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CROSS-HEDGING

A GUIDE TO SAFELY & EFFICIENTLY INCREASE PROFITABILITY IN THE SECONDARY MARKET

Prepared by:

CHRIS BENNETT

Principal

📞 (248) 869-8100

✉ cbennett@vicecapitalmarkets.com

🌐 www.vicecapitalmarkets.com

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Introduction

Capital markets and hedging are vital aspects of the mortgage industry, as these disciplines are the primary drivers of loan revenue and risk management.

This white paper aims to expand the world of capital markets for all mortgage professionals, offer a deeper understanding of the ins and outs of hedging in the current environment and provide basic information on the decision-making process for including cross-hedging as an effective and efficient capital markets strategy.

What Is Cross-Hedging?

cross-hedging [kraws-hej·ing]
noun
>*the act or practice of managing interest rate risk using two distinct assets with positively correlated price movements*

In the mortgage world, cross-hedging involves using a financial instrument, e.g., a mortgage-backed security (MBS), that is not perfectly related to the asset being hedged but has a measurable correlation with its price movements. Before looking at cross-hedging, lenders must first consider the merits and risks of a more direct hedging approach.

Basics of Hedging

Whether it's in the locked pipeline or closed inventory, in hedging, lenders generally want to short the same instrument these mortgages will become.

Every time a lender puts on a hedge, typically a forward sale (a.k.a. a short on MBS), there are only two things the lender can do with the hedge. The lender can either deliver a security into it or buy the position back later, otherwise known as pairing off the hedge. Unless a lender knows the loans will close and be delivered as an MBS, they don't want to short something that could be very expensive to pair off if delivery will not be made.

When hedging, lenders are primarily hedging with to-be-announced (TBA) MBS, which means the lender can deliver any loan that fits the coupon and isn't required to deliver a brand-new MBS. Take the example of a TBA Ginnie Mae (GNMA) II 6.0 coupon security. The buyer could potentially end up taking delivery on a security that might be 2 or 3 years old, which would have a very different expected shelf-life than it would if it were a brand-new security.

When lenders are forming new MBS, they can bid them to dealers as new securities and often receive a premium in the market for that brand-new security. Custom or specified pools often generate a much higher premium, as these have a longer expected life due to slower expected prepayment speeds than an older or more generic MBS.

What Does It Mean When a "Short Develops" in a Security?

A short develops when not enough bonds are being delivered for the number of short positions in the marketplace. When lenders short any kind of security, they have to either pair this position off (i.e., buy it back) or deliver a security to fulfill the earlier forward sale of a MBS.

Sometimes, these situations occur if the market has recently rallied, and there won't be enough production in a particular coupon that lenders are using as shorts to be able to fulfill those shorts. In these situations, a short can occur in the market, and a roll that historically might have been 2/32 or 2.5/32 will blow out to 5/32, 6/32 or an even higher number like 8/32.

In the end, all these positions must be satisfied, so if there are not enough securities created to satisfy those positions, it can create enormous strain in that roll market.

As we like to say at Vice Capital, roll early, and roll often.

Basics of Hedging (cont.)

Risk v. Reward

When possible, it's best to trade with the same instrument, but only if there's a good market for it, because using the instrument that matches the loans being hedged means they should always move up and down in value together. When facing a wide or inefficient market and deciding to cross-hedge, the risk for lenders is that the basis between the instrument and the loan will not change as expected, with no way of knowing if it will change in their favor.

What Is a Good Hedge?

So, what is an example of a good hedge?

Take the example of 5.875% fixed-rate conventional loans. Those loans will more likely be put into a 5.0 coupon Fannie Mae or Freddie Mac MBS, now known as a uniform mortgage-backed security (UMBS).

The most efficient way to hedge those 5.875% loans is by shorting a 5.0 coupon UMBS. Because the 5.875% loans will one day become a 5.0 coupon UMBS, the value of those two will largely move in tandem.

As the market rallies or the market tanks, the value of that loan will go up or down, and the value of that hedge (as a short position) moves in an equal and opposite direction.

Terms to Know

Bid price
The highest price at which broker-dealers will buy an MBS from a seller.

Ask price (or offer price)
The lowest price at which broker-dealers will sell back an MBS short (as a pair-off for an originator) to a buyer.

Bid-Ask Spread
The difference between the highest bid price and the lowest ask/offer price. MBS trade in points and ticks. A point is 1% of the amount of the security, e.g. 99, 100, 103, etc. A tick is 1/32 of 1 point. For example, a price of 100^16.5 would be read as par and 16+ or 100+(16.5/32), which is 100.515625.

Basics of Hedging (cont.)

What is a good market?

Every situation is different, but this is what Vice Capital uses as a rule of thumb:

Bid-Ask Spread

Spread	Rating
1/64	Excellent
1/32	Very Good
2/32	Fair
3/32	Poor
> 3/32	Unacceptable

So, what's a good market for this 5.0 coupon UMBS? Here's a recent real-life example.

On this particular day, the UMBS 5.0 coupon we desired to short was up 3 ticks on the day and had a bid-ask spread of 1.5 ticks. The bid price is 99^29, and the ask price is 99^30 1/2, more commonly referred to as 99^30+.

This means there is a 1.5-tick bid-ask spread, which is a reasonably decent market. The tightest the market often gets is typically around 1 tick. Thus, in this scenario, the lender has taken 5.875% conventional loans and used the matching hedge (e.g., a 5.0 coupon UMBS), and everything works out ideally.

But ideal doesn't always happen. There are times when a lender is originating mortgages for which the corresponding MBS is either illiquid, meaning it has a high bid-ask spread, or has a roll cost that is beyond what fair value for the roll would be. This scenario is where cross-hedging opportunities often come into play.

Basics of Hedging (cont.)

What is a roll cost, and how is the fair value of a roll determined?

In most cases, the price of an MBS in a farther settlement month is less than the price in the current month. That price difference is known as the roll. Billions of dollars in MBS roll transactions (i.e., buying in one settlement month and simultaneously selling in another month) take place every day.

Fair value for a roll is primarily determined based on the difference between the coupon of the security and the short-term risk-free rate of interest (e.g., SOFR, the Fed Funds rate, or the IOER rate). There are other factors, such as prepayment speeds, but this is the primary driver of market-priced rolls. An MBS buyer would prefer to start earning the MBS interest immediately, provided the coupon rate is higher than short-term interest rates.

Alternatively, the buyer can invest in short-term money until the MBS is delivered. Thus, the fair value is based on the difference between what the buyer can earn on the short-term money versus taking delivery of the bond immediately and is the primary basis for determining that roll cost.

For example, a buyer of a 6.5 coupon UMBS security can either take the security in the front (current) month, settle very quickly and receive the security and begin receiving 6.5% interest immediately, or they can buy the security in an out month (typically one month out or two months out) for settlement in 30 or 60 days.

When the buyer elects to buy the security one month out, they would invest in and earn a 30-day Secured Overnight Financing Rate (SOFR), or the 30-day going money market rate, and receive the security at the end of those 30 days.

Calculating the fair value looks at the difference between taking the 6.5 UMBS security in the front month and the 30-day SOFR. If the 30-day SOFR is 5.5%, the fair value of a one-month roll for the 6.5 UMBS security is the 100 basis points difference in the interest earned divided by 12 months, yielding approximately 8.3 basis points, or just less than 3/32nds.

Prepayment speeds can also impact roll costs. In an environment with heavy refinance activity, part of that 6.5 coupon security might be paid off in the next 30 days, leaving the buyer having paid a premium and only being paid back at par on the amount that was paid off early.

Basics of Hedging (cont.)

Under what circumstances would a roll be worse than fair value?

When rolls are more expensive than fair value, the cause is typically a lack of liquidity. Especially in cases of above-market coupons, lack of interest from buyers and uncertainty about market conditions several months out can cause those rolls to be far greater than the fair market value of the roll. This is a prime example of when cross-hedging can substantially reduce costs for lenders.

Factors to Consider in Cross-Hedging

When the corresponding MBS isn't very liquid or has an excessive roll cost, cross-hedging allows lenders to manage risk more cost-effectively. By using an MBS that is much more liquid and still has a high correlation to the loan being hedged, lenders can achieve a high degree of risk reduction without paying the higher costs associated with an illiquid MBS or one with a high roll cost. When faced with this situation, lenders must consider several factors for the cross-hedge.

- Bid-ask spread of different MBS choices
- Roll price out to the desired month of settlement
- Type of security, i.e., UMBS or GNMA II MBS
- Beta weight of the security choices (highly correlated with duration)

The first step in cross-hedging is to assess the risk of using the matching hedge to determine the best option. For example, let's say a lender has $2 million worth of 7% FHA loans that it expects to be able to deliver in a month. When the lender delivers those loans, they will go into a GNMA II 6.5 coupon MBS. But today, if the bid-ask spread was excessive, say 3/32 or more, it would be an undesirable new hedge. In this example, after looking at the bid-ask spread and roll price of the matching, straight-forward hedge, the lender determines the matching hedge carries an expected cost or exit risk that is too high.

Determining Beta Weight

A beta is how much an instrument moves in price relative to a benchmark. The technical definition involves measuring the covariance of a security relative to a benchmark against the variance of that benchmark.

A critical fundamental in cross-hedging is ensuring all instruments being hedged and used as hedges are properly beta-weighted.

Just like a stock that moves at half the speed of the overall stock market would have a beta of 0.50, every single MBS, and therefore every kind of mortgage, has a certain beta weight relative to the benchmark used. The benchmark will always have a beta weight of 1.00 by definition.

For example, if the benchmark security is an MBS 5.0 coupon and for every 1 point that 5.0 coupon MBS moves, the 5.5 coupon MBS moves 80 basis points, then the beta weight of the 5.5 coupon is 0.80 relative to the benchmark 5.0 coupon. In this example, a much higher coupon, like a 7.0 MBS, might have a weight of

Benefits & Challenges of Cross-Hedging

The main benefit of cross-hedging is that it allows lenders to manage risk more cost-effectively.

By using MBS that are more liquid and have a measurable correlation with the matching MBS, and therefore the loans being hedged, lenders can achieve a greater dregree of risk reduction without having to pay the higher costs associated with using a matching MBS.

While cross-hedging can be an effective risk management tool, some challenges are associated with its use. One example is basis risk, which occurs when the correlation changes between the hedging instrument and the loans and locks being hedged. This can lead to variance in gains in either direction for the lender, as the hedging instrument could provide too much or too little protection if those price relationships change.

Another challenge is the complexity of cross-hedging, which requires a deep understanding of financial markets and the relationships between different financial instruments. As such, not every lender will inherently possess the expertise to manage this more sophisticated strategy and may need outside assistance when shifting to this model.

Determining Beta Weight (cont.)

only 0.50 because it might move at only half the amount of the benchmark 5.0 coupon.

Higher note and coupon rates have shorter durations and, therefore, smaller beta weights because borrowers for these loans are more likely to refinance and payoff if interest rates drop.

Conversely, lower notes and coupons have a higher beta weight as they have a longer duration (i.e., borrowers are less likely to refinance or move) and will move more in price relative to the benchmark.

On average, 15-year loans will have lower beta weights than 30-year loans because they have a shorter duration and, therefore, move smaller amounts for every given change in interest rates.

Real-Life Examples

Example #1

UMBS 7.0% Coupons

	Cpn	Month		vs 4:45pm	Bid	Ask
UMBS	7.0 %	Sep	▼	-0"07½	102"03½	102"29½
UMBS	7.0 %	Oct	▼	-0"07½	101"25½	102"27½
UMBS	7.0 %	Sep/Oct	▼	-0"00⅛	0"01⅞	0"10
UMBS	7.0 %	Oct/Nov	▼	0	0"01½	0"12

UMBS 6.0% Coupons

	Cpn	Month		vs 4:45pm	Bid	Ask
UMBS	6.0 %	Sep		-0"05	99"16	99"17
UMBS	6.0 %	Oct		-0"04½	99"15	99"16
UMBS	6.0 %	Nov		-0"05	99"13½	99"15
UMBS	6.0 %	Sep/Oct		0	0"01⅛	0"01¼
UMBS	6.0 %	Oct/Nov	▼	0	0"00¾	0"01¼

In this example, 7.0 coupon MBS are very illiquid because the market has sold off dramatically, and originators are originating loans with rates in the high 7s. However, there are virtually no 7.0 MBS in the market yet. The chart shows that the difference between the bid and offer sides of UMBS 7.0 currently sits over a full point.

This is a position that lenders and capital markets professionals would never want to have to short because – unless they are going to deliver into this exact TBA – every one of these hedges must later be bought back or paired off when loans close and are later delivered.

Real-Life Examples (cont.)

Example #1 (cont.)

This also presents a perfect opportunity to cross-hedge by taking loans that are part of a 7.0 UMBS coupon and cross-hedging them with something more liquid. At the same time, 6.0 UMBS have a bid-ask spread of less than 2/32, which is much more acceptable and indicative of a fairly functioning market for this coupon. Both sides must now be beta-weighted to calculate how much 6.0 UMBS is required to cross-hedge a position of 7.0 coupon mortgages.

In this case, the benchmark is a UMBS 5.5. To cross-hedge properly, everything must be appropriately beta-weighted. If we're looking to cross-hedge 7.0 coupon loans, which are not liquid, with something that is liquid, such as a 6.0 coupon UMBS, it's critical to ensure everything is beta-weighted properly. In this example, a UMBS 7.0 has a beta weight of 0.60, with the UMBS 5.5 as the benchmark and a beta weight of 1.00.

This means that for every $10 million in UMBS 7.0 coupon loans, it takes only $6 million of UMBS 5.5 coupons to properly cross-hedge because for every given point of movement for the 5.5 coupon, on average, the 7.0 coupon is expected to move by 60 basis points, or 60% of that amount.

In this example, the 7.0 UMBS has a beta weight of 0.60, meaning a factored pipeline of $10 million of loans categorized as 7.0 UMBS and using a beta weight of 0.60 yields a beta-weighted amount of

Beta Weights

Coupon	Beta
4.5	1.21
5	1.12
5.5	1.00
6	0.86
6.5	0.72
7	0.60

$6 million. The cross-hedging instrument, the 6.0 UMBS, has a beta weight of 0.86 in this example. So, every 6.0 UMBS counts as 0.86, while every 7.0 UMBS counts as 0.60.

To decide how many 6.0 UMBS are needed, the beta-weighted $6 million of 7.0 UMBS is divided by 0.86, which yields a result of 6.98, or roughly $7 million. This enables the lender to hedge $10 million of factored 7.0 coupon loans with $7 million of 6.0 UMBS coupon securities

Through cross-hedging, the lender can take full advantage of being able to offer this rate and effectively protect itself without the substantial risk of using an illiquid MBS.

Real-Life Examples

Example #2

GNMAII 6.5% Coupons

	Cpn	Month		vs 4:45pm	Bid	Ask
GNMAII	6.5 %	Sep	▲	0*04	101*08½	101*12
GNMAII	6.5 %	Oct	▲	0*03½	101*04	101*08
GNMAII	6.5 %	Nov	▲	0*03	101	101*05½
GNMAII	6.5 %	Sep/Oct		-0*00⅞	0*03⅝	0*04½
GNMAII	6.5 %	Oct/Nov		0	0*02½	0*03¾

UMBS 6.5% Coupons

	Cpn	Month		vs 4:45pm	Bid	Ask
UMBS	6.5 %	Sep	▲	0*04½	101*16½	101*18½
UMBS	6.5 %	Oct	▲	0*04½	101*15	101*17
UMBS	6.5 %	Nov	▲	0*04	101*13	101*15½
UMBS	6.5 %	Sep/Oct		-0*00⅛	0*01¼	0*01⅜
UMBS	6.5 %	Oct/Nov		0	0*01⅜	0*01⅞

Real-Life Examples (cont.)

Example #2 (cont.)

This example illustrates an agency cross-hedge.

Here, the lender has loans that go into a 6.5 GNMA II coupon security. However, as shown in the screenshots, the GNMA II 6.5 coupon securities' roll is trading at 4.5/32, while the 6.5 UMBS coupon security has a roll trading at a fair value of just under 2/32.

Placing the hedge in the 6.5 GNMA II coupon two months out would incur a roll cost of over 8/32 relative to the front month price, significantly higher than fair value. Since the 6.5 UMBS roll cost two months out is just 4/32, we have an expected average pickup of that 4/32 difference by cross-hedging the 6.5 GNMA II coupon loans with 6.5 coupon UMBS securities.

In this example from another day, 6.5 GNMA II securities have a beta weight of 0.65, while the cross-hedge instrument (6.5 UMBS) has a beta weight of 0.70. This means that $10 million of factored loans categorized as 6.5 GNMA II securities multiplied by their beta weight of 0.65 yields a result of $6.5 million in beta-weighted loans that need to be hedged.

To determine how much of the 6.5 UMBS is needed to properly hedge the $6.5 million of 6.5 GNMA II securities, the weighted $6.5 million

Beta Weights

Coupon	UMBS	GNMA
5.5	1.00	0.98
6	0.84	0.80
6.5	0.70	0.65
7	0.58	0.51

is divided by the 6.5 UMBS beta weight of 0.70, yielding a result of roughly $9.3 million.

In short, $9.3 million of 6.5 UMBS coupon securities is needed to cross-hedge $10 million of 6.5 GNMA II coupon loans, as the price for GNMA II 6.5 coupons moves slightly slower/less than the price for UMBS 6.5 coupons.

The risk in this scenario is that the swap between the 6.5 GNMA II and 6.5 UMBS coupons changes to a different degree than expected, but the reward is that this trade has an expected gain of the full 4/32 difference in two months of roll of a 6.5 GNMA II security relative to a 6.5 UMBS security.

Real-Life Examples (cont.)

Example #3

15-Year UMBS Pricing

	Cpn	Month		vs 4:45pm	Bid	Ask
UMBS	5.5 %	Sep		-0*07	99*06	99*14
UMBS	5.5 %	Oct	▲	-0*07	99*05½	99*13½
UMBS	5.5 %	Nov	▼	-0*07	99*03½	99*14½
UMBS	5.5 %	Sep/Oct	▲	0*00⅛	0*00⅜	0*00¾
UMBS	5.5 %	Oct/Nov	▼		-0*01	0*02

30-Year UMBS Pricing

	Cpn	Month		vs 4:45pm	Bid	Ask
UMBS	5.5 %	Sep		-0*08	97*25½	97*27½
UMBS	5.5 %	Oct		-0*08	97*25	97*27½
UMBS	5.5 %	Nov		-0*08	97*24	97*27
UMBS	5.5 %	Sep/Oct		0	0*00¼	0*00⅜
UMBS	5.5 %	Oct/Nov	▲	0	0*00⅛	0*01

Real-Life Examples (cont.)

Example #3 (cont.)

Example 3 illustrates a cross-hedge of 15- and 30-year instruments.

The original instrument of 15-year UMBS 5.5 coupon securities has a bid-ask spread averaging 8/32, so the loans must be hedged with a more liquid security. At the same time, the 5.5 30-year UMBS coupon is much more active and has a bid-ask spread of only 2/32 or less.

The risk in cross-hedging 15-year loans with 30-year UMBS securities is a change in how they perform relative to each other because of possible changes in the yield curve, but the reward is being well-protected by a very tight bid-ask spread and not using an illiquid security.

The chart shows that the beta weight of the 15-year UMBS 5.5 coupon security is 0.74, and the beta weight of the benchmark 5.5 30-year UMBS coupon security is 1.00. With $10 million in factored 15-year loans going into a 5.5 security, the $10 million is multiplied by the 0.74 beta weight, yielding a result of $7.4 million beta-weighted loans being hedged.

Beta Weights

Coupon	30-Year	15-Year
4.5	1.29	0.92
5	1.18	0.81
5.5	1.00	0.74
6	0.78	0.65

Since the 5.5 30-year UMBS security being used as the cross-hedge is also the benchmark in this example, the $7.4 million is divided by the beta weight of 1.00. The result is $7.4 million 30-year 5.5 UMBS securities needed to effectively cross-hedge the $10 million of 5.5 coupon 15-year loans.

Conclusion

The most important aspect of cross-hedging is the proper beta weighting of both the loans being hedged and the security instrument being used to cross-hedge those loans.

As beta-weighting figures can change daily based on fluctuations in the yield curve, across the coupon stack and agency swap levels, it is critical to have reporting systems that properly calculate and track current beta-weighting levels.

The primary considerations in deciding whether or not to employ cross-hedging include the bid-ask spread, roll cost and the possibility that a short could develop in the market on an illiquid security. Cross-hedging avoids the possibility of a short developing on an illiquid security because liquid securities generally do not run into short squeezes as the settlement date approaches.

While it's recommended that lenders ensure their positions are squared up significantly earlier than one to two days prior to the 48-hour MBS settlement notification date, cross-hedging helps to additionally manage this risk by avoiding securities where a short is more likely to develop.

Ultimately, the key to cross-hedging lies in understanding how to conduct the cost/benefit analysis so that lenders can adequately protect themselves at the least possible cost.

About the Author

Vice Capital Markets Principal Chris Bennett began his career as a trader at the age of 15 in the commodities futures markets, starting with a small stake he had saved up from mowing lawns in the neighborhood.

After receiving his degree in economics from the University of Michigan, Chris began his 30-plus year career in mortgage banking as a trader with a mid-sized bank and later as head of Capital Markets for a nationwide independent mortgage company.

In 2001 he founded the hedge advisory firm Vice Capital Markets, now in its third decade of service to mortgage lenders of all types and sizes across the country. Today, one in every 15 mortgages originated in the U.S. are traded by Vice Capital or hedged using its proprietary software.

He can be reached by calling Vice's trading desk at (248) 869-8100 or via email at cbennett@vicecapitalmarkets.com.

About Vice Capital Markets

Since 2001, Vice Capital Markets has expertly navigated interest rate risk and driven profitability on over $1 trillion in MBS trades and mortgage-related transactions for a diverse range of financial institutions. Utilizing proprietary risk-management models and an advanced investor and agency platform, Vice Capital has enabled clients to enhance their secondary market strategies and achieve optimal sales gains. With traders averaging over a decade of experience, Vice Capital brings the expertise necessary to tackle market challenges and consistently deliver secure and effective profit growth for its clients. To learn more, visit our website or call (248) 869-8100.