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 on a consumer-direct basis 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...
Hedging

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correlation to changes in interest rates. If rates
go up. Thus, by being long and short
effectively, the same transaction acts to offset
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
go up, the value of the "short" position also
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 "fallback" 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
unhedged 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
dependent 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

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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 delta-neutral dynamic hedging, focused on keeping the hedge in perfect 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.

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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 accounting**

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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