Protecting the Value of the Mortgage Pipeline – How Hedging Works!

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Market risk is a reality in any mortgage banking operation resulting from fluctuations in interest rates. Fluctuations in interest rates impact the market value of the applications in the mortgage bank's locked pipeline and the closed loans in the warehouse. A mortgage bank can mitigate this market risk by applying a hedging strategy.

A hedge strategy is generated by applying a complex series of computations and mathematical algorithms. These hedge transactions that are implemented to construct a hedge position are unique in complexity from both a financial modeling and accounting perspective.

Implementing and managing a hedge strategy is both critical to the financial performance of a mortgage bank and involves an extremely complex set of calculations that is likely not within the skill-set of most lenders. This article is designed to provide an introduction to the value of hedging to your company.

A mortgage banking operation that offers mortgage loans to individuals through a Loan Originator is referred to as a retail mortgage operation. A mortgage banking operation that offers loans to consumers through a network of mortgage brokers is referred to as a wholesale lending operation.

Both retail and wholesale mortgage banks experience market risk and need to manage a hedge position. For the purpose of this discussion, we'll assume the mortgage lender initiating a hedge transaction is a retail mortgage bank called New Mortgage Bank (NMB).

The pipeline is an obvious point to begin our journey into hedging. NMB accepts loan applications from individuals looking to obtain mortgage loans. Compared to many other financial transactions, mortgage loans are relatively complex and require a longer period of time to process (20 to 45 days, on average).

As a result, it is important to note that due to the complexity and duration of this process, not all potential loans in the mortgage pipeline will actually fund and become a mortgage loan eligible for sale. While a mortgage application moves through the various stages of origination, the probability of it funding becomes increasingly likely as potential borrowers have fewer alternatives within the timeline, and will be less inclined to seek financing elsewhere.

At a certain point in the loan origination process, a potential borrower will request a guarantee of the interest rate or a rate lock. When a locked loan closes, NMB is obligated to provide the customer with mortgage financing at the locked-in interest rate irrespective of the subsequent changes in the interest rate environment.

Loans with a lock commitment are referred to as the locked pipeline. Once the mortgage note and other documents are signed by the borrower and loan proceeds are distributed, the mortgage loan is formed and is then owned by NMB.

Loans owned by NMB pending sale are referred to as loans held-for-sale, also known as the warehouse. Given that interest rates fluctuate on a daily basis, both the NMB's locked pipeline and warehouse are exposed to interest rate risk from the time a lock commitment is issued to a customer until the loan is sold. Loan sale and hedge transactions occur in the U.S. capital markets and are referred to as secondary marketing transactions.

As a side note about rate locks: Every time a loan is locked with an investor, the investor tracks the degree to which the locked loans are actually delivered to the investor. This is referred to as pull-through. The inverse of pull-through is fallout, which references the loans that were locked but not delivered. The terms are used interchangeably, but have opposite meanings.

The investor places a hedge when a lock is registered. When the locked loans are not delivered to the investor as agreed, the investor incurs a pair-off cost. This cost is recaptured by the investor through providing less favorable rate/price alternatives. The best way to get the best prices from an investor is to have a very high pull-through rate.

The best way to have a high pull-through rate is to have a centralized rate-lock desk and never let originators or brokers lock directly with the investor. The cost of a lock desk will pay for itself with improved pricing from the investors. If the brokers or originators insist on locking loans directly with the investors, do not become a mortgage bank - instead, broker all production.

Value preservation

The fundamental purpose of a hedge transaction is to create an offsetting financial event that is the direct inverse to the value change of the underlying hedged asset. In the case of a mortgage asset which is subject to interest rate risk, if the prevailing interest rate environment increases, there will be a corresponding decrease in the value of the mortgage asset.

Said another way: There is an inverse relationship to the value of a mortgage loan and the change in interest rates. The extent to which the value of the mortgage asset declines relative to the increase in the prevailing interest rate environment is a separate calculation based on the present value of the anticipated future cashflows discounted at the new interest rate.

When the mortgage company makes a loan, it is in effect buying a loan. The hedge transaction that most closely protects the value of the asset is to sell a loan with an identical sensitivity to the change in interest rates. Selling a loan as a hedge transaction is accomplished through forward sales.

The simplest presentation of the hedge transaction is to buy and sell the financial instruments that possess the same sensitivity to changes in the interest rate environment. Originating a loan, buying a loan or having a "long" position in loans all behave with an inverse relationship to the changes in interest rates. Selling a loan as a hedge transaction, or being "short" loans, has a direct or positive correlation to changes in interest rates. If rates go up, the value of the "short" position also goes

up. Thus, by being long and short effectively, the same transaction acts to offset or cancel the value impact of changes in the interest rate environment, which results in preserving the value of the underlying asset.

Theoretically, if interest rates rise, the short position goes up in value the same amount that the long position goes down and the value of the underlying asset is preserved. Calculating and implementing the actual transactions to accomplish this preservation of value event is very complicated.

Hedging is complicated!
Thus far, this discussion of hedging has been fairly straightforward and not significantly complex - some people might find it a bit elementary! The concept of offsetting interest rate risk with an inverse instrument is a simple concept. The actual process by which market risk is managed is very complicated and well beyond the experience base of most mortgage bankers.

It's easy to be deceived by "street firms" offering hedge advice, thus it is essential to thoroughly evaluate and verify any hedge advice received. The best method of ensuring accurate hedge advice is to hire a trusted advisor who will provide guidance in managing market risk.

The management of the interest rate risk in the NMB locked pipeline and warehouse is accomplished by implementing various hedging strategies. NMB should engage the services of a professional hedging firm (PHF) to support and perform the interest rate risk management via a hedge position recommendation based on the NMB's locked pipeline and warehouse.

A PHF provides mortgage bankers with the economies of scale and the expertise to reduce risk and maximize profit in the secondary market. As noted above, not all hedge firms are the same.

The process by which a PHF assesses, and subsequently recommends, hedge transactions to substantially offset the interest rate risk in the NMB's locked pipeline and warehouse is complicated, data-dependent, and iterative. The fundamental principal is to protect the value of the mortgage asset from changes in the interest rate environment.

However, the value preservation of the locked pipeline is complicated by the fact that NMB is obligated to honor the interest rate lock to the borrower, but the borrower is not obligated to accept the loan. The borrower may effectively cancel the transaction at any time with little or no consequence. In effect, the borrower may "put" the rate obligation back to NMB at any time for any reason. The process of calculating the likelihood that a loan in the locked pipeline will close or "pull thru" or not "fallout" and transfer to the warehouse is discussed extensively below.

Prepayment speeds & servicing asset
The value of any financial instrument, whether a government note or corporate bond, will change as the interest rate environment changes. Similarly, the value of a mortgage loan is impacted by changes in interest rates, but it is impacted to a greater extent than a corporate debt instrument resulting from the imbedded put mentioned above.

A corporate debt has a specified maturity; the maturity date of a mortgage note can be changed in any month at the option of the borrower. This is illustrated by a discussion of the servicing asset that is present in all mortgage loans. A servicing asset or loan servicing right is created based on the fees paid for the loan payment collection process. Changes in interest rates affect prepayment speeds or the probability that a borrower will refinance and payoff their current loan at a pace different than initially expected.

If the borrower prepays their loan or "puts" the loan back to the mortgage holder, the company collecting payments will no longer collect a servicing fee. If interest rates go up, the borrower is less likely to refinance their loan thus slowing the prepayment speed and increasing the value of the servicing asset.

The value of the servicing asset is considered in the hedging process and is significant when a mortgage originator retains the servicing rights of the originated mortgage loans. This information is presented to explain some of the uniqueness and complexity in managing the value of mortgage assets.

There are two principal risks associated with a mortgage pipeline and warehouse. First, there is interest-rate risk, which is the risk that un-hedged loans will lose value when rates increase. This is an obvious concept based on the inverse relationship between price or value and rates: rates go up, values go down.

Then there is fallout risk, which is the risk that loans in the pipeline fail to close. The accuracy of this calculation is essential to minimize financial consequence. The quantity of the loans obligated to the future transactions must be accurately identified.

A PHF accumulates pipeline data from NMB and then establishes hedging recommendations based on the results of their hedge model which they developed and update throughout each business day. The hedge model considers several factors to produce its recommendation, including fallout measurement, interest-rate neutrality calculation of expected return measuring risk, and optimizing risk and return.

The PHF will provide a summary output that displays the estimated pipeline profit and loss over a range of interest rates, factoring expected changes in secondary market prices and pipeline fallout at each level of interest rates. The likelihood of loans closing or falling out will be based on an analysis of the lock price relative to current market price, loan status, time to lock expiration, and any other relevant variable.

Fallout measurement
The PHF measures the fallout behavior of the NMB's pipeline on a monthly basis, at minimum, putting particular emphasis on fallout experienced by NMB during periods of extreme market volatility. The fallout patterns of the NMB's historical pipeline behavior form critical assumptions that drive the PHF's calculations. NMB should recognize that the performance of the pipeline hedge is highly dependant upon the ability of historical fallout behavior to predict future fallout.

The past must be indicative of the future to form the basis for the fallout predictions. The PHF also measures NMB's actual fallout behavior relative to behavior predicted by NMB's historical experience and reports any deviations.

It is essential that the NMB's pipeline data that is used by the PHF to calculate hedge positions contain accurate information. One key element in calculating pull-through probability is dependent upon the determination of the point at which a transaction is considered to become a "loan."

Some mortgage lenders include leads in their hedge pipeline. This is a dangerous practice that should be avoided. NMB should clearly define and communicate the exact definition of a pipeline loan to exclude leads.

To be included in the pipeline, the borrower must have selected a loan program, have a property, and have signed the application. Otherwise, calculating an accurate pipeline fallout probability will be difficult, if not impossible.

Hedge strategy

The PHF will identify the combination of forward sales of mortgage securities and optional contracts that will produce the optimal balance of risk and return over a range of various interest rates, which are probability-adjusted based on either historical or market-implied levels of interest rate volatility. In this case, the definition of "optimal balance of risk and return" is biased toward a preference for lower-risk strategies that produce as little volatility in the profit-and-loss statement as possible.

A PHF calculates price movements that are expected to result from mortgage-rate movements for all loans and hedge instruments in the locked pipeline and warehouse. Expected price movements are based on current mortgage security convexity and servicing multiple curves, and are expressed in the hedge model as duration.

Duration is a weighted average of the maturity of a fixed income security's income streams and is often used as a measure of volatility based on a 100-basis-point change in interest rates. As interest rates change, the price of a security is not likely to change linearly, but rather over a curved function in relation to interest rates. Convexity is the measure of how the duration of a bond changes as the interest rate changes. Differences in duration between hedge positions and actual mortgage loans at risk expose NMB to risk of changes in the slope of the yield curve.

The PHF assumes that interest rates cannot be predicted. Using historical levels of interest-rate volatility, it is possible to calculate the probability of rate movements during the duration of hedge. The PHF computes the probability of various interest-rate movements representing a range of statistical standard deviations. In a normal bell curve, or normal distribution, the greater the distance from the mean, the closer to zero the result. Thus, the greater number of standard deviations, the higher the probability.

The PHF computes the gain or loss on the locked pipeline, warehouse and the hedge position given all interest rates for a wide range of hedge strategies. Each gain or loss is then weighted by the probability or likelihood of the related interest-rate scenario. The result is the probability-weighted expected gain or loss for the specific strategy being evaluated.

Calculating risk

The risk of each hedge strategy is determined by calculating the gain or loss on the hedged portfolio of loans in a series of specific scenario. For each scenario there is a target gain or loss. Downside risk-adjusted performance, or downside performance, is achieved if the calculated gain or loss is less than the target gain or loss.

Generalized downside risk-adjusted performance is a more complicated concept calculated as within each Downside Performance result, the probability-weighted average of the squared Downside Performances across each statistical standard deviation scenario.

The hedging experts in a PHF have an advanced understanding of the logarithmic behavior and statistical analysis required to accurately apply the effect of these computations. This concept is essential to effectively calculate a hedge position. Failing to accurately compute and grasp the statistical output could lead to catastrophic financial results.

A risk-return quotient is calculated by adding together each strategy's expected return and GDP using a risk-weighting algorithm. The strategy with the best risk-return quotient represents the optimal balance between risk and return.

The PHF will also calculate the recommended level of hedge coverage as a percentage of the total amount of loans in the locked pipeline and warehouse. The warehouse is always 100% covered. The PHF's traders will maintain the actual pipeline coverage percentage within +/- 6% of the calculated recommendation. If the hedge model recommends a coverage level of 70%, the PHF's traders have the discretion to maintain the coverage between 64% and 76%. This is an important consideration because the cost of the trade transactions to perfectly fine-tune the hedge position could exceed the hedge exposure risk.

A common trade practice in the past known as deltan-neutral dynamic hedging, focused on keeping the hedge in prefect balance. This was an effective hedge, but an ineffective strategy resulting from excessive transaction costs.

Rate shock

NMB should protect itself from losses potentially generated by sudden, large market interest rate moves. While no loss can be perfectly hedged, NMB should seek to prevent one-time market losses from exceeding a rate-shock loss limit given an instantaneous movement of the base 30-year mortgage rate. The maximum instantaneous rate movement experienced by the mortgage market in the past 20 years occurred with a 0.35% rate increase in April 1987, October 1998, and November 2001, and a 0.35% rate decrease in October 1987.

Caution is needed when talking about financial futures as hedge instruments in volatile markets. There are limits to the amount of price change a futures contract can experience in a day. When a price limit is reached, trading in the specific instrument is halted. If the market forces push mortgage securities beyond this limit, it is possible for a futures-based hedge to become ineffective and result in financial consequence.

The PHF will calculate rate-shock exposure on each trading day by multiplying the expected change in pull-through times the expected mortgage-backed security price movement times the total pipeline loan amount. The maximum potential mortgage-backed security price movement will be calculated by multiplying 0.35% (historical maximum) times the expected average duration of the

current par mortgage-backed security. If rate shock exposure exceeds the rate shock loss limit, PHF will take corrective action.

Let's say NMB's primary hedging vehicle is the forward sale of mortgage-backed securities. It is important to evaluate the company through which NMB establishes the sale of securities. The best approach is to limit forward sales contracts to approved dealers, including primary dealers, large regional investment banks and large private investors.

The purpose of this limitation is to minimize counterparty risk and to ensure liquidity. Liquidity is best preserved when mortgage-backed security products are traded by at least two securities dealers.

One could also consider a "cross hedge," which exists when a forward sale of one security type (Fannie Mae or Freddie Mac) is used to offset the market risk in a different type of loan (jumbo fixed-rate loans). This is a common transaction and there is strong support to confirm this correlation, although the price movement is not exactly 1:1. The alternative would be to forward sell jumbo whole loans, but the lack of liquidity in this market limits the effective use of these as forward transactions in a hedge.

Pair-offs occur when the PHF executes a trade that offsets a previous open position. It is important the NMB insist that pair-off trades not be entered into for speculative purposes. It is common for pair-off transactions to comprise a relatively high percentage of the accounting entries.

Hedge accosting

The accounting principals for hedge transactions are established primarily by FAS133 as modified. The underlying objective is to associate hedge costs with the asset being hedged, thus effectively adjusting the basis of the asset to the extent of hedge costs. As an example, hedge costs resulting from a pair-off or other hedge transactions are not recognized as an expense until the asset is sold. Instead, the hedge cost is treated as an addition to the asset basis.

During the course of a business day, NMB offers rate-lock commitments to borrowers to originate a wide variety of mortgage products, often with varying rates and lock-commitment terms. To hedge this exposure, at the direction of the PHF, NMB sells blocks of mortgage securities.

These forward sales carry a specific product type and coupon, for delivery on a specific future month. The difference between actual loans in the locked pipeline/warehouse and the characteristics of the forward mortgage security must be addressed.

NMB should recognize that the rate-lock commitments it grants to borrowers are, in essence, put options (i.e., borrowers have the right, but not the obligation to put loans to NMB, and will tend to do so in greater numbers when rates have moved to NMB's disadvantage), and that the economic position of NMB's pipeline is equivalent to being short a portfolio of put options.

The PHF may periodically use options in addition to mandatory forward coverage to best neutralize interest-rate and fallout risk. The combination of a short forward position and a long call position is termed a "synthetic put."

There are also two options to consider. Call options are purchased to hedge the portion of the pipeline this is unlikely to close. Put options are used to hedge the portion of the pipeline with low fallout computational predictability. If interest rates increase, any losses in the NMB's net long position will be approximately offset by gains on the value of the puts.

Hedge model summary

The PHF hedge model applies a sophisticated and complex process to effectively calculate the secondary marketing transactions necessary to accurately and consistently preserve the value of the underlying NMB's locked pipeline and warehouse. The hedge model considers and assesses all of the necessary elements to reach a trade recommendation to accomplish the asset value preservation objective.

Market risk is a reality in any mortgage banking operation. When a mortgage lender accepts a loan-rate lock request from a customer, at that moment, the lender has entered into a market-sensitive contractual obligation. A mortgage broker that tells a customer they have a lock, but has not locked with the upstream originator of the note, has market risk. A mortgage bank that accepts a borrower's lock but does not lock with the investor has market risk.

The manner in which a mortgage bank mitigates market risk in its locked pipeline and warehouse via a hedging strategy is a complex series of detailed computations and mathematical algorithms. It is essential to obtain external support to effectively structure and implement a hedge program.

The important perspective to accept is that there is interest rate risk or market risk in mortgage lending - this is unavoidable. Simply ignoring it does not remove the risk. The only way to protect from interest rate risk is to have a comprehensive market risk management strategy that could likely include implementation of a hedge program.

All aspects of a hedge program are complicated. An effective hedge program can increase profits and improve a lender's competitive position by providing lower rates.

However, implementing a hedge program is very complex and can add additional risk of loss if the program is not managed correctly. It is essential that mortgage lenders understand that it is very likely that they do not have the background to implement or manage a hedge program. A hedge program is a complicated process requiring graduate-level math and finance training. All lenders need a hedge program, but few lenders have the internal resources to effectively implement and manage a hedge program.

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