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September 20, 2013

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

Re: Internal Equity Portfolios Review

Dear Mr. Jones,

Wilshire has conducted a review of the Global Equity internal index team's personnel, investment process, and resources. This review was conducted as part of Wilshire's contractual requirement to periodically review all of the internal asset management functions, and included a formal review of the entire trading system and a stress test of the compliance and order management system by me two years ago (the system has not significantly changed since that review), as well as several in-person visits to the trading desk every year (usually unannounced visits) and weekly phone conversations with the equity team. Overall, we are pleased with the quality of the personnel, systems, and processes, and believe that the Investment Committee should continue to support this internal team.

The internal team currently manages several index portfolios benchmarked to a variety of indices. These portfolios include, among others, the PERS Custom 3000 index (a broad US portfolio), US microcap, US fundamental-based index, developed international equity, non-US fundamental-based index, REITs, and emerging markets. All are managed by the same group of Staff, supervised by Dan Bienvenue.

With the exception of two portfolios, the PERS 3000 and microcap portfolios, all internally managed assets are treated as pure index funds, with the least amount of tracking error as possible. The two semi-active portfolios have been successful at adding value to date. In the past, several of the index funds were managed with slightly wider risk controls than is typical for index funds, allowing Staff the opportunity to add small amounts of value through superior trade timing around corporate actions and through the use of quantitative or other models that rank stocks and industries based on a variety of factors. This effort proved not to be the best use of CalPERS' risk budget and Staff's time and these "quasi-index" funds have now been

managed as traditional index funds for more than two years, reducing the tracking error risk in the portfolios

In our opinion, the termination of these attempts to outperform the benchmark is a demonstration of the commitment by Staff to reduce risk wherever possible and to recognize that time is best spent on other activities that add value or reduce risk to the total portfolio.

Review of Team

With more than \$100 billion in internally-managed index funds, CalPERS is one of the largest index managers in the world, surpassed by only a handful of money management organizations. Over the last several years, PERS has successfully constructed a team of seasoned professionals, mainly drawn from the former Barclays Global Investors and State Street Global Advisors, which is at least as experienced as any similar team at any external money manager. In fact, several members of this team were either portfolio managers or senior traders in BGI's and SSGA's index fund divisions before joining CalPERS. As assets have grown, the Global Equity SIO has been able to hire additional team members, and we believe that this team is sufficiently large and well-resourced to manage the assets with which it is charged.

In our opinion, the index team assembled at CalPERS should be able to handle any risk or complexity in the portfolio at least as well as any external index manager CalPERS might consider instead of internal management. If the Equity team intends to add greater exposure to actively managed portfolios, this opinion should be revisited.

As this team has grown, so has the number of portfolios under internal management. Originally, when Eric Baggesen and Dan Bienvenue were first hired to build out CalPERS' internal management capacity, there were approximately four internal index funds. Today, there are at least 16 passively-constructed funds, with a wide variety of target indexes. Four years ago, CalPERS was reaching the limit of how many funds can be managed internally given Staff and technology resources. We noted the lack of capacity and some technical issues to the Investment Committee and to the CIO at that time. Subsequent to that presentation, CalPERS has made a tremendous investment in technology and resources, alleviating many of the issues we observed and allowing for greater complexity of investment programs.

Three years ago, the team was restructured along functional lines. Previously, a single portfolio manager and a backup portfolio manager handled all aspects of a portfolio, from research through trading. Following the reorganization, Staff is now dedicated along three functional lines -- a "strategy team" that determines the desired weights in a portfolio, a "construction team" that converts the weights desired by the strategy team into actual desired positions and trade lists, and a "trading team" of three individuals that handles all transactions for all portfolios.

In our opinion, the current structure allows team members to specialize in various skill areas and also provides some increase in capacity for the team as future strategies are added. With approximately two years of actual experience under this new organizational system, it is apparent to us that the new structure allows for a much more streamlined workflow and has substantially increased Staff's management capacity.

In addition, as we note below, we have concluded that this new functional organization provides for a far more robust control environment than has previously existed at CalPERS.

Review of Portfolio Management and Trading Systems

As the team has grown, technology resources have been added as well, including additional data vendors, order management systems, risk measurement platforms, and trade compliance tools. All of the internal portfolios are managed under a common platform, although some team members may have different tools they employ individually for determining and modeling prospective active weights, and any member of the team can step in for another as required.

In our 2008 and 2009 reviews, we noted a number of technological issues with CalPERS database systems and trading platforms. We are pleased to report that the extensive technology review undertaken by Information Technology Staff has largely resolved several of these problems and greatly improved the quality and speed of data on the trading platform. While technology continues to evolve and there will always be a need to monitor the current state-of-the-art systems and make improvements, we believe that CalPERS is at less of a competitive disadvantage due to technology concerns.

It should be noted, however, that some technology improvements are still in process and have been a long time in development. Staff has found that current generation portfolio construction tools are not commonly available from third-party vendors for the types of portfolios that CalPERS manages and that most major index fund managers have had to develop their own proprietary systems. A current technology vendor for the fixed income team was developing a commercial product for equity management, but has largely abandoned that effort. To supplement staff resources, a technology upgrade is currently in process with a current vendor which is hoped to enable the portfolio construction and trading functions to move to a more integrated platform and eliminate some of the custom or Excel tools used to manage the various portfolios.

Review of Compliance Process

Portfolio management Staff clear all trades through a compliance software package, and we have tested this system during our past visits, asking a trader to execute some or all of the following trades:

- Buy stock in a tobacco company
- Buy a stock on the "Sudan list" or "Iran list"
- Buy the ADR version of a stock on the "Iran list"
- Buy 1 billion shares of IBM (testing for obvious errors in trade sizes)
- Buy a stock on the Insider Trading list
- Buy a non-dollar stock in a US portfolio
- Buy preferred stock
- Buy / sell stock options (to open positions)
- Sell a security short (or oversell a security)

We have reported over the last few years that all of the above transactions were blocked by the system or, as in the case of the "fat finger" large trade, were no longer possible due to the elimination of manual trade entry. For the traders, these blocks were absolute and required an override (if the trade was necessary) by the Compliance Department.

Over the last three years, we have spent more time watching the order management system in action and did not feel the need to ask the team to manually enter test trades as we have concluded that the functional reorganization of the team presents a strong compliance process by its very nature – since traders no longer manually enter trades and all trade lists are generated by others within the team.

Only three members of Staff are authorized to transmit trades to counterparties and all counterparties have been directed to only accept trade information from those people. This limits the number of people who have the ability to directly impact the portfolio.

Those three people also share a "trade blotter" (a listing of all trades in process or executed) which simultaneously shows the same transaction list on each person's computer. Were a trader to manually enter an erroneous trade (manual trades are now rare, given the creation of trade lists by the "portfolio construction" team) which somehow bypassed the compliance controls programmed into the system, the other two people would see the trade and could cancel it or ask the trade originator about it. If an individual began to "day trade" securities within the portfolio, or otherwise "went rogue" and began trading against CalPERS' interests, the others would note the high volume of transactions on their own screens and could see the individual trades as they are entered into the system. While it is possible that an individual could enter and execute an erroneous or malicious trade while he is alone on the trading desk,

the others would see the transaction upon their return and could enter an offsetting transaction fairly quickly.

While no system can completely prohibit an individual intent on malevolence from entering a few transactions, we are reasonably confident that the system in place will prevent unintentional or accidental compliance violations and would likely require significant collusion among a variety of members of Staff to execute a series of trades that were not directed by the portfolio construction team.

As discussed in an agenda item presented by Staff annually, Staff has also been working with the consulting firm Mosaic in reviewing and optimizing its brokerage relationships. This project has enabled Staff to reduce the number of counterparties to a more manageable number of firms while reducing transactions costs. The end result of this is a more streamlined trading process at a lower cost – good goals for CalPERS to achieve. The semi-annual review of this list of counterparties helps to make sure that CalPERS is continually moving toward a lower-cost and better execution environment.

Data Integrity

In the past, we have reported that while erroneous trades would be prevented by a combination of compliance software and peer observation, there was a distinct possibility of erroneous transactions based on erroneous data. As a result of the relatively new contract with the custodian, in February of this year an investment book of record went live that should reliably supply current and accurate data to the trading desk.

Conclusion

In brief, we believe that Staff has demonstrated the ability to implement the passive equity portfolios and to add small amounts of value versus select index funds where appropriate. We are pleased with the experience of Staff and commitment by CalPERS to assess and improve the technology resources at their disposal. Since our last review, we have not discovered any significant adverse issues and are confident that CalPERS has sufficient resources to manage these portfolios as authorized by the Investment Committee.

Sincerely,

A handwritten signature in black ink, appearing to be 'Michael A. ...'.

Strategy Evaluation: CalPERS Internal Equity Index Funds

Organization (0-100)

SCORE:

COMMENTS:

Ownership/Incentives (0-30)
Direct Ownership/Phantom Stock
Profit Sharing
Performance Bonus
Depth of Incentives

Employees receive performance bonus only.

The pressures on employee compensation that we have documented in the past (furloughs, incentive compensation reductions, etc) appear to be subsiding.

Score: **10 (up from 8)**

Team (0-25)
Communication
Role of Manager, Research, and Operations
Longevity of Team

There are several portfolio managers/traders with different areas of primary responsibility, but all can exchange/cover other portfolios on a common platform. Team has been constructed over the last few years, but has excellent chemistry and appears to work together well.

Score: 22

Quality of Key Professionals (0-15)
Experience
Quality of Leadership
Quality of Education

Education and technical skill set of portfolio managers/traders are exceptionally good, by any standard. The portfolio managers/traders all have substantial experience with CalPERS or in similar capacities at external money managers. Leadership skill of SPM-Global Equities-Internal Assets is very good and his experience level is outstanding. Understands risks and issues to be monitored or resolved regarding strategy. Appropriately concerned about process, reporting, and monitoring. CalPERS is currently searching for a new SIO for Global Equities given an internal reassignment of duties and our opinion may change depending on the selection of the replacement.

Score: 15

Turnover of Senior Professionals (0-15)
Low (<10%), Medium (<20%), High (>20%)

Score: 4

Staff turnover for CalPERS is high at both the senior and junior levels, including the departure of the previous SIO for Global Equities, the SIO for AIM, two CIOs, and the CEO over the last handful of years. Lack of long-term retention incentives lead some staff to consider the organization as a "stepping stone" to better compensation in similar positions elsewhere. Although turnover can be an organizational risk, it should not have a significant impact due to the passive (indexed) nature of these portfolios.

Commitment to Improvement (0-15)
Clear Mission
Re-investment
Process Enhance

Score: 15

Strategy has clear mission and objectives. Resources are sufficient to the current tasks assigned to team, and support exists within the organization to add staff or other resources if strategy expands or other demands warrant.

Philosophy/Process (0-100)

SCORE:

COMMENTS:

Market Anomaly/Inefficiency (0-40)
Permanent or Temporary
Clear Identification
Where and How Add Value
Empirical or Academic Evidence to
Support

These are passive portfolios that seek to track the index performance, and will not seek to add more than slight value.

Score: 40

Information (0-15)
Unique Sources, Unique Processing

Score: 15

Highest score given as these are generally passive portfolios that have met or exceeded their mandates. Future internally-managed active strategies that seek to exploit inefficiencies or information advantage may receive a different score.

Buy/Sell Discipline (0-15)
Disciplined/Structured Process
Quantitative and Qualitative Inputs

Score: 15

Highest score given as these are generally passive portfolios that have met or exceeded their mandates. Future internally-managed active strategies that seek to exploit inefficiencies or information advantage may receive a different score.

Portfolio Construction (0-15)
Benchmark Orientation
Risk Controls
Ongoing Monitoring

Score: 15

Highest score given as these are generally passive portfolios that have met or exceeded their mandates. Future internally-managed active strategies that seek to exploit inefficiencies or information advantage may receive a different score.

Quality Control (0-15)
Return Dispersion
Performance Attribution
Performance Consistency
Style Drift

Score: 15

Tracking error on all portfolios is reviewed monthly, and leeway is given to Staff to add modest amounts of value only if clear skill is demonstrated. Portfolios managed as pure index funds have had almost no tracking error.

Resources (0-100)

SCORE:

COMMENTS:

Research (Alpha Generation) (0-40)

Appropriate for Product Style
Conducted Internally/Externally
Quantitative/Qualitative
Sufficient Databases and Models for
Research
How are Research Capabilities Enhanced

Score: 40

These are passive portfolios, and Staff receives all data feeds that are required to maintain them in line with published indices. Small amounts of value may be added through the utilization of additional quantitative information from several investment banks.

Information/Systems Management (0-15)

Ability to Manage Large Flows of Data
Appropriate Systems for Research and
Management

Score: 13

The organization has recognized the importance of data integrity and has changed the relationship with the custodian to improve data. In addition, improvements to the portfolio construction and trading systems have been made, with more under consideration.

Marketing/Administration/Client Service (0-15)

Dedicated and Knowledgeable Group
Quality of Materials/Presentations of RFPs
Responsiveness
Measuring Client Satisfaction

Score: 14

Since marketing and client service are not involved, unlike external sources for such a strategy, full resources of portfolio managers will be devoted to CalPERS, as the portfolio managers will not have to travel to service other clients or market to prospects.

End client (Investment Committee) has regular meetings that usually require SIO and some Senior Portfolio Managers, but team is able to continue to operate in their absence.

Trading (0-30)

Turnover Relative to Process
Sophistication of Trading Process
Measurement of Trading Costs
Soft Dollars in Client Interest

Score: 25

CalPERS' trading room is very sophisticated, was constructed in the last few years, and has subscriptions to all of the most popular trading data resources, i.e. Bloomberg, Instinet, ITG, WM, etc. Part of the underpinning of the value-added strategies lies in the trading, and there have been no significant trading issues that should impact the execution of the strategy. There is sufficient back-up and separation of responsibilities in the trading function.

Staff uses at least two systems for monitoring transactions costs, and scores well under both systems. CalPERS does not use soft dollars.

Discussion

Wilshire's score on this strategy of 86% or 259 out of 300 possible points reflects the strong team and clear success demonstrated at managing the portfolio as charged. The main reasons for a less-than-perfect score overall are largely due to organizational-level issues such as senior management turnover and lack of retention incentives. The slight improvement from the 2012 score of 257 points (86%), the 2011 score of 253 points (84%), the 2010 score of 248 points (83%), and the 2009 score of 244 points (81%) is due to the observed benefits of the functional reorganization of the team which should allow for greater capacity, the longevity of the team managing the trading desk, and an improvement in technology resources.