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COMMENTARY

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The Convexity Trade – Why You Should Care

"Fannie Mae is exposed to interest rate risk because changes in interest rates may affect mortgage portfolio cash flows in a way that will adversely impact earnings or long-term value. Fannie Mae's management of interest rate risk involves analyses and actions that position the corporation to meet its objective of consistent earnings growth in a wide range of interest rate environments."

Fannie Mae 1999 Information Statement

Treasury yields live in two different worlds.

One world is the world of economics where investors base their buying/selling decisions on expectations of inflation and economic growth. Nearly all interest rate forecasts and explanations for interest rate movements are based in this world.

The other world is the "arbitrage world." In this world, Treasuries are bought and sold based on their relative value to other securities. The key issues in this world are **not** based on economic growth or inflation. Rather issues like, "the need to hedge," "replacing lost duration," or "spread levels" are the key factors in this world.

The world of arbitrage makes Treasury yields somewhat unique. Other financial instruments like corporate bonds or equities do not have a large and influential group of buyer/sellers that base their decisions on non-economic factors. Treasuries, however, have a huge and ever growing arbitrage world. While many dismiss arbitrage factors as "technical," arguing that yields cannot defy fundamentals, we would argue that arbitrage factors **are** a critical "fundamental" of the Treasury market.

Mortgages Are Now Top Dog

As Chart 1 shows, the market value of the Merrill Mortgage Master Index has recently surpassed the market value of the Merrill Treasury Master Index (this happened several months ago for the equivalent Lehman Indices). This is the first time since the Merrill Domestic Master Index (or the Lehman Aggregate) was invented that the Treasury market is **not** the largest sector of this index.

Notice that the size of the mortgage index was only 60% of the Treasury index as late as January 1998. Now it is 101%. To achieve this relative growth over the last three years, the market value of the mortgage index has **increased** by \$530 billion while the market value of the Treasury index has **decreased** by \$450 billion. **We believe this trend is having a huge impact on the level of interest rates.**

What is the Convexity Trade?

In the bond market, there is a rather arcane trade tied to the fortunes of the mortgage market loosely called "the convexity trade." Thanks to the trends demonstrated in Chart 1, we believe this trade is now larger than ever. Understanding the convexity trade is critical to understanding the arbitrage world that is affecting the Treasury market.

The convexity trade gets its name from a defining characteristic of the mortgage market – "negative convexity." This means that as overall market yields fall, the duration of the mortgage index falls (shortens) as well. Duration measures how sensitive price movements are to changes in interest rates. The fact that mortgage prices become less sensitive to falling interest rates (rising prices) is not a good thing for the owners of mortgage securities. This is why they are said to be "negatively convexed." Conversely, when yields rise (falling prices) mortgage prices become more sensitive to changes in yields -- also not a good thing.

This negative convexity is mainly due to mortgage refinancing. When yields fall, homeowner's rush to refinance their mortgages. Since mortgage securities "pass-through" refinancing to their

investors, this has the affect of speeding up mortgage prepayments, thus shortening duration and causing prices to rise less as rates fall. In extreme cases, an investor who bought a mortgage security believing he would get interest payments over **many** years might wind up with significantly fewer payments than anticipated, and receive his money back in a **few** years. If this investor paid a price significantly over par (100) for this security (he would do this believing this security would pay interest for many years), a loss can occur. This is why mortgage investors more often run into problems when rates fall as opposed to when they rise.

So what is the convexity trade? As mortgage yields fall, duration shortens or is "lost." This is of particular concern to professional bond managers who manage a bond portfolio with a large portion in mortgage securities targeted to a specific duration (such as an insurance company that tries to match their bond portfolio's duration to their liabilities' duration). When yields fall and duration is lost, many of these managers will seek to replace the lost duration by purchasing other fixed-income assets such as Treasuries (which have "positive convexity") or interest rate swaps.

The convexity trade, by itself, cannot create a new trend in yields. It will only exaggerate an existing trend. This trade is neither bullish nor bearish, but the increased amount of trading is causing exaggerated moves and more volatility.

The 800-pound Gorilla of the Bond Market?

Now that we have a basic understanding of the convexity trade, how big is it? To answer this question, we assembled Charts 2 and 3. These charts show the equivalent amount of 10-year Treasury notes needed to replace the lost duration given a 25 basis point drop in the yield of the Merrill Mortgage Master Index. These charts are re-calculated weekly.

Both these charts were at new highs a few weeks ago. This may come as a surprise to many bond professionals since their understanding of mortgage securities is that convexity becomes a bigger issue the further overall market yields fall. Since yields were much lower in 1998, why is this chart showing a new high now? See Chart 1. In 1998 the mortgage index was 60% of the size of the Treasury index. Today its 101%. Because the mortgage index is now much larger relative to the Treasury market, so is the convexity trade despite the fact that interest rates were lower in 1998.

Currently, if mortgage rates were to drop 25 basis points, Chart 2 suggests about \$99 billion of "10-year equivalents" would be needed to replace the lost duration. Chart 3 shows that this \$99 billion is about

14.8% of all outstanding Treasuries maturing in more than 10 years - a huge amount.

Enter Fannie and Freddie

Charts 2 and 3 should not be taken literally. Not every mortgage security is owned in a portfolio that will engage in the convexity trade. Rather Charts 2 and 3 are meant to show the potential size of the convexity trade. Its potential now is larger than it has ever been.

Who does this trade? It depends on the objective of the bond portfolio. If the objective is to outperform a benchmark bond index that includes a mortgage component (such as the Lehman Aggregate Index or the Merrill Domestic Master Index), then these portfolios might **not** engage in the convexity trade. As yields fall and mortgage durations shorten, so does the duration of the benchmark. Therefore, it would not be necessary to replace lost duration since the benchmark is losing duration as well.

If, however, the objective of the bond portfolio is to match the duration of a non-bond benchmark (such as a stream of liabilities), then they might very well consider the convexity trade.

Who are these non-benchmark portfolios and how large are they? Interestingly, many market participants might conclude that these portfolios are small and not significant. These portfolios are not typically large revenue generators, and thus do not get the attention from Wall Street that active managers trying to beat a bond benchmark do.

There are, however, two gigantic accounts that actively engage in the convexity trade and might single-handedly be the most important forces in the fixed-income markets – Fannie Mae and Freddie Mac.

As chart 4 shows, Fannie Mae and Freddie Mac both have huge portfolios of mortgage securities that they actively manage. These portfolios consist of mortgage securities that they issue. This means that they manage portfolios of their **own** securities.

On December 31, 2000, Fannie Mae's portfolio was \$607 billion and Freddie Mac's portfolio was \$285 billion. Together, these two portfolios account for \$992 billion or 51% of the mortgage index. **That's right, these two portfolios are over half of the mortgage index!**

Are these two portfolios active in the convexity trade? The quote leading this commentary is from Fannie Mae's 1999 information statement (Freddie Mac has a similar statement which essentially says the same thing). This statement clearly states that Fannie Mae is "exposed to interest rates risk" and then says that Fannie Mae actively manages this risk – the convexity trade. In fact, this information statement goes on for many pages explaining how

Fannie Mae manages its interest rate risk, suggesting how important this issue is to them.

So, at least half the mortgage index is actively involved in the convexity trade. As Chart 4 also shows, the rapid growth of Fannie Mae and Freddie Mac's mortgage portfolios means that this issue is only a few years old. After combining Fannie Mae and Freddie Mac, insurance companies and pension plans that manage to a non-bond benchmark, and Wall Street's inventory, one can see how large and dominating this trade has become in just a few short years.

Furthermore, Charts 2 and 3 show that the need to replace lost duration has only been a major issue for about 2 ½ months. We note November 10 on these charts. From that date through now, the need to replace lost duration has increased exponentially. The convexity trade was not an issue when we were recounting votes in Florida, and arguably was not a significant issue when Bob Dole was running for President.

Conclusion: Is Success More Dangerous Than Failure?

As the Treasury has been running surpluses and paying down debt, its role as the benchmark for the bond market has been diminishing. Fannie Mae and Freddie Mac are attempting to fill this potential void and are trying to become the new benchmark for the bond market. This has led them to engage in a strategy of rapid growth (issuing billions of dollars of mortgage securities) in recent years. A by-product of this growth has been the exploding size of their mortgage portfolios.

Many have justifiably criticized this activity arguing that both of these Government Sponsored Enterprises (GSE) are using their implied government backing for risky ventures. Other have claimed they are nothing more than a large leveraged hedge fund and, if they "mess up," the federal government could be on the hook for an S&L sized bailout.

While we agree that these are all valid concerns, we are more worried about the opposite: what if they are successful! As the convexity trade grows, it will

come to dominate the Treasury market. This trade could have the effect of exaggerating interest rate trends much more than people realize.

There is an old saying on Wall Street that "price drives news." This means that we often give fundamental reasons for market activity *after* the move has taken place. For instance, if yields plunge it must mean the economy is slowing. We then go looking for evidence of slowing economic growth to explain the drop in yields.

This is where the convexity trade can be so dangerous. When yields were plunging late last year, how much of it was because the economy was slowing and how much of it was due to the convexity trade? Did a yield-plunge-induced hysteria about the economy even reach the halls of the Federal Reserve, causing them to panic and cut rates 50 basis points on January 3?

No one knows the answers to these questions, but they need to be asked before we launch into an economic explanation for every move in interest rates.

In the meantime, look for volatility around the 10-year sector of the yield curve to increase, as mortgages continue to grow and Treasuries continue to shrink. Look for many to dismiss the influence of this trade, and continue to explain this increased volatility as evidence of economic uncertainty. This volatility could (and may have already) lead to several policy mistakes as economists cling to the belief that Treasury yields move *only* on the outlook for growth and inflation. Finally, look for spreads to become more volatile and uncertain as the Treasury leg of each spread gyrates around.

Much has been written and a lot of discussion has taken place regarding the Treasury Department's decision to buy back \$30 billion dollars of Treasury securities every year. Many have suggested this activity has changed relationships in the bond market. We agree. So, where is the commentary and discussion about more than \$1 trillion involved in the convexity trade and how it is changing relationships? This commentary does exist, but it is also not as forceful as it should be. This is why we should care.

Chart 1

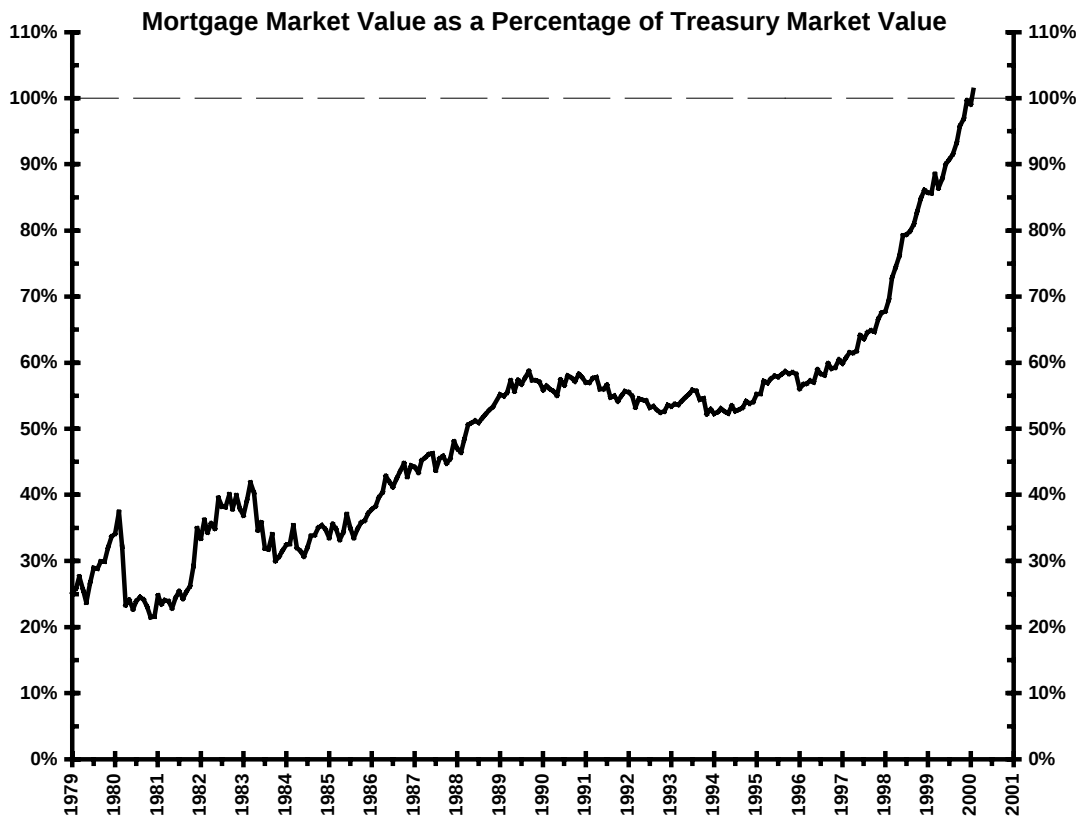
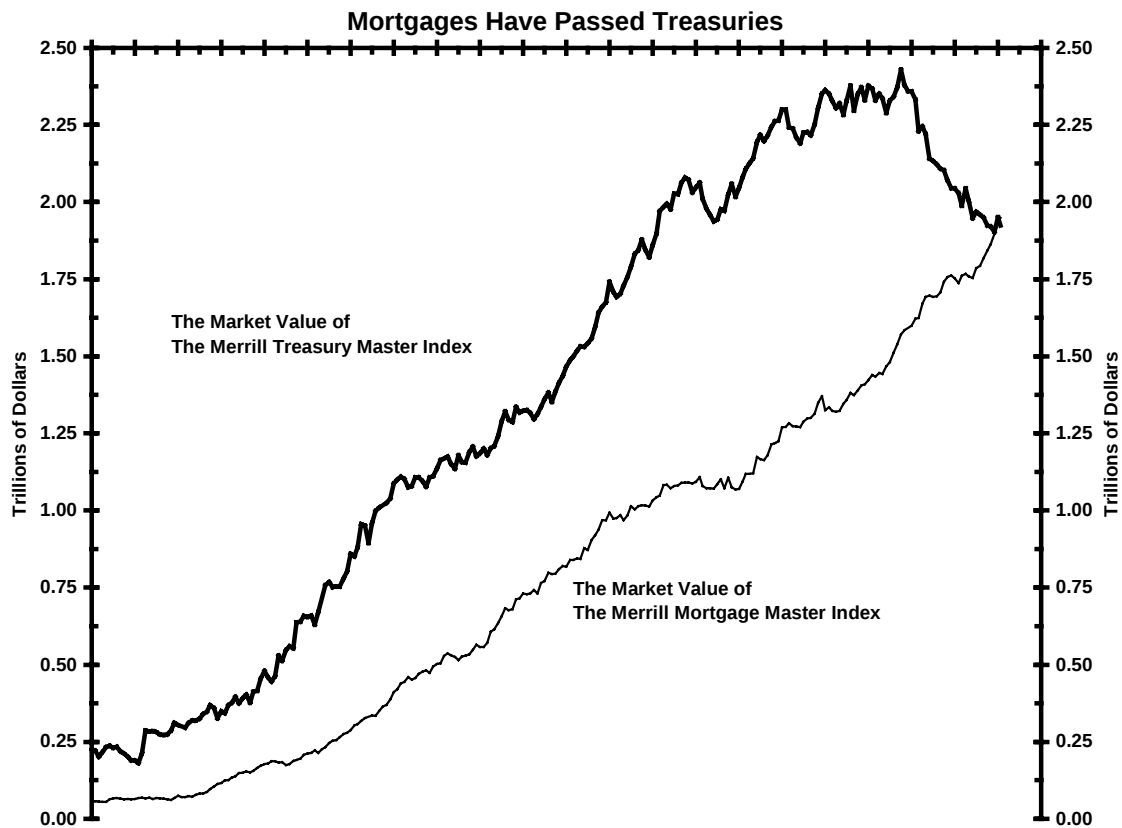


Chart 2

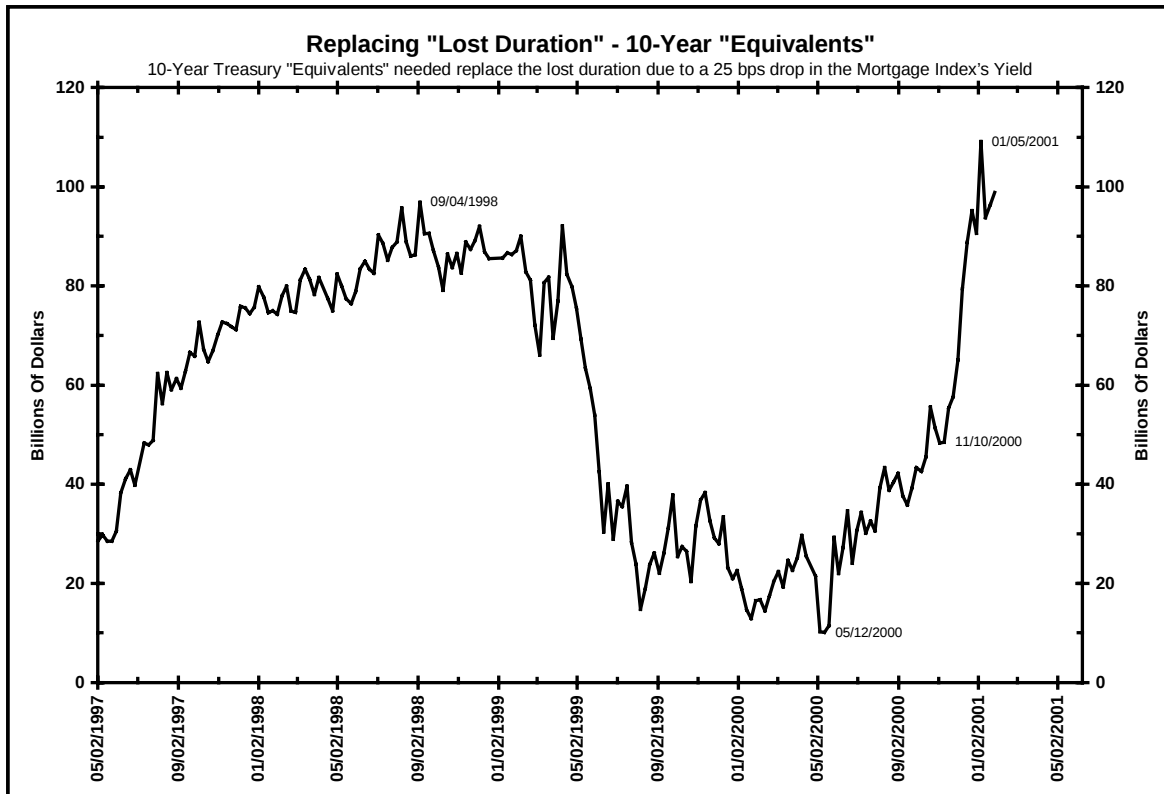


Chart 3

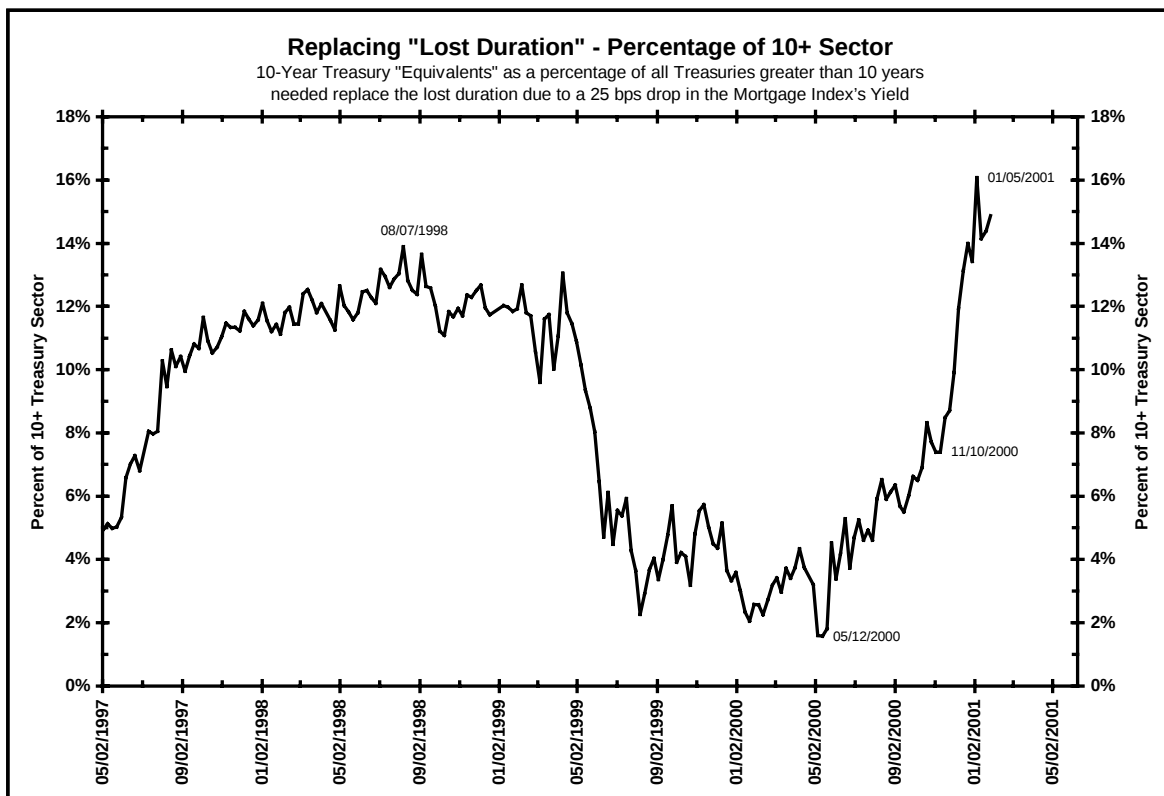


Chart 4

