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How to Size an Interest Rate Hedge Strategy:

Allocating Target Outcome Swaption Strategies to Manage Interest Rate Risk

Interest Rates – Like Gravity

Market participants compare interest rates to gravity: When rates go up, all risk assets tend to go down. Since interest rates are a critical factor in investment decisions, investors need to be prepared for the risks associated with changing rates. And with interest rates starting to rise after a prolonged period of decline, investors need to be even more vigilant and have a proactive strategy to manage the risk. Rising interest rates will cause the value of a bond or other fixed-income investment in the secondary market to decline, and other assets in multi-asset portfolios (such as equities) may also be susceptible to interest rate fluctuations.

Historically, interest rates peaked in the early 1980s and declined to nearly zero over the next four decades. Lulled by declining rates over this long period, many investors did not fully appreciate the risks of interest rate increases. However, the rate hikes that began in 2022 in response to inflation led to broad and sustained declines in portfolio values, revealing investors' unpreparedness for a rising rate regime.

Interest Rate Strategies as a Hedge

The good news is that investors have a few ways to reduce or manage exposure to the risks associated with interest rate fluctuations. One common approach may be to move funds into cash or reduce allocations to fixed income. However, investors need to be mindful that simply moving to cash may not always be the best strategy—particularly at times when fixed income portfolios may be offering attractive levels of yield.

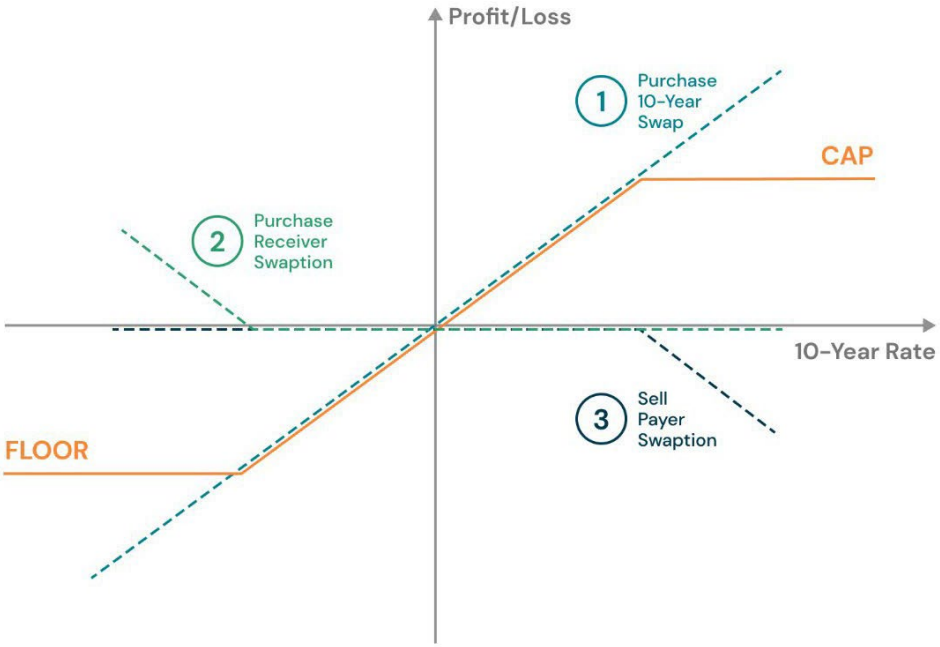
While a broad set of investors may be largely unprepared for interest rate risk or managing it by moving to cash, institutional investors have been using advanced tools to mitigate interest rate risk, such as interest rate-linked derivatives. (These derivatives are so prevalent that the global market for interest rate-linked derivatives exceeds the market value of derivatives for all other asset classes combined.) A specific derivative that institutional investors employ to manage interest rate risk is the interest rate swap. An interest rate swap is an agreement between two parties to swap cash flows, with each party receiving a payment based on a different interest rate. One party agrees to pay a fixed interest rate on a notional amount of money, while the other party agrees to pay a floating rate based on a specified benchmark, such as the Secured Overnight Financing Rate.

Furthermore, interest rate swaps can also serve as an underlying reference for interest rate swap options, or "swaptions." Swaption strategies can provide sophisticated investors with even more fine-tuning towards hedging their interest rate risk. An example of one popular strategy for interest rate risk hedging is a costless-collar interest rate hedge (Figure 1). This involves first purchasing a swap on a benchmark rate, for example the 10-year rate, that increases in value when the 10-year rate goes up and decreases in value when the rate goes down. It is then overlaid by two swaption positions. The second position is a purchase of a receiver swaption to set a maximum loss floor[i] from the 10-year rate going down. The third position will be to sell a payer swaption to limit the maximum growth opportunity from the 10-year rate going up. The amount of premium paid for the receiver swaption will be exactly offset by the amount of premium received from the

sale of the payer swaption, making it a costless-collar interest rate hedge.

This approach—a costless-collar interest rate hedge through the use of derivatives—is a style of investing that may be called Target Outcome® investing. Popularized in the late 2010s on equities, these Target Outcome Strategies® linked to interest rates are now being made available to a broader set of investors through publicly registered funds. By putting the swaps and the swaptions together, a fund can create a Target Outcome "package" that may not incur an upfront net premium cost to get into, and can profit from rising rates. But the fund can also seek to limit losses from extreme downward moves in rates to a floor[i], while also capping gains from extreme rate hikes.

FIGURE 1. PAYOFF DIAGRAM OF AN EXAMPLE OF A TARGET OUTCOME COSTLESS-COLLAR INTEREST RATE HEDGE STRATEGY USING SWAPTIONS



Sizing the Trade

Having constructed a Target Outcome Strategy linked to interest rates, investors wonder how to size the trade. This question has two elements to it:

1) What should be the interest rate hedge strategy's sensitivity to changes in interest rates? In other words, how much should the strategy profit from an increase in rates and lose from a decrease in rates?

2) Having established the interest rate sensitivity of the strategy, how much of an investor's portfolio should be allocated to the strategy relative to the size of the interest rate-sensitive part of the portfolio?

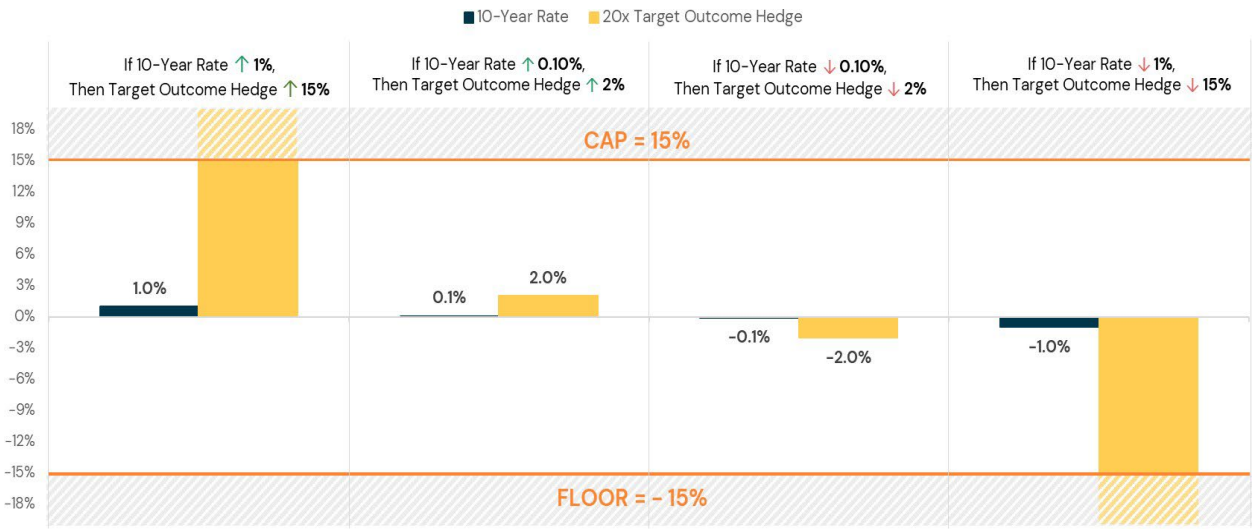
We examine these elements one at a time.

Interest Rates Sensitivity (or Duration) of the Hedge

Since the Target Outcome collar strategy is designed to be a costless strategy, one can theoretically increase or decrease the sensitivity to interest rates as much or as little as one may want, without a change in upfront premium outlay. On one hand, investors are motivated to increase the sensitivity to interest rates, as that allows them to have a rather modest allocation to the hedge to mitigate interest rate risks across a larger part of the portfolio. However, increasing the sensitivity can also create risks from the hedge itself if interest rates were to go down. These two opposing forces lead investors to seek to strike the right balance.

For example, this balance can be achieved by targeting a 20x duration sensitivity to the 10-year rate, illustrated by Figure 2. In this case, if the 10-year rate goes up 10 basis points, the hedge would seek to go up 200 basis points; conversely, if the 10-year rate goes down 10 basis points, the hedge would seek to go down 200 basis points. This can be coupled with establishing a floori of -15% through the purchase of a receiver swaption—such that the maximum loss over a three-month period is limited to 15%. The purchase of a receiver swaption will necessitate the sale of a payer swaption, to bring back the net premium to zero. This will create an upside cap that will be determined by the market conditions at the time. (However, for illustrative purposes, we can assume a cap of approximately 15%.) Such a Target Outcome hedge seeks to have a high level of sensitivity to interest rates such that a modest allocation can hedge a large part of an investor's interest rate-sensitive portfolio. Simultaneously, it also seeks to strike the balance ensuring that the risk from the hedge itself (i.e., high sensitivity) is manageable.

FIGURE 2. PERFORMANCE OF THE THEORETICAL HEDGE UNDER DIFFERENT INTEREST RATE SCENARIOS



The chart is for illustrative purposes only and is not indicative of any actual investment. The chart is intended to illustrate potential outcomes at the end of the outcome period and is based on hypothetical reference asset returns. The chart does not account for payment of fees and expenses. The strategy may not be able to achieve the illustrative returns set forth above.

Allocation to the Portfolio

Having established the sensitivity of the Target Outcome hedge, investors must next determine the size of the allocation. This, in turn, depends on the interest rate sensitivity of their investment portfolio. This is particularly true for fixed coupon bonds, which have a particularly strong relationship with interest rates. As a result, many investors base the size of their hedge on the size of their fixed-coupon bond portfolio.

One way to measure this sensitivity is by using a metric called "duration." By calculating the duration of a portfolio, an investor can better understand how much the portfolio will be affected by changes in interest rates. In today's world, many beginner-level portfolio analytics software packages can measure risk, including the duration of a bond portfolio. As a result, most financial professionals are well aware of the duration of the bond portfolios they manage. (The duration of the costless-collar interest rate hedge we constructed above is 20. For a 1% move in 10-year interest rates, the hedge varies by 20%.)

Once an investor knows the duration of the bond portfolio they wish to hedge, they can calculate the size of the hedge using the following framework:

$$A_{FI} = \frac{D_T + D_H}{D_{FI} + D_H}$$

$$A_H = 1 - A_{FI}$$

Where:

A_H = Allocation size to the interest rate hedge strategy
A_{FI} = Allocation size to the original interest-sensitive portion of the portfolio
D_H = Duration of the interest rate hedge strategy (strategy sensitivity)
D_{FI} = Current duration of the interest-sensitive portion of portfolio
D_T = Desired target duration of the interest-sensitive part of portfolio

Consider the instance where an investor's $10 million portfolio includes a bond portion made up of all the bonds from the Bloomberg US Aggregate Bond Index. The duration of this investor's hypothetical portfolio would be 6.26.[ii] While the bond portfolio earns an attractive level of yield at 4.59%, [ii] the investor will be exposed to the risk of an increase in the level of interest rates. Consider that they wish to reduce the sensitivity of the bond portion to target a net duration of 2 by using the Target Outcome costless-collar interest rate hedge duration of 20 we constructed earlier. Computing the allocations based on the framework above, we find:

$$A_{FI} = \frac{2 + 20}{6.2 + 20} = \frac{22}{26.26} = 83.78\%$$

$$A_H = 1 - .8378 = 16.22\%$$

In this case, the investor can make an allocation of 16.22% to the Target Outcome hedge to reduce the duration of the portfolio to 2. A way to verify the targeted net duration is by calculating the net duration of the interest- sensitive portion of the portfolio using the weights above:

$$D_T = (0.8378 \times 6.26) - (.1622 \times 20)$$
$$D_T = 5.24 - 3.24$$
$$D_T = 2$$

Assuming this bond portion is 40% of the overall portfolio (as part of the typical 60% equity / 40% fixed income portfolio), an approximate allocation size that seeks to bring in the target duration to 2 would be to allocate approximately 6% from the 40% fixed income allocation to the Target Outcome interest rate hedge strategy. A 60/40 portfolio would consist of a new allocation of 60% equity / (34% Fixed Income / 6% Target Outcome interest rate hedge). Figure 3 shows how to partition out a US Bloomberg US Aggregate bond allocation to make room for an interest rate hedge to target a duration of 2.

FIGURE 3. HOW TO PARTITION FIXED INCOME ALLOCATION TO INCORPORATE INTEREST RATE HEDGE

Target Duration = 2			
CURRENT FI ALLOCATION		A_{FI}	A_H
20%	→	16.76%	3.24%
30%	→	24.13%	4.87%
40%	→	33.51%	6.49%
50%	→	41.89%	8.11%
60%	→	50.27%	9.73%
70%	→	58.64%	11.36%
80%	→	67.02%	12.98%

As each investor possesses their own set of unique objectives and preferences, the allocation of portfolios tends to vary widely. Nonetheless, it is possible to establish a foundation for sizing an allocation that can potentially serve as a hedge against interest rate risk by leveraging the framework outlined earlier. The magnitude of such an allocation depends on several key factors, including the fixed income duration, interest rate hedge strategy duration, and notional fixed income amount. These elements form an integral part of the decision-making process for investors seeking to make prudent allocation choices. In taking a holistic approach that considers the interplay of these factors, investors can arrive at an informed allocation decision that aligns with their investment goals and appetite for risk.

Conclusion

Institutional investors have been using advanced tools to mitigate interest rate risk, such as interest rate-linked derivatives. Target Outcome Strategies, such as costless-collar interest rate hedge strategies, can now be accessed by a broader spectrum of investors through recently launched, publicly registered funds. Furthermore, these allocations can be carefully sized to ensure they achieve the right balance between sensitivity to interest rates and risks from the hedge itself. Once investors understand portfolio duration, a framework can be used to calculate the allocation to the hedge. Understanding costless-collar interest rate hedge strategies and how they can be used according to a portfolio's duration may help investors weather interest rate volatility and decrease risk.

Definitions

Derivative: A security with a price that is dependent upon or derived from an underlying asset, group of assets or benchmark. The derivative itself is a contract between two or more parties based upon the asset or assets. Options and swaps are among the most common types of derivatives.

Duration: A measurement of a bond's or fixed income portfolio's price sensitivity to interest rate changes.

Interest rate derivative: A financial instrument with a value that is linked to the movements of a single interest rate or group of interest rates.

Interest rate swaption: An option on interest rates.

Hedge: An investment made with the purpose of reducing the risk of adverse price movements in another asset.

Swap: A derivative contract through which two parties exchange the cash flows or liabilities from two different financial instruments.

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8350 Broad St, Ste. 240 McLean, VA **info@vestfin.com** **(855) 979-6060**

[i] There can be no guarantee that an interest rate hedge strategy would be successful in its objective to provide protection against declines below a floor in the 10-year rate over an outcome period.

[ii] As of March 14, 2023; Source: Bloomberg

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