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Review of the Appropriateness of a REIT Index Fund Allocation in the L Funds for the Federal Thrift Savings Plan

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INTRODUCTION AND BACKGROUND

The Federal Retirement Thrift Investment Board (FRTIB) requested that EnnisKnupp & Associates (EnnisKnupp) review the appropriateness of including an explicit allocation to a real estate investment trust (REITs) index fund in the L Funds. In conducting our review of the above topics we discuss the following:

- Discuss the merits of REITs serving as a proxy for direct private market real estate
- Review the L Funds' REIT exposure and provide comparative information on peer lifecycle fund REIT exposures
- Discuss the pros and cons of including an asset class in the L Funds and not offering the asset class as an investment fund option to participants
- We also review the appropriateness of applying a liability-driven investing (LDI) framework to the L Funds

We conclude our review by providing our recommendations to the FRTIB on the appropriateness of allocating to a REIT index fund in the L Funds and employing an LDI framework for the L Fund.

Background

In 2006 we conducted a comprehensive review of the TSP's investment structure to see if any new asset class/category warranted inclusion in the TSP's investment line-up. The analysis indicated that no additional investment fund options were appropriate to add as the asset classes/categories evaluated in detail were not compelling investment fund additions for the TSP. In conducting our 2006 review, we reviewed the appropriateness of adding REITs (among other classes/categories) to the TSP investment fund line-up.

We applied the following criteria (individually and collectively) to assist in determining the types of investment funds most relevant to consider as potential investment fund additions:

- Major diversified asset class/category not currently offered as an investment option
- Asset class/category is large enough for the TSP to invest in
- Potential diversification benefit for TSP participant portfolios
- Index fund products are available
- Practices of peers

Our detailed review of REITs did not find them particularly compelling. Noted below is an excerpt from that report.

"REITs are a sub-sector of the U.S. stock market with a market capitalization of less than $400 billion. TSP participants currently can attain exposure to REITs in market weights via the C and S Funds. The low correlation of REIT returns to major capital markets has the potential of providing a diversification benefit, but the benefit of offering REITs does not significantly improve TSP participant portfolios. It is also not common practice among peers to offer a stand alone REIT option. Overall, we believe the negatives more than outweigh the potential benefit of REITs. We recommend the FRTIB not offer REITs as an investment fund alternative."

We have re-reviewed the factors that led us to our recommendation to not offer REITs as a stand alone investment option in 2006 with updated information. In reviewing the updated information on REITs, we found that our earlier conclusions are still valid.

- The market capitalization of the U.S. REIT market declined by 52%, from approximately $400 billion in 2006 to $192 billion as of December 2008. At $202 billion, the TSP's assets are greater than the market capitalization of the REIT market. Large TSP transactions could influence the price action of the REIT index, causing participants to pay more for purchases and receive less from sales.

- REITs continue to be available in just a small number of participant-directed defined contribution plans (e.g., 401(k) plans) as only about 24% of all plans in the 2008 Profit Sharing/401(k) Council's 51st Annual Survey of Profit Sharing and 401(k) Plans (2007 Plan Year Experience) offered them. Moreover, REIT adoption rates in plans with a large number of participants is lower – only 16% of plans with over 5,000 participants offered a REIT option.

- Including REITs as a stand alone investment fund option does not significantly improve TSP participant portfolios from a risk-return or portfolio efficiency standpoint

We also found that since 2006, REITs have become materially more volatile, particularly during 2008's capital markets tumult. Later in our report we will show how REITs over the past year have become approximately twice as volatile as other major stock market indices. Volatility, which is a standard risk metric, measures the magnitude of dispersion in the returns of an asset. Greater volatility implies a greater degree of dispersion in an asset's return – both on the upside and the downside.

While we continue to recommend that REITs not be offered as a stand alone investment fund option in the TSP, we review the appropriateness of including an explicit REIT index fund allocation in the TSP's L Funds in the following sections.

Pension plans have historically invested in private market real estate because the lower volatility, diversification benefits, and stable income generation made it an attractive addition to their portfolios. In this section of the report, we discuss whether REITs can serve as a proxy for private market real estate. Prior to our review of the research papers that discuss the merits of considering REITs as private market real estate, we review how pension plans have historically invested in real estate.

The common investment practice for corporate and public **defined benefit** pension plans investing in real estate over the past 20 plus years has been to invest in private market real estate as opposed to REITs. Private market real estate is best defined by how commercial properties owned by institutional owners are transacted -- i.e., property purchases and sales occur privately between parties and as such, the transaction does not occur on a securities exchange.

These funds have limited the risk of their private market real estate investments by purchasing exposure to core style properties (retail, multi-family, industrial and office) generally through privately-offered funds that use little leverage to modest amounts of leverage (less than 40%). The largest pension funds also own properties directly.

As private-market real estate properties are not transacted on a frequent basis, the values of the properties are based on appraisals. Given that properties are appraised on an infrequent basis (ranging from quarterly to once every three years), the volatility of private market real estate's "price" returns is generally low to modest. The low price volatility combined with fairly stable income returns historically has made private market real estate an attractive asset class to pension funds. Moreover, the low volatility of returns has been an attractive attribute to pension funds as private market real estate's low to modest return volatility has complemented the volatility of their bond and stock investments well.

Pension funds that have invested in private market real estate have typically allocated five to ten percent of their portfolios to private market real estate. The allocations to private market real estate have been modest overall due to the illiquidity of the private real estate market – i.e., private market transactions take months to complete versus daily for securities traded on public market exchanges.

In contrast, REITs are specialized companies that own, and in most cases, operate, income generating real estate properties. Publically traded REITs are listed on most major stock markets and can be traded just like shares in any other company. REITs must distribute at least 90% of their taxable income to shareholders annually.

We review the case for considering REITs as a proxy for private market real estate below. In evaluating whether REITs could serve as a proxy for private market real estate, we reviewed three research papers that compared the performance of REITs to that of private market real estate. The papers we reviewed were:

- Pagliari, Jr., Joseph L., Scherer, Kevin A., Monopoli, Richard T. "Public versus Private Real Estate Equities." *The Journal of Portfolio Management,* Special Issue 2003, pp. 101-111.

- Riddiough, Timothy J., Moriarty, Mark, Yeatman, P.J., "Privately Versus Publicly Held Asset Investment Performance." *Real Estate Economics* 2005.

- Tsai, Jengbin Patrick, "A Successive Effort on Performance Comparison Between Public and Private Real Estate Equity Investment" submitted to the Department of Urban Studies and Planning in partial fulfillment of requirements for the degree of Masters of Science in Real Estate Development at the Massachusetts Institute of Technology, September 2007.

Before discussing the research papers, we first discuss the benchmarks commonly used for private market real estate and REITs. The common index used for private market real estate is the National Council of Real Estate Investment Fiduciaries (NCREIF) Property Index (NPI). A description of the NPI is provided below.

NPI: The NPI is constructed from property information provided by institutional investors, investment managers, insurance companies, and large public and private pension plans. The Index includes over 6,200 properties with an aggregate market value of $331 billion as of September 30, 2008. While the NPI does not include the data from all properties held in institutional portfolios, it does reflect a representative sample of the universe of high quality, private, U.S. real estate properties. Property types included in NPI are office, retail, industrial, apartments and hotel. NPI property returns are provided on an unlevered basis.

REITs: Several firms have created U.S. REIT indexes in order to track REIT performance. The major REIT indices are the DJ Wilshire REIT Index, MSCI U.S. REIT Index and FTSE NAREIT Index. In this report, we use the DJ Wilshire REIT Index as a proxy for REITs for the following reasons:

- The DJ Wilshire REIT Index is more investable than the FTSE NAREIT Index, and better represents the opportunity set available to the TSP
- Little to no assets are passively managed to the FTSE NAREIT Index, largely due to its lower investibility
- The FTSE NAREIT Index is also not widely used to benchmark actively managed REIT portfolios
- The DJ Wilshire REIT Index has a much longer return history than the MSCI U.S. REIT Index

The primary differences of the NPI and REIT indices are:

- NPI's returns represent unlevered property returns while the majority of REITs employ leverage
- NPI includes property types that are considered "core" – i.e., office, industrial, retail, apartments and hotel – while REITs include core property types as well as non-core property types, such as golf courses, health care, and self-storage
- NPI is an appraisal-based index and as such, returns are smoothed due to the lag or infrequent pricing of the properties while REITs are valued on a market-based pricing basis and display volatility similar to that of public equities

Performance Comparison

We compare the performance and risk (volatility of return) of NPI and REITs in the table below over trailing periods. Risk as defined by standard deviation is a measure of the deviation from the rate of return. For example, NCREIF standard deviation of return of 9% means that, in two of three years, one should expect to experience a return between 1% and 19%, or one standard deviation around the expected return. REIT's standard deviation of 41% means that if the expected return is 10% in two of three years, one should expect to experience a return between -31% and 51%.

Performance Statistics (Based on Quarterly Data ending December 31, 2008)

	Historical Performance		Risk (Standard Deviation)	
	NCREIF Net Property Index	DJ Wilshire REIT	NCREIF Net Property Index	DJ Wilshire REIT
Trailing 1-Year	-6.5%	-39.2%	9.1%	41.4%
Trailing 3-Years	8.1	-12.0	7.2	29.0
Trailing 5-Years	11.7	0.7	6.0	25.7
Trailing 10-Years	10.5	7.7	4.3	20.3
Trailing 20-Years	7.9	7.5	4.2	18.0
Since Inception (Trailing 30 Years and 9 Months)	9.7	11.6	3.9	17.6

As the chart shows, the returns of REITs over the very long-term (30 years) are superior to those of NPI. However, REITs amplify the volatility of their real estate holdings for several reasons. REITs are valued on market pricing (as opposed to appraisal based pricing for private real estate) and can trade at a discount or a premium to the actual value of the underlying properties. This is because REITs offer an immediate entry and exit point to the real estate market. If conditions change materially, or an investor has a viewpoint on the direction of the real estate markets, the fastest way for an investor to act on that information is through REITs, either entering or exiting investments. Private real estate is time consuming to purchase and/or sell, whereas REITs can be transacted immediately. As market conditions have deteriorated recently, many investors have turned to the REIT market as a way to cut exposure to real estate and provide liquidity. Another factor that contributes to REIT volatility is the general equity market factor. REITs are a part of the broad U.S. equity universe, and generally fall within the classification of small cap value stocks. Any total market index funds, whole stock portfolios, small cap value managers and exchange traded funds (ETFs) will also be active in the REIT market, however, they are not focused on the underlying property fundamentals. They are instead focused on the stock market characteristics of each security and trade on information that is vastly different from the characteristics analyzed by REIT managers. This can create dislocations in REIT market volatility relative to underlying real estate fundamentals. This also results in hedge funds investing in REITs, particularly as volatility increases, as they can make momentum plays on REIT stocks.

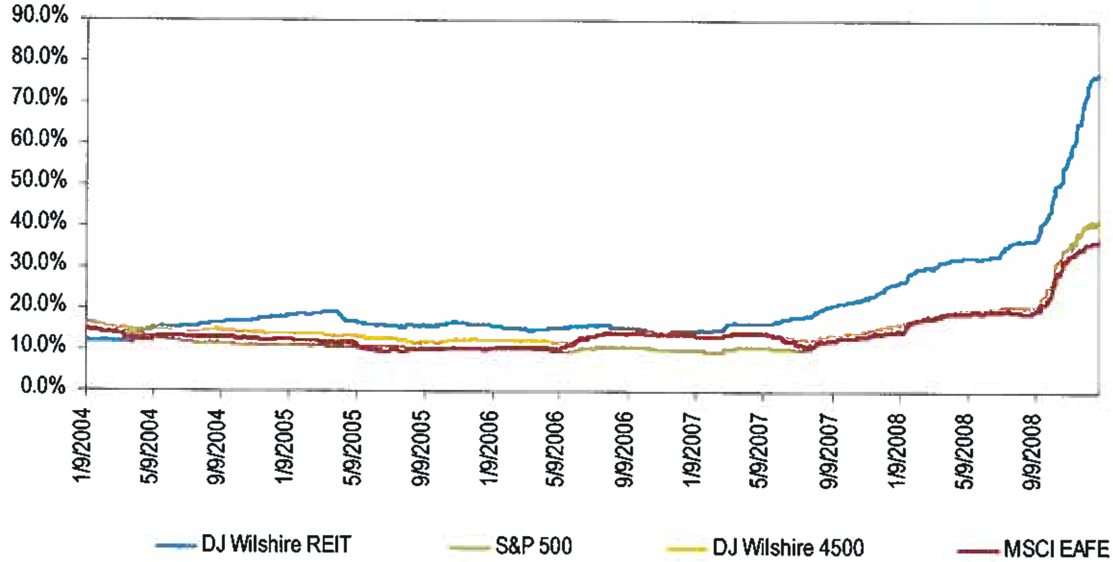
The higher returns of REITs versus NPI over the very long-term are understandable as the majority of REITs use leverage while the NPI returns represent unlevered performance. The use of leverage is a very important distinction to note. While leverage increases returns (in a positive market), it also increases risk, which was particularly evident in 2008, as the capital markets froze. REITs borrow money by issuing bonds. When those bonds come due the REITs must refinance them. It is becoming increasingly difficult for REITs to refinance their debt, and their stock prices have suffered as a result. These stock prices decline not just in relation to falling property values, but because investors are uncertain the REITs will be able to refinance their debt. Whereas privately held real estate, e.g., an office building, may decline in value over time during recessionary periods, a REIT may actually be forced to declare bankruptcy because of its borrowing. For example, the stock of General Growth Properties has fallen from $44 a share in May 2008 to less than $1 a share in November 2008, a 100% decline. There are few, in any, directly held shopping malls, office buildings, hotels, etc. that declined by 100% in that six month period. In fact, the buildings owned by General Growth Properties have likely declined in value, but not by 100%. It is its structure as a REIT, using a business model that exploits leverage, that has resulted in this decline.

Hence, we do not believe REITs are a proxy for private market real estate.

Recent REIT Performance

Given 2008's capital markets' tumult, we reviewed how REITs performed relative to the equity asset classes that are offered in the TSP – C, S and I Funds. It is no surprise that the returns of the equity indices are materially negative and we do not focus on the relative performance differentials as it is a short-period of time. What we did find surprising was the higher level of volatility of REITs versus the other equity assets classes currently in the TSP. Volatility, which is a standard risk metric, measures the magnitude of dispersion in the returns of an asset. Greater volatility implies a greater degree of dispersion in an assets return – both on the upside and the downside. For instance, on December 1, 2008, the S&P 500 Index, which represents large cap stocks in the U.S., declined 8.9%, while the MSCI EAFE Index, which represents broad non-U.S. developed stocks, declined 4.5%. The DJ Wilshire REIT Index declined 19.8% on the same day.

Rolling 252 Day Annualized Volatility
(Based on Daily Returns)



While all the indices shown in the table above experienced a material increase in volatility over the past year, the rolling-daily volatility of REITs was materially more than that of the other equity asset classes offered in the TSP.

Research Papers

We reviewed three research papers which posited that REITs can be used as a proxy for private market real estate. In comparing the performance of REITs to private market real estate, the authors made several adjustments to the return and risk data in order to make REITs and private market real estate, as represented by NPI, more comparable. The adjustments they made included:

- De-leveraged REIT index returns
- Excluded non-core real estate from REITs performance
- Adjusted composition of NPI to make sector allocations for private market real estate comparable to core REIT sector allocations
- Adjust NPI's appraisal-based returns to reflect a market-based valuation approach for private market real estate

After making these adjustments to the REIT and NPI return data, the authors concluded the risk and return characteristics of REITs were superior to or comparable to those of private market real estate – suggesting that REITs are a good proxy for private market real estate.

The analyses of REIT and NPI returns by the authors was rigorous and fundamentally sound in order to compare REIT returns and private market real estate on an "apples-to-apples" basis. The adjustments made to the data by the authors, however, were material and do not reflect the true investment opportunity set for investors, particularly the TSP's investment opportunity set. An investor and the TSP cannot invest in an after-the-fact adjusted-return series or an index that does not commercially exist. Moreover, if a REIT index were created to take into account all the adjustments made, the resulting index would have too many arbitrary adjustments to be considered a true representation of the REIT investment opportunity set – e.g., removal of leverage from REITs and the exclusion of non-core property types would not represent a capitalization-weighted representation of the REIT market.

Conclusion

We believe REITs are <u>not</u> a good proxy for private market real estate, as the characteristics of REITs are materially different than private market real estate – volatility of return, composition of the REIT and private market real estate proxies/benchmarks and use of leverage. Moreover, an investor is not able to replicate the adjustments made to the REIT data as detailed in the three research papers we reviewed in an actual investment portfolio, and as such, would experience a different return pattern by investing in REITs than one would with private market real estate. It is also important to note that the TSP has historically used broad market indices (e.g., S&P 500 and Lehman Aggregate Bond Index) for its investment options and the TSP would not be able to access REITs in such a way that it would serve as a proxy for private market real estate.

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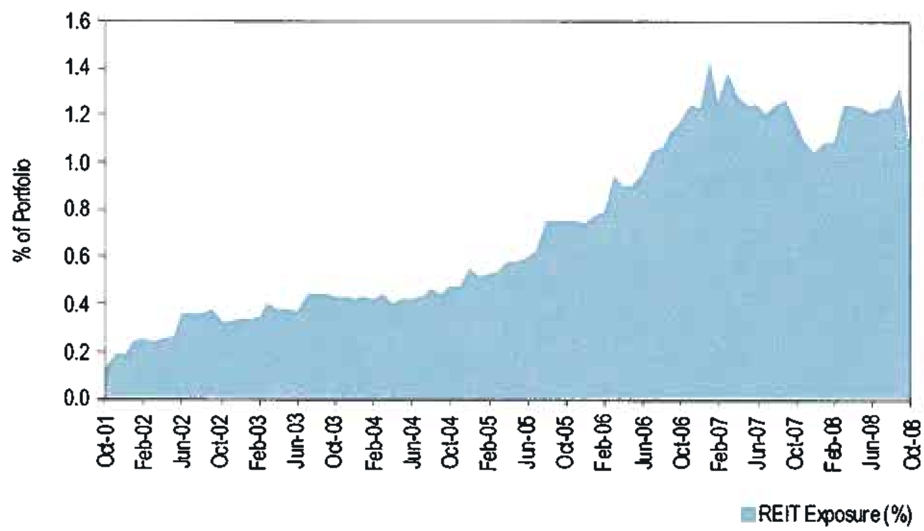
In determining if an allocation to REITs is appropriate within the L Funds, we first review the L Funds' current exposure to REITs and compare to peer lifecycle fund practices. The L Funds are comprised of the G, F, S, C and I Funds. The S and C Funds have exposure to U.S. REITs, as they are broad U.S. stock market index funds. We identify the actual U.S. REIT exposure of the L Funds showing first the C and S Funds' REIT exposure and then the L Funds' REIT exposure.

C Fund REIT Allocation

We show the historical allocation of the S&P 500 Stock Index to REITs in the graph below. The C Fund invests in an S&P 500 stock index fund. As shown, the S&P 500's current REIT exposure is approximately 1% of the Index. We note that REITs were not included in the S&P 500 prior to 2001.

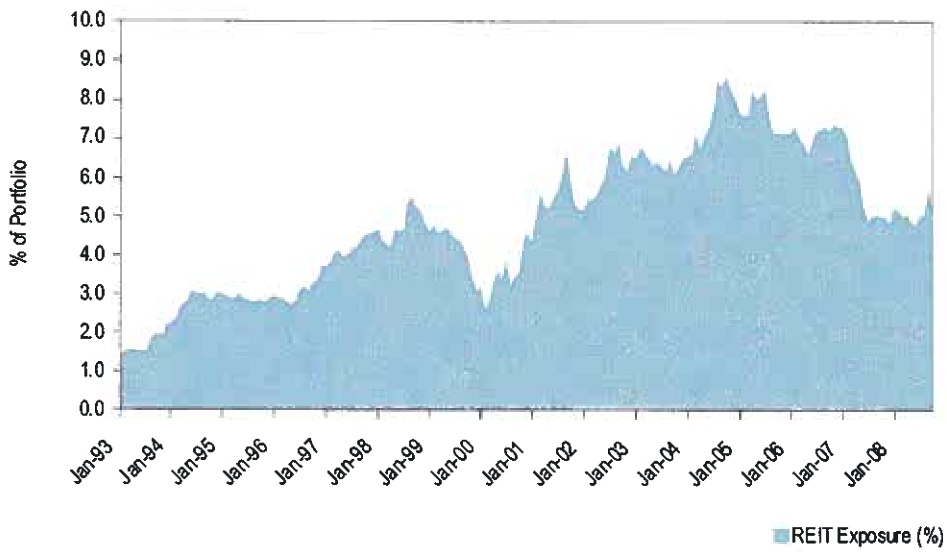
Historical Monthly REIT Exposure (%) - S&P 500 Index



S Fund REIT Allocation

We show the historical allocation of the Wilshire 4500 Stock Index to REITs in the graph below. The S Fund invests in a Dow Jones (DJ) Wilshire 4500 stock index fund. As shown, the S Fund's current REIT exposure is approximately 5% of the Index. We note that REITS were not included in the DJ Wilshire 4500 Stock Index prior to 1993.

Historical Monthly REIT Exposure (%) - DJ Wilshire 4500 Index

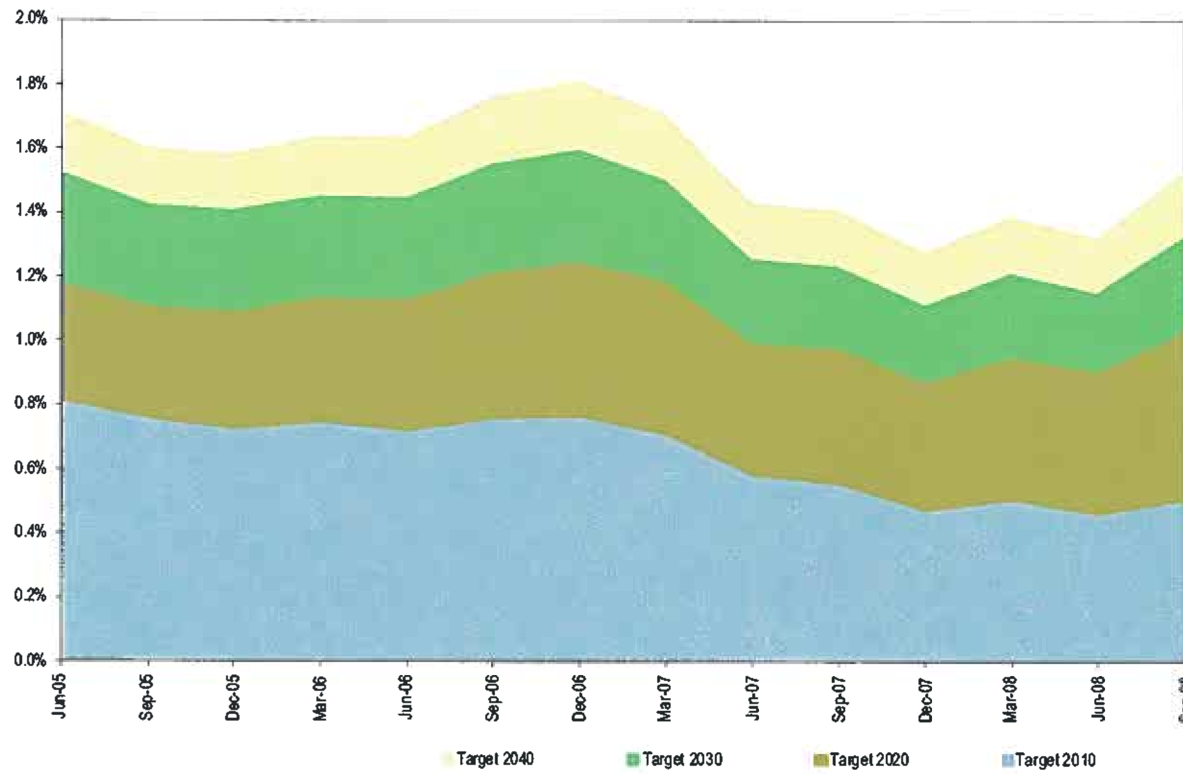


L FUNDS' REIT EXPOSURE

L Funds REIT Allocation

We show the L Funds' current and historical allocations to U.S. REITs in the graph below. As shown, all of the L Funds have an allocation to U.S. REITs, with the 2040 Fund having the highest allocation to U.S. REITs at approximately 1.5% of assets as it has the highest allocation to the C and S Funds. We note that the C and S Funds' exposure to U.S. REITs represents market weights in their respective indices. As such, the L Funds' U.S. REIT exposure represents a market weight based on the allocations to the C and S Funds.

Target Funds - U.S. REIT Allocation



Peer Lifecycle Fund Allocations to REITs

As the L Funds are considered lifecycle funds, we surveyed the marketplace to see what peer lifecycle practices were with regard to REIT allocations. The table on the following page indicates the lifecycle funds that we surveyed that have an explicit allocation to REITs and their current allocation within their 2020 lifecycle funds. We selected the 2020 funds as the majority of providers offer a 2020 fund.

We note that many of the funds that do not have an explicit allocation to REITs have exposure to REITs via their funds underlying holdings – e.g., the Vanguard Target Retirement Funds use broad stock market index funds to attain their equity exposure and broad equity market indices have exposure to REITs. We note that 15 of the 36 funds surveyed have explicit allocations to REITs, with allocations ranging from 0% to 16.6% for the 2020 funds.

Lifecycle/Target Date Series Name	REIT Exposure	2020 Fund Allocation
AIM Independence Now	X	3.0%
Alliance Bernstein Retirement Strategies	X	10.0%
American Century LIVESTRONG Portfolios	X	1.7%
BGI LifePath Portfolios	X	4.3%
BlackRock Prepared Portfolios		--
Capital Guardian FundForLife		--
Charles Schwab Target Funds		--
DWS LifeCompass Funds		--
Fidelity Freedom Funds		--
Franklin Templeton Retirement Target Funds	X	0.0%
Hartford Target Retirement Funds		--
ING Solution Funds	X	10.0%
John Hancock Lifecycle Portfolios	X	2.0%
JPMorgan SmartRetirement Funds	X	16.6%
Legg Mason Target Retirement Series	X	5.0%
Mainstay Retirement Funds		--
Manning & Napier Retirement Target Collective Investment Trust Funds		--
Mass Mutual Destination Retirement Funds		--
Mellon Target Maturity Funds		--
MFS Lifetime Funds		--
Northern Trust Target Date Collective Funds	X	6.0%
Nuveen PersonalPlan Target Maturity Solutions		--
Oppenheimer Transition Funds		--
PIMCO RealRetirement Funds	X	15.0%
Principal LifeTime Funds	X	5.7%
Putnam Retirement Ready Funds		--
Pyramis Lifecycle Funds		--
Russell LifePoints Strategy Funds	X	5.0%
SEI Target Date Portfolios	X	0.0%
SSgA Dow Jones Target Date Strategies		--
TIAA-CREF LifeCycle Retirement Funds		--
T. Rowe Price Retirement Funds		--
UBS TargetRetirement Funds	X	5.0%
Vanguard Target Retirement Funds		--
Wellington Trust Target Series		--
Wells Fargo Advantage Dow Jones Target Date Funds		--

Impact of Transaction Costs on Tracking Error

Each of the individual L Funds offered by the TSP is rebalanced on a daily basis to ensure that the Funds' asset allocation remains in line with the specified allocation that matches an investors' retirement age, or the age that they expect to withdraw assets from the TSP. All rebalancing trades with respect to the L Funds are executed at the end of each day and the L Funds receive the net asset value of the underlying funds at the end of each day (in the proportion that they own the underlying funds).

As noted earlier in this report, the market capitalization of REITs (at approximately $192 billion) is smaller than the total assets held in the TSP. Assuming even a small fraction of the TSP's assets are invested in REITs, say 2%, that investment would represent over 2% of the overall REIT marketplace. Any REIT-related trading activity initiated by the TSP (to ensure that the L Funds' weights are consistent with the target weights) could result in large swings in the prices of many REITs at the end of any day where large trades take place. This would, in turn, result in tracking error of the L Funds relative to their benchmarks. The TSP's trading activity would further exacerbate the impact that passive investors such as index funds and ETFs (exchange traded funds) have on the REIT market. Further, as noted earlier, REITs offer investors an ability to express their view / outlook on the real estate market. As a result, the value of a REIT could trade at a discount or a premium to the fair value of its underlying properties. In aggregate, the activity of investors, such as index funds and ETFs, could result in higher transaction costs for REIT investors, which would ultimately impact the tracking error of the L Funds relative to their benchmarks.

Conclusion

While the L Funds have a modest allocation to REITs relative to peer lifecycle funds with explicit allocations, the L Funds' REIT allocations are relatively similar to peers overall. We do not find a compelling reason for the TSP to allocate to a REIT index fund as the L Funds' allocation to REITs represents a market weight and are relatively similar to peers.

PROS AND CONS OF ALLOCATING TO AN ASSET CLASS EXCLUSIVELY IN THE L FUNDS

As we understand, it has been proposed to the FRTIB that it consider including certain asset classes or sub-asset classes in the L Funds (e.g., REITs), but not offer the asset class as a stand alone investment fund option to TSP participants. We review the pros and cons of investing in an asset class in the L Funds and not offering the asset class as an individual investment fund option to TSP participants below.

Pros of Investing in an Asset Class Exclusively in the L Funds

- **Potentially Improve L Fund Portfolio Efficiency:** In our 2006 Investment Structure Review for the TSP, we identified asset classes that could potentially marginally improve a TSP participant's efficient frontier (emerging markets stocks and commodities) and/or allow them to more broadly diversify their portfolios (TIPS and non-U.S. bonds), but did not recommend offering these asset classes as an investment option because the asset classes or strategies were:

  - Overly complex to offer as an investment option to participants (e.g., commodities and non-U.S bonds),
  - Market capitalization of asset classes was too small for the TSP's consideration as a moderate TSP participant allocation could cause the TSP to own an undue portion of the asset class (5% or more) (e.g., TIPS)
  - Limited liquidity of asset class could cause trading issues for the TSP given its large plan size (e.g., emerging markets)

  The TSP could potentially improve the portfolio efficiency of and/or more broadly diversify the L Funds and avoid the issues mentioned above by including assets classes or strategies in the L Funds, but not offer them as investment fund options.

- **Overly Complex Asset Class or Strategy:** Certain strategies are particularly complex and as such, are difficult to educate participants on how to properly use the asset class in building their portfolios (e.g., commodities). By including an asset class or strategy in the L Funds, the TSP would avoid the education/communication issue noted above.

- **Liquidity Constrained Asset Class:** Given the TSP's large asset base and potential for large daily cash flows to/from an asset class based on participant decisions, many asset classes are not liquid enough to handle the TSP's daily trading requirements without undue market impact. The TSP would likely not encounter this issue if a less liquid asset class was allocated to within the L Funds, but not offered to participants (e.g., TIPS and emerging markets stock). Although recent market activity has led to greater activity in L Fund rebalancing.

- **Small or Moderately Sized Asset Class:** As the TSP is one of the largest retirement plans in the world, a significant allocation by participants to an asset class with a small or moderate market capitalization could cause the TSP to own an undue portion of the market and potentially impact the market's performance. The TSP could avoid this issue by accessing the asset class only through the L Funds. Although recent market volatility has led to greater L Fund rebalancing activity.

Cons of Investing in an Asset Class Exclusively in the L Funds

- **FRTIB L Fund Asset Allocation Management:** While we noted above how the TSP could avoid many of the issues related to investing in less liquid or small asset classes by only accessing them through the L Funds, the TSP may find itself in the awkward position of having to "actively" manage its allocations to certain assets classes within the L Funds in the future. As the L Funds grow larger in size, the TSP staff may need to actively manage its exposures in order to ensure the TSP does not become an overly large investor or trader of an asset class due to its L Fund investments. The TSP currently manages the allocations in a mechanical or model-driven methodology and moving to an environment where it may need to make "active or subjective decisions" on allocations within ranges based upon market liquidity would change the nature under which it currently operates the L Funds. Moreover, "actively" managing the L Funds would be contrary to Congress's intent that the TSP offer only passively managed investments.

- **L Fund Participant Guidance:** The L Funds are meant to be a "one-stop investing solution for participants", but they also serve as a guide to participants who make their own investment decisions. Many participants making their own asset allocation decisions will look to see how pre-mixed portfolios, such as the L Funds, are structured for "guidance" on how to construct their own portfolios. If an asset class(es) are added to the L Funds but not offered as individual investment options, the L Funds usefulness as a "guidance tool" is lessened.

- **Participant Dissatisfaction:** Participants who create their own investment portfolios may become upset if the TSP were to include certain asset classes or strategies in the L Funds, but not offer these same asset classes or strategies on an individual fund basis. As such, participants potentially would not be able to create portfolios that are as "optimal" as the L Funds. This could create dissatisfaction among participants who actively create their own portfolios and lessen their satisfaction with the TSP. A common complaint could be "if the investment is good enough for the L Funds, it should be good enough for me".

- **L Fund Complexity:** The L Funds were introduced to participants using existing funds and this aspect was heavily communicated to participants. If a new asset class or strategy was added, participants may not realize that there are other investments in the L Funds and as such, could find this confusing. Moreover, adding a fund that is not currently in the TSP investment line-up would likely require legislation.

PROS AND CONS OF ALLOCATING TO AN ASSET CLASS EXCLUSIVELY IN THE L FUNDS

Summary

We do not find the reasons for the TSP to include certain asset classes exclusively within the L Funds compelling enough to overcome the cons. As we reviewed in 2006, the addition of different asset classes would provide only marginal portfolio improvement, and as such, would potentially provide only marginal benefit to the L Funds' portfolio construction. The added management complexity of including complex, smaller and/or less liquid asset classes could fundamentally change how the FRTIB manages the L Funds and would be a material change in practice.

The primary objective of the L Funds is to provide a "one stop" investment solution for TSP participants and the key is for the funds to be 1) broadly diversified, 2) evolve from higher risk, equity-oriented portfolios to more conservative risk, fixed income-oriented portfolios as the target maturity date nears, 3) low cost and 4) easy for participants to understand. Adding asset classes that are complex, smaller and/or less liquid could work against these objectives.

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We reviewed research papers and/or lifecycle fund provider materials on the merits and use of liability-driven investing (LDI) for lifecycle funds. We reviewed in detail the research paper prepared by Ibbotson Associates for the National Association of Real Estate Investment Trusts titled "The Impact of Liability-Driven Investing On Real Estate Allocations". (The TSP L Funds are considered lifecycle funds as the objective of lifecycle funds is for an investor or plan participant to select a pre-mixed asset allocation fund based upon a target maturity date for their portfolio, e.g., the year in which they expect to retire).

We begin our discussion of the appropriateness of using an LDI framework for the L Funds by first defining LDI, its traditional use within defined benefit pension plans and potential application to defined contribution plans

The phrase "Liability Driven Investing" (LDI) has been used primarily to describe investment strategies for defined benefit plans that take into account the characteristics of a pension plan's liabilities. The popularity of this approach has increased due to changes in pension plan regulations (PPA 2006) for U.S. corporate plan sponsors. The main feature of the regulatory changes was moving closer to a "marked-to-market" basis for evaluating plans' asset-to-liability funded status. Since a major source of risk in measuring pension plan liabilities on a market value basis is the volatility of interest rates, LDI for a defined benefit plan is mainly an approach to reduce a plan's interest rate risk.

For defined contribution plans, there is no regulatory requirement to measure the present value of future benefit payments on a market value basis, as no such defined liability measure exists. Thus, the traditional meaning of LDI as it applies to defined benefit plans is not applicable in the same sense for defined contribution plans. However, taking into account the "liabilities" in a defined contribution plan can mean becoming more aware of the economic risks facing the expected cashflow withdrawals from a defined contribution plan participant's account balance. Since the primary purpose for cashflow withdrawals would be to satisfy the living expenses of a retiree, inflation risk (or maintaining the purchasing power of a participant's assets) would be one of the most relevant economic risks for a defined contribution plan participant.

We believe employing an "LDI framework" within a defined contribution plan has merit if it is used to build broad portfolios, such as lifecycle funds, where one studies the impact different asset allocations have on a participant's inflation-adjusted income replacement in retirement. Many of the leading retirement date fund providers have begun to study this type of an approach within their glidepath[1] methodologies. We note that we have had discussions with only one provider, which employs an LDI approach.

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[1] A "glidepath" is the methodology used to decrease a lifecycle funds' equity exposure as the fund becomes more conservative, fixed income oriented as it reaches its target maturity date.

We do not believe that this is a wholesale change over how glidepaths have typically been built in the past, but instead represents a modest improvement. Typically this type of analysis leads to allocating more dollars to assets highly correlated with inflation very late in an investors working years and, perhaps most importantly, during retirement. This protects against building a large nest egg in nominal terms, but not in real (after inflation) terms, resulting in a loss in actual consumption/purchasing power in retirement.

A "real income replacement" focused approach, which is the phrase we believe better describes an LDI approach for defined contribution plans or lifecycle funds, does not, however, necessitate the addition of REITs to the glidepath methodology as REITs do not ensure consumption/purchasing power in retirement. As such, we do not believe the FRTIB needs to allocate to REITs within the L Funds if it employs a "real income replacement" or LDI approach.

The Ibbotson research paper noted the benefits of allocating to "real assets" (i.e., TIPs, REITs and commodities) as a hedge against inflation for defined contribution liabilities. While REITs are more highly correlated with inflation than most other asset classes, the correlation of return relative to inflation is not material at 0.25. In fact, none of the asset classes reviewed had a correlation of return with inflation over the 10 plus year period. A correlation of 1.0 means a perfect correlation of returns, a correlation of -1.0 means returns are inversely correlated and a correlation of 0 implies no correlation of returns exists.

The table below shows the historical correlations of major market indices, inflation and the G Fund. We show the correlations since the U.S. Treasury began issuing Treasury Inflation Protected Securities (TIPS) in March 1997.

Correlation Matrix
Based on Monthly Returns from March 1997 to November 2008

	S&P 500	*DJ Wilshire 4500*	*MSCI EAFE*	*MSCI Emerging Markets*	*Government (G) Fund*	*Lehman Aggregate Bond*	*Lehman TIPS*	*Lehman Global Aggregate (ex-USD)*	*Dow Jones Wilshire REIT*	*Goldman Sachs Commodity*	*Inflation*
S&P 500	**1.00**										
DJ Wilshire 4500	0.83	**1.00**									
MSCI EAFE	0.84	0.78	**1.00**								
MSCI Emerging Markets	0.74	0.76	0.83	**1.00**							
Government (G) Fund	0.08	0.03	0.03	-0.08	**1.00**						
Lehman Aggregate Bond	-0.04	-0.05	-0.03	-0.08	0.25	**1.00**					
Lehman TIPS	0.00	0.01	0.06	0.07	0.17	0.75	**1.00**				
Lehman Global Aggregate (ex-USD)	0.01	0.04	0.22	0.08	0.03	0.49	0.50	**1.00**			
Dow Jones Wilshire REIT	0.46	0.49	0.44	0.43	0.07	0.06	0.24	0.14	**1.00**		
Goldman Sachs Commodity	0.13	0.24	0.27	0.32	0.08	0.07	0.32	0.21	0.19	**1.00**	
Inflation	0.05	0.08	0.11	0.08	0.00	-0.14	0.17	0.04	0.25	0.35	**1.00**

We were surprised to see the G Fund have a correlation of return of 0.0 relative to inflation during this ten-year plus period of time, as the G Fund's return is based on the average yield of all Treasury notes and bonds with maturities of four-years or greater. One would expect the yield of Treasuries to track the movements of inflation fairly well as Treasuries are considered a risk-less investment from a credit perspective and investors generally expect a modest return over inflation from Treasuries. The low correlation of return between the G Fund and inflation generally reflects the low and declining inflation environment experienced for the most part from 1997 to November 2008.

As such, we also reviewed the historical correlations between major market indices, inflation and the G Fund in a higher inflation environment. The correlations were calculated between January 1988 and December 1991, during which period inflation exceeded 3.0%. TIPs were not in existence during this period.

Correlation Matrix
Based on Monthly Returns from January 1988 to December 1991

	S&P 500	*DJ Wilshire 4500*	*MSCI EAFE*	*MSCI Emerging Markets*	*Government (G) Fund*	*Lehman Aggregate Bond*	*Dow Jones Wilshire REIT*	*Goldman Sachs Commodity*	*Inflation*
S&P 500	**1.00**								
DJ Wilshire 4500	0.91	**1.00**							
MSCI EAFE	0.46	0.38	**1.00**						
MSCI Emerging Markets	0.43	0.46	0.47	**1.00**					
Government (G) Fund	0.04	-0.14	-0.08	-0.11	**1.00**				
Lehman Aggregate Bond	0.58	0.49	0.25	0.10	0.15	**1.00**			
Dow Jones Wilshire REIT	0.64	0.76	0.23	0.35	-0.18	0.37	**1.00**		
Goldman Sachs Commodity	-0.42	-0.43	-0.30	-0.19	0.14	-0.34	-0.53	**1.00**	
Inflation	-0.43	-0.50	-0.34	-0.23	0.43	-0.15	-0.38	0.21	**1.00**

As shown, most of the major market indices including REITs had negative correlations to inflation during this period, meaning their returns declined as inflation rose. The G Fund had a modest positive correlation to inflation of 0.43 during this period.

Overall, given the modest correlation of return between REITs and inflation, we do not believe adding REITs will materially assist the L Funds as a hedge against inflation under a LDI or non-LDI approach. We believe it is appropriate for the TSP to continue to use a "real income replacement" or defined contribution LDI approach in constructing its L Funds' asset allocations.

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SUMMARY AND CONCLUSIONS

In the preceding sections of this report, we evaluated and commented on the following issues:

- Merits of REITs serving as a proxy for private market real estate
- L Funds' REIT exposure and peer practices
- Pros and cons of including an asset class exclusively in the L Funds
- Appropriateness of employing a liability-driven investment (LDI) approach in constructing the investment mix of the L Funds and if a LDI approach supports a REIT allocation

After reviewing the issues individually and collectively, we recommend the TSP not allocate to a REIT index fund in the L Funds and continue employing a LDI framework (or real income replacement approach) for the portfolio construction of the L Funds. The rationale for our recommendations is:

- REITs do not serve as a proxy for private market real estate due to their non-core real estate exposures and higher volatility, and the fact that REIT performance behaves very differently than private market real estate
- The L Funds currently have a market weight to U.S. REITs via its U.S. equity allocations
- The L Funds REIT allocations are relatively similar to peer lifecycle funds
- REITs do not improve the TSP's efficient frontier and as such, do not improve the portfolio efficiency of the L Funds
- We do not find the reasons for the TSP to include certain asset classes exclusively within the L Funds compelling enough to overcome the cons. Any asset class that would be added to the L Funds would only provide a marginal benefit to portfolio efficiency and potentially make the management of the L Funds more complex if the asset class was small/moderate in size and/or was less liquid than the current asset classes included in the Funds
- An LDI approach to portfolio construction for defined contribution plans and lifecycle funds is appropriate, as it factors in the impact of inflation-adjusted income replacement in retirement but does not necessitate a REIT allocation

We note that the objective of the L Funds is to provide a "one stop" investment solution for TSP participants, and the key is for the funds to be 1) broadly diversified, 2) evolve from higher risk, equity-oriented portfolios to more conservative risk, fixed income oriented portfolios as the target maturity date nears, 3) low cost and 4) easy for participants to understand. Adding asset classes that are complex, smaller and/or less liquid and not offered as an individual investment fund option would work against these objectives.

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