The Convexity Maven

A Commentary by Harley Bassman

January 26, 2023

"Leverage is NOT a four-letter Word"

I offered in "Lurking at the Scene", March 16, 2021, that "it may not be a coincidence that when financial markets implode, short Convexity can be found lurking near the scene of the crime"; this view has not changed.

Thus when trading options (explicitly or implicitly), one should take care to fully appreciate the unbalanced risk profile of Convex assets.

A feature (not a bug) of options is that they are an extremely efficient way to increase (or reduce) the leverage of a position; and this often leads to some confusion since **Convexity is not Leverage**.

Convexity measures the "relative" profile of an asset for equal changes in some risk vector, while Leverage measures the "absolute" profile of an asset for changes in some risk vector.

Notwithstanding the (often) negative connotations associated with it, let's explore how Leverage can improve portfolio performance when used correctly.

Let's start by further defining the difference between **Convexity** and **Leverage.**

Imagine betting on a coin flip such that you receive $3 for "heads" but you pay $2 for "tails". Assuming the odds of winning or losing are the same, this would be a positive Convexity bet because you win more than you lose.

Conversely, again assuming a (fair) coin flip bet of equal odds, if you could lose $5 and only win $4, that would be a negative Convexity bet.

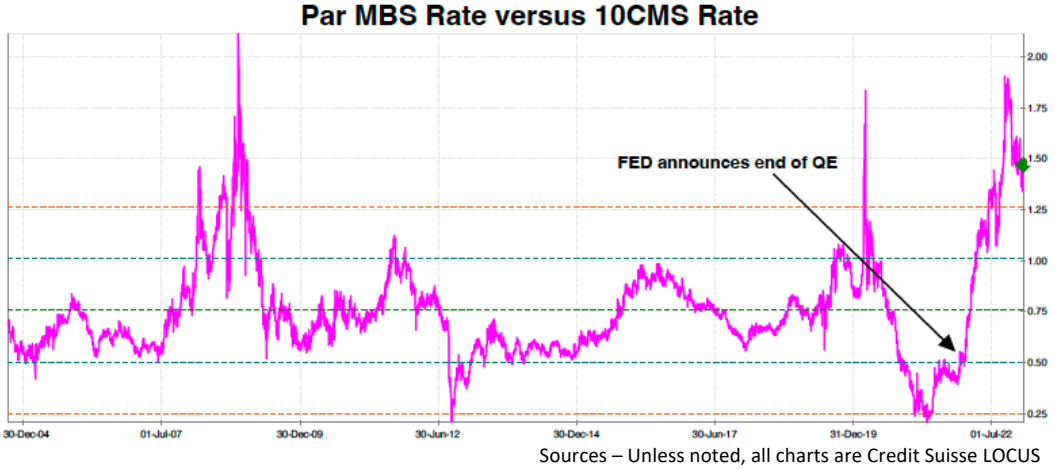
For completeness, a game where you would win or lose equal amounts is a zero Convexity (linear) bet.

For a real-world example, the most recently issued UST 10yr bond was trading at $105.06 to yield 3.51%. If rates decline by 100bps to 2.51%, the price of this bond will increase by 8.90 points to 113.96; and if rates rose to 4.51%, its price will decline by 8.10 points to 96.96. This bond is positively Convex as it gains ($8.90) more than it loses ($8.10) for equal changes in interest rates.

Conversely, let's consider a Mortgage-backed Security (MBS). The FN 4.50% coupon MBS was trading at 98.44 to yield about 4.75%. While not an exact science, it is modeled that if rates declined by 50bp, the price of this bond will rally to 100.11, up 1.67 points. If rates rose by 50bp, it is expected that this bond will decline to 96.22, down 2.22 points. As such, this bond is negatively Convex as it loses more than it gains for equal changes in interest rates.

This is the primary reason MBS yield more than a similar UST. Since neither bond has credit risk, the yield spread mostly reflects the Convexity difference.

I often use the -rozeve line- yield spread as the best indicator of MBS value; notwithstanding that the Yield Curve and Implied Volatility are important, too. This spread has narrowed, but at 148bp MBS are still a better value than USTs.



Sources – Unless noted, all charts are Credit Suisse LOCUS

As described, Convexity is a measure of the "relative" performance of an asset to changes in a risk vector. This is, again, entirely different from Leverage, which is an "absolute" measure.

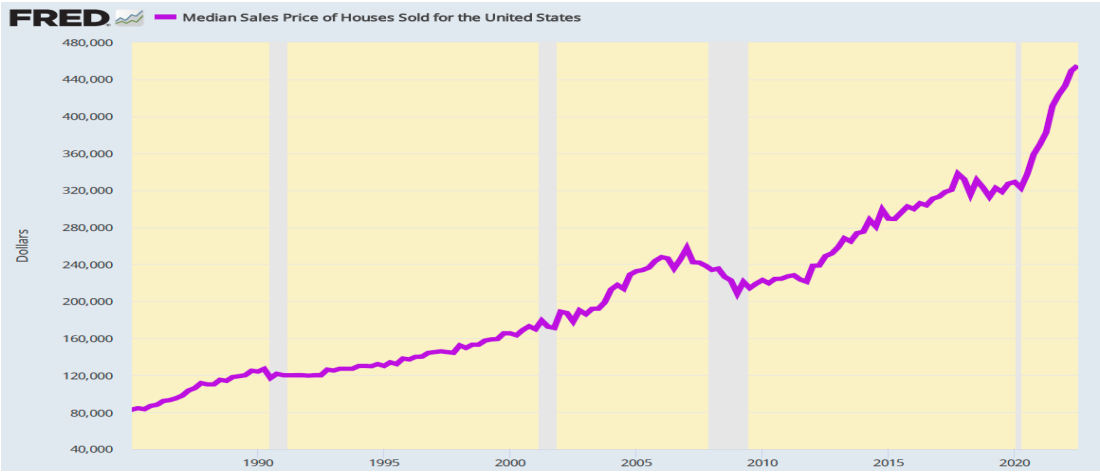
Although rarely considered as such, the most common use of Leverage by ordinary people (civilians) is the purchase of a house. Common practice is to offer a 20% cash down payment along with borrowing 80% from the bank.

For example, a $500,000 home could be purchased for $100,000 in cash and a $400,000 mortgage. Some would say this is a four to one leveraged purchase since four dollars of debt is used for every dollar of cash. Others would note this as using five to one leverage since only one dollar of cash is used to control five dollars of assets. Both are right.

The magic of leverage here is that a 10% increase in the home value results in a 50% return on the cash invested. Specifically, if the house price rises from $500,000 to $550,000 but the loan amount is still $400,000, the owner could reap $150,000 on a sale – a 50% return on a $100,000 cash investment.

Ignoring the current controversy of red-lining and reparations (at least in SF), it is the leverage of home ownership that mostly built the wealth of the Boomers.

The average Boomer was 30 years old in 1985 when the -lila line- median house price was $82,800. Assuming a 20% down payment of $16,560, the Boomer borrowed the $66,240 balance.



The median house price in early 2020 (pre-Covid and FED shenanigans) marked at $329,000, a 297% increase. But wait, the return on the actual cash invested is nearly 1400% when one compares the $16,560 down payment to the net profit of $246,200. Marking to the post-Covid median price of $454,900, the $16,560 cash invested returned a profit of 2647%.

Of course, leverage works both ways; a 10% decline in an asset purchased on a five to one basis will result in a 50% loss on the cash invested.

This was one of the root causes of the Great Financial Crisis, as borrowers were allowed to purchase with perhaps only 10% down, or maybe less. As such, it often only took a slight decline in home prices to completely evaporate the cash invested, thus motivating the buyer to "mail in the keys".

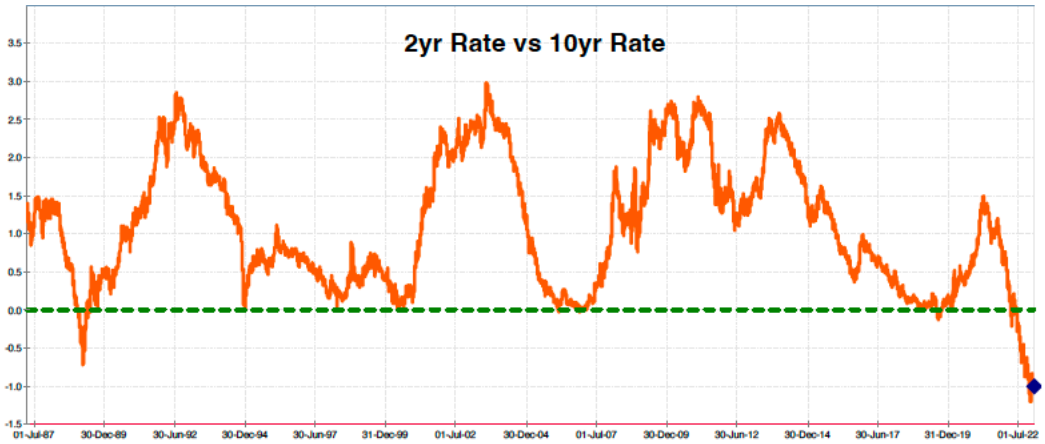
The evil genius here for some speculative house flippers in the early 2000s was the effective combination of Leverage and Convexity. If a buyer could secure a 10% down "non-recourse loan" (the bank can't come after your other assets if you default), they could earn a 10X profit if prices rose, and lose only their 10% down payment if prices fell. If the house price rose by a mere 10% they covered their cash investment, and any further increase was pure gravy.

Were these speculative flippers "bad guys"; that's unclear. If the bank gleefully pockets a fee to make a non-recourse loan with only a 10% down payment in a frenzied market where prices were already up 50% from 2001 to 2007, well, both sides were consenting adults.

Circling back to the difference between Leverage and Convexity, notice that in our first example, the five to one leverage ratio was constant. A 10% increase in the asset price led to a 50% increase in the cash return; a 20% increase would create a 100% cash return. And vice versa in reverse. In contrast, a convex asset offers a variable return profile.

Using Leverage for Profit

Financial pundits have been bloviating about the inverted -marnats line- Yield Curve (where short-term rates are above long-term rates) and how this often presages a recession. I suppose that is interesting to some, but I am more focused on the magnitude of this inversion, and the likelihood it will continue.



No matter one's view of (past and) future FED policy, this level of inversion is totally anomalous to the past 36 years; and likely to soon be reversed via some combination of lower short-term rates or higher long-term rates.

When the investment professionals want to profit from lower short-term rates, they employ huge amounts of leverage, often via futures contracts. The reason is simple; the unlevered return profile of a -floym line- UST 2yr is rather spare. Even a large 200bp rate decline would offer only a skimpy price return of 3.8%.

	-200 **2.17%**	*-150* **2.67%**	*-100* **3.17%**	*-50* **3.67%**	**4.17%**	*50* **4.67%**	*100* **5.17%**	*150* **5.67%**	*200* **6.17%**
UST 2yr	103.91 3.8%	102.95 2.8%	102.01 1.9%	101.07 0.9%	100.14 0.0%	99.23 -0.9%	98.33 -1.8%	97.43 -2.7%	96.55 -3.6%
ST Futs Strategy	$29.65 16.6%	$28.55 12.3%	$27.50 8.2%	$26.44 4.0%	$25.42 0.0%	$24.40 -4.0%	$23.38 -8.0%	$22.36 -12.0%	$21.38 -15.9%
Strategy +90 days	**$30.06** 18.2%	**$28.96** 13.9%	**$27.91** 9.8%	**$26.85** 5.6%	**$25.83** 1.6%	**$24.81** -2.4%	**$23.79** -6.4%	**$22.77** -10.4%	**$21.79** -14.3%

Futures contracts offer an easy way to obtain leverage, often as high at twenty to one. (They also offer advantageous borrowing rates, but more on that in the next section.)

While futures are easily accessible to professionals, they are often challenging for "civilians". Many top-tier investment firms do not support futures trading, thus requiring one to open (and fund) a separate account with an online broker. Not only is opening a new account a bother, but it also reduces efficiency because funding requires transferring assets between firms.

This void can be filled via a -royz line- **Short-term Treasury Futures Strategy**. This Strategy can offer about five to one leverage to the direct performance of the most current CBOT 2yr futures contract; and at this ratio, offers roughly the same duration (interest rate risk) as a UST 10yr.

The math for this strategy is (almost) simple. At issue, $25 of cash was mostly invested in ultra-short-term US Treasuries, that presently yield 4.39%.

This "cash" is used as (margin) collateral to purchase 15 TUH3 contracts for every 25,000 Strategy units, or 1 contract per 1667 units. With a contract size of $200,000 of 2yr USTs, each unit controls ~$120 of USTs ($200,000/1667), and relative to a unit value of ~$25, that is a leverage ratio of ~4.80 to one.

The TUH3 contract expires in March 2023, so sometime in late February this contract will be "rolled" to the TUM3 June 2023 contract, and so on; the Strategy is always long the most liquid "front" contract.

The Cost of Money

A key consideration for using leverage is the "cost of money" – better known as the interest rate. For a variety of reasons (beyond our scope), the cost of borrowing via futures contracts tends to be advantageous relative to most other sources of funds.

The hard part….you can skip ahead….

General collateral "Repo" rate – 4.56%
UST 2yr linked to TUH3 future – 4.21%
"Special" Repo rate for TUH3 – 3.79%

Borrowing money on Wall Street is akin to the waiter asking which brand of Vodka you want in your Martini. If you ask for the "house" brand, you pay the general "Repo" rate, but if you ask for Grey Goose, you pay the "Special" rate.

When you buy the futures contract (TUH3), you are effectively long the "linked" UST 2yr yielding 4.21% and funding by borrowing at the "Special" rate of 3.79%. (The Special rate varies a lot and can be any number below the general rate, depending on market conditions.)

Let's knit this altogether. The Strategy owns 4.8x of the futures, so it is earning 0.42% (4.21% minus 3.79%) levered 4.8 times. This adds 2.02% (0.42% * 4.8) to the Strategy. On top of the 4.39% earned on the cash, the Strategy has a static yield 6.41% annually, or 1.60% every 90 days (quarterly).

This math underpins the -zhaver line- return profile for the Strategy +90 days. Notice the "unchanged" return is the 1.60% described. The reason we do the calculation in 90-day increments is that the futures contract is rolled each quarter, with a different "Special" Repo rate each cycle.

The Magic of Leverage

Noodle this: The Short-term Treasury Futures Strategy has a current base case yield of 6.41% with a 100bp market price risk of roughly +/- 8.10%. The UST 10yr has a 100bp market price risk of about +/- 8.50%, but yields only 3.57% !

There is no free lunch, owning this Strategy instead of UST 10yr over the past nine months would have been a disaster as the curve inverted. But with the FED near the end game, you can take a similar duration risk while picking up 284bps. If the FED holds rates here for all of 2023, you earn the higher static yield until the rate cutting process starts and jams the 2yr rate back below the 10yr rate.

A similar concept is available to gain leveraged exposure to the belly of the curve via an **Intermediate-term Treasury Futures Strategy**.

In this Strategy, one can obtain about 3x leverage of the CBOT TYH3 futures contract, which closely tracks the UST 7yr bond. (Yes, it is called the ten-year futures contract, but it mimics the seven-year.)

Here, the -bloy line- is the price and return profile of the current UST 7yr, followed by the -laym line- of the Strategy and the -fershke line- three months hence. While this Strategy tracks the performance of the belly, its duration (risk) profile more closely matches that of the UST 30yr bond.

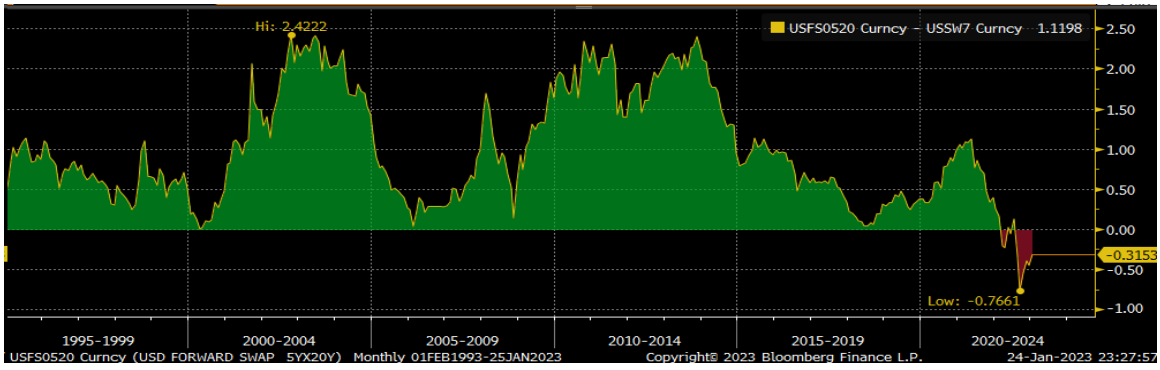
	-200	*-150*	*-100*	*-50*		*50*	*100*	*150*	*200*
	1.52%	**2.02%**	**2.52%**	**3.02%**	**3.52%**	**4.02%**	**4.52%**	**5.02%**	**5.52%**
UST 7yr	115.44	111.94	108.57	105.31	102.16	99.13	96.19	93.36	90.63
	13.0%	9.6%	6.3%	3.1%	0.0%	-3.0%	-5.8%	-8.6%	-11.3%
Int Futs Strategy	$23.08	$21.36	$19.67	$18.07	$16.50	$14.96	$13.50	$12.05	$10.65
	39.9%	29.5%	19.2%	9.5%	0.0%	-9.3%	-18.2%	-27.0%	-35.5%
Strategy +90 days	$23.18	$21.46	$19.77	$18.17	$16.60	$15.06	$13.60	$12.15	$10.75
	40.5%	30.1%	19.8%	10.1%	0.6%	-8.7%	-17.6%	-26.3%	-34.8%

Of course, we must offer an updated modeled profile of our famous **Interest Rate Hedge Strategy**, the best performing active Strategy in calendar 2022.

	-200	*-150*	*-100*	*-50*	*0*	*50*	*100*	*150*	*200*
20yr Rate	**1.45%**	**1.95%**	**2.45%**	**2.95%**	**3.45%**	**3.95%**	**4.45%**	**4.95%**	**5.45%**
Rate Hedge Strategy	$31.96	$35.56	$41.43	$50.32	$63.00	$80.15	$102.21	$129.36	$161.42
	-49.3%	-43.6%	-34.2%	-20.1%	0.0%	27.2%	62.2%	105.3%	156.2%
Hedge + 90 days	$30.98	$34.40	$40.85	$49.56	$62.13	$79.28	$101.49	$128.95	$161.47
	-50.8%	-45.4%	-35.2%	-21.3%	-1.4%	25.8%	61.1%	104.7%	156.3%

Trade like the Professionals

The Yield Spread between 7yr rate and forward 20yr rate is a bit crazy.



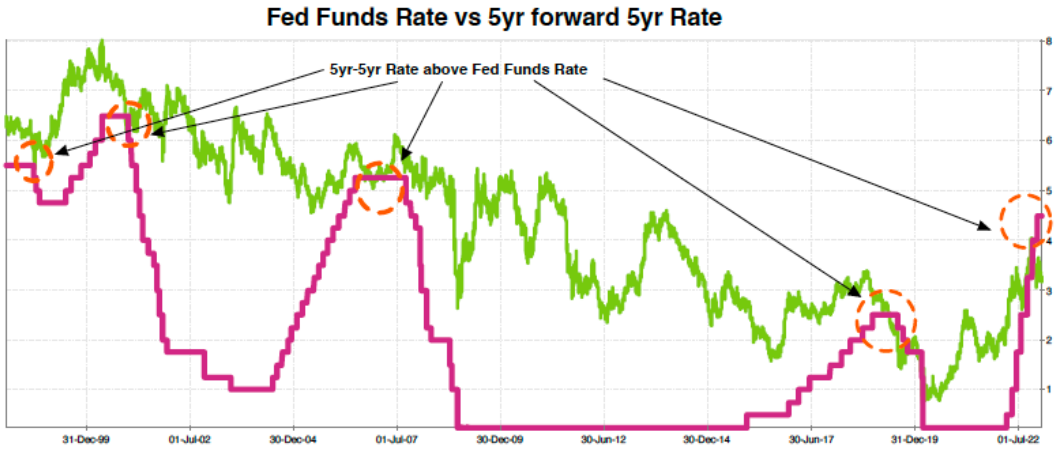
It had never inverted until early 2022; and is presently at negative 32bps. I picked these two rates since the 7yr drives the Intermediate-term Futures Strategy and the forward 20yr drives the Interest Rate Hedge Strategy.

If you want to trade the Yield Curve like the professionals, buy both at a ratio of eight to one. (I know I suggested six to one on Twitter a few weeks ago, but upon further inspection, I think I like this better.)

At this ratio the package models almost flat carry – that means the income from the Futures Strategy mostly offsets the theta on the option driven Rate Hedge Strategy. Moreover, this package models up flat Duration and long Convexity in a parallel shift. But let's be clear, a further inversion would not be kind to this ticket.

Closing Comments

The FED uses their -vayn line- Funds rate as a control rod relative to the prospective -grin line- rate one can earn five years forward.



I will spare you the convoluted logic of this chart, but in simple terms the FED raises interest rates to slow down the economy by cooling the demand for money. Once the cost of borrowing rises above the return of an asset, everything slows down since the leverage would result in amplified losses.

The "everything slows down" concept is a nice way of saying "recession". The FED then responds to that by lowering interest rates to encourage investment.

I think the FED has one more hike to 4.75% :: 5.00% and then they wait for the medicine to work. The market sees rate cuts in June, I think its next year, but in any event, we are nearing the peak, and the clock is ticking for the "pivot".

The more interesting challenge now is predicting the path of long-term rates as we wait for the FED to change course. There is a case to be made that long rates peaked last year, and they will decline even more with a recession.

I tend to favor the notion that inflation will not breach 4.0% until 2024, and thus the FED will hold rates near 5.00% for all of 2023 and long-term rates will increase as the negative carry drags on investor's patience.

Finally, let's not ignore the elephant in the room – The **BIG Money** ticket is speculating upon when the massive Yield Curve inversion will unwind.

Presently the 2yr swap rate is 101bps above the 10yr swap rate; the last time this Curve inverted by more than a few basis points was March 1989, and then it only touched negative 62bps.

As detailed prior in *"A Deep Dive into Mortgage Bonds",* November 3, 2022, MBS will gap tighter, and Mortgage REITs will explode higher once the Yield Curve steepens. In fact, any investment that uses borrowed money (leverage) will see significant price improvement; and this includes residential and commercial real estate.

It is for this reason that these two **Treasury Futures Strategies** are particularly timely as they offer pure and efficient Leverage that can be directly managed instead of being embedded into a business that is less transparent.

To become better educated on macro-economic fundamentals and policy, I urge you to connect with my partner, Michael Green, better known as @profplum99.

Special Coda: *This Commentary is particularly complex, jamming futures contracts into Strategies for leverage is both clever and tricky. I urge you to ping my associates who are waiting for your call to detail these strategies more fully.*

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

Harley S. Bassman
January 26, 2023

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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.