DiMeo Schneider & Associates, L.L.C.

White Paper

DiMeo Schneider & Associates, L.L.C.
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A Practical Liability-Minded Investment Approach for Pension Plans

Several developments are driving the recent publicity on *Liability-Driven Investing*. On the legislative and regulatory fronts, passage of the long-anticipated *Pension Protection Act* and changes to FASB pension accounting rules will result in a greater "marking-to-market" of pension assets and liabilities, increasing both the *volatility* of *minimum funding contributions* and impacts to the *balance sheet*. As a result, plan sponsors are accelerating their exodus from defined benefit plans, which creates another issue of its own. Namely, a first step to get out of a defined benefit plan (*and ultimately transfer pension obligations to an insurance company*) is to freeze future benefit accruals. This turns an infinite investment period into a relatively short and quantifiable time-horizon. Like any other investor, a shortening time horizon reduces the ability of a pension fund to absorb short-term investment losses relative to liabilities.

The Economics of Pension Liabilities

These recent developments have increased short-term impacts and have been catalysts for many pension sponsors to re-examine their asset allocation policies within an asset-liability framework. However, the long-term economics of assets and liabilities remain unchanged. Namely, defined benefit plans have always had long-dated obligations and investment portfolios designed to fund them.

A first step to understand the rationale for a liability-minded investment strategy is to understand how pension liabilities work. For example, ACME, Inc. promises to pay their employee, John Doe, $100,000 in 20 years when he retires (at age 65). Assuming a 20-year zero coupon government bond has an implied 5% annualized return, ACME would have to invest $37,700 to guarantee $100,000 in 20 years. *Simply stated, compounding at 5% per year, $37,700 would grow to $100,000 in twenty years*. However, if the interest rate on the 20-year zero coupon government bond declines 0.50% (*from 5% to 4.5%*), ACME would have to invest $41,500 to guarantee $100,000 in 20 years. *Simply stated, compounding at 4.5% per year, $41,500 would grow to $100,000 in twenty years*. Therefore, the initial investment required to guarantee a $100,000 in 20 years increases about 9% (or ~$3,800) as the compounding rate falls from 5% to 4.5%.

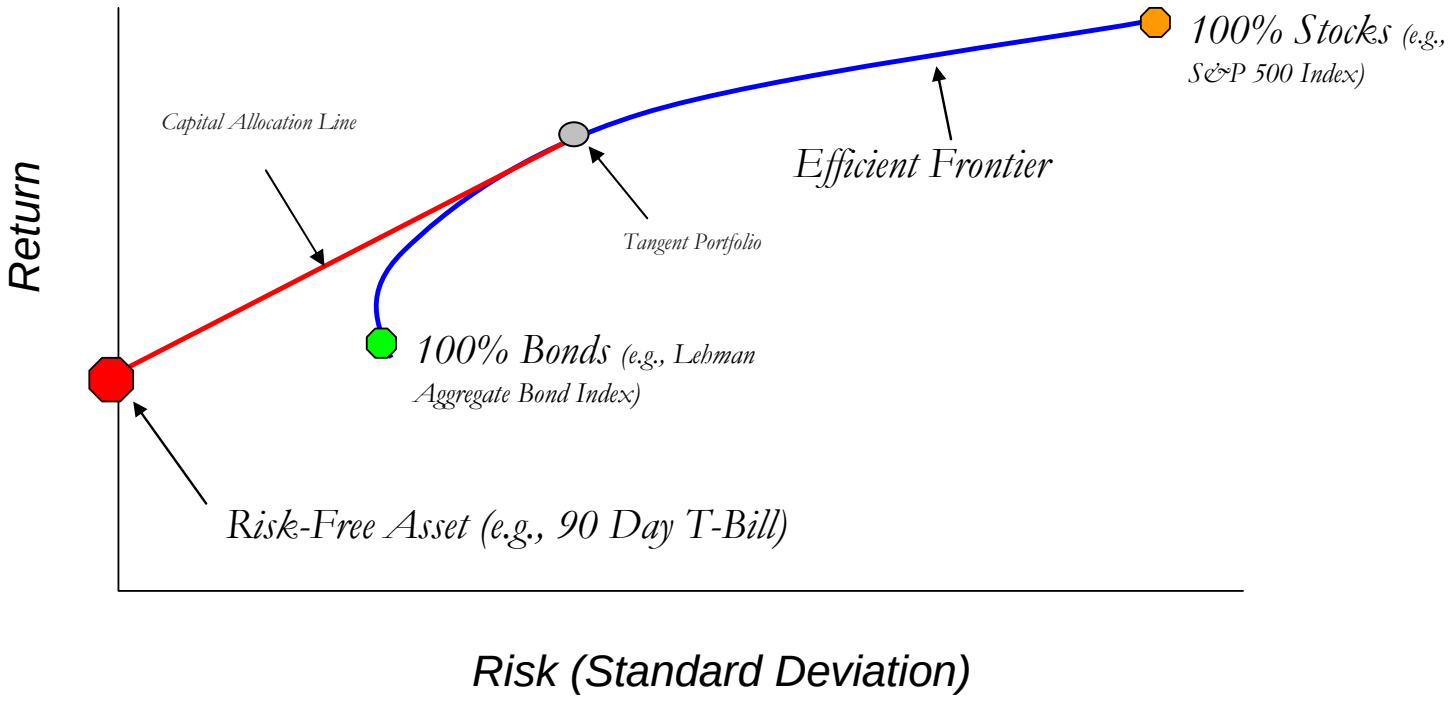
While a simplified representation of a pension plan liability, this example serves to illuminate an important point. The present value of future pension obligations is a function of long-term interest rates. So at first glance, a pension sponsor may be satisfied with a 10% annual return. However, if the present value of future pension obligations rises 15% during the year because of falling interest rates, the plan would fall 5% behind on a funded basis. Therefore, the absolute return for a pension fund is irrelevant. The relevant measure of investment success (or failure) is the change in a plan's funded status which directly relates to *asset returns relative to the moving target of liabilities*.

Modern Portfolio Theory 101

Traditionally, most pension sponsors have used Modern Portfolio Theory to build efficient portfolios that seek to maximize absolute returns per unit of absolute risk (defined as standard deviation around the expected absolute return). The following illustration (see exhibit 1) shows a simple, two-asset efficient frontier that includes **Stocks** & **Bonds**. The Efficient Frontier (blue curve), which connects the two asset classes bows up and to left because stocks and bonds are not perfectly positively correlated. Namely, when stock returns are above average, bond returns are often below average (and vice-versa). Because the two asset classes do not perfectly correlate, a portfolio mixed 50-50 between the two asset classes has a lower volatility than the average volatility of the two asset classes. As additional low-correlating assets are included in the mix, the Efficient Frontier shifts further up and to the left. This diversification benefit is one of the only quantifiable free lunches afforded by the capital markets.

Because the 90-Day T-Bill is a US government security with no interest rate risk, it is the theoretical *risk-free asset*. Therefore, investors' only willing to tolerate risk below where the *Capital Allocation Line* intersects the Efficient Frontier can maximize risk-adjusted returns by allocating to any combination of *T-Bills* and the *tangent portfolio*.

Exhibit 1: Two-Asset Efficient Frontier

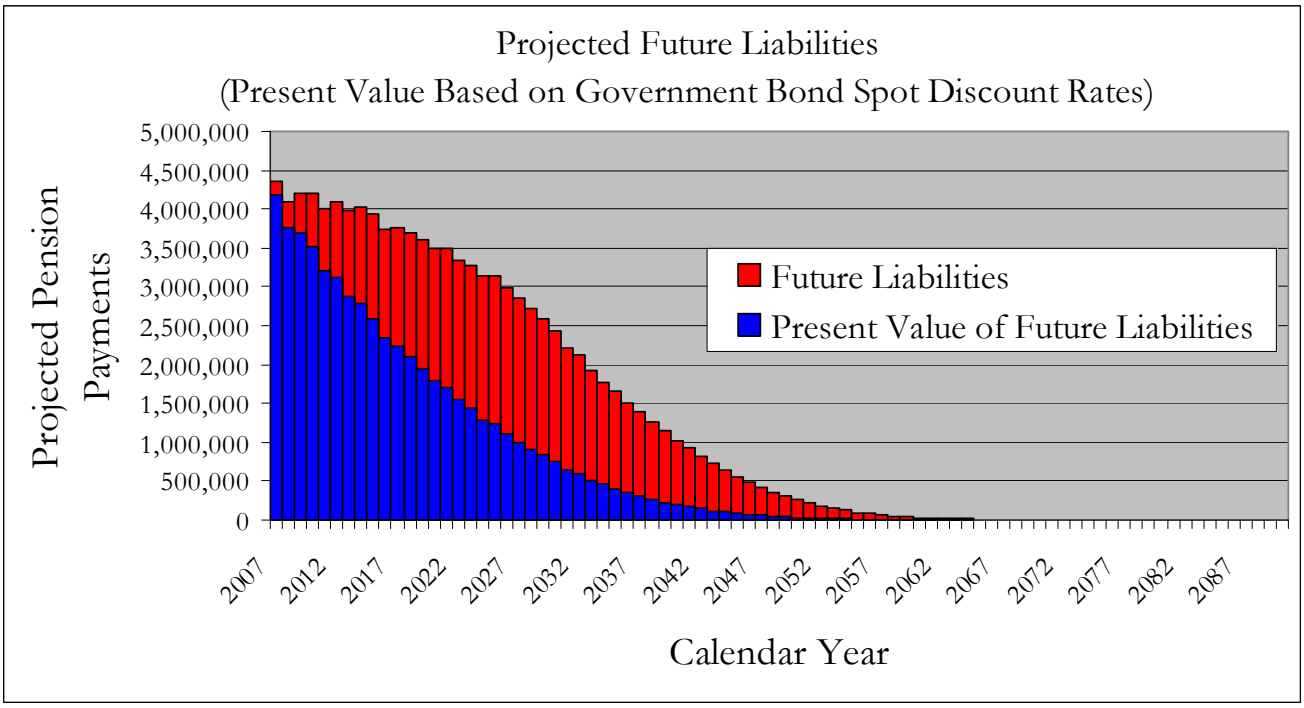


Drawbacks of Traditional Modern Portfolio Theory for Pension Plans

Traditional Modern Portfolio Theory provides a well-reasoned framework for investors to diversify their portfolios when the goal is to maximize long-term *absolute* risk-adjusted returns. On the other hand, pension fund risk is a function of how *assets perform relative to liabilities*.

Assume ACME's pension plan is fully funded (*with $100 million in both assets and liabilities*). The $100 million in liabilities represent the present value of all future obligations for John Doe and his 1,000 coworkers, including obligations for employees that are retiring in 1 year, 2 years, 3 years, 4 years……. and all the way up to 30+ years. Exhibit 2 illustrates ACME's future pension obligations (*where the average duration is 10.2 years*[1]).

Exhibit 2: Theoretical Representation of the ACME Group's Pension Liabilities



The following illustrates how traditional Modern Portfolio Theory falls short when the goal is to build an efficient pension plan portfolio. In this analysis, there are only three investments from which to choose. Exhibit 3 illustrates the expected returns, risks & correlations for a **Lehman Aggregate Bond Index Fund**, an **S&P 500 Index Fund**, and a custom-built **Liability-Matched Bond Portfolio** (*with 10.2-year duration*).

[1] *Duration for the ACME Group plan liabilities is calculated from the average time horizon of cash flows (weighted based upon the present value).*

Exhibit 3: Modern Portfolio Theory Inputs:

Returns and Risks

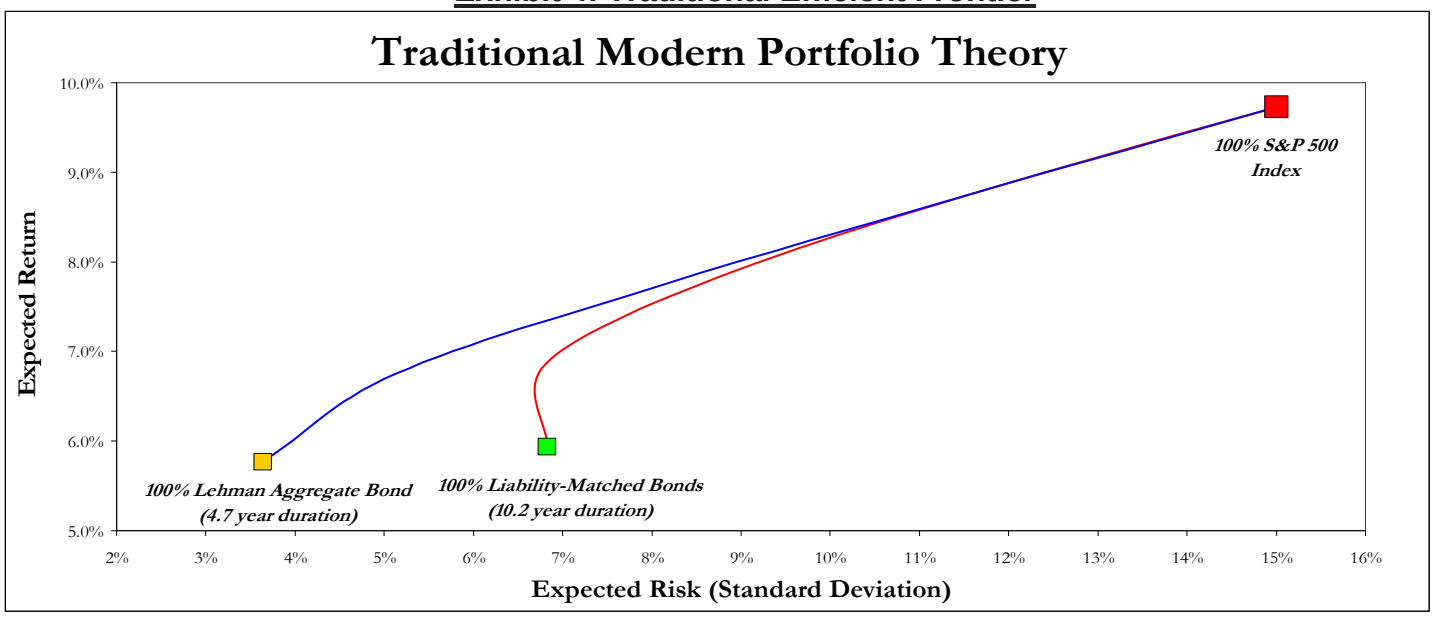
ASSET CLASS	E(ARITHMETIC RETURN)	E(RISK)
Liability-Matched Bond Portfolio	5.9%	6.8%
Lehman Aggregate Bond	5.8%	3.6%
S&P 500 Index	9.7%	15.0%

Correlation Matrix

	Liability-Matched Bond Portfolio	Lehman Aggregate Bond	S&P 500 Index
Liability-Matched Bond Portfolio	1.00		
Lehman Aggregate Bond	0.70	1.00	
S&P 500 Index	0.17	0.24	1.00

The traditional Efficient Frontier (Exhibit 4) would have no allocation to the **Liability-Matched Bond Portfolio** (*with 10.2-year duration*) because it has higher volatility than the **Lehman Aggregate Bond Index fund** (*with 4.7-year duration*) with about the same expected return. Therefore, if the goal is minimize absolute volatility of a portfolio at the desired return in accordance with Modern Portfolio Theory principals, there is no place for the longer duration and higher volatility **Liability-Matched Bond Portfolio**.

Exhibit 4: Traditional Efficient Frontier



The next example includes the impact of liabilities. Since the plan has $100 in assets for every $100 in liabilities, the liabilities can be expressed as a ***negative 100% position in a Liability Portfolio***. As you can see from the input assumptions (in exhibit 5), the liabilities have an expected return on par with our **Liability-Matched Bond Portfolio** with an expected correlation of +1.00.

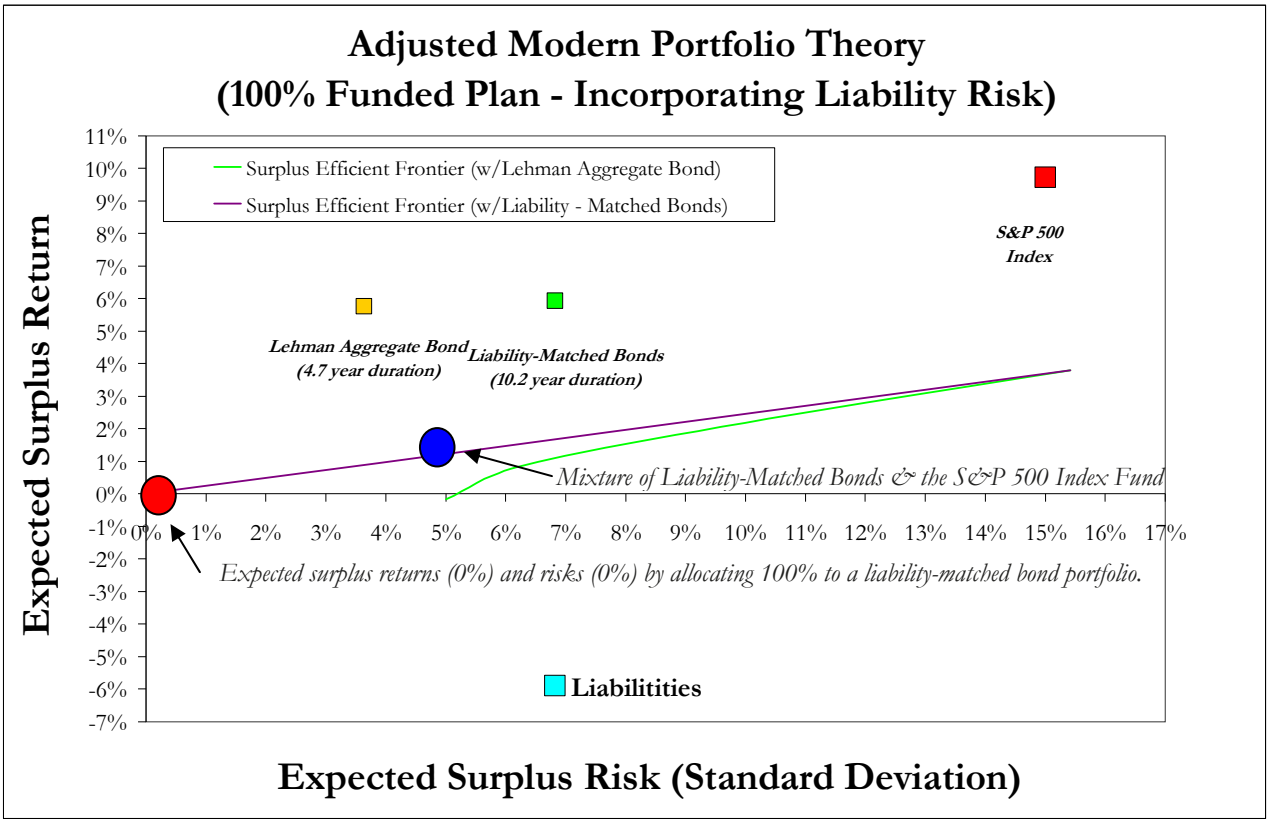
Exhibit 5: Modern Portfolio Theory Inputs (Incorporating Liabilities):

ASSET CLASS	E(ARITHMETIC RETURN)	E(RISK)
Immune Bonds	5.9%	6.8%
Lehman Aggregate Bond	5.8%	3.6%
S&P 500 Index	9.7%	15.0%
Liabilities	5.9%	6.8%

	Immune Bonds	Lehman Aggregate Bond	S&P 500 Index	Liabilities
Immune Bonds	1.00			
Lehman Aggregate Bond	0.70	1.00		
S&P 500 Index	0.17	0.24	1.00	
Liabilities	1.00	0.70	0.17	1.00

The **Liability-Matched Bond Portfolio's** expected return of 5.9% can fully offset the impact of Liabilities (-5.9%). Therefore, we can break-even by allocating 100% to the **Liability-Matched Bond Portfolio** (see exhibit 6). In addition, the expected volatility of the Liability-Matched Bond Portfolio matches the Liabilities and is perfectly positively correlated (1.00). Therefore, if interest rates rise, the Liability-Matched Bond Portfolio and the Liabilities should fall in tandem. If interest rates fall, the Liability-Matched Bond Portfolio and the Liabilities should rise in tandem. Net-net, would be able to lock in a 0% annual surplus return with *zero surplus risk*. In traditional Modern Portfolio Theory, where risk is an absolute measure, the risk-free asset is the 90-Day T-Bill. *For pension funds, the risk-free asset is a liability-matched government bond portfolio.*

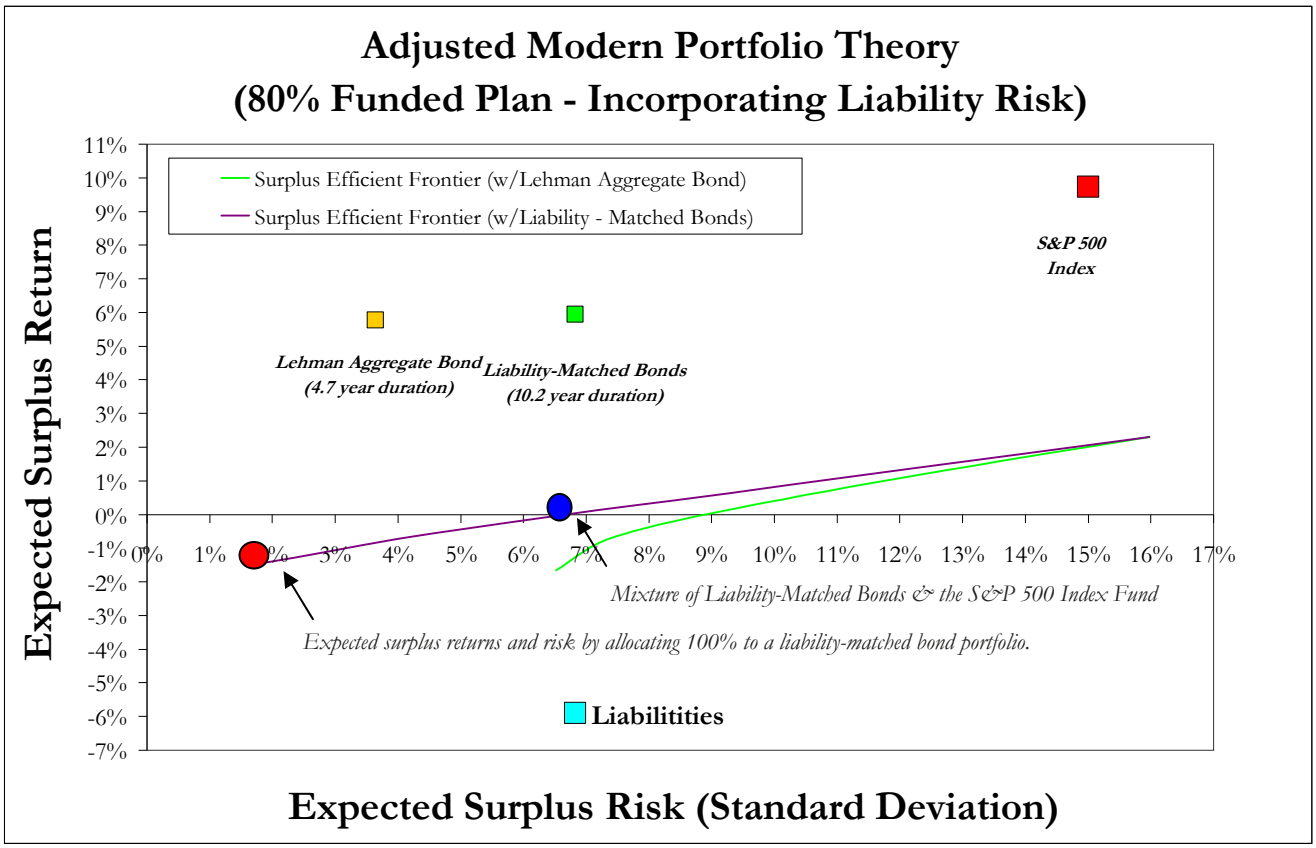
Exhibit 6



On the other hand, if 100% is allocated to the **Lehman Aggregate Bond Index Fund** (*as Traditional Portfolio suggests to minimize absolute risk*), the surplus risk would be 5% per year. If the plan sponsor is comfortable with 5% surplus risk, it would make better sense to allocate the majority of the assets to the **Liability-Matched Bond Portfolio**, and then allocate the rest to the **S&P 500 Index Fund** where there is an opportunity to generate surplus returns.

The following (exhibit 7) is an analysis of a pension plan that is 80% funded. In this example, allocating 100% of the portfolio to the **Liability-Matched Bond Portfolio** would lead to an expected negative surplus returns (with about 2% surplus volatility). On the other hand, a 100% allocation the **Lehman Aggregate Bond Index Fund** would provide about the same expected (negative) surplus return, but with markedly higher surplus risk (about 6.5%). If a plan sponsor is comfortable with 6.5% surplus risk, it would make sense to allocate the plan between a mixture of the **Liability-Matched Bond Portfolio** and the **S&P 500 Index Fund** where there is an opportunity to earn a higher surplus return.

Exhibit 7



The Liability Engineer™

The prior examples assumed we could invest only in *Bonds* and an *S&P 500 Index fund*. The following **Liability Engineer™**[2] analysis (see exhibits 8 & 9) broadens the investment strategy to incorporate multiple asset classes including *TIPS, High Yield Bonds, Foreign Bonds, US stocks (large, mid and small), REITs, Foreign Stocks (developed & emerging), Commodity Futures, Energy Infrastructure MLPs, and Alpha Strategies (Hedge funds)*. By incorporating these additional asset classes, we strive to further shift the Surplus Efficient Frontier up and to left (see Exhibit 9). The complexity increases, but the underlying theory remains the same. Ultimately, we allocate a pension plan's assets to a mixture of the *Liability-Matched Bond Portfolio* and *other risky assets* and evaluate the expected surplus return-risk tradeoff.

Exhibit 8: Modern Portfolio Theory Inputs (Increased Opportunity Set):

INPUT ASSUMPTIONS

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ASSET CLASS	E(ARITHMETIC RETURN)	E(GEOMETRIC RETURN)	E(RISK)	Debt, Equity or Alternative
TIPS	5.6%	5.2%	8.4%	D
Immune Bonds	5.4%	5.2%	6.8%	D
Foreign Bond	6.4%	6.0%	8.4%	D
HY Bond	7.1%	6.7%	8.5%	D
Large Cap	9.7%	8.6%	15.0%	E
Mid Cap	9.9%	8.6%	16.3%	E
Small Cap	10.3%	8.4%	19.4%	E
REIT	8.2%	7.0%	15.5%	E
Intl Equity	10.5%	9.1%	16.7%	E
Em. Mkt. Eq.	11.2%	8.4%	23.6%	E
Liabilities	5.4%	5.2%	6.8%	N/A
HFOF	10.2%	10.0%	7.0%	A
Commodity Futures	9.8%	8.6%	15.2%	A
MLPs	10.9%	10.0%	13.7%	A

	TIPS	Immune Bonds	Foreign Bond	HY Bond	Large Cap	Mid Cap	Small Cap	REIT	Intl Equity	Em. Mkt. Eq.	Liabilities	HFOF	Commodity Futures	MLPs
TIPS	1													
Immune Bonds	0.53	1												
Foreign Bond	0.53	0.41	1											
HY Bond	0.05	0.29	0.08	1										
Large Cap	-0.18	0.17	0.00	0.50	1									
Mid Cap	-0.13	0.21	-0.03	0.55	0.93	1								
Small Cap	-0.16	0.15	-0.08	0.55	0.80	0.93	1							
REIT	0.10	0.29	-0.02	0.43	0.56	0.67	0.69	1						
Intl Equity	-0.17	0.20	0.42	0.36	0.57	0.55	0.52	0.38	1					
Em. Mkt. Eq.	-0.11	-0.06	0.00	0.43	0.59	0.63	0.63	0.37	0.58	1				
Liabilities	0.53	1.00	0.41	0.29	0.17	0.21	0.15	0.29	0.20	-0.06	1			
HFOF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1		
Commodity Futures	0.34	0.21	0.19	0.02	0.16	0.17	0.15	0.15	0.19	0.09	0.21	0.0	1	
MLPs	0.18	0.19	0.13	0.46	0.25	0.32	0.32	0.33	0.23	0.28	0.19	0.0	0.24	1

ARITHMETIC RETURN: Sum of expected annual returns for next 10 years divided by 10. **GEOMETRIC RETURN**: A measure of central tendency by taking the product of (1+ annual percent return) for ten years to the 1/10th power, then subtracting 1. **Geometric Returns ~ Arithmetic Returns - (Portfolio Variance / 2).**

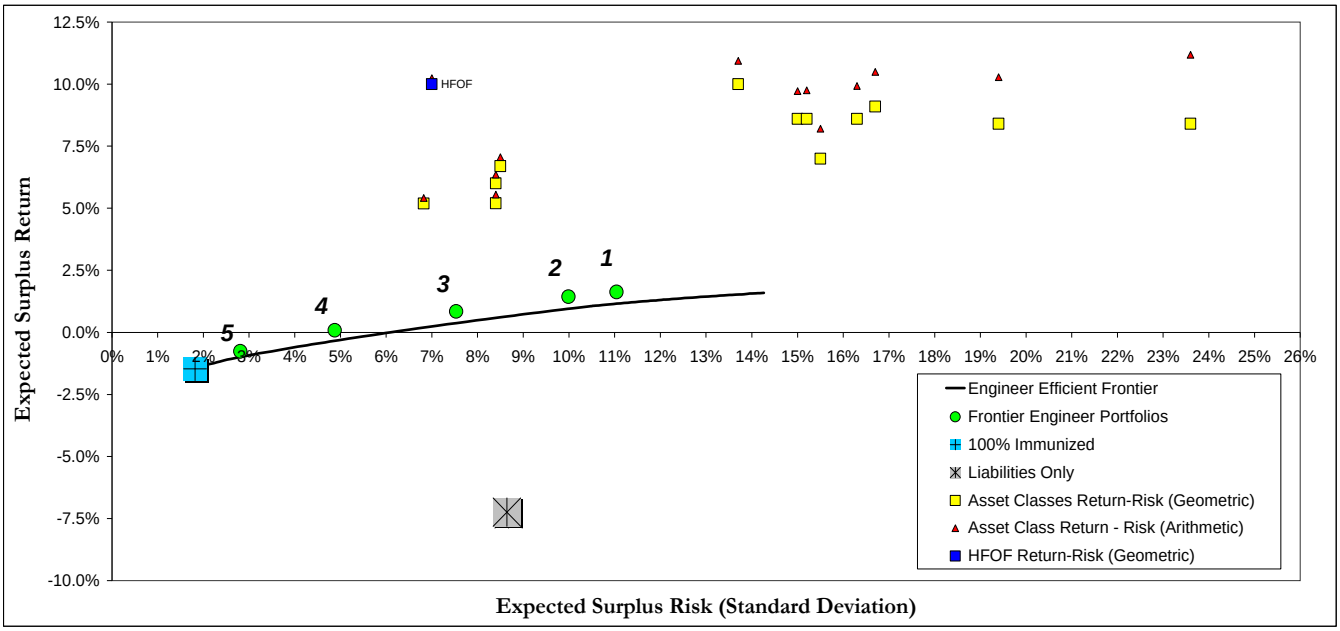
[2] The Liability Engineer™ is DiMeo Schneider & Associates' proprietary probabilistic asset allocation model that incorporates liabilities and asset class forecasting uncertainty.

Exhibit 9

Liability Engineer™ Analysis

Underfunded, Inc. Analysis (80% Funded & Plan liabilities = 10.2 Year Duration)

	*Normal Distribution 1-Yr MSL (99%-ile)	% Equity	% Debt	% Other	Cash	TIPS	Immune Bonds	Foreign Bond	HY Bond	Large Cap	Small Cap	REIT	Intl Equity	Em. Mkt. Eq.	Liabilities	HFOF	Commodity Futures	MLPs	E(Surplus Return)	E(Surplus Risk)
Portfolio 1	-24%	62%	23%	15%	0%	11%	1%	6%	5%	21%	9%	11%	10%	12%	-127%	8%	4%	3%	1.6%	11.0%
Portfolio 2	-22%	56%	29%	15%	0%	14%	0%	9%	6%	19%	8%	11%	11%	7%	-127%	8%	4%	3%	1.4%	10.0%
Portfolio 3	-17%	39%	46%	15%	0%	11%	25%	7%	4%	13%	6%	8%	8%	5%	-127%	8%	4%	3%	0.8%	7.5%
Portfolio 4	-11%	19%	66%	15%	0%	5%	55%	3%	2%	7%	3%	4%	4%	2%	-127%	8%	4%	3%	0.1%	4.9%
Portfolio 5	-7%	0%	85%	15%	0%	0%	85%	0%	0%	0%	0%	0%	0%	0%	-127%	8%	4%	3%	-0.8%	2.8%
100% Immunized	-6%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	-127%	0%	0%	0%	-1.5%	1.8%
Liabilities Only	-27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-127%	0.0%	0.0%	0.0%	-7.2%	8.6%



*Normal Distribution 1-Yr MSL (99%-ile): Represents theoretical worst case annual surplus return (with 99% confidence) in any given year. Assumes returns are normally distributed.

HFOF 8.0%
Commodity Futures 4.0%
MLPs 3.0%

The Liability Engineer™ uses the expected returns, risks & correlations of the asset classes[3] and a pension's (unique) liability stream to generate portfolios that maximize expected surplus return per unit of surplus risk. Since estimation error in forecasting asset class returns over finite periods (e.g. 10-years) is notoriously high, **The Liability Engineer™** also incorporates an uncertainty adjustment to the inputs (e.g., Monte Carlos simulations) to self-constrain the allocation so it does not require precise forecasts to generate practical output.

In the above **Liability Engineer™** summary (exhibit 9), Portfolio 4 has an expected surplus return of 0% (break-even) and surplus risk of 5%. Therefore, Portfolio 4 would be expected to "tread water" relative to liabilities at the lowest possible surplus risk level (5% annual standard deviation). On the other hand, if the plan sponsor's goal is to reduce future contributions, and can afford greater (asset vs. liability) volatility, portfolios 1, 2 or 3 may be also be appropriate. Every company must evaluate the pros and cons of each approach in light of their unique organizational objectives, balance sheet strength (and loan covenants), profitability and free cash flow. *The above Liability Engineer™ analysis is for an actual pension with its own unique liabilities. Pensions with different liability structures will have different outputs.*

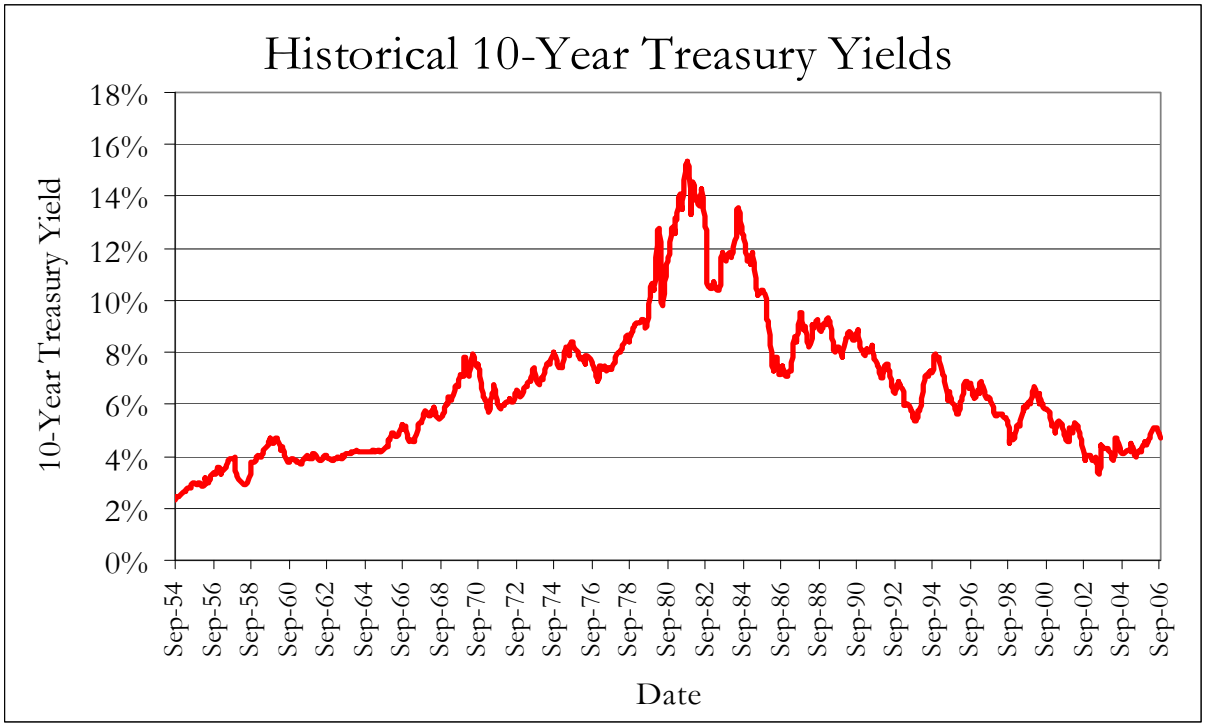
[3] Returns, Risks & Correlations are 10-year forecasts developed by DiMeo Schneider & Associates, LLC. They are not guaranteed

The Right Time to Get Religion?

The 2000-2002 bear market was not kind to pension plan sponsors. From September 1, 2000 through September 30, 2002, the S&P 500 Index declined 45%. Adding insult to injury, long-term interest rates also fell dramatically (10-year US Treasury Bond Yield fell 1.56% from 5.83% to 4.27%) over the same stretch. The double whammy of the falling equity markets and falling interest rates pushed many plans into under funded positions. Had pension sponsors been mindful of their asset-liability mismatch risks in the late 1990's, and allocated at least some of their assets to liability-matched bond portfolios (*instead of Lehman Aggregate Bond Index Benchmarked Portfolios*), the carnage could have been lessened.

In hopes of not repeating their historical misdeeds, many plan sponsors are now jumping on the Liability-Driven Investing bandwagon, which may be a wise long-term "strategic" move. However, is now the right time to make the move towards lengthening duration? As the following graph illustrates, long-term interest rates have been on a downward trend for the better part of the last 25 years (see exhibit 10). During this stretch, pension plans holding shorter duration bond portfolios benchmarked to the Lehman Aggregate Bond Index have seen their deficits widen.

Exhibit 10



Long-term interest rates are still relatively close to 40-year lows. By adopting a Liability-Driven investment strategy (*and increasing bond portfolio duration*) at this stage, a pension plan would forgo the windfall if long-term interest rates reversed course and trended back towards 1980's levels.

It is extremely difficult to predict the direction of future long-term interest rates. Yet, many who suffered through the double digit interest rates of the 1980's might find it is strange to immunize liabilities at these low current interest rates. While this view may be understandable (and ultimately correct), one fact remains; *asset-liability mismatches increase minimum funding uncertainty and balance sheet volatility*. Maintaining bond portfolio duration shorter than liabilities should be "tactical" with a finite time horizon. It should not be "strategic" because interest rates do not rise (or fall) forever. Do shareholders expect executives to take risks in pension plans (by making interest rate bets), or do they expect calculated risk-taking in the areas where the company has a core competency? In any regard, it is helpful to quantify the potential consequences of an interest rate bet gone awry.

Alternative Ways to Increase Duration Exposure:

A 30-year maturity US Government bond has a duration of 12 years. For pension funds with liability durations greater than 12 or 15 years, it can be difficult to build a liability-matched portfolio without the use of **STRIPS** or derivatives like **Interest Rate Swaps** or **Custom-Built Solutions**.

STRIPS (*Separate Trading of Registered Interest and Principal of Securities*) are Treasury zero-coupon securities. These bonds are issued in the traditional way (with coupons), but are separated into interest and principal components at the discretion of the bondholders using book entry accounts at Federal Reserve banks. Since a STRIP security does not pay coupons, its duration is simply the time remaining until it matures. For example, a STRIP security that matures at $100 in 20 years with a 5% discount rate will trade at $37.69 today (*$37.69 invested at 5% will grow to $100 in 20 years*) and has a duration of 20 years. STRIPS are usually available for terms up to 30 years. One drawback to STRIPS is they tend to have lower liquidity in the market place which results in higher bid-ask spreads than traditional coupon bonds. As a result, they can be more explicitly expensive to buy, and as government issued securities, can be implicitly expensive to own (on an opportunity-cost basis).

Interest Rate Swaps are derivatives that can alter the interest rate exposure of a pension plan. Interest rate swaps can be an efficient way for a pension plan to gain longer-duration interest rate exposure. In an interest rate swap, two parties agree to exchange periodic interest payments based on a predetermined notional principal amount over a specified period (e.g. 10 years). One party to the transaction will pay a fixed interest rate (e.g., fixed 5%), while the other party agrees to pay a floating rate (e.g., LIBOR floating rate currently at 5%). For example, two parties may enter into a swap agreement with a $100 notional principal. In this example, both parties start out exchanging $5 per year. If rates fall 1%, the LIBOR payer pays only $4, but continues to receive $5 from the counterparty (fixed payer). In this situation, the value of the Swap would increase above $100 for the floating, LIBOR payer and fall below $100 for the fixed interest ratepayer. Since no notional principal is ever exchanged, it is possible for a pension fund to generate long-duration interest rate exposure without allocating any assets to bonds. A major issue to consider before entering into an interest rate swap agreement is the counterparty's credit quality and their ability to make the required payments over the life of the agreement.

Commingled funds have been developed in recent years so pension funds can indirectly invest in swaps. These funds invest in short-term fixed income instruments to collateralize their swap agreements (with multiple counterparties) where they pay floating and receive fixed interest payments. If the interest rates fall, the value of the swap increases (and vice-versa). These commingled products can be attractive for several reasons. First, credit research on counterparties is outsourced to the fund's manager. Second, the fund manager can enter into swaps with multiple counterparties, which can reduce the concentration of credit exposure. Third, the products offer a relatively high degree of liquidity. Fourth, the products are structured so that they can be easy to incorporate into a pension investment strategy. For example, a $100 investment in the **2040–2044 Maturity Fund** is allocated pro-rata (e.g., $20 each) to five zero coupon swaps that mature in 2040, 2041, 2042, 2043, 2044. The average duration of the fund would be approximately 36 years (2042 – 2006 = 36), designed to match anticipated pension plan obligations coming due during that five year stretch. As interest rates rise and fall, the products should approximate the movements of a 36-year duration bond (if such a bond existed).

There are also **Custom-Built Derivative Solutions** available for reducing or eliminating pension asset-liability mismatches. For example, one large global bank recently rolled out a product (*in the United States*) that seeks to eliminate a pension's liability risks over a 1-year period. First, the present value of the pension's future obligations is calculated using objective swap-index rates (that correspond with the maturities of the obligations). At expiration of the contract a year later, the present value of future obligations is revalued using the same swap-index rate benchmarks. The difference in value between the two periods is netted. If rates rose, the plan pays the bank. If rates fell, the bank pays the plan.

In addition to having a single contract to hedge the plan's unique liabilities, another benefit of the structure is that the agreement is relatively short-lived reducing the unquantifiable risk of long-term counterparty exposure. Also, because the liability risk can be reduced (or eliminated) without allocating any capital to bonds, the portfolio can remain more heavily allocated to alpha strategies and/or asset classes with higher expected returns.

A Note of Caution: Because this customized derivative structure is essentially a leveraged position to long-duration bonds, it is wise to make sure there is little-to-no residual interest rate exposure in the investment portfolio. Over hedging interest rate exposure is just as risky as under hedging it!

Liability-Minded Investing:

Liability-Minded Investing, the term used in the title of this paper, is different from *Liability-Driven Investing*. The difference may be subtle, but is important. The traditional *Liability-Driven* strategy can "drive" a plan sponsor to lose sight of the possible pitfalls of adopting pure, liability-matched portfolios. Some potential pitfalls include greater allocations to fixed-income (*reducing expected long-term returns*), the potential counterparty risk of swaps, the explicit & implicit costs of owning STRIPS, the potential esoteric risks of other custom strategies (*that essentially increase implicit leverage*), and pragmatic considerations (*e.g., long-term interest rates are near 40-year lows*).

On the other hand, a *Liability-Minded* strategy implies that plan sponsors should be "mindful" of the risks of their pension liabilities and understand the potential consequences of asset-liability mismatches. Yet, we can be "mindful" of the pragmatic risks of moving full speed into a liability-matched strategy where none existed before. We should also be "mindful" that pension liabilities are usually just one of many future obligations of a corporation. If a pension fund has no plans to freeze benefit accruals (*and retains its infinite investment horizon*), the company has relatively strong and stable cash flows, and pension deficit fluctuations are manageable in terms of the overall balance sheet, a "mindful" strategy can leave the door open to investment strategies that emphasize equities.

Conclusion:

With recent changes in pension legislation and accounting rules, there has been an increased focus on reducing the volatility of minimum funding requirements and the impacts to the balance sheet that can result from asset-liability mismatches. However, plan sponsors should not immediately seek long-duration exposures at the expense of all other considerations. Pension liabilities are typically long-term in nature. Many plan sponsors with these long duration liabilities have allocations to bond portfolios benchmarked to the Lehman Aggregate bond index (*with a relatively short 4.7 year duration*). An easy first step is to alter the investment benchmark so it is closer to the duration of liabilities while still taking advantage of the potential excess returns of equities. If the sponsor believes the 25-year trend of declining interest rates might be ending, perhaps gradually "tip-toeing" towards a liability-matched position is the right move.

Note: DiMeo Schneider & Associates, LLC's proprietary probabilistic asset-liability model, The Liability Engineer™, optimizes for expected surplus return per unit risk. Please contact your consultant or Matthew Rice for more information at 312-853-1000.

About the Author:

Matthew Rice, CFA, CIMA®: Matt is the firm's Chief Research Officer and a Senior Consultant. As Chief Research Officer, Matt spearheads the firm's research efforts in the areas of capital market analysis & forecasts, investment strategy, asset allocation & portfolio rebalancing modeling and alternative investments. He is also a member of the DiMeo Schneider & Associates, L.L.C.'s investment committee which sets investment policy, establishes the framework for asset allocation and approves investment managers. In 2004, he co-authored The Practical Guide to Managing Nonprofit Assets (John Wiley & Sons). Matt received a BA in Economics from Northwestern University, is CFA Charter holder (Chartered Financial Analyst), a CIMA (Certified Investment Management Analyst), a CIMC (Certified Investment Management Consultant), and earned an Alternative Investment Certificate from the Wharton School of Business & IMCA. Prior to joining DiMeo Schneider & Associates, L.L.C., Matt was a Trust Officer in the institutional investment services group at Fifth Third Bank (formerly Old Kent Bank), worked as a Corporate Retirement Plan Consultant for First Business Investment Services, and was an Investment Consultant at AXA Advisors.