Pension Solutions' Insights

Stock replacement strategy for pension plans

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Introduction

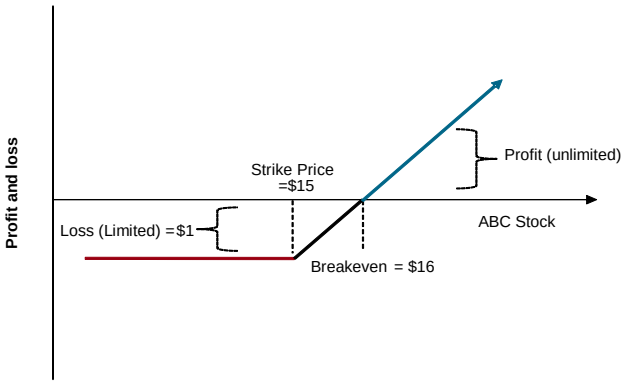
US pension plans have experienced significant increases in funded status over the past several years due to increases in global equities and interest rates. Plans that seek to secure some of these recent gains can utilize option strategies to shape payoff profiles. LGIMA believes a stock replacement strategy, which includes divesting physical equities and replicating long equity exposure via purchased calls, is an attractive tool for plans to limit downside risk and increase upside equity exposure while releasing significant funding to potentially deploy into liability hedging assets. Stock replacement can help a plan shape its overall funded status outcomes and ultimately mitigate funded status volatility due to changes in equities, interest rates, and credit spreads.

Call option overview

A call option gives the buyer of the option the right, but not the obligation, to buy an asset at a specific price (the strike or exercise price) until a future date (the expiration date). The buyer of the call option pays a premium for the upside exposure to the asset above the strike price, and risks only this premium paid if the stock falls.

Consider the following simple example:

Assume an investor would like to add long exposure to ABC stock, which is trading at $15. Instead of purchasing shares at $15, an investor could purchase a 1-year ABC 15 call option contract for $1, giving the investor the right but not the obligation to purchase ABC at $15. The payoff profile of this call option strategy is below:



At expiration, ABC stock would need to trade at $16 for the investor to breakeven on the strategy--in options parlance, breakeven is achieved when the intrinsic value (or positive difference between the underlying price and the strike price) equals the premium paid. The investor will have unlimited upside as ABC rises while the downside is limited to the $1 premium outlay.

Prior to expiration a number of market sensitivities or "Greeks" affect an option's price. Some of the more important Greeks are: delta, vega, theta, and gamma

Delta is the measure of the change in an option's price given a price change in the underlying asset. A call option will have a positive delta position: as the underlying asset price increases, the option price increases (ceteris paribus). A call option's delta will increase as it becomes further in the money (underlying price > strike price), and will decrease as it moves further out of the money (underlying price < strike price).

Typically an at-the-money ("ATM") call option has roughly a 0.50 delta; therefore, in the above example, should ABC stock increase from $15 to $16, the $15 call option price would increase from $1.00 to $1.50. An investor can replicate an outright long exposure by implementing a "delta neutral" call option position. For example, if an investor wanted to replicate 100 shares of ABC stock via a delta neutral call position with 0.50 delta ABC options, they would buy call options for 200 shares (100 shares / 0.50 delta).

Vega is the measure of the rate at which an option price will increase or decrease given an increase or decrease in the implied volatility of the underlying asset. Implied volatility is the market's expectation of the future realized volatility of the underlying asset; volatility typically increases in a falling market and decreases in a rising market. A call option purchaser is long volatility—as implied volatility increases, a call option's price will also increase.

Theta is the measure of the rate of decline in premium as time passes. The option value, or portion of the option's price that is not intrinsic value, will decay over time as the option's expiration approaches.

Gamma is the measure of the rate of change in delta or "acceleration" of delta. A call option will have a small gamma if the strike price is far away from the underlying price (if the option is deep out-of-the-money or deep in-the-money); the gamma will increase as the underlying price nears the strike price.

Stock replacement strategy for pension plans

The mechanics of a stock replacement strategy consist of selling physical equities and replicating the sold exposure by purchasing calls. The strategy is typically executed on a delta neutral basis, such that the mark-to-market exposure of the calls at the time of execution is equivalent to the physical equities sold. If executed via ATM calls, this will typically result in roughly twice the notional in calls relative to the physical equity sold. If equities rally above the purchased call strike price, the plan has significantly more upside exposure to equities, whereas, if equities fall, the plan's downside exposure is limited to the premium spent on the calls. An additional benefit of the stock replacement strategy is that it releases a significant amount of capital from the physical equities portfolio, which can then be deployed into liability hedging assets.

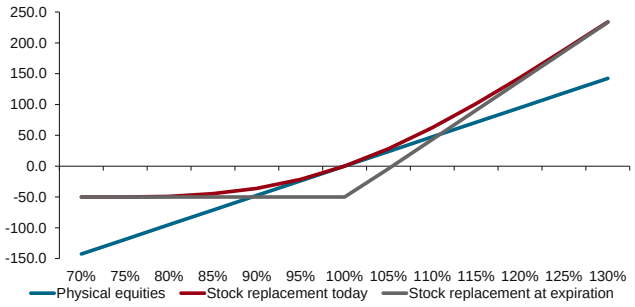
Consider a hypothetical pension plan with the following characteristics:

Example Plan (50/50)	
Assets	$950
Liabilities	$1,000
Funded Status	95%
Equity Allocation (50%)	$475
Fixed Income Allocation (50%)	$475
Status	Frozen

Implementing a stock replacement strategy	
Long 100% Calls (Notional)	$950
Long 100% Calls (Exposure/Delta)	$475
Physical Equities Sold	($475)
Cash Generated	$425

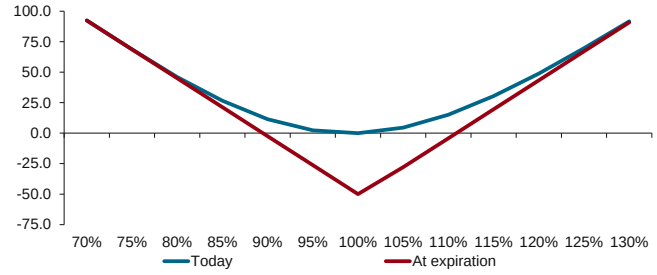
In this example we assume the plan replaces 100% of physical equity exposure with long calls. The plan implements $475 million of mark-to-market equity exposure by purchasing $950 million in 1-year ATM calls with a premium outlay of $50 million[1]. Under this strategy, the plan limits its downside to $50 million (premium outlay) while significantly increasing the upside potential. Capital released from the equity sale (less premium) could be deployed into liability hedging assets to hedge plan exposure to interest rate and credit spread risk.

Payoff diagram - physical equities versus delta neutral stock replacement (1-Year ATM calls)



The above chart shows the payoff profile of physical equities relative to stock replacement both today and at expiration. The stock replacement payoff profile is one of limited downside and significantly increased upside.

Net payoff differential - physical equities versus delta neutral stock replacement (1-Year ATM calls)



As can be seen in the net payoff differential chart, the stock replacement strategy is expected to outperform physical equities assuming instantaneous moves from current market levels. As time decay erodes the call option value, breakevens of the strategy at expiration are +/- 10.5% moves from current levels in equities.

Funding status sensitivity to changes in equities (Instantaneous)

	Funded status sensitivity to changes in equities						
	-30%	-20%	-10%	0%	10%	20%	30%
Physical Equities	81%	86%	90%	95%	100%	105%	109%
Stock Replacement	90%	90%	91%	95%	101%	109%	118%
Net Differential	9%	4%	1%	0%	1%	4%	9%

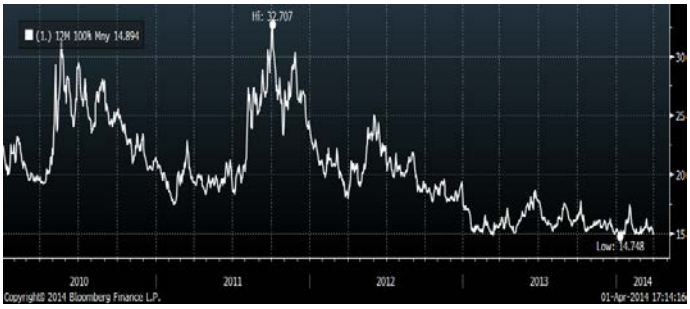
[1] Illustrative premium amount in line with SPX ATM call March 2014

As shown in the above funded status sensitivity table, the delta neutral stock replacement strategy is expected to improve instantaneous funded status outcomes across a variety of equity scenarios. When equities fall, funded status losses are limited to the premium spent; when equities rise, increased exposure results in additional funded status gains. This analysis ignores potential returns related to the $425 million cash generated from executing the stock replacement strategy.

Market implications plans should consider when implementing a stock replacement strategy

Volatility

1-year at-the-money implied volatility



Implied volatility of a 1-year at-the-money call is at post-crisis lows, making now an ideal time for plans to consider implementation of a stock replacement strategy. The current breakeven for a 1-year ATM stock replacement strategy versus outright long equities is a 10.5% move in either direction. The table below shows the S&P 500 annual returns and the differential between each year's high and low over the past 10 years. The current 10.5% breakeven is well below the 10 year average return of 17% and average differential of 31%.

SPX Realized Annual Change				
	Annual Return	Differential	SPX Low	SPX High
2013	32%	29%	1,426	1,848
2012	16%	17%	1,258	1,466
2011	3%	24%	1,099	1,364
2010	14%	23%	1,023	1,260
2009	30%	67%	677	1,128
2008	-38%	95%	752	1,468
2007	6%	14%	1,374	1,565
2006	16%	17%	1,224	1,427
2005	6%	12%	1,138	1,273
2004	11%	14%	1,063	1,214
Avg	17%	31%		

Option tenor and strike selection

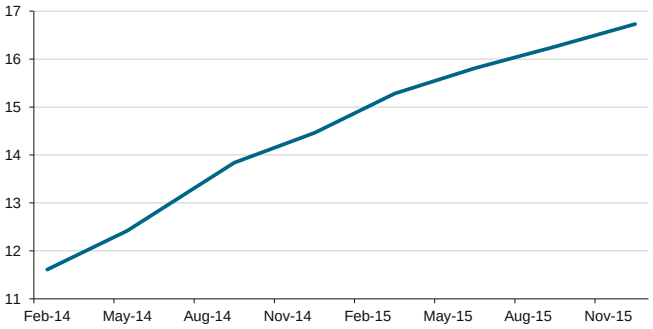
When implementing a stock replacement strategy, plans should optimize tenor and strike price, to meet both strategic objectives and market opportunities. The relative attractiveness of one option relative to another due to tenor and strike can vary widely.

Calendar volatility curve

The calendar volatility curve is the implied volatility across various option tenors. A stock replacement strategy is long volatility making the calendar volatility curve an important factor

in determining optimal option tenor. In typical markets, implied volatility for an option will increase with time to expiry (e.g. a 1-month option will have lower implied volatility than a 1-year option). The calendar volatility curve also provides the current market estimate of expected option premium decay, as the option is expected to "roll down" the curve over time. Selecting the appropriate tenor of a stock replacement strategy will depend on the shape of the calendar volatility curve. If the calendar volatility curve is steep, a shorter-dated call is a more advantageous position as it limits the decay due to curve roll-down. If the calendar volatility curve is flat, a longer-dated option may be attractive as decay due to curve roll-down is limited.

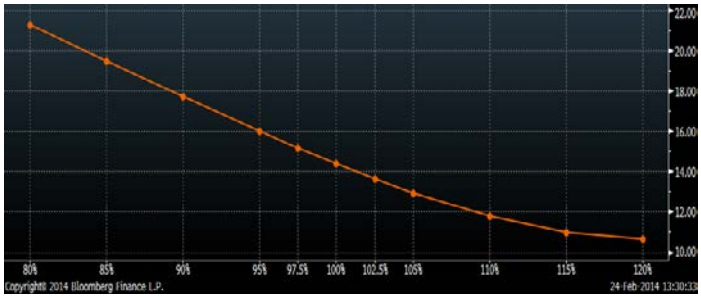
Calendar volatility curve



Skew curve

Skew is the difference in implied volatility between option strikes. Implied volatility falls as market strike levels increase—this intuitively makes sense as rallying markets exhibit less realized volatility than falling markets.

Implied volatility is the y-axis / % Moneyness is the x-axis



Flat skew between strikes means the difference is small and steep skew means the difference is large. It is preferable to buy an ATM call in a stock replacement strategy when skew is flat, as out-of-the-money calls are expensive on a relative basis. If skew is very steep, buying an out-of-the-money call may be preferable to achieve a plan's stock replacement objectives.

Dynamic rebalancing guidelines

Depending upon overall plan objectives and market opportunities, plans may wish to incorporate rebalancing guidelines within a stock replacement strategy. These rebalancing guidelines may include:

- **Maintain target delta-adjusted equity exposure via rebalancing trades:** delta adjusted equity exposure will increase as equities rally and decease as equities fall. Some plans may prefer to sell equity exposure when equities rally and purchase equity exposure when equities fall to maintain a specific level of delta adjusted exposure. Rebalancing can be accomplished by adjusting size or strike of the options. This type of rebalancing during choppy markets will capture gains to offset premium expense.
- **Implement a volatility cap:** as implied volatility increases due to higher expectations of future volatility or higher actual realized volatility, options get more expensive. Should volatility increase dramatically, some plans may prefer to monetize the volatility gains in a stock replacement strategy, and replicate the synthetic equity exposure via non-option instruments such as futures or total returns swaps.
- **Option tenor and strike rebalancing:** as skew or calendar volatility curve shift, more opportunistic tenors or strikes may arise, offering opportunities to restructure an existing stock replacement strategy.

Conclusion

Pension plans can utilize a stock replacement strategy to secure funded status improvements due to recent gains in equities and higher rates. Stock replacement strategies provide asymmetric payoff profiles with excess upside and downside limited to premium spent, while freeing up significant capital to potentially be deployed into liability hedging assets. Stock replacement strategies offer many strategic advantages to shape funded status outcomes; however, plans must also consider market conditions during implementation, such as overall option volatility levels, volatility calendar, and skew of the position. Plans may also wish to incorporate rebalancing guidelines due to changes in position delta, volatility, or tenor / strike opportunity set. If properly structured and implemented, a stock replacement strategy can help plans meet strategic objectives and improve funded status outcomes.