmark		0.5%	1.4%	0.8%	0.5%	-.-%	
Value Added		0.0%	0.2%	0.2%	0.2%	-.-%	
CalPERS ESEC Cash Collateral	2.3	0.4%	1.2%	0.8%	0.6%	-.-%	6/10
Custom Benchmark		0.4%	1.4%	0.8%	0.5%	-.-%	
Value Added		0.0%	-0.2%	0.0%	0.1%	-.-%	

	Market Value	Qtr	1-Year	3-Year	5-Year	10-Year	Inception Date
INFLATION	**20.8**	**0.8%**	**9.3%**	**0.8%**	**-0.4%**	**-1.8%**	**9/07**
Inflation Policy Benchmark		0.8%	8.9%	0.5%	-0.9%	-1.0%	
Value Added		0.0%	0.4%	0.3%	0.5%	-0.8%	
Internal Commodities	**3.7**	**8.2%**	**30.3%**	**-4.3%**	**-9.5%**	**-12.4%**	**9/07**
GSCI Total Return Index		8.0%	30.0%	-4.4%	-9.4%	-12.4%	
Value Added		0.2%	0.3%	0.1%	-0.1%	0.0%	
Core Inflation Linked Bonds	**14.0**	**-2.0%**	**2.6%**	**1.8%**	**2.0%**	**2.9%**	**3/08**
Custom Benchmark		-1.9%	2.6%	1.8%	1.8%	2.7%	
Value Added		-0.1%	0.0%	0.0%	0.2%	0.2%	
Tactical Commodities	**1.6**	**8.7%**	**32.5%**	**-4.8%**	**-9.7%**	**-.-%**	**1/13**
GSCI Total Return Index		8.0%	30.0%	-4.4%	-9.4%	-.-%	
Value Added		0.7%	2.5%	-0.4%	-0.3%	-.-%	
Tactical TIPS	**1.6**	**0.8%**	**2.1%**	**1.8%**	**1.5%**	**-.-%**	**1/13**
CalPERS TIPS		0.8%	2.1%	1.9%	1.7%	-.-%	
Value Added		0.0%	0.0%	-0.1%	-0.2%	-.-%	

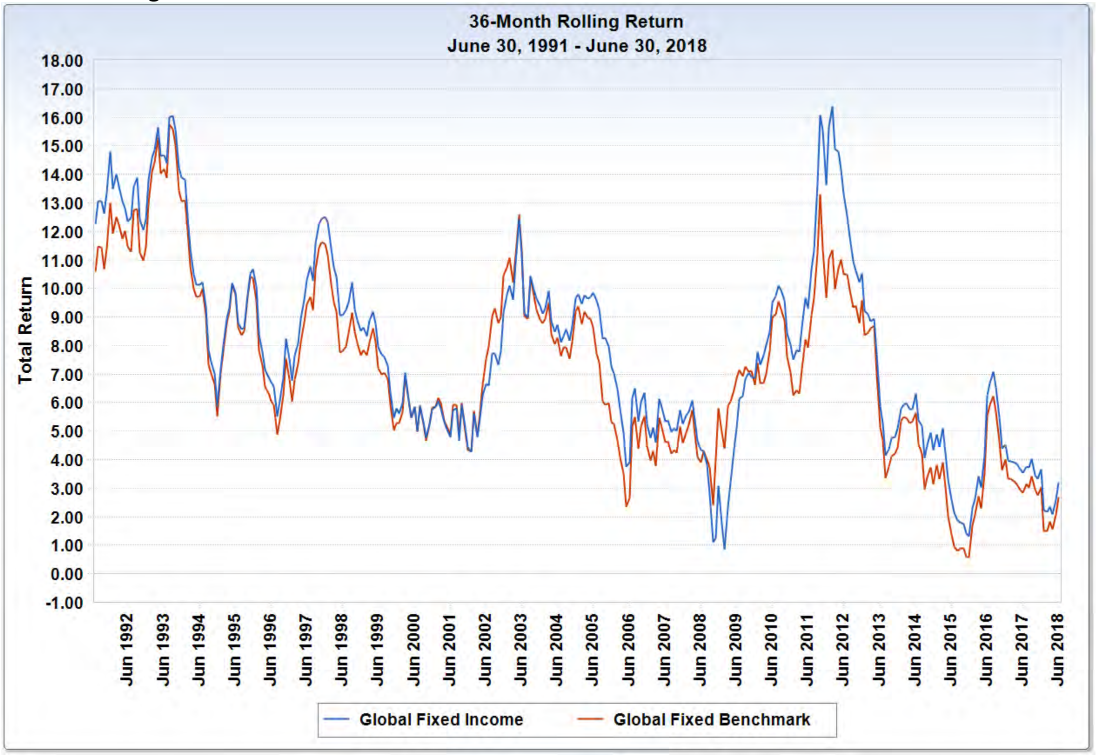
Monthly Excess Returns



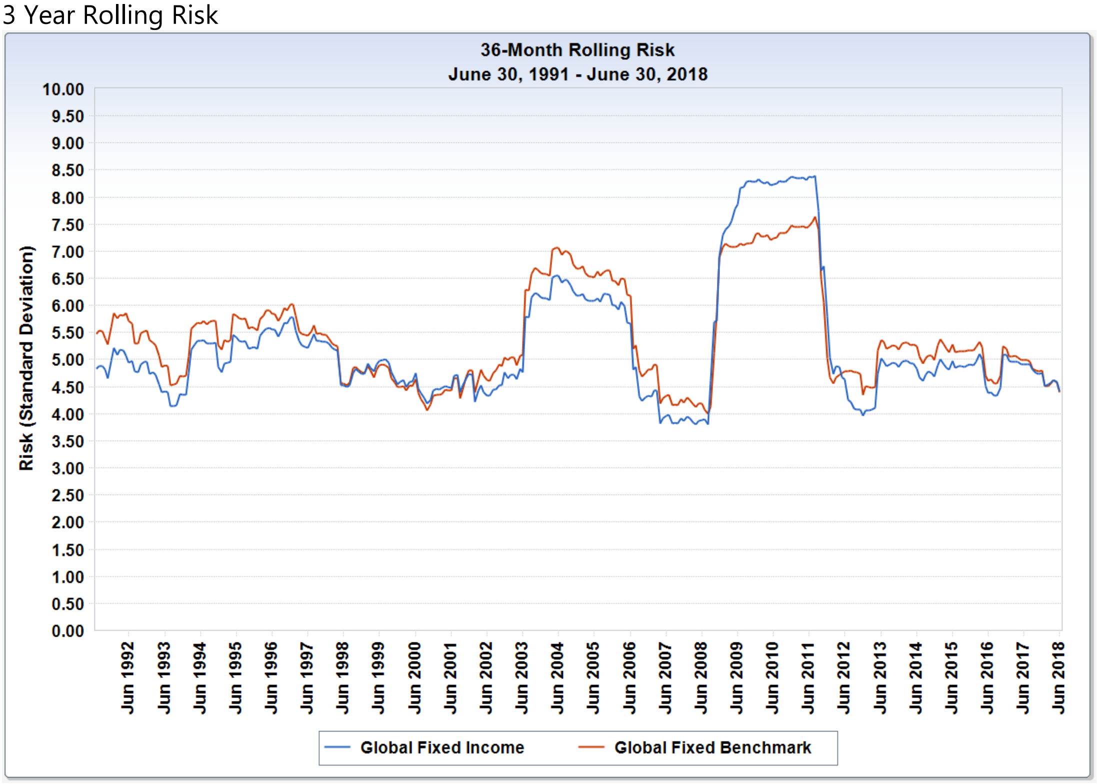
Cumulative Returns



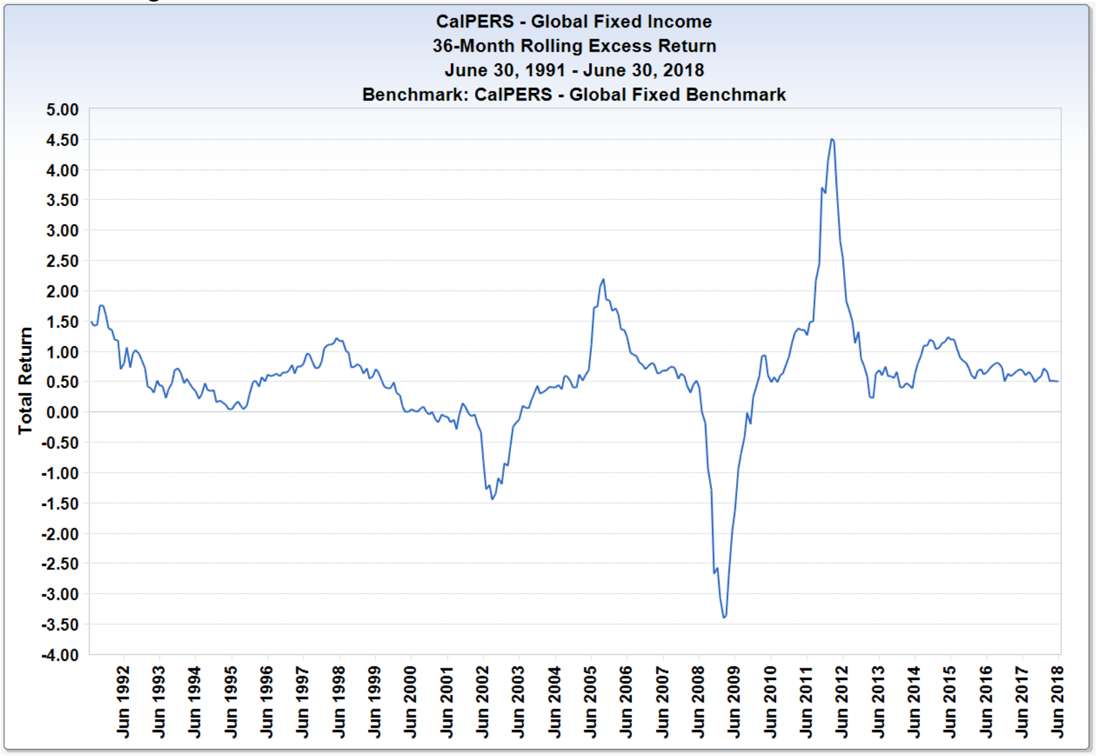
3 Year Rolling Returns



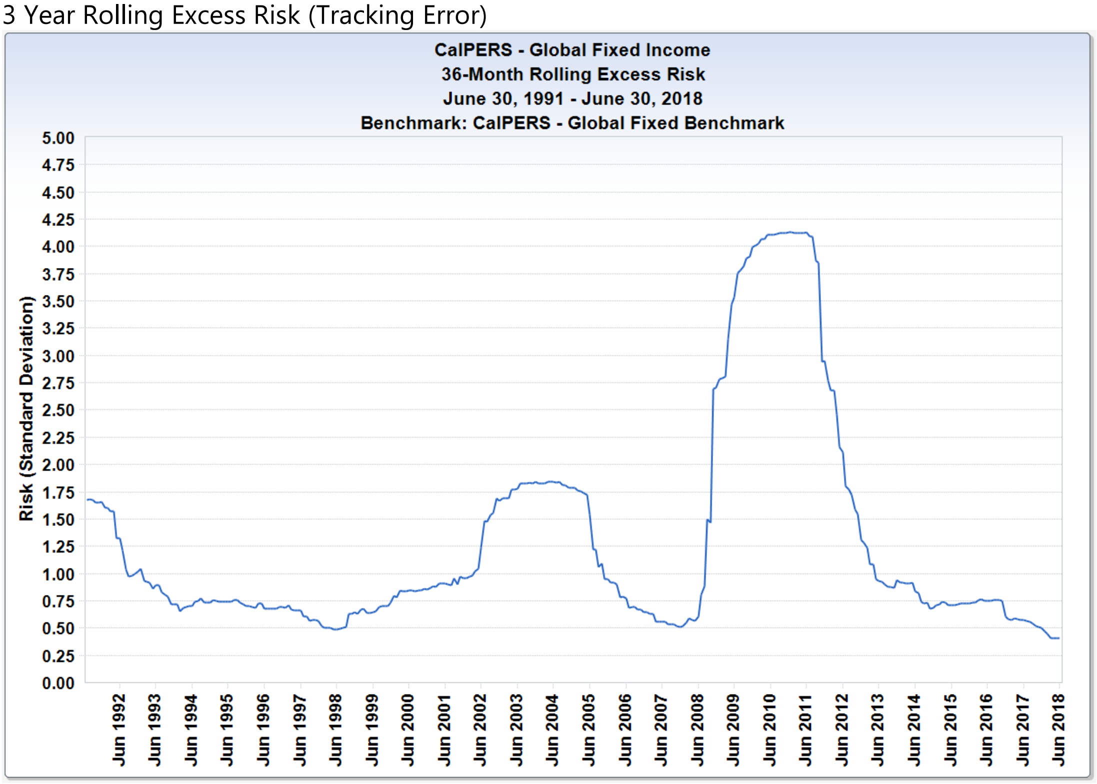
3 Year Rolling Risk



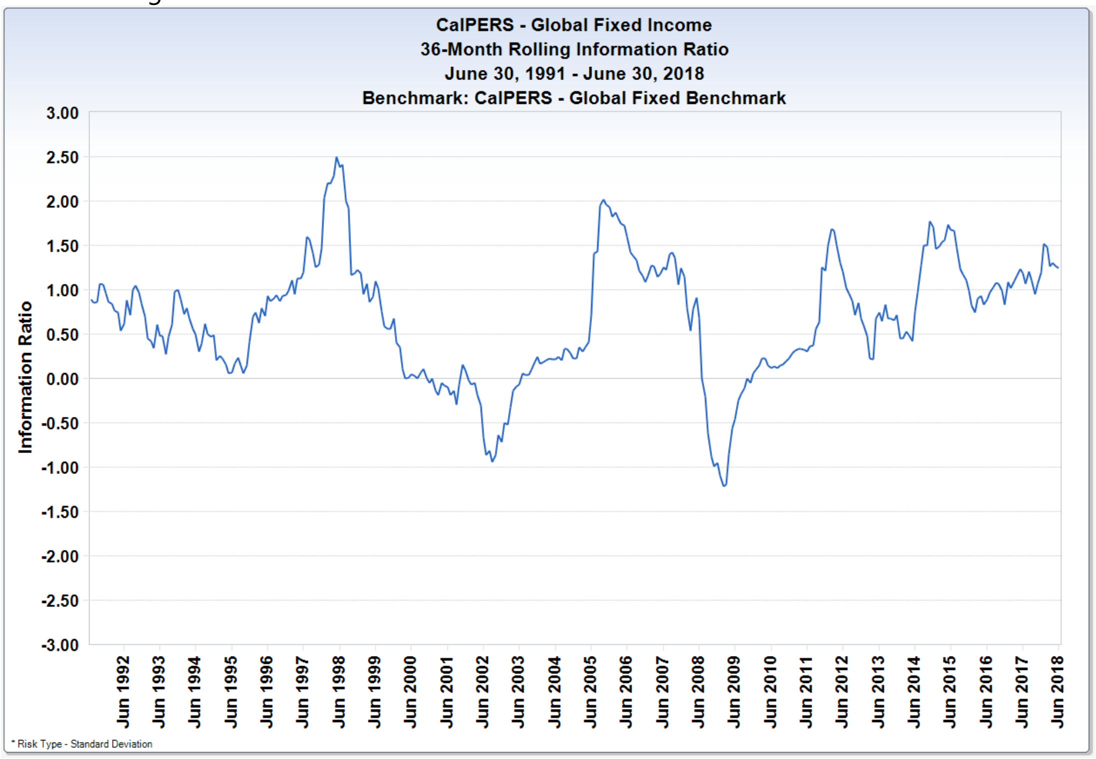
3 Year Rolling Excess Returns



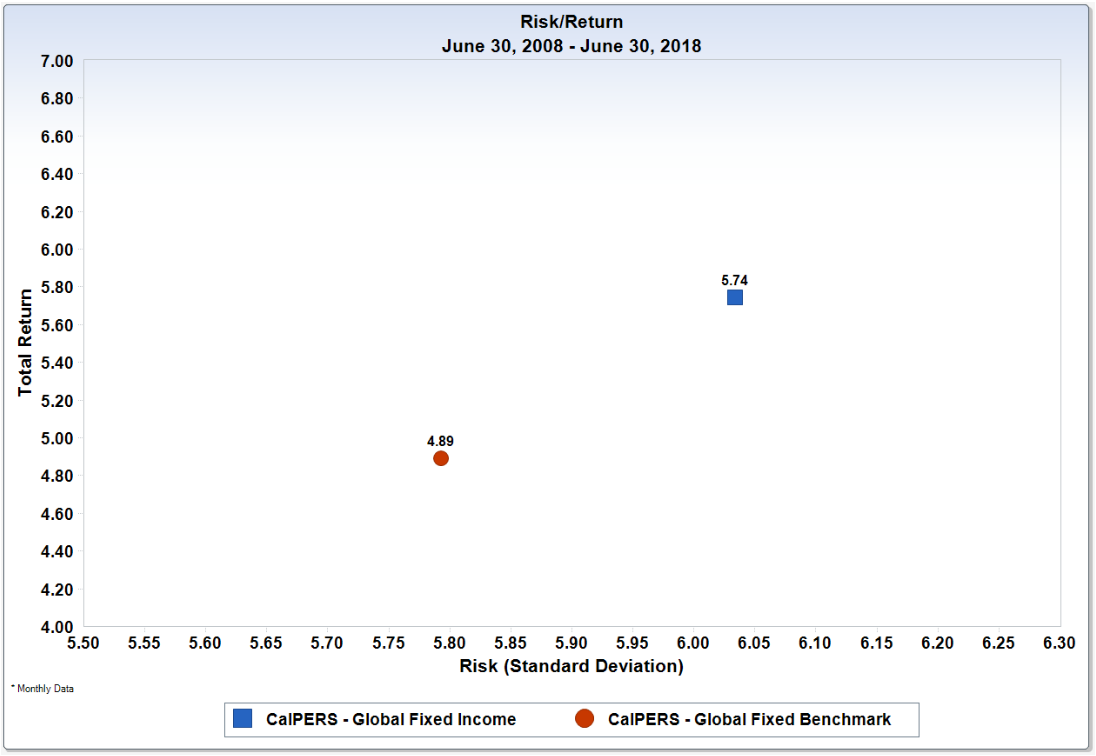
3 Year Rolling Excess Risk (Tracking Error)



3 Year Rolling Information Ratio



Risk vs. Return - Last 10 Years



Risk vs. Return – Last Five Years