

The Convexity Maven

A Commentary by Harley Bassman

June 1, 2022

“The Water is Warm in the MBS Pool”



As fig leaves were replaced by loin cloths, so too later were suits of armor succeeded by suits by Zegna. Was this a societal advancement, perhaps.

In the world of financial economics, barter advanced to metal coinage, and eventually gold-backed money morphed into Government-backed fiat currency.

For better or worse, this has accelerated expansion of our economy; but more important, it has democratized available credit to the expanding middle classes.

Of all recent financial innovations, none has been more impactful than the creation of Mortgage-backed securities (MBS). This was the missing link and public policy good that allowed national saving to fund private home ownership for the average citizen.

A high-level discourse on the value and valuation of MBS is near to my heart as I spent most of my Wall Street career engaged in Mortgage bond structuring and trading, starting in 1985 when as a young pup I sat on the 36th floor OLP Merrill Lynch trading desk surrounded by an eventual all-star team of financiers.

Not to bury the lead, let me state clearly that vanilla MBS are crazy cheap (on both a historical and analytical basis), and I would encourage financial professionals to carefully consider them for client portfolios.

MBS: A Bit of History

Let's dial back to Jimmy Stewart and "It's a Wonderful Life", the Frank Capra holiday classic released in 1946. Here, the Bailey Brothers Building & Loan takes in deposits and lends these funds so average income families can buy a house, too often from the cringe-worthy Mr. (Henry) Potter.

There are three huge problems with this sort of finance; the first (ignoring fractional leverage) is that the bank is limited to lending only its total deposits. The second is the risk they must pay depositors more than the fixed-interest they charge for the mortgage loan. And the third is the liquidity risk of a "bank run" if the depositors want their money back before the loan is paid off.

In reverse order, the creation of deposit insurance via the FDIC in 1934 effectively resolved the "bank run" risk; and offering floating-rate business loans reduced funding-rate risk. But home buyers demanded a fixed-rate loan so they could properly budget a home purchase with no interest rate risk.

Ideally, banks would like to examine the credit of the borrower, make the loan, and then sell it to an investor at a slightly higher price (lower rate) to lock-in a profit. But no rational person would blindly buy a loan to a single individual.

Thus, the creation of the Government National Mortgage Association (GNMA – pronounced Ginnie Mae) in 1968, and later of Fannie Mae and Freddie Mac.

These Government Sponsored Enterprises (GSEs) would "buy" loans from banks that fit certain guidelines (FICO and size) and "pool" (combine) loans of similar interest rate and maturity into a giant single security (\$-billions) that they would sell back to the banks (less a fee). To make these securities attractive to investors, the **GSEs would guarantee the timely payment interest and principal**, effectively making them as **safe a US Treasury bond (UST)**.

This expanded the banking system's deposit base to include the assets of Insurance/Pension funds so banks could recycle deposits to new mortgage loans.

MBS and Convexity

Despite the fact that Wall Street hired a stadium of newly minted Physics PhDs to model and value MBS bonds, by construction MBS are rather simple since there is no risk of default; the only question is the maturity date of the bond.

An ordinary US Treasury bond that matures in ten years pays interest every six months and returns the principal in a single payment at the end of year ten.

An MBS level-pays the interest and some principal every month, until the loans “pooled” into the bond are all paid off. This could take thirty years, or perhaps only a few months, since **the homeowner** (borrower) **has the option** to pay off the loan early at no cost – this is called a “prepayment”.

Estimating prepayments is the “magic of mortgages” because they can happen for a variety of reasons. Clearly if one borrows money at 4% and rates then drop to 3%, one will “refinance” the loan to the lower rate. So, the old 4% loan is paid off, and a new 3.0% loan is created.

In this situation, owners of this 4% MBS bond will receive their money back early; but they may have to reinvest into a lower rate 3% MBS (ouch). If rates rise to 5%, the borrower has no incentive to refinance, so they will keep the loan for a long time; so, the MBS owner earns only 4% in a 5% world. This is known as “extension risk” (double ouch).

Other reasons a prepayment might occur early include a home sale when one moves for a job, upsizes or downsizes, divorce, default, or granny dies.

Significant computational horsepower is required to discern the correlation between interest rates, the economy, demographics, and home prices.

Versus corporate bonds, MBS investors are swapping **Credit** risk (**if** principal will be returned) for **Duration** risk (**when** principal will be returned). Prepayment risk almost always works against the MBS owner and can be a significant problem for asset/liability managers. Prepayment risk is why MBS bonds yield more than US Treasuries, and the skill here is to evaluate that risk.

While MBS bonds are rock-solid safe, **they are negatively Convex**; this means that if rates decline by 1%, a 4% MBS might go up three points in price, but if rates increase by 1%, a 4% MBS bond might drop by five points in price. The question is how much more yield than a US Treasury should one demand to take such a Convexity Risk – what is the fair value of this prepayment “option” ?

You should now appreciate how I earned the moniker: **The Convexity Maven**

Dissecting MBS

MBS bonds are actually quite simple in construction, the problem is that many of the economic inputs are not transparent, so the valuation process is murky.

Let's ignore the fact that MBS return some principal monthly, and model them similarly to a regular UST 10-year bond. To illustrate, an MBS is a package of:

Long a 3.0% coupon UST with ten years to maturity, priced at par (100).
Short a call option on this UST, strike = 100, with an expiration in thirty years.

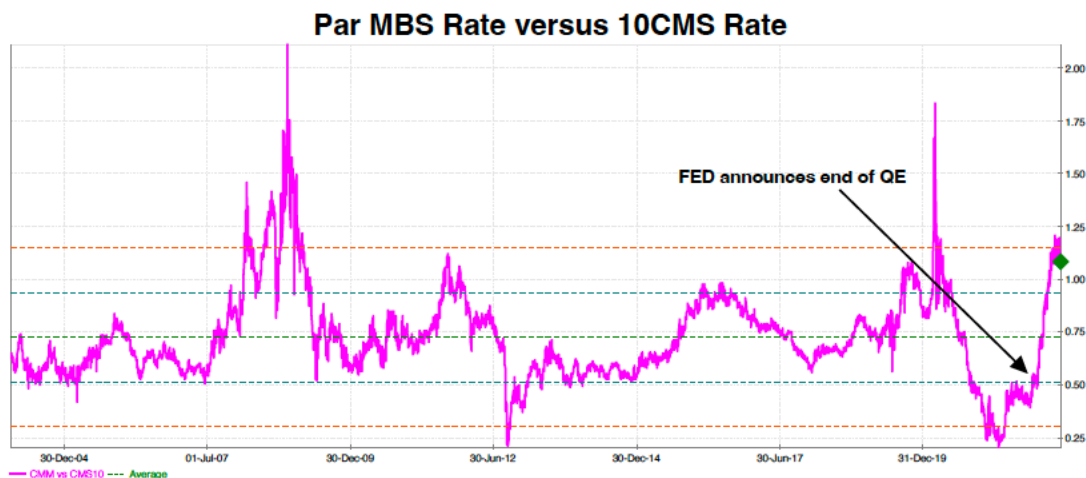
If the option costs 6 points, then the package is worth \$94 (\$100 – \$6).

Using a standard bond calculator, a 10yr bond, with a 3% coupon, at a price of 94 has a yield of 3.73%. So, the "spread" of the MBS over the UST is 73bps.

There are many inputs required to value the borrower's right to prepay, but the most significant is the proximity of the MBS bond to the strike price of 100.

To create an apple to apples construction, Wall Street will consider the yield of a synthetic MBS bond always priced at 100, known as a Constant Maturity Mortgage (CMM), and compare this to the constant ten-year interest rate (CMS).

I consider this **-koshu line-** spread to be the best macro indicator of MBS value; and at a recent spread of **-muscadine dot-** 115bp it is nearly two standard deviations above its long-term average of 73bps.



Source – Unless noted, all charts are Credit Suisse LOCUS

This is why I have been pounding the table that MBS are crazy cheap. While MBS are not a "free lunch", and their prices will lag if Rosy and Lacey are right about rates returning to 1%, one is still being well-compensated for such a risk.

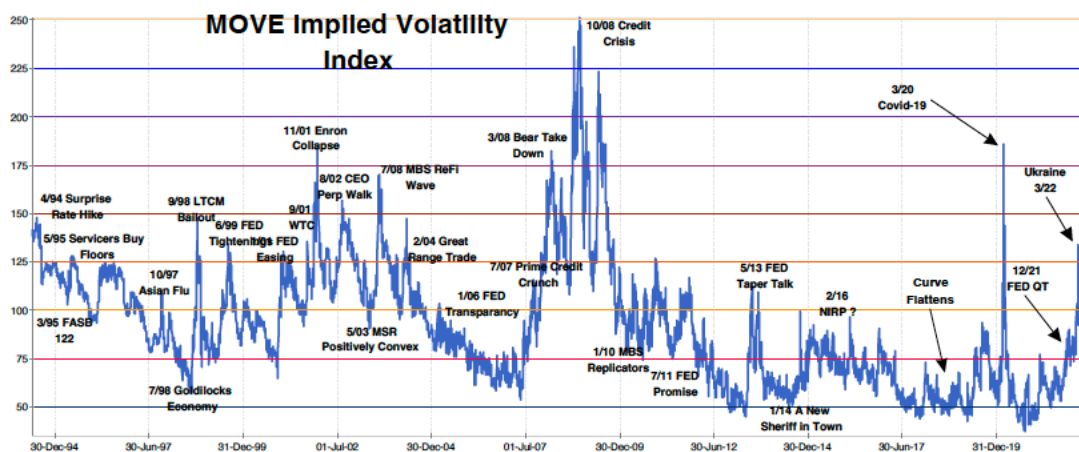
MBS – A Deeper Dive

If you are an investment civilian, please skip ahead to the end page; otherwise, let's dig deeper. There are five inputs into the Black-Scholes option formula.

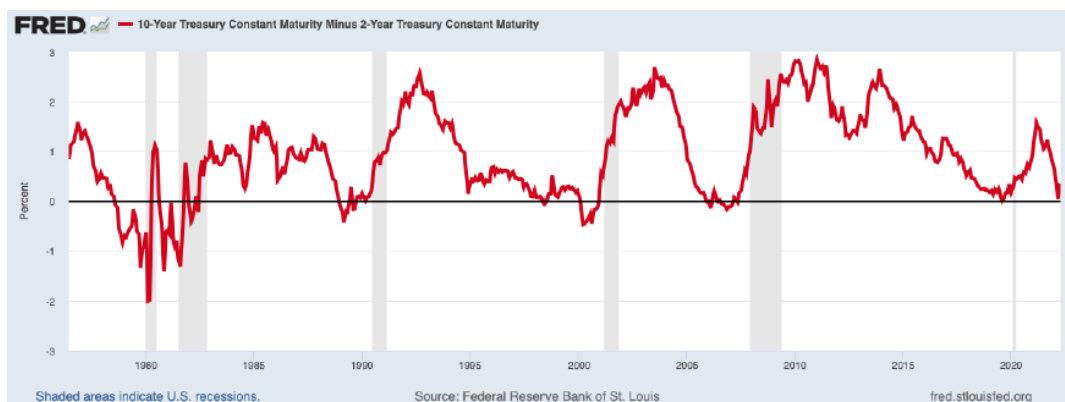
- 1) Asset price
- 2) Strike price
- 3) Interest rate
- 4) Expiration date
- 5) Implied Volatility (Ivol)

The first four are readily transparent, with Volatility being the secret sauce.

One of the reasons the MBS spread (CMM vs CMS) widened from the mid-40s to the low 100s was the elevation of **-carmenere line-** Implied Volatility. All else equal, an increase in Ivol will result in a higher option price.



The flattening **-malbec line-** Yield Curve (the spread between short and long rates) also increases the option value. Without going full nerd, the model heightens the odds the option will be in-the-money and a prepayment will occur.

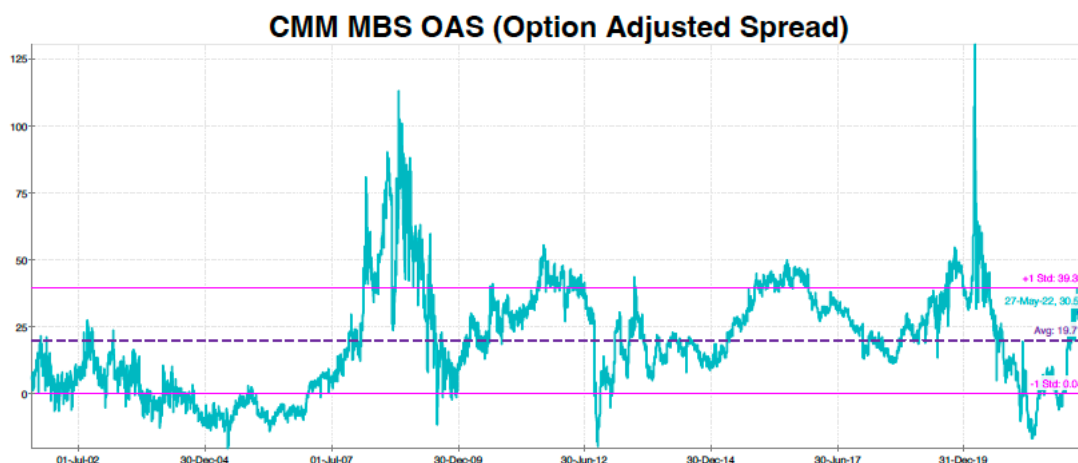


As noted, there are many other factors that drive prepayments, and thus the value of the option the MBS owner is short to the borrower. These include:

- 1) The Economy driving job transfers, or upsize/downsize, and foreclosure
- 2) Home price appreciation enhances "cash-out" refinance
- 3) Yield Curve shape can encourage Adjustable-rate mortgages (ARMs)
- 4) Loan Size – smaller loans prepay slower (cost as percent of loan balance)
- 5) Location – blue states are more mobile (services vs goods employment)
- 6) State taxes – some states charge a mortgage origination fee

To model this panoply of variables, some of which are coincident and others that are orthogonal, Wall Street quants locked in dark rooms with buckets of Red Bull sort through reams of data to model the net impact and make projections.

The quants create a theoretically perfect replication of a MBS using only liquid options and derivatives and subtract that value from the MBS yield. What remains is the **-marselan line-** Option Adjusted Spread (OAS); this is the excess value / income of owning the MBS instead of the modeled replication.

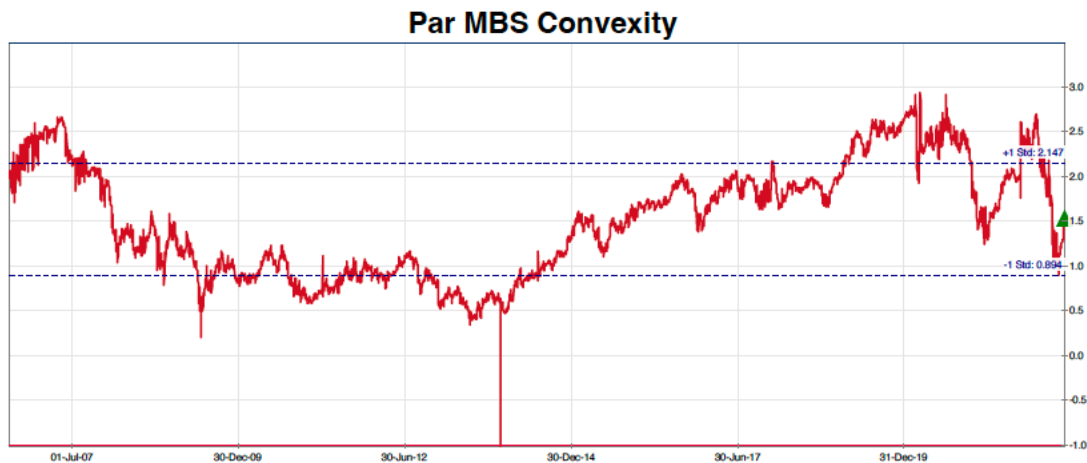


While I will not say the OAS is "right", it does generally capture the relative value of MBS over time. The caveat is that there are times when MBS look optically expensive. This happened during the 2003 to 2005 period where funding advantages existed that allowed MBS owners to lend their bonds to short sellers for a hefty premium of 50bp to 75bp annually.

To be clear, a high OAS does not always mean that MBS are a good investment. The OAS is simply the net value of the MBS over the cost of buying back all the embedded options and rate hedges. A high OAS when Ivol is low only means you are selling Ivol less cheaply. Presently, one is selling the embedded prepayment option at an Ivol above a MOVE Index near its highs, this why I think MBS are such a terrific investment.

During the process of analyzing MBS bonds for relative value, the models all compute other useful metrics, such as the Option Adjusted Duration (OAD) and the Option Adjusted Convexity (OAC).

The **-cahors line-** OAC below is helpful as it indicates that MBS are less negatively Convex, which means their price performance profile is more stable. A few pages back I suggested a MBS might rise by 3 points versus fall by 5 points for opposing 100bps changes in rates, a convexity of -2. At a convexity of -1, the MBS might rally by 4 points versus a decline of 5 points, clearly a better bond.



Derivative geeks would have predicted this since Convexity is inversely proportional to the level of Implied Volatility. As a reality check, it is nice that the OAS model confirms our intuition.

Investing in MBS

If one owns single security seven-year to ten-year maturity US Treasury bonds and has an intermediate term holding period, notwithstanding the tax implications, swapping out of those into near par-priced MBS looks good. Presently it's a sell at ~2.73% vs a buy at ~3.88% (+115bp) with no credit risk.

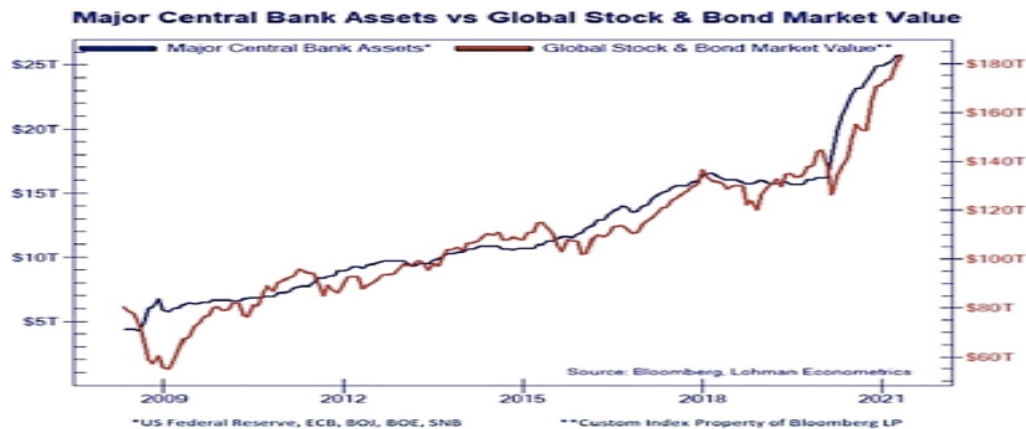
Similarly, moving out of Investment Grade (IG) mid-duration (7yr-10yr) funds into Mortgage-centric vehicles also could be a switch worth considering.

Of course, the super charged way to play the idea is to invest in Mortgage REITs; which I detailed in ["The REIT Money Machine"](#) – September 14, 2021. This can be a risky venture since there is a lot of active management that is not always done well. At that time, I said "MBS are not a value proposition" since the spread was only 50bp with the MOVE in the mid-60s. With a current spread of 115bp and the MOVE near 105, mREITs are a much better value.

Closing Comments:

I am exhausted from the usual suspects insisting the FED did not “print money”; of course, they did. At least these trolls have given up on saying that inflation is “transitory”; unless it is offered in the same context as “life is transitory”.

The major Central Banks printed ~~-tannat line-~~ money which led to ~~-pais line-~~ inflation of financial assets. We are now going to find out what happens when the toothpaste of fiat currency is forcefully jammed back into the tube.



I will stipulate that inflation will continue above 5% for the balance of 2022, and perhaps well into 2023. For a variety of reasons, I do not know whether interest rates will also reach that level. This would create negative “real rates” (where nominal rates are below the inflation rate), which would be nirvana for the FED.

The US has too much debt, which can only be reduced via default or inflation, where the latter is a slow-motion default. As such, inflation will quickly reduce our Debt vs GDP ratio while low interest rates will support the stock market.

I am waiting for one more card to be turned over. MBS cheapened by 75bps as soon as the FED announced they would stop buying; let’s see what happens when the FED lets their balance sheet run down by up to \$95bn/month.

Remember: For most investments, sizing is more important than entry level.

Harley S. Bassman
June 1, 2022

Follow me on Twitter: [@ConvexityMaven](https://twitter.com/ConvexityMaven)

Your comments are always welcome at: harley@bassman.net

If you would like to be added to my distribution, just ping me.
For reference literature on the financial markets - particularly about options and derivatives - I will immodestly direct you to my educational archive at:

<http://www.convexitymaven.com/themavensclassroom.html>

If you still have kids in the house, please take a vacation that is more interesting than the Four Seasons, Costa Rica – life is not a dress rehearsal. Turn off the Crackberry (did I just date myself ?) and explore with the family. You don't need to break the bank, rent an RV and see the U.S. We traveled with our four kids on five incredible RV trips.

<http://bassman.net>

Special credit to [Gerard Minack](#), the best macro analyst on the planet.



"I'm looking for a hedge against my hedge funds."

Robert Mankoff – The New Yorker

The Convexity Maven ("CM") is a publisher, not a registered investment advisor, and nothing in CM's Commentary is intended, and it should not be construed, to be investment advice. CM's Commentary is for informational and entertainment use only. Any mention in CM's Commentary of a particular security, index, derivative, or other instrument is neither a recommendation by CM to buy, sell, or hold that security, index, derivative, or other instrument, nor does it constitute an opinion of CM as to the suitability of that security, index, derivative, or other instrument for any particular purpose. CM is not in the business of giving investment advice nor advice regarding the suitability for any purpose of any security, index, derivative, other instrument or trading strategy, and nothing in CM's Commentary should be so used or relied upon.

All ideas offered in these Commentaries are my own, and do not represent, nor have any relationship to, those of Simplify Asset Management.

CM hereby expressly disclaims any and all representations and warranties that: (a) the content of its Commentaries are correct, accurate, complete, or reliable; (b) any of its Commentaries will be available at any particular time or place, or in any particular medium; and (c) that any omission or error in any of its Commentaries will be corrected.

Although from time-to-time CM's Commentaries may link to or promote others' websites or services, CM is not responsible for and does not control those websites or services.

CM's Commentary is published and distributed in accordance with applicable United States and foreign copyright and other laws.

For the record, the Convexity Maven publishes Commentaries and maintains a website as an exercise of the unlimited right to offer non-commercial speech and publication under the First Amendment of the United States Constitution; notwithstanding our past President.

At any given time, CM's principals may or may not have a financial interest in any or all the securities and instruments discussed herein.