The Federal Retirement Thrift Investment Board

Review of Impact from Proposed Changes to G Fund on TSP Fund Line Up

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Investment advice and consulting services provided by Aon Hewitt Investment Consulting, Inc., an Aon Company.

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Section 1: Executive Summary

The Federal Retirement Thrift Investment Board (FRTIB) asked Aon Hewitt Investment Consulting (AHIC or Aon Hewitt) to review the impact that a change in the interest crediting rate on the G Fund would have on participants' ability to construct efficient portfolios and to evaluate what other potential fund options might be available to fill the role the G Fund currently plays in the Thrift Savings Plan (TSP) fund line-up.

Currently, interest crediting rate for the G fund is the weighted average yield of all Treasury bonds with 4 or more years to maturity. It has been proposed that this be changed to reflect the 90-day T-Bill rate (a much lower rate in a normal yield curve – upward sloping yield curve – environment). Throughout this report, we refer to the current practice as the "current G Fund" and the proposed practice as the "proposed G Fund."

This report concludes that changing the interest rate on the G Fund will have the following impact:

1) Participants will receive a significantly lower rate of return on the G Fund that will not allow them sufficient growth to meet investment objectives, which includes saving enough for retirement and protecting against inflation.
2) The FRTIB would have to consider adding another fund to make up for the gap in the fund line-up that a change in the G Fund interest rate would cause. However, the FRTIB would not be able to prudently implement any of the additional fund options described in this report as all of the options are either not viable given TSP's size and liquidity needs, are much riskier, or both.
3) Those participants that are nearing retirement will be hurt the most by the change in the G Fund interest crediting rate as they are more likely to have lower risk portfolios with higher allocations to the G Fund – either constructed on their own or by investing in the L Funds. We also note that these participants tend to have the highest balances, have saved the longest, and are the oldest portion of the TSP population, thus they have the most to lose.

When evaluating the investment structure of the Thrift Savings Plan, we consider the G Fund to represent three options: money market, stable value, and TIPS (Treasury Inflation-Protected Securities) – since it provides benefits and/or attributes associated with each of these categories. The G Fund adjusts monthly to changes in interest rates (without any price volatility), which may be a result of rising inflation (TIPS), provides daily liquidity (money market), and provides higher yields than money market without risk of loss to principal (stable value).

We believe a plan's investment options should offer a sufficient range of choice to allow participants to form well-diversified portfolios that meet a reasonable range of risk and return preferences. As such, we believe that the TSP should have a structure that:

- Offers sufficient range of choice – with options that reasonably span the risk and return spectrum
- Allows participants to form well-diversified portfolios

- Is appropriately comparable with peers
- Meets broad participant demand

We believe the current options offered represent the major categories found in peer plans and the options to which most participant assets are directed. However, if the rate on the G Fund were to change from the current interest crediting rate, which is the weighted average yield of all Treasury bonds with 4 or more years to maturity, to reflect the 90-day T-Bill rate (a much lower rate in a normal yield curve – upward sloping yield curve – environment), this would introduce a gap in the fund line-up.

With a significant change in the rate of the G Fund to reflect that of the 90-day T-Bill, the G Fund becomes a fund option that solely provides principal preservation and daily liquidity for participants at an extremely low level of yield (similar to a money market fund), and therefore, leaves a gap to fill in the fund option line-up for the TSP given that the G Fund no longer exhibits the same attributes as money market, stable value, and TIPS (Treasury Inflation-Protected Securities). In order to continue to provide both a sufficient range of options as well as a reasonable number of options, so that participants can form well-diversified portfolios with reasonable levels of risk and return to help them achieve their retirement goals, the FRTIB would have to consider adding another fund option. There are three other potential fund options we describe in this report for consideration; however, we note that the FRTIB would not be able to prudently implement any of the additional fund options described in this report as all of the options are either not viable given TSP's size and liquidity needs, are much riskier, or both, which would leave TSP participants without an appropriate low risk investment option.

We provide an overview of the three potential fund options in the following table:

- Stable Value Fund
- TIPS Fund
- Short-Term U.S. Government Bond Fund

Supplemental G Fund Options	Benefits	Considerations
Stable Value Stable value funds seek to provide capital preservation and a relatively stable rate of return that is generally higher than money market funds. The funds comprise a conservative, fixed income portfolio that a bank or insurance company will "wrap" via an insurance contract to provide stable returns over time.	• Principal preservation (with the exception of very extreme market environments) • Smoothed returns with use of book value wrap agreements • Return premium relative to the proposed G Fund return	• Size of the wrap market is prohibitively small for the TSP asset base • Fund design challenges • Lack of liquidity in underlying assets • Passive implementation not possible • Insurance company (i.e. wrap provider) credit risk
TIPS Treasury securities that are indexed to inflation. The principal of a TIPS bond increases with inflation or decreases with deflation, as measured by the Consumer Price Index.	• Inflation protection attributes • Diversification benefits • Passive implementation	• Not commonly offered as option in DC plans • Higher volatility relative to other supplemental options • May not be properly used by participants; requires enhanced education from sponsor • Lack of market size / liquidity
Short-Term U.S. Government A Short-Term U.S. Government Bond Fund invests in Treasury bonds that mature between one and three years.	• Essentially no credit risk • Passive implementation • Return premium relative to the proposed G Fund return	• Higher volatility • Additional duration and yield curve risk

We also describe one additional consideration that the FRTIB would need to evaluate in the event that the rate on the G Fund is changed. As a result of the significant change in the interest crediting rate of the G Fund, the FRTIB would need to evaluate whether to map participant assets from the current G Fund to another fund. We discuss this further in **Section 4.**

Section 2: Current Design of G Fund

The investment objective of the G Fund is to earn a reasonable return while avoiding exposure to credit risk and market price fluctuations. The G Fund invests in non-marketable short-term U.S. Treasury securities specifically issued to the TSP. The G Fund's earnings are entirely made up of interest income earned on the securities. The interest rate calculation for the G Fund is based on the weighted average yield of all outstanding notes and bonds issued by the U.S. Treasury with four or more years to maturity. The G Fund rate concept comes directly from the formula used for the securities issued to the Civil Service Retirement and Disability Fund and the Social Security's Old-Age, Survivors, and Disability Insurance Trust Funds. The payment of the principal and interest on the G Fund are guaranteed by the full faith and credit of the U.S. government. Hence, the G Fund is essentially free from default risk. Additionally, since the G Fund is structured as a short-term / overnight security, it is not subject to volatility or fluctuations in the value of principal resulting from changes in interest rates.

Due to the structure of the G Fund, as noted previously, we consider the G Fund to represent three different fund options: money market, stable value and TIPS (Treasury Inflation-Protected Securities).The G Fund provides benefits and/or attributes associated with each of these categories. The G Fund adjusts monthly to changes in interest rates (without any price volatility), which may be a result of rising inflation (TIPS), provides daily liquidity (money market), and provides higher yields than money market with virtually no risk of loss to principal (stable value). The current balance in the G Fund is approximately $195 billion.

Section 3: Discussion of Additional Options – Quantitative Analysis

The additional options the TSP would need to consider adding to the fund line-up include:

- Stable Value Fund (benchmark proxy = Hueler Stable Value Pooled Index[1])
- TIPS Fund (benchmark proxy = Barclays U.S. TIPS Index[2])
- Short-Term U.S. Government Bond Fund (benchmark proxy = Barclays U.S. Government 1 – 3 Year Index[3])

Characteristics of Options

The table below compares the historical returns and risk of the G Fund relative to the three additional options. Risk is defined as the possible range of returns that could result in a given year. Therefore, when investing in an asset that has a higher level of risk, an investor can expect the range of returns actually experienced from month to month and year to year to vary more significantly than an investor in a lower risk asset.

Figure 1:

	Historical Annualized Return	**Historical Annualized Risk**	**Historical Occurrence of a Monthly Loss[4]**	**Historical Occurrence of a Better Monthly Return than G Fund[5]**
Time Period (Longest Common)	18 Years, 1 Month			
TSP G Fund	4.1%	0.5%	0%	-
TSP Proposed G Fund: Citigroup 90-Day T-Bill Index	2.4%	0.6%	0%	6%
Stable Value: Hueler Stable Value Pooled Fund Index	4.4%	0.5%	0%	67%
TIPS: Barclays U.S. TIPS Index	5.9%	5.8%	30%	62%
Short-Term U.S. Government Bond Fund: Barclays U.S. Government 1 – 3 Year Index	3.8%	1.5%	22%	38%

The current G Fund is significantly more attractive than the other fund options given its strong return and extremely low level of return volatility ("risk") together with the essentially risk-free nature of the

[1] The Hueler Stable Value Pooled Fund Index represents investment strategies of $103.59 billion in stable value assets, across 15 pooled funds, invested in contracts across 8 general account issuers and 16 synthetic wrap providers.
[2] The Barclays U.S. TIPS Index represents all inflation-protection securities issued by the U.S. Treasury.
[3] The Barclays U.S. Government 1 – 3 Year Index represents securities with a maturity from 1 year up to (but not including) 3 years that are issued by the U.S. Treasury or a U.S. government agency.
[4] Defined as the # of months the index had a negative return divided by 217 months (longest common time period)
[5] Defined as the # of months the index had a better return than the G Fund divided by 217 months

underlying securities. There is no other public security that provides all three of these characteristics. Stable value initially appears similarly attractive in terms of risk and return; however, stable value strategies are highly active strategies with significantly more risk (i.e. default risk and liquidity risk, which are not explicitly visible to a participant in the standard deviation number shown for stable value in Figure 1) in the underlying securities than the G Fund, making a stable value strategy less attractive for a participant. Furthermore, as detailed later in this section, given the size of the TSP asset base, it is not feasible for the TSP to offer a stable value option.

TIPS exhibits a higher return (and earns a better monthly return than the G Fund in more than 50% of the months over the past 18 years); however, this comes at a much higher level of risk, as can be seen by the percentage of months with a loss over the past 18 years (30% vs. 0% for the current G Fund).

Short-Term U.S. Government Bond Funds have a lower return *and* higher risk than the current G Fund. Therefore, it is clearly not a good alternative to the current G Fund.

Efficient Frontier Analysis

A tool that shows that the TSP is providing a set of fund options that allows participants to construct appropriate portfolios is the efficient frontier analysis. The efficient frontier is a combination of the most optimal portfolios – meaning a spectrum of portfolio combinations (using the existing TSP fund options) that provide the highest return for a given level of risk. Below we provide:

1) The efficient frontier for the current fund line-up
2) The efficient frontier for the fund line-up that includes the G Fund with a 90 day T-Bill rate plus one of the additional fund options listed above. We provide this information in Figure 2 historically (18 years 1 month) and on a forward-looking basis, Figure 3 (based on AHIC's 1Q 2015 10-year forward looking capital market assumptions –expected risk and return for each fund option) .

The historical or expected return is shown on the vertical axis and the corresponding level of risk for each point on the curve is shown on the horizontal axis. Therefore, the bottom left point represents the lowest risk combination of portfolios, which in the case of the "Current" scenario, is represented by an allocation of 100% assets in the G Fund. As the points move up and to the right, these scenarios represent portfolios with higher levels of risk and in most cases, commensurately higher levels of return.

Figure 2:

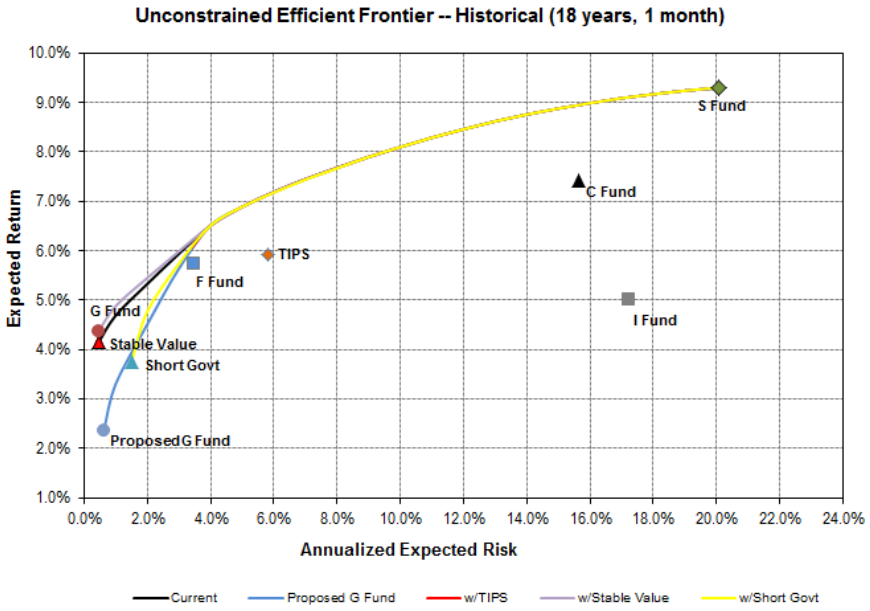
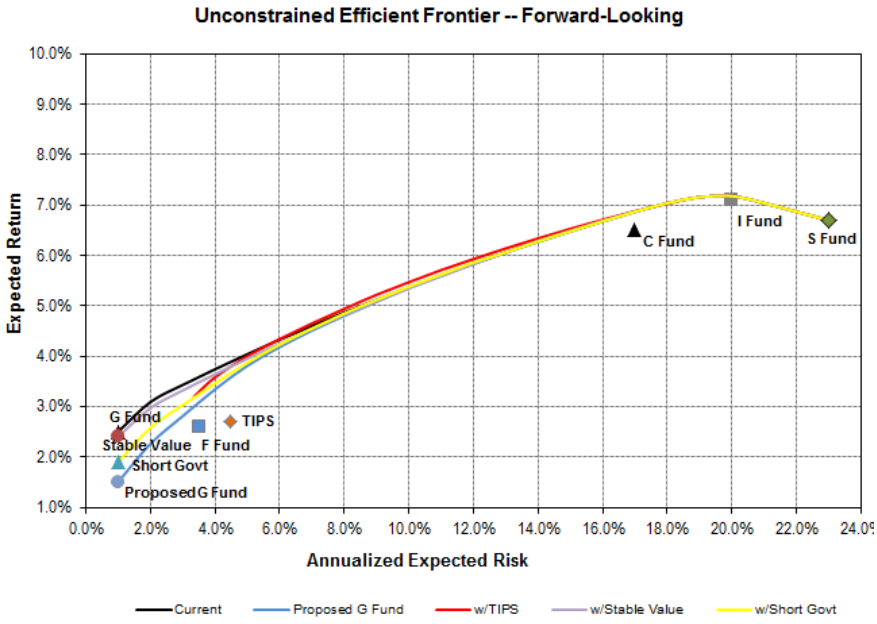


Figure 3:



The efficient frontier lines diverge at the lower left of the curve (lowest risk scenarios) with a 100% allocation to the G Fund resulting in a higher return at a similar or slightly higher level of risk (dot is

higher on the chart and a bit farther to the right) relative to the other potential fund options. The lines then converge for all scenarios for those portfolios with higher risk profiles.

This indicates that changing the G Fund yield and adding one of the proposed principal preservation options, most directly impacts those participants that are looking for a lower risk portfolio (a risk level that is generally about 3 – 4% overall return volatility). Generally participants looking for a lower risk portfolio are those that are nearing retirement and place a higher emphasis on principal preservation rather than growth. This harm for participants in lower risk portfolios is true both based on historical data (Figure 2) and based on forward expectations (Figure 3).

Impact on L Funds

The TSP L Funds (target retirement date funds) are also a good illustration of this as they are meant to be efficient portfolios that correspond with a participant's expected retirement year. Generally, as participants near retirement, the L Fund begins to reduce the overall level of volatility by increasing its allocation to the G Fund and decreasing the allocation to the C, S, and I Funds.

Below we compare the L Income Fund (for those at retirement) to a few other L Funds farther out on the risk spectrum (L 2030 and L 2050) that are offered for participants with more years to retirement and therefore, more time to withstand volatility. As expected the L Income Fund invests significantly more in the G Fund than the 2030 or 2050 fund (74% versus 29% and 10%, respectively). The expected risk, return, probability of monthly loss, and worst 1-month expected return are calculated using AHIC's 1Q 2015 capital market assumptions. As can be seen in the table, the fund meant for those entering retirement has less risk and is expected to produce a lower return.

Figure 4:
Current G Fund Design (Current G Fund = Yield on 4 Years+ Maturity)
Asset Allocation & Annual Expected Risk/Return

	L Income	L 2030	L 2050
G Fund	74%	29%	10%
F Fund	6%	6%	5%
C Fund	12%	34%	42%
S Fund	3%	12%	18%
I Fund	5%	19%	25%
Expected Return	3.6%	5.7%	6.4%
Expected Risk	3.6%	11.5%	15.0%
Probability of a Monthly Loss[1]	39%	44%	45%
Worst 1-month Expected Return[1]	-2.1%	-7.0%	-9.0%

[1] Defined as the given L Fund experiencing a negative return over the course of one month.

Below we illustrate the same metrics of the L Income Fund if the G Fund yield is lowered to the 90 day T-Bill rate. The result is a much lower expected return and slightly higher level of risk.

Figure 5:
Proposed G Fund Design (Proposed G Fund = 90 Day T-Bill)
Annual Expected Risk/Return

	L Income	L 2030	L 2050
Expected Return	2.9%	5.4%	6.3%
Expected Risk	3.7%	11.5%	15.0%
Probability of a Monthly Loss	41%	45%	45%
Worst 1-month Expected Return	-2.2%	-7.0%	-9.1%

And in Figure 6 below, we show the difference caused by the proposed change to the G Fund yield. As shown, the impact is much greater on the L Income Fund than it is on the L 2030 or L 2050. Thus, the proposed change would hurt participants that are closest to retirement that have diligently saved and invested for retirement.

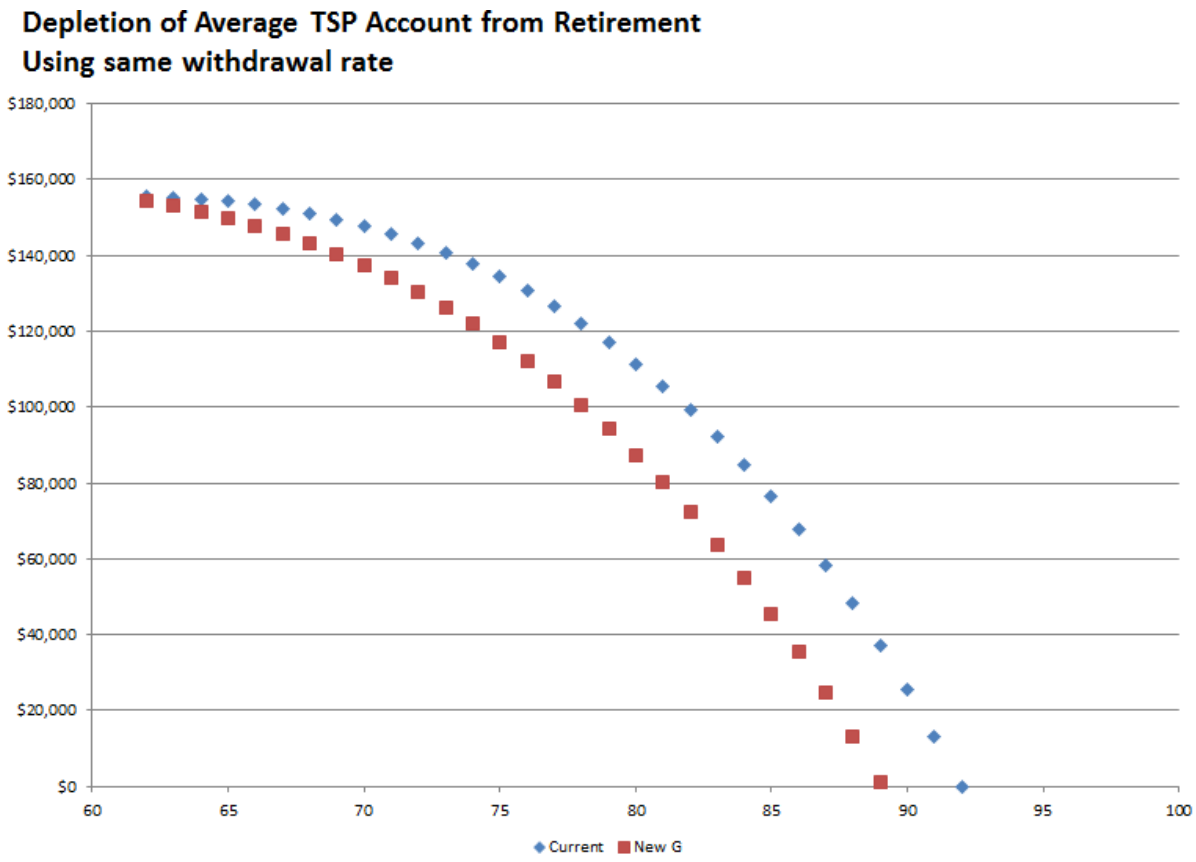
Figure 6:
Difference in Annual Expected Risk/Return Caused by Change in G Fund

	L Income	L 2030	L 2050
Expected Return	-0.7%	-0.3%	-0.1%
Expected Risk	+0.1%	No Change	No Change
Probability of a Monthly Loss	+2.0%	+1.0%	No Change
Worst 1-month Expected Return	+0.1%	No Change	+0.1%

While the expected volatility of returns ("risk") and worst 1-month expected return are not significantly worse for the L Income Fund with the proposed G Fund compared to the current G Fund, we do note that the probability of a monthly loss is 2% greater, and more importantly, the expected return on the L Income Fund is significantly lower. Below we provide a chart that illustrates the impact that changing the rate on the G Fund will have on a TSP participant that enters retirement at age 61. The chart assumes a participant's balance is invested in the L Income Fund, and that he or she takes an annual withdrawal consistent with the expected rate of inflation, or approximately 3.0% per year. The two lines on the chart depict the rate at which the participant's retirement account will be depleted in an L Income Fund that uses the current G Fund (blue diamonds) and an L Income Fund that uses the proposed G Fund (red diamonds).

[1] Defined as 99th percentile return over one-month for the given L Fund.

Figure 7:



As shown, the current G Fund allows a participant to utilize their retirement savings for approximately 4 more years as compared to the proposed G Fund, which would deplete a participant's assets before the age of 90. Earning almost 1% less in investment return each year will significantly hurt those in the L Income Fund and their ability to ensure their assets remain available to them throughout their retirement.

As illustrated by the efficient frontiers and the various charts above, changing the yield on the G Fund will more significantly impact the group of participants looking for a portfolio with 3 – 4% overall volatility (i.e. less risk) than others that can and want to take more risk (greater than 5% annual volatility). Because participants looking for less return volatility hold a significant percentage of their portfolio in the G Fund, if a change to the yield is made, those participants will either earn a lower return (for a similar level of risk) or be forced to take more risk in order to earn a similar return.

The modeling also indicates that because the proposed G Fund will provide such a low rate of return, if a participant wishes to continue to earn a 3.6% expected return on the new L Income Fund (with the lower G Fund rate), they will be forced to move into riskier asset classes. The impact this has for the participant is an increase in expected risk of around 5.0%, about a 28% increase in expected volatility

over a 10-year period (increasing from 3.6% annualized volatility to 5.0%). This is consistent with the results from the efficient frontier analysis, where as an investor moves up on the chart to earn more return, they must also move to the right, incurring more risk.

As is evident from the quantitative analysis no single option is a perfect supplement to the G Fund, and we further discuss the tradeoffs associated with each option in the following section.

Section 4: Discussion of Additional Options – Pros and Cons

Stable Value

Stable value is a conservative, fixed income investment that seeks capital preservation and relatively stable rate of return. There is no passive implementation option for a stable value fund strategy.

The asset class is typically viewed as a "hybrid", combining safety, stability, liquidity, and higher returns from holding a high quality, short-to-intermediate fixed income portfolio. A bank or insurance company will then "wrap" the portfolio via a contract:

- To provide stable returns via a mechanism to amortize market gains and losses over the duration of the portfolio based a crediting rate formula
- To provide liquidity for participant-driven withdrawals regardless of the underlying value of the fixed income portfolio

Stable value funds are offered in defined contribution plans for the following reasons:

- Principal preservation
- Smoothed returns with the use of book value wrap agreements
- Returns over full market cycles typically in excess of money market funds

However, the factors listed below illustrate that there are obstacles that prevent the TSP from offering a stable value fund as a fund option:

1) Wrap capacity constraints due to asset size of potential TSP allocation to stable value
2) Fund design requirements that could result in market value payouts or a discontinuation of the wrap contract (plan changes / employer events).
3) Equity wash feature – in order to lessen the risk for wrap providers of participants "gaming" interest rate movements, any direct transfer of assets from the stable value fund to another plan option can only occur to a non-competing option (e.g., from stable value fund to an equity fund) and assets must be held in such a non-competing option for a period of time – such as 90 days – before they can be transferred to a competing option (e.g., a money market or fixed income fund).
4) Liquidity and additional investment risks of underlying securities in investment pool
5) Lack of passive option for implementation

Wrap Capacity Constraints

One key issue to understand is the capacity of wrap agreements in the current market. As of March 31, 2015, the G Fund assets stood at $193.5 billion. As of September 30, 2014, the stable value market was approximately $712.8 billion in size. If all fund assets moved to a stable value option, the TSP would make up **over 20%** of the stable value marketplace. This is in comparison to the C Fund that makes up a little less than 1% of the large cap U.S. equity market ($145 billion in the C Fund compared to the large cap U.S. equity market valued at $18.3 trillion), the S Fund that makes up 1.2% of the small cap U.S. equity market ($45 billion out of $4.5 trillion), and the F Fund that makes

up 0.1% of the U.S. investment grade bond market ($25 billion out of $16.7 trillion). Even in the C, S, and F Funds, which are a tiny portion of their respective markets, the TSP has been challenged, especially around times of market stress, to maintain the daily liquidity levels necessary for fund participants. Therefore, the size of the G Fund assets compared to the size of the stable value fund market makes it impossible for the TSP to offer a stable value fund given the significant risk that being 20% of the market poses to participants.

While there is sufficient wrap capacity in the marketplace presently, a rapid 20% increase in demand is highly likely to be too large for the wrap market to bear. A large infusion of assets into this market would raise prices on wrap contracts (which ultimately could reduce returns), which would in turn impact other defined contribution plans offering stable value funds and generally cause a negative disruption in this market place that would not be specific only to the TSP. For context, the largest current (as of 9/30/14) stable value offering in a DC plan is $12.0 billion. Without wrap contracts, participants would not be able to transact at book value. While we have not specifically discussed this scenario with the wrap providers currently in the market, this conclusion is based on our knowledge of the market place and our belief that this could be a key challenge for the TSP given its size.

Fund Design Changes

Another operational challenge associated with stable value is plan design. Plan changes that could impact the book value coverage of the stable value fund include:

- New investments added
- Re-enrollment of large segments of participants (or other significant changes in the composition of the workforce)
- Changes to employer match contributions, loans, transfers, and eligibility provisions

Any plan changes (i.e. re-enrollment of large participant groups) and/or employer events would need to be communicated to the stable value manager and approved by the wrap provider. Wrap contracts do not normally cover cash outflows aside from normal operations of a plan. If a plan change or employer-driven event does occur, the wrap provider could cancel the contract and payments to participants would be made at current market value, which could be lower than the book value or below participant statement value. Given the evolution of the federal work force and potential changes to the uniformed services retirement plans, this may be a significant hurdle for the TSP to be able to offer a stable value option.

Equity Wash Feature

As an example of an operational concern for adding a stable value option, if TSP sought to add a mutual fund window as an investment option for plan participants, this option would likely be considered a competing option to the stable value fund. A mutual fund window can be considered a competing option because there may be funds within that window that allow a participant to circumvent the equity wash provisions described earlier. Within the core lineup, as an example, the Stable Value fund provisions would prohibit movement of moneys directly from the Stable Value Fund to a competing option, such as a money market option. However, once assets are transferred from a stable value fund to a mutual fund window, it would not be possible for the stable value fund manager

and wrap providers to know what type of fund a participant is utilizing within the mutual fund window (a participant could transfer the assets into a money market fund in the window thus circumventing the equity wash provision of the core lineup). Therefore, most Stable Value fund providers and wrap providers require that a mutual fund window be designated as a competing option. This means a participant would not be able to transfer assets directly from the stable value fund to the mutual fund window.

Liquidity, Credit, and Default Risk

Another consideration to note is that stable value funds are not risk-free investments and are viewed as riskier than the current G Fund. The underlying fixed income portfolio of a stable value fund typically has meaningful allocations to non-Treasury securities, which carry default, credit, and duration risks. In addition, TSP participants must also consider the additional risk that a wrap provider may go insolvent, even though this would be a low probability event. Both of these issues would be a stark contrast to the protection the U.S. Government provides on principal and interest on the G Fund that TSP participants have come to expect. In addition, liquidity in the underlying fixed income securities can face liquidity challenges in certain market environments as compared to the essentially certain daily liquidity provided by the G Fund.

Lack of Passive Option

While the underlying assets could be invested passively (which is uncommon for stable value strategies), there is no way to create a truly passive stable value product as a complete structure given the unique wrap contracts and crediting rate that need to be negotiated. And lastly, given the complexity of setting up a stable value fund, there would be substantial cost beyond that which would normally be expected by TSP participants.

As can be seen from the above analysis, there are substantial obstacles that prevent the TSP from adding a stable value fund.

TIPS

TIPS are Treasury securities that are indexed to inflation, as measured by the Consumer Price Index. TIPS are typically used as an investment strategy to protect against the negative effects of inflation, such as the erosion of purchasing power due to rising inflation. At the maturity of a TIPS bond, an investor receives the original face value plus the aggregate of all inflation adjustments since the original issuance. In other words, TIPS offers an investor a “real return.”

Since the G Fund has inflation-protection attributes through its ability to adjust monthly to changes in interest rates, which typically accompany increases in inflation, the addition of a TIPS fund warrants consideration.

TIPS funds offer:

- Inflation-protection attributes

- Diversification benefits
- Passive implementation available

However, the factors listed below illustrate that a TIPS fund has several unattractive attributes as a fund option:

1) Not commonly offered as standalone option in participant directed retirement plans
2) Higher volatility relative to other options being considered
3) Breakdown of inflation-protection attributes in the short-run
4) Return drivers other than inflation
5) Market liquidity

TIPS can serve as a source of diversification. Historically, TIPS have exhibited a low correlation with other types of investments such as stocks. In the context of a diversified portfolio, an allocation to TIPS may reduce overall portfolio volatility. The chart below provides the historical correlation of TIPS, as measured by the Barclays U.S. TIPS Index, to various stock and bond indices (a correlation below 0.5 is generally considered favorable for diversification purposes).

Figure 8:
Correlation of TIPS and Current G Fund to Various Markets

10 Years Ending 3/31/15	Barclays U.S. TIPS Index	Current G Fund
Barclays U.S. TIPS Index	1.00	0.30
S&P 500 Index	0.15	-0.23
MSCI EAFE Index	0.23	-0.20
Barclays U.S. Aggregate Index	0.78	0.36

While TIPS appear to be an good source of diversification, the negative correlation to equity markets (i.e. the S&P 500 Index and MSCI EAFE Index) exhibited by the Current G Fund is more attractive for an investor looking to create a well-diversified portfolio.

Consistent with the management style of other TSP fund options, TIPS could be offered as a passive investment option. A passive TIPS fund will typically use a full replication strategy due to the relatively small universe of Treasury Inflation Protection Securities. Low fees that are usually associated with passive investments are also available with a TIPS index fund.

Not Commonly Offered in DC Plans

While a TIPS fund offers appealing attributes, there are also several considerations that should be evaluated. In the context of a participant directed retirement plan, TIPS funds are not a commonly offered standalone investment option. According to the Plan Sponsor Council of America, only 8% of plan sponsors offer a TIPS fund[1]. Aon Hewitt has found two primary explanations for this observation.

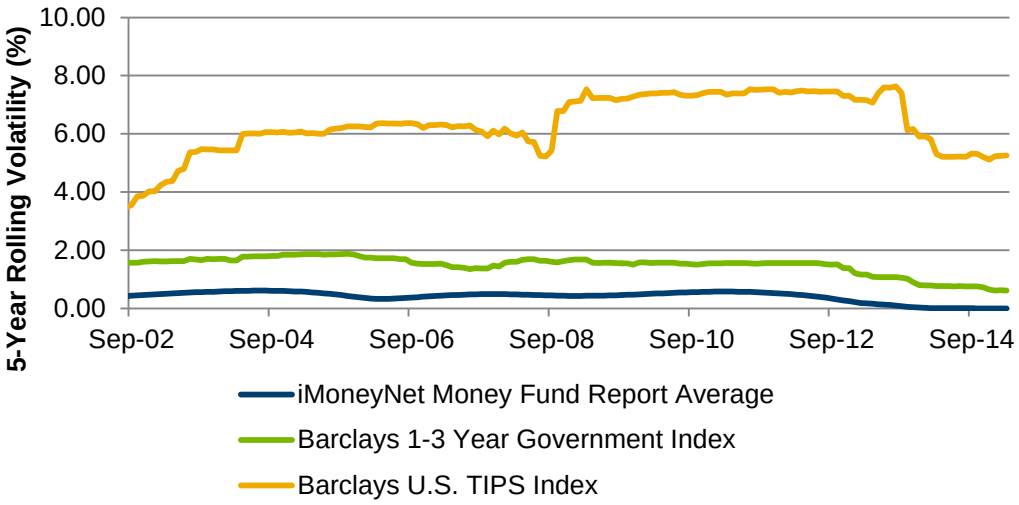
[1] 57th Annual Survey: PSCA's Annual Survey of Profit Sharing and 401(k) plans

First, plan sponsors express concerns as to whether participants will properly utilize the fund. To benefit fully from investing in a TIPS fund, investors need to have a long-term buy and hold perspective. Too often in participant directed retirement plans, just the opposite is true.

Higher Volatility

An additional pitfall associated with TIPS is volatility. Relative to other options being considered, a TIPS Fund would be a riskier investment option. The extent to which TSP participants would fully appreciate this difference is unknown. To illustrate, the chart below compares the five-year rolling volatility of TIPS, money market funds, and short-term government bonds. As is shown by the yellow line higher than the other two lines, TIPS have exhibited significantly higher volatility.

Figure 9:



Inflation-Protection Attributes

While it is true that over the long-run TIPS provide a good inflation hedge, this attribute can breakdown in the short-run. A feature of TIPS that is likely not recognized by all investors is the inflation adjustment lag. The inflation adjustment of a TIPS bond does not occur at the same time as the inflation announcement. Instead, there is a three-month lag between the inflation announcement and when the TIPS bond value reflects the adjustment. This nuance of utilizing TIPS as an inflation hedge is likely lost on the common participant, and ties back to the education component that plan sponsors face when deciding whether to offer a TIPS fund.

Return Drivers Other Than Inflation

Another reason that plan sponsors elect to not offer a TIPS fund is around participant education. Inflation is not the only driver of returns for a TIPS fund. Other return drivers include changes in real interest rates and changes in inflation expectations. Therefore, there is a burden placed on plan sponsors to provide additional education specific to the asset class.

Market Liquidity

We also have concerns over the size of TIPS market and liquidity. As of 12/31/14, the total market capitalization of the U.S. TIPS market was $1.08 trillion. As such, the TSP would represent 10 – 20% of the market if it were to offer a TIPS fund. Similar to the stable value discussion, liquidity would be a challenge for the TSP in this market. We also note that the Federal Reserve held approximately $113 billion of the overall TIPS market as of March 31, 2015, which further restricts the liquidity of the TIPS market.

Lastly, we also considered a sub-set of the TIPS market. As measured by the Barclays U.S. 0 – 5 year TIPS Index, the short-term TIPS market has exhibited significantly lower volatility relative to the broad TIPS market. However, this tradeoff comes with a lower return. In addition, the short-term TIPS market is small. The market cap of the Barclays U.S. 0 – 5 Year TIPS Index is approximately $400 billion. As such, the short-term TIPS market is prohibitively small for the TSP to consider.

Short-Term U.S. Government Bond Fund

A Short-Term U.S. Government Bond Fund invests in Treasury bonds that mature between one and three years. Typically this is a passive strategy that does not seek to outperform any benchmark, but instead simply ensures that the fund invests in the available Treasury bonds with the appropriate maturities.

We review the merits of offering a short-term U.S. government bond fund in the TSP fund line-up for the following reasons:

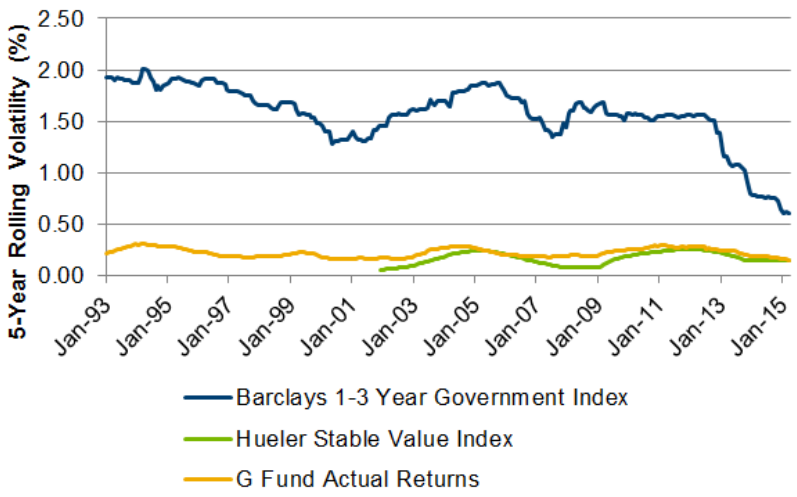
- Essentially no credit risk
- Passive implementation

However, the factors listed below illustrate that a short-term U.S. government bond fund has several unattractive attributes as a fund option:

- Higher volatility
- Additional duration (i.e. interest rate sensitivity – when interest rates rise, bond values fall and vice versa when interest rates fall) and yield curve (i.e. sensitivity to changes in the yield curve) risk

While a short-term U.S. government bond fund does provide some characteristics that we see in a cash equivalent or stable value DC fund option including essentially no credit risk, there are some drawbacks. As shown previously, a short-term U.S. government bond fund provides a reasonable yield but at a significantly higher level of volatility than a stable value fund, or the current G Fund. To further illustrate, the chart below provides the rolling 5-year volatility of the Barclays 1-3 Year Government Bond Index against that of stable value funds and the current G Fund (blue line is higher than the other lines indicating higher levels of volatility).

Figure 10:



While in recent years, the volatility has come down, the historical track record shows meaningfully higher volatility as compared to either a stable value fund or the G Fund. In addition, as shown previously in this section, the percentage of monthly loss for the Short Term Bond Fund was 22% vs. 0% for the G Fund, further illustrating the riskier nature of this type of fund.

Typically, in an upward sloping yield curve environment (longer dated maturity bonds have a higher yield than shorter dated maturity bonds), this type of fund will offer a higher yield than a money market fund, and in some environments, a stable value fund; however, the return-enhancement disappears if the yield curve flattens (similar yield across all maturities) or becomes inverted (shorter dated maturity bonds carry higher yield than longer dated maturity bonds). In addition, this type of fund faces much more duration risk given that it invests out to a maturity of three years, where there is more sensitivity to changing interest rates. Duration risk (as defined above) is especially important to consider in the current market environment of very low interest rates. Most investors expect interest rates to rise in the short term and if that were to occur, short-term U.S. government bond funds will experience negative returns (as interest rates rise, bond values fall).

Lastly, while not as material of a consideration as it is for the other options evaluated, the size the short-term U.S. government bond market is worth noting. As of 12/31/14, the total market size was $2.9 trillion. TSP would represent approximately 7% of this market, much lower than with stable value or TIPS; however, much higher than the other fund options currently in the TSP line-up.

Given the higher level of volatility incurred by this option, the risk of earning a lower yield depending on the yield curve environment, and the increased duration risk, we do not feel that a short-term U.S. government bond is appropriate for the TSP fund line-up at this time.

Section 5: Other Considerations

We have also identified another consideration that the FRTIB would need to evaluate in order to add a new fund option.

Mapping of Assets

If additional options to the G Fund are introduced, then several considerations around mapping of participant assets will arise. First and foremost, the FRTIB would need to decide whether it would want to map participant assets from the new low yielding G Fund to any additional options added to the fund line-up. If so, it would require legislation from Congress to gain the ability to map assets given that currently the TSP does not have the authority to map participant assets. In instances where the G Fund is the sole holding of a participant, a strong argument could be made that the onus is on the FRTIB to map assets into a more diversified, higher returning portfolio. Mapping participant assets in instances where the G Fund is just one of several holdings may not be as critical.

In the event the FRTIB deems it appropriate to map participant assets, considerations such as the method and communication around the event need to be evaluated. A common approach is to use an "opt out" framework. In communications to participants ahead of the event, the decision would be presented as an "opt out" decision. If a participant does not actively opt out of the mapping, then his or her assets would be mapped per the guidelines established by the FRTIB, and communicated to participants ahead of time.

The manner in which assets would be mapped also warrants consideration. One option would be to map participant assets into an option that is deemed most similar to the current G Fund. A second option would be to map participant assets into the lifecycle funds. The communication to participants ahead of the event would need to clearly articulate the chosen method.

Section 6: Summary & Conclusion

Aon Hewitt evaluated three different options that could be added alongside the proposed G Fund. We found pros and cons of each option. On balance, we believe that each option has significantly more challenges associated with it than advantages. The table below summarizes our findings.

Supplemental G Fund Options	**Benefits**	**Considerations**
Stable Value	• Principal preservation (with the exception of very extreme market environments) • Smoothed returns with use of book value wrap agreements • Return premium relative to the proposed G Fund return	• Size of the wrap market is prohibitively small for the TSP asset base • Fund design challenges • Lack of liquidity in underlying assets • Passive implementation not possible • Insurance company (i.e. wrap provider) credit risk
TIPS	• Inflation protection attributes • Diversification benefits • Passive implementation	• Not commonly offered as option in DC plans • Higher volatility relative to other supplemental options • May not be properly used by participants; requires enhanced education from sponsor • Lack of market size / liquidity
Short-Term U.S. Government	• Essentially no credit risk • Passive implementation • Return premium relative to the proposed G Fund return	• Higher volatility • Additional duration and yield curve risk

Of the options we considered as possible replacements for the G Fund all of them are either not viable to implement within the TSP fund line-up, are riskier, or both. Participants will most certainly be worse off in terms of their ability to construct portfolios that will continue to grow their assets and protect against inflation if the G Fund rate were to change.