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Hedging Insurance Company Surrender Risk

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INTEREST RATES HAVE BEEN IN A SECULAR DECLINE OVER THE PAST SEVERAL YEARS and have remained below their long-term averages as central banks across the globe have embarked on asset purchase programs to jump start economic growth. While supportive to risky assets and the economy as a whole, this extended period of low rates poses significant challenges to the Insurance Industry. There is the immediate impact of spread compression as General Account portfolio yields approach statutory minimum crediting rates, but there is also the potential longer-term risk of policyholder surrender (or disintermediation) if rates sell off sharply.

In this article we will review the dynamics of surrender risk, briefly discuss current valuations in the Interest Rate option markets and present some tailored structured hedging instruments that can be used to manage this risk.

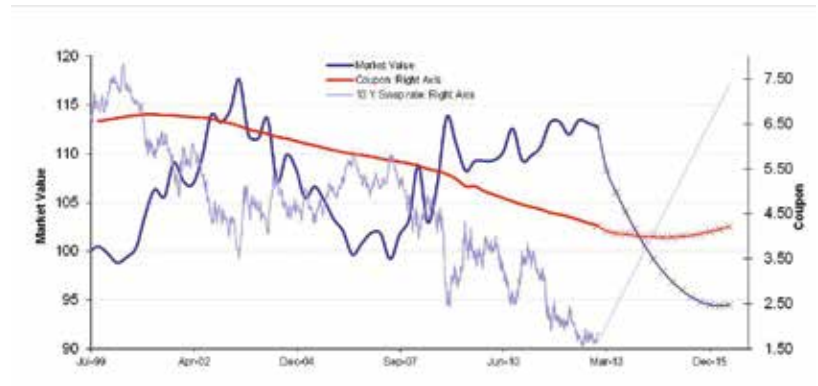
SURRENDER RISK DYNAMICS

In *Chart 1* we demonstrate the dynamics of an insurance company general account by simulating the average coupon and market value of a synthetic general account (GA) portfolio¹.

As market rates (light blue line) move lower, the average coupon of the general account (red line) also moves lower as maturing assets are invested at lower yields. In the event of a future selloff, the average coupon cannot keep up with market yields and policyholders ultimately have an incentive to surrender their policies. This forces the insurance company to sell assets when their market value (dark blue line) is trading below par.

Insurers have traditionally hedged surrender risk in the interest rate options market and current options valuations suggest that it is still a good time, on a historical basis, to consider adding protection.

Chart 1: Impact of Rising Rates on a Synthetic General Account Portfolio



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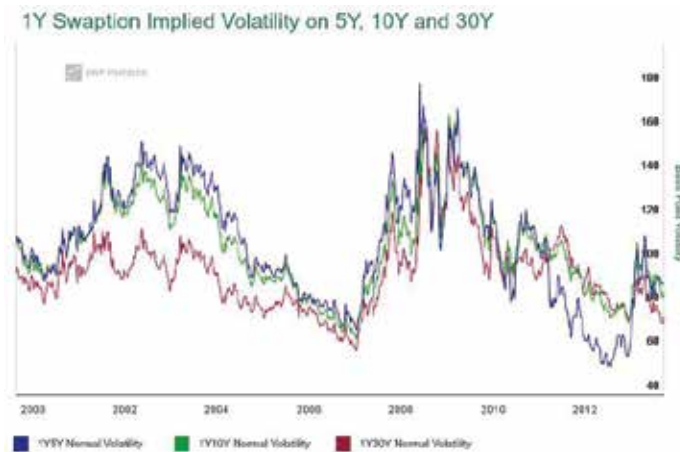
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INTEREST RATE OPTION VALUATIONS

In *Chart 2* below we show the history of 1Y maturity options on 5Y, 10Y, and 30Y swaps. Implied volatilities are currently quite low in relative terms and have been lower on just two occasions since 2000. The first was during the pre-Lehman crisis period when liquidity was abundant and there was little risk premium in the market. The second was during the second quarter of 2013 when rates were at multi-year lows and the market was convinced that the Fed was going to be purchasing assets over the long term. While past performance is not indicative of future behavior, a review of historical record suggests meaningfully lower levels in 1y volatility are not likely.

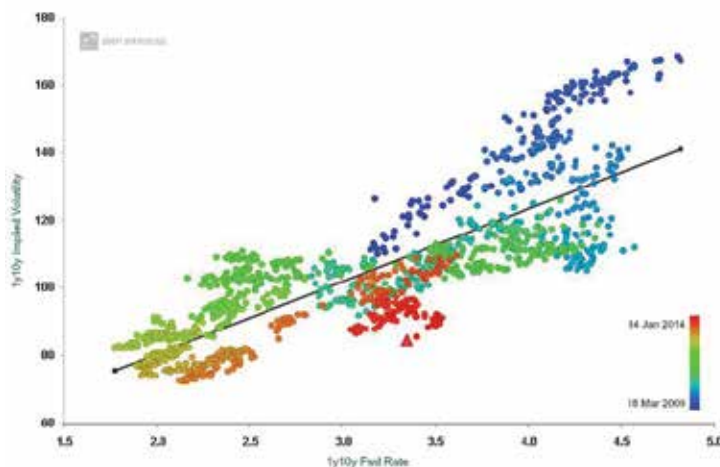
Chart 2: Swaption Implied Volatilities (1Y Expiry)



Source: BNP Paribas Global Markets

An alternative way to gauge the fair value of option pricing is to look at the relationship between forward rates and implied volatility. We specifically look at 1y10y forward rate versus 1y10y implied volatility in *Chart 3*. This chart suggests that implied volatility is cheap relative to the current level of rates since the Fed committed to Quantitative Easing in 2009.

Chart 3: 1y10y Fwd Rate vs 1y10y Implied Volatility

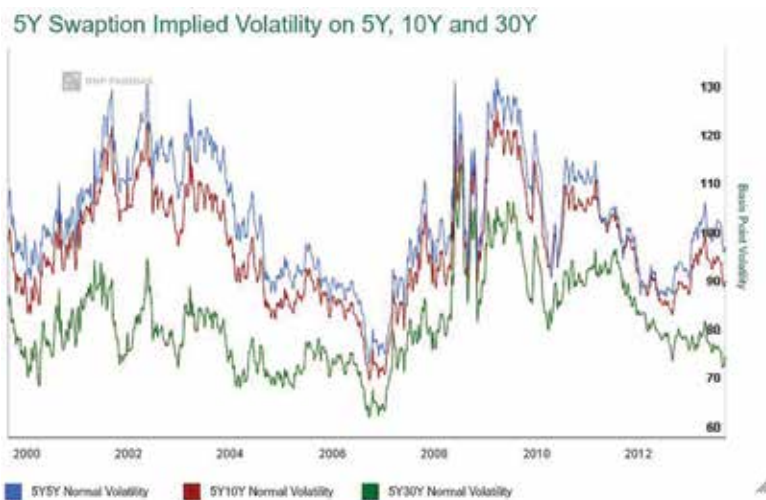


Source: BNP Paribas Global Markets

“ Insurers have traditionally hedged surrender risk in the interest rate options market and current options valuations suggest that it is still a good time, on a historical basis, to consider adding protection. ”

The history of longer-dated volatility, specifically 5Y options on 5Y, 10Y and 30Y swaps, is shown in *Chart 4*. Here the picture is somewhat more mixed as longer-dated volatility is low relative to levels observed over the last five years BUT is still higher than pre-crisis levels. This owes largely to the absence of Structured Note issuance which has historically provided supply of longer-dated volatility into the market.

Chart 4: Swaption Implied Volatilities (5Y Expiry)



Source: BNP Paribas Global Markets

However, while longer dated volatility does not exhibit the same relative cheapness that we see on the short end of the volatility surface, it is still well below post-crisis levels. Furthermore, given the FOMC’s tapering of their asset purchase program, one could certainly argue that implied volatilities could richen in the near term. This brings us back to our fundamental point—it is (still) a good time to hedge.

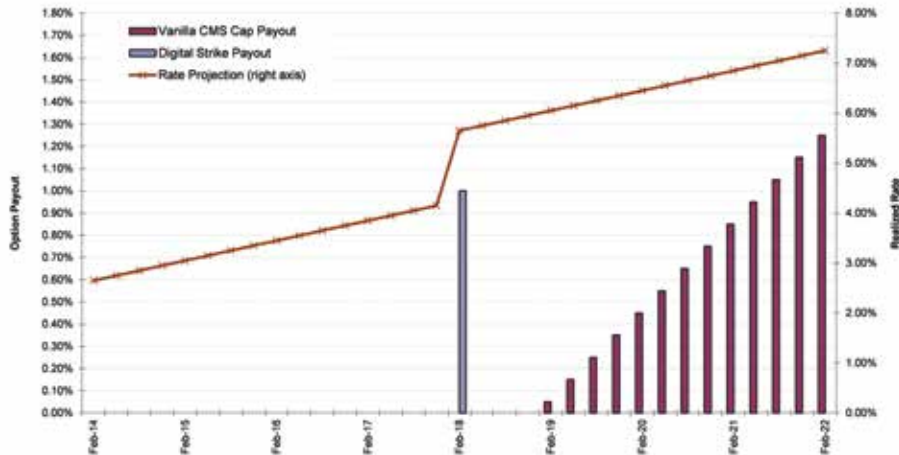
SURRENDER RISK HEDGING SOLUTIONS

As we alluded to earlier, surrender risk is well understood by the industry and many Insurance Companies do continue to buy high strike interest rate options (payer swaptions and CMS Caps) to protect against a move higher in rates. However, as one analyzes the available hedging alternatives, it is worth considering structured solutions that could provide more tailored protection at a lower cost. After all, while Constant Maturity Swap (CMS) Caps will protect against higher rates, given the path dependency² of the underlying surrender risk, they may be a fairly blunt and costly instrument.

An ideal alternative to hedge such a path dependent risk would be a digital option that paid the option buyer a lump sum (1.0 percent of notional in our example) in the event that market rates moved significantly higher in a single three month period. The payout diagrams in *Chart 5* highlight the difference between the standard CMS Cap hedge and the “ideal” Digital Option hedge under a stylized interest rate scenario. Both the CMS and Digital Caps start 3Y forward and end 5Y after their start date with 20 quarterly observations. The strike of both the vanilla and CMS caps is 6 percent. The CMS cap has a standard linear payout while the Digital Cap pays 1 percent of the notional amount if rates move up by 1 percent in a single quarterly observation period. In this example, the insurance company receives the option payout precisely when they expect to experience surrender

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Chart 5: Payout of Digital Cap versus Vanilla CMS Cap under a Stylized Rate Scenario



Source: BNP Paribas

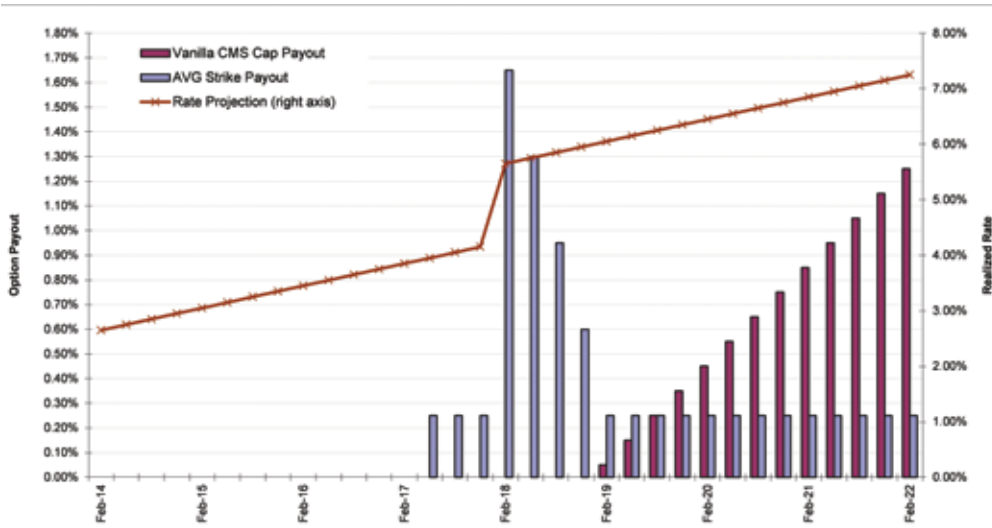
on their general account portfolio. However, while this solution may be ideal for the insurance company, in practice it is extremely difficult for option desks to risk manage this type of digital, forward volatility product and therefore most desks are unwilling to offer this structure in any meaningful size.

The goal then is to find a hedging structure that addresses both considerations. A structure that contains some path dependency to match the underlying surrender risk but does not leave option desks exposed to large digital risk on forward volatility. One possible alternative is an averaging strike cap. The averaging cap pays out if the rate in the current period is higher than the average rate over the past four observation periods. As shown in *Chart 6*, this structure provides a larger payout to the option buyer when there is a significant jump in rates in comparison to a vanilla cap. However, the averaging rate cap will have a lower payout than a vanilla cap if rates are high but are increasing gradually. Importantly, the averaging feature smoothes out the path dependency making the structure easier to risk manage and, consequently, easier to offer in larger size.

Another alternative structure that insurers can consider is a knock out cap. As shown in *Chart 7*, this structure has the same payout as a vanilla CMS cap so long as the underlying interest rate

“ The goal then is to find ... a structure that contains some path dependency to match the underlying surrender risk but does not leave option desks exposed to large digital risk on forward volatility. ”

Chart 6: Payout of Averaging Strike CMS Cap versus Vanilla CMS Cap under a Stylized Rate Scenario



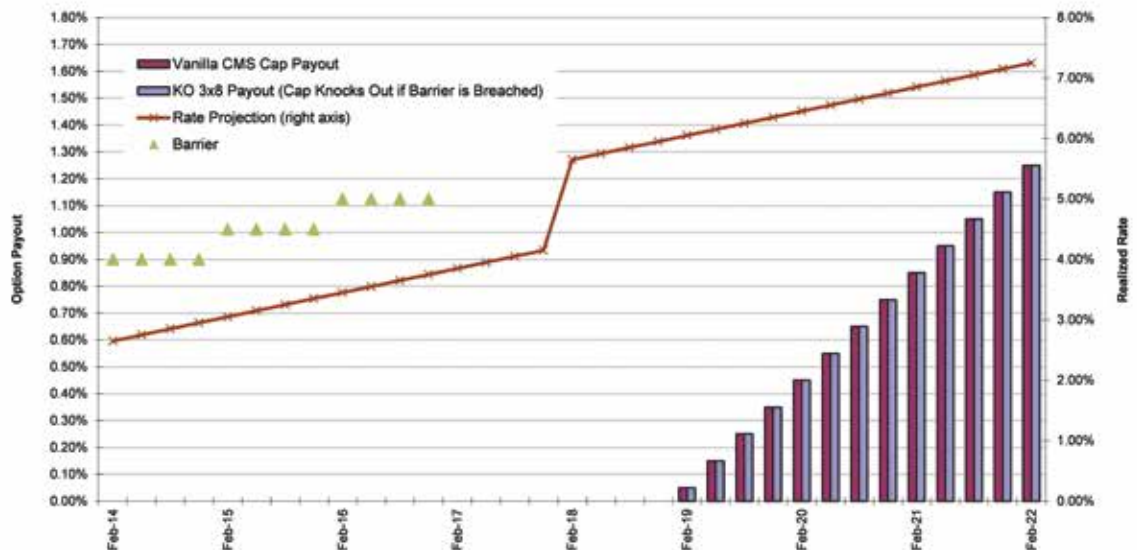
Source: BNP Paribas

does not break the “barrier” in the first three years. In this case, the insurance company is effectively selling the scenarios in which rates move higher in the near term in order to cheapen the protection in the medium and longer term. The knock out cap with barriers set at 4 percent, 4.5 percent and 5 percent for Years one through three respectively costs roughly 25 percent of the cost of a vanilla cap with the same strike. This structure may appeal to those who are of the view that the economic recovery will be tepid for the next few years and rates will remain low in accordance with the forward guidance being provided by the FOMC.

These structured products represent just two examples of how hedging solutions can be tailored to meet the specific needs of an insurance company. However, as we have highlighted, the important consideration when selecting a hedging instrument is to balance the dynamics of the underlying risk that is being hedged with the ability of the market participants to provide liquidity in the necessary size.

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Chart 7: Payout of Knock Out CMS Cap versus Vanilla CMS Cap under a Stylized Rate Scenario



In conclusion, valuations in the interest rate options markets are currently attractive relative to recent history. With the Federal Reserve initiating the unwind of its extraordinary quantitative easing program, there is potential for volatility markets to reprice higher. Given this backdrop, insurers should review their hedging programs to ensure they have sufficient coverage. In addition to vanilla instruments, insurers should also consider tailored solutions, such as the ones presented here, that more closely hedge the path-dependent risk that drives policy surrender.

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ENDNOTES

- ¹ The synthetic portfolio replicates the performance of a laddered bond portfolio invested equally across the USD swap curve with a weighted average maturity of five years
- ² The path dependency of the liability implies that there is an increased likelihood of surrender when rates rise rapidly as the GA portfolio crediting rate cannot keep up with market rates.