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Mortgage-Backed Securities—Are They Appropriate for Insurance Company Portfolios?

Track: Investment

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Summary: Insurance companies in the United States have, for many years, invested in mortgage-backed securities (MBS). The suitability of MBS for insurance company portfolios has been called into question by recent changes in interest rate volatility and increased capital requirements.

MR. MARK W. BURSINGER: I work for AEGON USA in Cedar Rapids, Iowa. I'm also the chairperson of the Investment Section Council this year.

The year of 2003 was certainly a period of historically low interest rates. Many of you probably saw the yields on your companies' portfolios declining much more rapidly than expected. Many of us found ourselves in the last year evaluating this impact on our current earnings, future earnings, reserve adequacy and possibly even capital. There are a number of reasons why yields dropped more than expected. I want to focus on "more than expected," because certainly in low-interest-rate environments we would always expect our yields to be lower. But those contributing factors could be things like portfolio turnover, prepayments on

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callable bonds and asset-backed securities. The one we're going to focus on today is MBS.

In hindsight, holding MBS looked to be a bad decision over the last year, maybe even couple of years. But, as we know, history does not always repeat itself. We don't know where rates are going to go tomorrow, whether they're going to rise or fall. Given we don't know what's going to happen tomorrow, the question we ask today is: Should we be holding MBS in our portfolio? If we should be holding MBS, how much should we be holding?

Our panel brings a diverse set of backgrounds and perspectives on the subject. Speaking today will be Linda Lowell, Ross Bowen and Arthur Fliegelman. First will be Linda Lowell. Linda is a research analyst and managing director at Greenwich Capital Markets, focusing on MBS and investment strategies. She is a well-known market strategist and security analyst with 18 years of experience communicating with fixed-income investors in person and print. Prior to Greenwich, she was a director at Credit Suisse First Boston, a member of the mortgage strategies team at UBS Payne Webber, head of mortgage strategies at Smith Barney and first became involved in mortgage research at Drexel Burnham. She began her career in investments at Bankers Trust in the investment management group. Her articles have been reprinted in various publications and books, including *The Handbook of Mortgage-Backed Securities* and *The Handbook of Non-Agency Mortgage-Backed Securities*. Her degrees in English literature and finance are from Harvard University and the Stern School of Business at NYU, respectively.

MS. LINDA LOWELL: My topic normally takes about a day to cover. I'm going to rush through a few high points and try to leave you with some vocabulary and a place to start to understand. In my market we think about two things. We think about the collateral, which would be the pools of mortgages. Then we also think about structures that we make out of them. So first I'm going to be very focused on collateral, and then I'm going to try to talk a little bit about structure and how structure enhances the average-life stability of these bonds.

What I want you to understand above all is why MBS must be in institutional portfolios, including life company portfolios. They are really the largest part of the high-grade market. We have 7.3 trillion home mortgages. The Federal Reserve gets a flow of funds, and they keep track of all the assets and liabilities on the books of the United States. They get down to households. This is about the biggest piece of debt out there—our homes. Depending on what kind of loan it is, and there are all kinds of loans to borrowers of all kinds of creditworthiness, those securitized are somewhere between 30 to 90 percent. Ninety percent would be the things that can go into Fannie Mae, Freddie Mac (Federal Home Loan Mortgage Corporation) and Ginnie Mae (Government National Mortgage Association) securities.

The MBS market is, by far, one of the largest. Many investment managers are at least implicitly evaluated versus the Lehman aggregate, the Salomon BIG or some other broad fixed-income index. MBS are the biggest chunk.

Another way to look at the liquidity is to look at the broad base of institutional investors. Many institutional investors notice, first of all, that Fannie Mae and Freddie Mac portfolios went from 5 percent of the market in 1994 to almost 30 percent at the end of 2002. I don't want to get into the ideological debate about the wisdom of that, but I can tell that when the market goes through some kind of cataclysm as it may when the yield curve begins to flatten and the Federal Reserve begins to tighten its monetary policy, the other investors involved in this market are going to be very glad that Fannie Mae and Freddie Mac are involved, because they provide a floor on spread widening. It's very important. This market, because these securities are so complex, needs as many sophisticated borrowers on the margin after the widening.

The other thing that appeals to your investment professionals about these securities is that they have very attractive nominal yields. A nominal yield is what you would anticipate given today's lifetime prepayment expectation, and those are available on a Bloomberg analytic system. That all reflects the current market. The current market is a very static yield calculation. It uses just one prepayment expectation. So they're fictions from the get-go, as you know. This doesn't reflect what would happen as you begin to account for the yield using FAS-91 and so forth. But you can see the appeal—104 basis points of yield over a 10-year Treasury, 64 basis points over a 10-year swap, 24 over the Bloomberg fair market composite of 10-year, AA corporate. So that's attractive.

Now that yield advantage is going to vary with market conditions (Chart 1). The market condition that is the most important for where MBS trade at any given time is the prepayment expectation. You see these spikes here—this is versus the five-year Treasury yield. It's just an indication. Here we're tracking the refinance applications that are picked up in a survey weekly done by the Mortgage Bankers Association. What happened here to widen spread over the AA corporate was a huge jump in refinance applications. We had the combination of the absolute top of the rally for this interest rate cycle last June, and then a rapid reversal in the interest rate path following the remarks made by Chairman Greenspan. The market misinterpreted them to mean that monetary policy was imminently going to be tightened and yields backed up sharply, taking applications down and inflicting a tremendous fear of extension risk in the MBS market. A lot of leveraged investors who were heavily involved in this market fled. We had a sharp spread widening. You can see for investment professionals this can be a tricky market.

The fundamental security we're talking about is the pass-through, which means we've just taken a pool of securities. As an investor, you want a pro rata share of the principal and interest as it is passed through from the mortgage servicer. More

importantly, we have three markets that we pay attention to in the generic MBS market. The first is TBA, which is a pass-through that can be delivered into any single trade. The second is specified, which means we require the security to have specific characteristics. Then we can slice it up, and we have the agency collateralized mortgage obligations (CMOs)—private label, prime jumbo and what we call Alt-A. These are very good borrowers from a credit perspective, but they are private securities. The liquidity in that market really reflects the standardization that was introduced by the GSEs (government sponsored enterprises).

Now just about any loan that you can take out as a homeowner can be securitized, is securitized, and is traded by these sophisticated institutional investors including insurance companies. Adjustable rate has become a much more important part of the market. Still, the most common, largest and most liquid part of the market is clearly the fixed rate. Again, you can get an FHA/VA loan that goes into Ginnie Mae. Next is the conforming conventional. Up to \$333,700 is eligible for Fannie or Freddie if the borrower is prime or practically prime. These have slight differences in prepayment characteristics. The FHA/VA loans can be assumed on sale, so they can extend. They are not automatically relinquished when a house is sold.

Now this is terminology that you do need. Prepayments are measured as a percentage of the outstanding principal at the beginning of the period that is retired during that period. We can talk about it as a single monthly mortality (SMM). That was an early term in the market borrowed from you guys. We can annualize that and call it a constant prepayment rate (CPR). Investors look at the historical rates on a one-, three-, six-, 12-month and lifetime basis. Very large investors, all of the large Wall Street firms who trade these securities and some third-party vendors, have also developed sophisticated econometric models to project prepayments. These models are constantly revised to reflect the advances in technology and changes in the way mortgages are structured. If you think back 10 years ago, when you borrowed money you always had to pay points. There was no waiving of fees; there was no compressing the whole thing into one easy-to-swallow, instantly refinancible little package. So we've had to continuously revise our models. But those models are pretty good. My trading desk developed the model that we use at my company so that they could hedge their positions day-to-day. They're pretty good at anticipating the way the price will change for a given change in interest rates.

The best way to guess how a security is going to prepay is just to look at the weighted average coupon (WAC), which is somewhere between 50 to maybe 65 basis points over the stated coupon on the security. You take that number, which right now for a current coupon is somewhere around 6.25. You subtract the current mortgage rate—6.25 minus 6.25 is zero. So an MBS being created today has a kind of zero refinance incentive. That is a very, very simple way to get at it.

We also use a prepayment assumption called the PSA (formerly the Public Securities Association, which has now renamed itself the Bond Market Association), and this was developed so that we could structure CMOs. It's really very simple. In

the late 1980s, this research committee sat down and said, "We need to reflect the way a pool seasons. Because if we said that the pool was going to prepay in month one of its existence at the same speed it's going to prepay in month 30 of its existence, then we're going to have shortfalls in projected cash flows. We'd then slice those up and make bonds out of them." So they came up with a standard that is 100 percent of this standard. We all talk about PSA as if it were an incredibly scientific term. It's just a vector.

In the first 30 months, prepayments go from a zero CPR to 6 percent CPR, and each month you just linearly interpolate. They are then 6 percent thereafter. So if you wanted to say 3.5 times that vector, you'd say 350 percent PSA. Again, it's very rigid; it is fiction, because the actual prepayment experience is going to vary over the life of the security depending on the interest rate cycle and, to a far lesser extent, on the economic environment behind it. Usually what we see is even when unemployment is rising, falling interest rates compel most borrowers to refinance. Most borrowers are still employed and able to refinance. The only time we see a recession really impact prepayment rates is in a regional way—say Texas during the sun belt/oil belt crisis in the late 1980s, or California in the very early 1990s. A lot of those borrowers had house properties that were underwater and couldn't get a good appraisal to refinance, or they were unemployed. They had to sit out the first part of that refinance rally in 1992-1993.

The prepayment option is completely the puzzle for MBS. It's the issue that you need to think about; it's the issue the investor community has to think about; it's what your investment professionals must focus on to hold these securities successfully. There are three components to prepayment. The first is refinancing: rate, term and cash-out. You can shorten your term—go from 30 to 15. You can cash out. You can just lower your rate. The next is sale, then we have default. Default would be a de minimis issue in a Fannie or Freddie. It's actually an important component of Ginnie Mae prepayments.

The likelihood of prepayment seasons; as the loan gets a little older, you're not going to prepay. You just got your loan; you just went through the whole hassle; you're not going to refinance in the next three months unless there's some really compelling opportunity. You have to be paid to go through that again. We all know how to make that decision. That decision is made on a large mass aggregate basis behind every one of these securities that can be in every one of these portfolios. In a way they are easy to understand, because all the events that change the cash flows are events that you yourselves have participated in. So I think mortgage-backed prepayments are in a way easy to understand; you just bring your own experience to them.

Now after a long time, at the same level of incentive, they begin to burn out. So a pool that prepaid like mad all last summer, if we re-rallied, it's going to start to prepay again, but not quite as strongly. Normally they do not. I'll leave that for your future study.

Chart 2 shows prepayments across the coupon stack for specific vintages. They are all seasoned about the same. They were about two years old when I picked up these prepayments. From the vintage of 2003, we had fours, 4.5s, all the way up to seven. That population of coupons reflects the fact that we had these tremendous rallies where we were making loans at historically low rates. So we have fours with mortgages that had rates of 4.65 and so on. Now you can see that when those 2003s came through, they're just a year old, but you can see the tremendous response that they generated in the spring. Now look at the red line—these are 2002 vintage in the rally, at a point where interest rates were dropping in November of 2003.

Now look at the 1998s. The 1998s were originated in a rally in 1998, and in the spring of 2000 we were still in that incredibly hot economic tech-driven economy. Interest rates were high, and the yield curve was relatively flat. You can see how low all those prepayments were. Across that we call it the coupon stack. The cash flows as a result are highly volatile.

If we use a static assumption, we're going to say it's going to prepay at the same rate every month for its lifetime. Chart 3 shows how, at 45 percent CPR, which is easily posted by securities in these rallies, we come up with all the cash flows squished into the first five years of life at that assumption. Whereas, at a 9 percent CPR, which is kind of a no-refinanceability, high-interest-rate environment, some are at 9 percent CPR; you can see there's a long, long tail on these cash flows.

In a nutshell this means that these securities are very problematic for life companies. We have two issues here. We have the duration drift when they extend, and the market is pricing the cash flows farther out on the yield curve and more of them are taking a longer time to arrive. They extend as interest rates are rising, so their price sensitivity actually increases as interest rates are rising. Say you bought your MBS and thought it had the same duration as the five-year Treasury. Then interest rates back up; its price is going to go down faster now than that five-year Treasury, because you're already estimating its duration is longer than that five-year Treasury that was your benchmark. Your benchmark is now short, and now you're thinking maybe the seven-year Treasury is your benchmark. Then you're thinking the 10-year Treasury is your benchmark. In a rapid backup it can move very quickly. And even slowly it requires some careful management. Likewise, if it shortens up, it's going to get shorter—its duration, its price sensitivity is going to be reduced in a rally. So suddenly you're not getting the same gain that you're getting off your five-year Treasury. You're getting the gain you get off a two-year Treasury maybe, so you have that problem.

Another problem is what really afflicted life companies' MBS portfolios. The principal all runs off and has to be reinvested at yields that are just unattractive. You're not picking up the margins that you need over your liabilities at those yields, and that really was a problem. Likewise, when you back up and suddenly you're not getting

the prepayments you anticipated at your original time of purchase, you have the principal coming back more slowly.

You can see that depending on what CPR number we pick for a discount, we get an entirely different yield (Chart 4). The yield goes up with speed when you pay under par. The yield goes down when you pay over par. It goes up as the thing slows down.

Chart 4 gives you a sense of how these durations have drifted. This is just a Fannie 5.5. The duration here is dramatically different depending on where we are in the interest rate cycle. You can see that when swap rates are low, the security is very short; it's very long when swap rates rise.

To start this out, we use option-adjusted spread (OAS) models. We use sophisticated two- and three-factor models that capture yield curve processes. We eliminate arbitrage from our models. We do a lot of very sophisticated things. We employ Ph.D.s in finance and physics to get this right for us. We simulate over many interest rate paths the cash flows and the securities, and then we bring them back to the price. By doing that we take out the average expectation of exercise of that prepayment option. You can see in Chart 5 where we started out with this great big spread over swaps, up to as high as 150 basis points back there in 2002. When we're done we have something that's more like zero and sometimes very negative spread over swaps after the option costs are removed. We have what we call the current coupon. That's a par-priced security that trades around about 12 OAS, that's 12 basis points of spread on average you would expect over the lifetime of that security if you hedged it for interest rate movements. That's what you would get over swap.

Since we have a gentleman from Moody's here I won't go too deeply into the S&P methodology, which happily has been changed. They have a model for just one side of the game, which is for the assets. They have a capital charge that explicitly focuses on convexity. This may not be fair because they don't recognize the liabilities. There were a couple of other problems. The new test does give us a good feeling. This is how the test works. We basically subtract the behavior we'd expect without change, without option costs, from the behavior we would project using a good model for an interest rate shift with the options. There's a tremendous difference in different interest rate environments.

This is what I want you to carry away now. Back in February 2003 when this methodology was first adopted, a 30-year 5.5 could generate a charge of 3.81 percent (the larger one), and that's for its extension risk. This reflects the relatively large economic impact of extension on that particular security. In May of this year, it was somewhat more callable. But in any case, the charge that this test generated is much smaller either way, because the security is much more extended now in this interest rate environment. We have securities now that, because their durations are mostly fully extended, are much more manageable. You can see the

same economic impact of the difference between what we expect given the exercise of options and what we would get if they didn't have those options now is a much more manageable number.

In general we can say that we now have the MBS market, because we've gone through these ways of prepayment. A huge percentage of those 7.3 trillion outstanding residential mortgages have been refinanced into very low coupons. Those low coupons are now fully extended. The extension risk, which is the most punishing from your point of view at this point in terms of the capital charge, is reduced and the callability I would argue is reduced because I think it's unlikely that we'll revisit the interest rates that we've seen. Now that's your call. But I think this remarkable 1 percent Fed funds regime is not going to be repeated in the near future. Sixty-five percent of the market is now very well behaved. Seventeen percent is at par, which means it's reasonably well behaved. The securities that really have swing now in average life variability are the premiums.

I just want to make a couple of comments about structure. Everyday, for jumbo, Alt-A and Fannie Mae, Freddie Mac and Ginnie Mae collateral, we run the cash flows at some PSA convention, and the market has all agreed that that number is a fair convention for today. Then we slice them up to get bonds with particular average life. The insurance company buys something that's back here. While interest rates are doing their rallying and going through normal interest rate cycles, this cash flow back here is unaffected. It has call protection from all of these bonds in front of it.

We can do something else. We can generate two runs. We can say, "What would happen if all the bonds paid at 350 over their lives? What would happen if they all paid at 95?" We get two sets of cash flows, and we want the inner section, the ones that would be met at either speed. We take that and we call that the path. We give those bonds a priority, and we use this piece of the cash flow to take the first prepayment hit, either to wait while we pay the PAC schedule or to get paid down while we protect the PAC schedule.

Here's another way to look at this (Chart 6). This is, again, the value structure. This is a PAC. It receives some interest, and then out here it begins to pay down. Now interest rates will change and we could project this in a fast interest rate environment and other bonds are paying off. But then interest rates can slow down, and what we see is this thing has shortened maybe as much as time has passed. Maybe twice as much, but it still has that lockout from bonds in front of it. That's why structure is so valuable, and that's why you'll see many of these seven- and 10-year sequential PAC CMOs in life company portfolios—to take advantage of that prepayment lock out.

With weighted average life graphs, there is a sequential at varying speeds. Its average life slowly degrades. At a very fast speed, it's very short. As we lower the speeds, we get longer projected average lives. In a PAC, we have this stable

average life between those two structuring speeds. That stable average life is the value of structure.

MR. BURSINGER: The next speaker will be Ross Bowen. Ross is a vice president within the insurance advisory group of Conning, where he provides asset-liability-management (ALM) services to insurance companies. Prior to joining Conning, Ross was investment actuary and vice president for Fortis Inc.'s U.S. operations. He has specialized in the ALM field since 1994 and has 19 years of total experience as an actuary. Ross graduated from the University of Virginia with a BA in economics and earned an MBA in finance from Carnegie Mellon University. Ross is a CFA as well as an FSA.

MR. ROSS BOWEN: Mark asked me to use the ALM tools that we have at our disposal at Conning to evaluate the optimal allocation of MBS in insurance company portfolios. I think the question posed is: What's the optimal allocation? I took two actual liability models and two actual portfolios as a test case. The results that I show may be specific to these two particular lines of business. We removed all the MBS from their existing portfolios, and then I incrementally added MBS back in, 1 percent at a time. I evaluated these results on an efficient-frontier framework. The results I found were generally unfavorable. I'm going to talk about what these results mean, why I think these results came about, and then I want to talk about what role I think MBS might have in a portfolio today.

We took an annuity and a traditional block of business. As I've said, we removed all the MBS, and we started adding MBS back in. To represent the MBS, I took the universe of agency pass-throughs, modeled them all together as one asset and then started adding them back in. I took into account capital and the interest maintenance reserve (IMR). As I added in the MBS, the capital would change. Theoretically I was selling the assets that were there, and so I created an IMR balance.

Let me explain our method. We produced efficient-frontier graphs, which are risk/reward framework. We take the present value of distributable earnings (PVDE) at the company cost of capital, and I assumed the cost of capital was a 90-day rate, plus 600 basis points. I would call this the enterprise value. It's close to embedded value maybe as you calculate it at your company. For risk we looked at the standard deviation of PVDE. I also wanted to look at the 5th percentile return. This would enable me to say something like this, "If you follow this strategy with your investments, the expected value of your block of business is \$20 million, but it won't be less than \$16 million with a 95 percent probability." It has a couple of different risk measures. I also look at the distribution of the entire results. I think that can be enlightening, too.

Here are a few facts about the models. The annuity portfolio is actually quite a bit longer than the assets. I would say in the low rate environment, when management

is reaching for a yield, the traditional block is closely matched on a duration and convexity basis.

One of the key things to note here is that the book yield on the MBS is a lot lower than the legacy assets in the current portfolio. I think that's going to be a problem for this test, even though with the IMR that should mitigate the impact of selling the higher coupon assets and buying lower coupon assets.

We used the April 30 yield curve for this model. I know rates are higher now than they were on April 30, but a lot of this year's run-up in rates is accounted for in this yield curve. At Conning we have an in-house rate generator that generates our simulation scenarios, and we have a mean reversion target. The mean reversion target is a lot higher than the current 90-day rate at April 30, and it's somewhat higher at the 10-year rate. This means that my scenarios are generally going to be increasing, so that's going to impact the model as well.

Chart 7 shows my first efficient-frontier graph for the traditional block. We should talk about this for a second, because we're going to see this graph quite a bit. What makes a good strategy? What makes one strategy better than the other? That happens if return is higher and risk is lower. Return is on the Y-axis, and higher is better. Risk is on the X-axis, and further to the left is better. So we want to be on the upper left.

In this graph 0 percent is the highest return point, so not rebalancing in the MBS at all will give you your highest return. But risk decreases as you move to the left of that point. Fifteen percent is the lowest risk point, so on this graph anything between 0 and 15 percent will be called an efficient point. That's what you want to investigate.

Chart 8 shows a different risk measure—the 5th percentile risk. The same rules still apply. The upper left is good. As you move to the right, you'll see that your 5th percentile expected value of your business declines, which is bad. Now in this graph 0 percent is still the highest return point, but it's also the lowest risk point. For the first graph you'd say, "Well, anywhere between zero and 15." Here you would say, "Zero is the best point." So if you are concerned about downside risk, and not just straight risk volatility, then you wouldn't pick MBS based on this graph.

Chart 9 emphasizes the previous point. This is a distribution of results for various allocations of MBS 0 to 25 percent. Let's look at the 0 percent bar and compare it to the 5 percent bar. The top line is the 95th percentile return; it's higher at zero than at five. One line represents the 75th percentile; it's higher than 5 percent. The middle line is the median; the other line is the mean; 25th percentile and 5th percent percentile are up there too. In my terminology, 0 percent allocation of MBS dominates any other allocation. You wouldn't pick anything besides 0 percent MBS based on this graph.

Now let's look at the annuity bar (Chart 10). Zero percent is the highest return, but risk decreases as we increase the allocation of MBS as we move to the left. Pretty much all these points are close to being efficient points. I notice that the line isn't as tight as it was with traditional. There are a lot more moving parts in a deferred annuity model with variable credited rates and policyholder behavior. We used 100 scenarios here. If we used 1,000, I would expect this line to straighten out. Chart 11 brings us back to the 5th percentile results. Zero percent looks like it's the highest return, and it's about the lowest risk. As you move to the right and you add MBS, your PVDE decreases. There's a fairly large drop-off—from a 95 percent share will make 21 million down to a 95 percent share is worth 18 million.

Chart 12 shows the same thing that the previous page shows, that 0 percent allocation dominates the 5 percent allocation. What could be causing these bad results? Could it be extension risk? We know, and Linda showed us, that when rates rise, prepayments are going to slow. That means we can't reinvest into higher yielding assets as fast as we were expecting to. The duration of the MBS block that I used increases very rapidly. If rates go up 100 basis points, the duration would grow from 4.8 to 6.2. When rates rise, I expect to see liability duration shorten. At the same time, these mortgages are lengthening. One point to note—if you're managing a portfolio tightly to some duration band, if you have a lot of MBS in it, you're going to be doing a lot more rebalancing.

Extension risk is a problem for these mortgages, but the results may be dictated by specific models we chose and the characteristics of the portfolio we're changing. The mortgages, as I pointed out, are yielding a lot less than the assets we're selling. IMR should offset this somewhat, but I don't think it really replaces the lost yield.

Another thing to know about our model is that we're not reinvesting in the MBS because of the difficulty of accurately modeling in the future. After five years, the weighted average life of these MBS is five years, so a lot of them are going to be gone.

I think the question I asked myself wasn't, "What's the optimal allocation to MBS?" It was, "Should this company rebalance any MBS on April 30?" The results of this analysis seem to say no. There were MBS in the portfolio. When we started, we removed them all. To me it's still an open question—should this portfolio keep its MBS and should it reinvest into them in the future?

There are reasons to buy mortgages that I don't think are captured in our model. When you hold corporate bonds, you introduce credit risk into the model, but I don't think we've modeled credit risk stochastically. We have a static default and a static spread assumption, but in the future defaults are going to vary, and spreads are going to widen and tighten. On the other hand, for the MBS I think we have a pretty good model. We're capturing what I call interest rate structure risk fairly well. We're comparing two asset classes—credit, where we don't have a lot of the

risk really dynamically modeled, versus MBS, where we have the interest rate structure risk model. It's not quite a fair comparison to throw in one asset class where I think the risks are better captured compared to another asset class. But I do know one thing: mortgages bring in a diversifying type of risk and given modern portfolio theory, I think you'd agree that's a good thing at some level.

The biggest fear that people have to be in mortgages right now is that they will be poor investments in what we anticipate is going to be a rising rate environment. But if you go back in history this hasn't proven to be true. In 1994, 10-year yields were up 203 basis points. The MBS index lost 161 basis points, but it outperformed comparable Treasury and the Lehman aggregate. The same thing happened in 1999—10-year rates rose 179 basis points. The MBS were up 186 basis points. They beat the comparable Treasury, and the Lehman aggregate actually lost money that year.

Chart 13 echoes a graph that Linda showed. MBS yields right now are near an historic high compared to credit yields. This graph shows the difference in yields to worst of the Lehman mortgage index compared to the Lehman credit index. Looking at this graph alone, it looks like a good time to be in mortgages.

Let me summarize what I've shown you so far. We've used our framework to make an asset class comparison, and mortgages do not look good. It could be the blocks of business I chose and particularly the fact that there were higher yielding assets than the portfolio. Or it could be extension risk. But I also believe despite the results of these models, there are positive aspects to mortgages, such as their past history in rising rate environments and their good relative yields.

Let me talk for a second about the way we generally use our efficient-frontier framework at Conning. We prefer to use it to determine a maturity distribution. I take a portfolio, I sell all the assets, and then we reinvest into the universe of bonds that are out there. We model all the available bonds in the Salomon Brothers Big Index. We break them up into weighted average life buckets—one-to-three-year buckets, three-to-five-year buckets, five-to-seven-year buckets and seven-to-10-year buckets. We use efficient frontiers to determine the asset allocation based on those buckets. So we might come up with this kind of result. I would say for your line of business you should have 20 percent in a three-to-five-year bucket, 60 percent in a five-to-seven-year bucket and 20 percent in the seven-to-10-year bucket. At that point, I would hand it over to the portfolio manager who's current on the financial markets. He would make some relative value decisions on the margin about where to deploy the money consistent with that maturity distribution.

Chart 14 shows an example of an efficient frontier where we used the maturity bucket example. Chart 15 shows the distribution of results for each strategy. Below it you can see the makeup of the tested strategy and its results, the way it's composed of the various maturity buckets. The distribution of results is at the

bottom. This is the preferred way I have to use the efficient-frontier framework that we're currently using.

MR. BURSINGER: Speaking next will be Arthur Fliegelman. He's vice president and senior credit officer in the life insurance group of Moody's Investors Services. His primary responsibility is serving as a lead analyst for a portfolio of life insurance companies. He also assists in the development of special comments discussing Moody's views on topics of importance regarding the evaluation of insurance company creditworthiness and other significant industry affairs. Previous to joining Moody's, Mr. Fliegelman was the principal of A. Fliegelman & Associates, an investment, research and consulting firm specializing in the insurance industry. Mr. Fliegelman has extensive experience in working in both life and property/casualty companies in investment and other financial issues with the effect of regulatory and accounting activities on insurance company investments.

MR. FLIEGELMAN: I know I'm dealing with a bunch of actuaries. Obviously you're expert in a wide variety of topics. But as referred to a little earlier, mortgages are actually something even the man in the street can understand. I just want to run an informal survey. How many of you have a residential mortgage? How many of you have ever prepaid a residential mortgage? How many of you have ever prepaid a residential mortgage more than once? So you can see indeed we have a lot of experts here. How many of you do not have as a pretty top priority making sure that you make your mortgage payment every month on time? I would presume for the vast preponderance of you, you have a top financial priority making sure your mortgage payment is paid on time. That's basically both the positive and the negative of the residential mortgage story.

As some of my colleagues here mentioned, we've obviously come through a credit cycle where we've seen a lot of credit losses. I'm sure all of you have dealt with that to some degree. In the residential mortgage market, quite frankly, we really didn't see that at all. Obviously there are times, as Linda mentioned, when it can happen. There are certain sub-segments of the market, some subordinate pieces. There are credit issues if one wanted to purchase in the residential mortgage market. But I don't think that's what we're talking about. It's a pretty small sub-piece, and it's probably not something the industry participates in very much.

I've been asked to address a couple of issues, which I will address up front. Unlike some of our peers we do have indeed a capital model. As a matter of fact, the capital model is in the process of being updated rather extensively by one of my colleagues, Scott Robinson, who's not here today. He is an actuary. However, both our current and our proposed new capital models don't treat MBS in any special manner. We haven't carved them out and treated them in any specific manner different than the other assets we deal with. One of the major reasons for that, quite frankly, is that both our current and proposed new capital models are based on public information. We really don't think there's enough public information available on the interaction between assets and liabilities to really discriminate

either in favor or against any specific asset class. We think that that's pretty important. It's really not a matter of assets or liabilities; it's really a matter of the interaction of the two. I think you need to do some pretty detailed analysis, which we had just discussed here. What makes sense for a specific company?

Now that said, when an analyst at Moody's (and I presume an analyst at other rating agencies) evaluates a company overall, he would try, to the extent appropriate, to incorporate expected optionality effects into the company's analysis, both quantitatively and on the more general basis. But that doesn't mean we're getting right down to it and have a model where we would try to adjust numbers or anything on a specific basis. We obviously are always interested in looking at what companies are doing. I would say that's probably one of the most important things we do. We look at the quality of the analysis and the type of analysis that a company has done. Have they really looked at these issues? Have they really addressed these issues? Do the answers they come up with pass the smell test? Do they make sense? Do they seem rational?

The next topic is effect on ALM. I'm not going to spend a lot of time talking about that. That was discussed a little bit before. I assume most of you have dealt with it in your own efforts in the past. I know I've done a lot of modeling in my prior life. In the effect on ALM, clearly you have some issues with the assets where many of the assets in the MBS world are somewhat more or less stable than you would see in other asset classes. Again, you have to recognize that there are things such as callability in the corporate world too. There are a lot of assets out there that have various forms of callability, so it's not necessarily unique to residential mortgages. Obviously the interaction with liabilities is extremely important.

As an analyst I would look at a portfolio that is heavily residential MBS differently depending if it was backing, for example, a deferred annuity block or some other block that had a fair amount of flexibility in terms of its crediting rate, versus, for example, if you were matching it up with a long-term structured settlement portfolio of liabilities where you have to make fixed payments for a very long time period and have no ability to adjust it.

Obviously there is the impact of prepayments and extensions on investment income. Again, when we are talking to a company, and when they are doing their modeling, we see those kinds of characteristics. The company may or may not have the ability to flow through those on some kind of participating basis to the underlying contract holders depending upon the nature of the product you're looking at. One thing we would pay particular attention to is what we would describe as exotic investments. That's something Linda didn't really talk about. I'm sure she's familiar with all these terms—interest only (IO), principal only (PO) and inverse floaters, and I'm sure there are numerous other kinds of support bonds or companion bonds. Obviously those exotic classes are something that we would look at very carefully, because that's the kind of thing where we really get our particular attention, any kinds of support bonds that might be involved. Some of the more

esoteric classes might bring different kinds of risk or even increased volatility rather than relatively benign volatility in the residential MBS market.

Also, we'd like to understand any kind of hedging strategy being used. I would say that hedging strategies are fairly unusual; they are not typically being used. Obviously any kind of hedging typically is going to cost you if you're going to be trying to reduce your volatility or reduce your risk profile. The whole point in going in this asset class, or for that matter any other asset class, is generally to pick up yield or spread. Companies are going to be somewhat loath to spend that incremental spread and even beyond in any hedging strategy. But nonetheless, there may be caps or floors or some other particular kinds of characteristics that you're using to help manage the risk profile.

What kinds of things are we going to be looking at? The first is obviously the type of collateral—government-sponsored enterprises (GSEs) of Fannie and Freddie, obviously versus some private-label-type collateral. Our experience to date has generally been that the collateral has not been an issue. It hasn't really been a credit issue, though again, I think there can be corners of the market where credit might be a problem.

Another thing we look at quite extensively these days, and what is a very important issue historically in the industry, is liquidity. One of the things that I don't think was addressed too much this morning yet is the fact that, for the most part, MBS have a very favorable liquidity profile. I think my colleagues would agree that there are few assets that are more liquid, particularly if you have a pass-through. I think if you have some really exotic tranche of a CMO or something like that, you may have some issues. But you have both good liquidity, in terms of being able to sell a security when necessary most of the time, and you also can borrow against it. So there's a very high liquidity profile and a very favorable liquidity profile for MBS. We would view that favorably for most segments of it.

Next I'd like to discuss the investment process and the investment portfolios in general. One comment I used to like to say is, "All things in moderation." I certainly don't necessarily like to see a portfolio that's 100 percent MBS, but for that matter I don't really necessarily want to see a portfolio that's 100 percent anything. I think that diversification can offer a lot of benefits, the kind of analysis that we heard talked about. While there's clearly risk in MBS, quite frankly there are very few if any asset classes that don't have risk. If you don't have any risk, you don't have any yield. So I think the objective is to try to develop a portfolio that's reasonably balanced overall, that you're not taking any specific kind of risk in excess amount, and you are really able to deal with the kind of volatility one is reasonably going to see in the marketplace without taking an undue amount of risk for the company. Clearly, I think it depends upon the nature of their assets and liabilities and their interaction. I mentioned that a couple of times already. We really want to see it all in context. I don't think there's such a thing as a bad type of asset. I think there

may be a bad asset for specific liability, but you really have to look at them in context.

As I mentioned a little earlier, they may be a good fit for something like deferred annuities if you have the ability to pass through the crediting rate. But for a long-dated product like a structured settlement or a long-dated-funding-agreement-backed note, they would not necessarily be appropriate unless you have a very good lockout provision. We talked about good yield. Obviously it's like any market. Sometimes the yield is more favorable than other times. Clearly it makes more sense to buy it when the yield is favorable than unfavorable.

Credit quality is obviously a pretty important issue. We've done a lot of extensive studies. I actually was the lead author on a report about some of the credit experience of the industry in the last couple of years. And 2004 has been good. Clearly the last couple of years have been pretty difficult. Companies that actually had MBS portfolios really did benefit, and it helped offset some of the credit issues they were dealing with in other parts of their portfolios.

We also look for expertise to manage the asset class. Certainly, as Linda mentioned, this is not a simple asset class. It's not something that you can just go in and buy blindly. I guess you could, but I don't know if I'd recommend it. You really need some expertise to deal with it. I would disagree with her a little bit. I think prepayment models are still more often wrong than right. That's why they spend so much time refining these things, and I suspect that will continue to be the case. So I think you have to take these prepayment models with a grain of salt, and you have to be able to obviously stress them also. You have to see what happens to the extent that they're wrong, and obviously they all depend upon what interest rates are doing. Again, as Linda alluded, people's behavior has been changed as the market evolves over time. Clearly it's a market that's becoming more and more efficient.

I've also been asked to do a distribution of residential MBS as a percent of invested assets. Chart 16 is a time series for the companies that we rate. This is our rated universe; it's not the industry as a whole. However, it's probably 90 percent of the industry. You can see its range from about 16 percent to about 14 percent. It's been a pretty tight range, and it hasn't moved around all that much.

We took our rated universe and we determined what percentage of invested assets is in residential MBS (Chart 17). Now these are not weighted by size of company or anything like that, and they are on a legal-entity basis. For example, a company like AEGON would have a bunch of legal entities listed in here. We haven't adjusted for that. You can see the sweet spot, so to speak, as being in the 10-15 percent range. You see some companies with a fairly modest exposure. Some companies are 0 percent. You can see some companies, a fairly small number, were above 30 percent. I would say typically we would not be surprised to see somewhere in between the 10 to 20 to 25 percent range. Again, I don't think there's a right

number. I'm not going to say whether you're below that or above that is right or wrong. But I think probably with any asset class if you're significantly outside the norm for the industry, that's something we'd want to talk about. We'd like to have an understanding of why you've done it. It doesn't mean it's right; it doesn't mean it's wrong. Most importantly, we would want to have a better understanding of why you're doing what you did.

The last thing I'd like to comment on is really kind of off the topic, but I think, nonetheless, it's probably very useful for a group like the Society of Actuaries. When you're doing your other actuarial work, I think it's very important for you to view what's happened with the residential mortgage market. It's kind of a benchmark of efficiency of exercise of options owned by retail customers. We've had a lot of discussions with insurance companies about the options they've written on products of various kinds—annuities, life insurance and so on. I think this is one thing the industry has not really recognized very effectively, and is only beginning to recognize. I think it is undervalued to the extent that over time the markets and retail customers will be getting increasingly efficient in exercising these options. For example, one issue that we're looking at today is universal life with a no-lapse guarantee. One of the discussions we've been having is how efficiently these are going to be exercised.

Another interesting characteristic is we're also beginning to see secondary markets being developed in these with the help of the Wall Street firms. So even if there's not a value to the end customer in the option itself, they are being packaged, securitized and sold in the capital market. As actuaries, when you're wearing your other hats doing this kind of analysis, you ought to look at this very carefully and recognize the fact that the residential mortgage market has evolved, and it's gotten increasingly efficient over time. You really have to expect to some degree that that's going to happen with a lot of the other products you're showing in the embedded options involved in those products.

FROM THE FLOOR: I'd like to thank the panel for an excellent session. It was very enjoyable. I wanted to focus on Ross's model, if only because it highlights the downsides of MBS. I think this would be a case where it would be fairly useful to see some old-fashioned scenario analysis where we could see under what circumstances MBS would actually be beneficial. I also think it would be useful to have seen a little bit more on what were the alternative assets that were being looked at, but I presume there were proprietary reasons why we couldn't say too much about that.

My question is really around something that Arthur actually touched on, which was the usage of derivatives. I'm just wondering if Ross has done any analysis that has looked at some of the results that you showed, incorporating some derivative instruments, so that you could enjoy some of the benefits of diversification, higher yield from MBS without the downside aspects that you highlighted. It may be that the cost of using derivative instruments may have outweighed some of the risk

reduction elements. I'm just interested if that's something that you looked at, if you could hint at some of the results that you may have seen. I think that would be useful.

MR. BOWEN: First I'll agree with you that looking at some deterministic scenarios would be useful. We usually do that too. I'll take the New York Seven scenarios. We call them the New York Eleven, because we add up 100, up 200, as well as the pop-up 300.

Generally no, I haven't been testing derivative strategies in conjunction with the MBS like this. It's a function of the clients that we're working with, most of them don't have a derivative use plan in place. I think it would be very interesting though.

MR. FLIEGELMAN: I think we do see some companies that use derivatives on kind of more of a macro basis. I'm not personally aware of any company that uses derivatives specifically against, for example, this asset class. I would again have to imagine that you burn through the spread that you're earning on the asset class pretty quickly if you tried to do that.

MS. LOWELL: The trading desks do use some derivatives, but I think they avoid paying premium. They try to dynamically hedge that duration so they might hold something opposite. This brings me to a question I had for you, Art. How often do you see the exotic MBS? And I would think that if you saw IO and PO, those would be preferred as a hedge vehicle rather than as an outright speculative, highly leveraged investment.

MR. FLIEGELMAN: Clearly as an outright leveraged speculative investment is the way you would put it. It would not be something we would encourage.

MS. LOWELL: Do you see it at all?

MR. FLIEGELMAN: No, I don't think so. I think most companies have it, particularly in what I would call their mainline portfolios. They may have a little portfolio off to the side where they have the portfolio's managers getting to do some trading. They stick to the pretty much plain vanilla stuff. They need a substantial size. And also, you have a lot of accounting and financial reporting issues. In many cases you might get the economics to say, "Well, they work a little better doing this than that." But the accounting won't necessarily be anywhere near as pretty. A lot of the companies obviously are very sensitive to financial reporting issues. So I think for the most part they're going to be pretty much straight down the middle looking for as stable as you can reasonably get, conservative, reasonably yielding assets to back up their mainline portfolios. You can add a little smattering of this or a little smattering of that. But quite frankly, if it's not substantial enough to make a difference, why bother?

MR. WILL MITCHELL: The question I have is whether you looked at combined residential mortgages, plus commercial mortgages, plus maybe company-issued mortgages. If you take that sum would you find some companies that have way above 30 percent?

MR. FLIEGELMAN: Well, we don't really look at it that way. I guess, first of all, by company-issued mortgages you're talking about residential or commercial or both? And I'd also say that residential and commercial have very different characteristics. I don't know whether you've been involved with the commercial market at all. It has very different characteristics. You're dealing with much larger loans that are underwritten in very different ways. Obviously, liquidity is a much different issue. They typically have lockouts. Credit becomes a much more important piece of it. In many cases they may or may not be in the commercial MBS vehicle versus residential MBS. I guess I would say that we think of them as very different markets with very different characteristics. We don't see any particular reason you'd take our residential and commercials and add them up. You could add them to a lot of other things, but I don't think there's any real value there in terms of just the types of assets they are because the characteristics are so different.

FROM THE FLOOR: To what do you attribute MBS outperformance in 1994 and 1999? I think that's a little bit counterintuitive.

MS. LOWELL: Well, to answer that question I have to also have been good at corporates and Treasuries. But I think one of the advantages that mortgages had, and they have that advantage today, is they cheapened up as the market backed up. In 1994, for instance, in addition to having a very rapid backup and an acceleration of the backup that was blamed on mortgage hedging, this was the first of many incidents where just the sheer size of the mortgage market proved to be a force that would move the rest of the capital markets. So we have very cheap mortgages going into that period where they outperform. We go into a period of softer performance on the credit side.

Now I could give you a firmer answer if I were only a corporate bond expert as well. But I think the real answer is the cheapness, and also in 1994 we had a similar situation to what we have now as we're going to see the whole interest rate cycle shift. The predominant opportunity set of the mortgage market is now low coupon; most of it is fully extended; it has much better convexity characteristics in aggregate and very large coupon concentrations that are also very well behaved. So what investment managers can choose from now is a much more palatable, less risky asset and it has the advantage of being fairly high-yielding.

Now the problem is that nobody wants to own too much of the mortgage-backed asset until we get to the other side of whatever the Federal Reserve has in store for us. So there's a lot of caution. That caution is the source of the cheapness, but what I really see in a simple way is that as the banks, who have been holding these securities as leveraged carry investments, have to let go, insurance companies and

the GSE portfolios should be the main beneficiaries. There are yet cheaper times I think ahead for MBS. And that's when I would expect to see the savvier investment managers in your companies begin to bring them in. They'll remember when they got the outperformance.

The people that I talked to in insurance companies have been asking me for help to stem the tide of reducing that mortgage allocation, because they know there is the time coming when they want to be as fully invested in mortgages vis-à-vis the other asset classes for their companies as they can be.

MR. BURSINGER: Let me add one comment to that. That outperformance is also a function of a total return measurement system. If you have a company that just manages to book yield, that only looks at book yield, you are not going to see that type of outperformance. You need to have a company that's willing to manage on total return basis and move in and out of asset classes in order to realize those types of gains.

MR. FLIEGELMAN: I think probably the companies that are most successful over the long run also recognize that, in residential MBS as in any asset class, there are times that are more attractive than others. I don't necessarily expect them to get in and out of asset classes in their entirety, depending on their level of attractiveness. But at least we'll kind of move the ball or the measure a little bit so when it's more attractive put more of it on, and when it's less attractive put less of it on. I think it's really slavish to always have exactly 22.5 percent in asset class regardless of the level of attractiveness. I don't think that leads to optimal economics.

MR. BOWEN: I think the graph I had up there showing the current yield of mortgages compared to corporate sort of echoes maybe what Linda said, that they look attractive now. They looked attractive before 1994 too.

MS. LOWELL: I have a little more information about the liquidity, which Art referred to. In general if you trade a pass-through as a TBA instrument (that is, you can deliver any pass-through that you have of that coupon and that program into the trade), those trade with the same liquidity as any on-the-run Treasury instrument. And arguably better at certain times. So that's one plus.

Then we have huge generic coupons. The outstanding is whether you subtract the CMOs that are pledged to or not, they still vastly exceed the availability of any other particular security. So we can call all the Fannie Mae 5.5s that are outstanding, whatever year they were created in, as one security for a TBA trade. That provides a kind of liquidity that is challenged only when the market is extraordinarily rolled. If you remember back to 1998, the chaos, the liquidity crisis, the emerging markets crisis and then the collapse of long-term capital, MBS became the preferred instrument for many investment managers who also had corporates and Treasuries. They found it easier to get their hands on cash in that

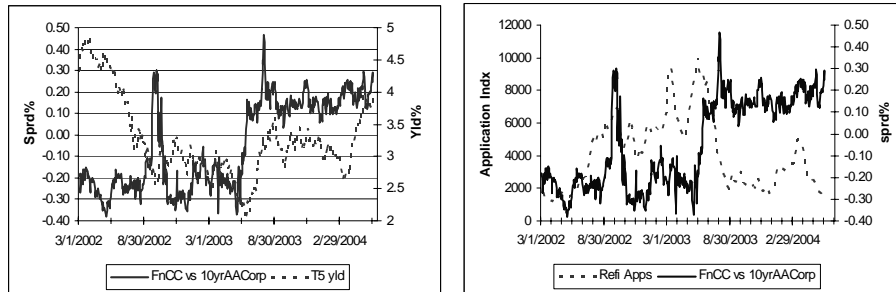
episode by liquidating MBS closer to the price they expected to see. That's a very important characteristic.

MR. FLIEGELMAN: We've also seen some insurance companies becoming members of the Federal Home Loan banking system. Again, they can use them as vehicles for advances from the Federal Home Loan banks. It is still uncommon, but we are beginning to see that a little bit more in the life industry. That's another liquidity source.

Chart 1

RBS Greenwich Capital

Yield advantage varies with market conditions

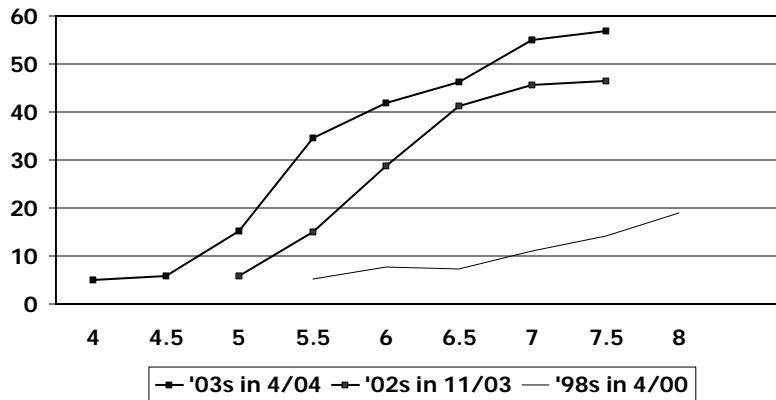


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Chart 2

RBS Greenwich Capital

1-month CPRs on Freddie 30-year Coupons, Selected Vintages, Selected Months



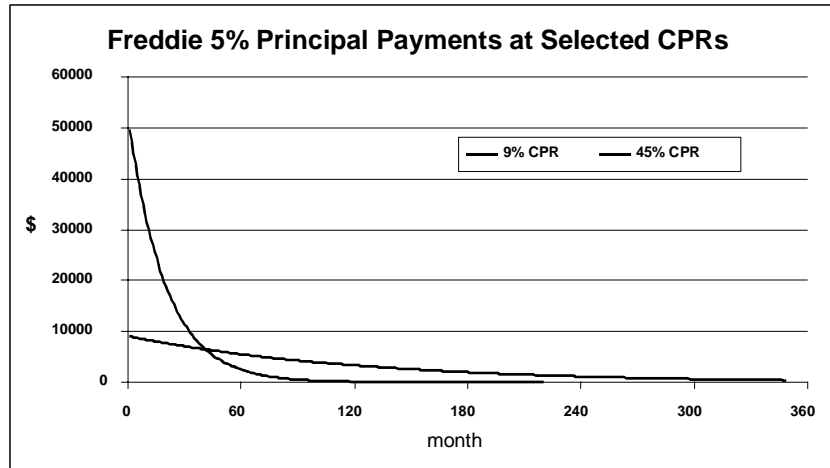
Avg 30yr Mtg Rates 2 mos prior: 5/04 5.65%; 11/03 6.05%; 4/00 8.20%

14

Chart 3



As a result, cash flows are highly volatile

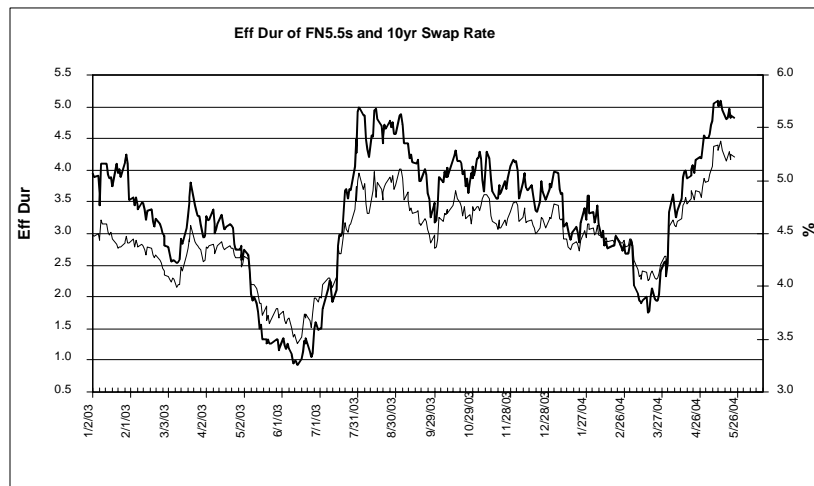


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Chart 4



Negative Convexity: Duration "Drift" of FN 5.5s with Interest Rates

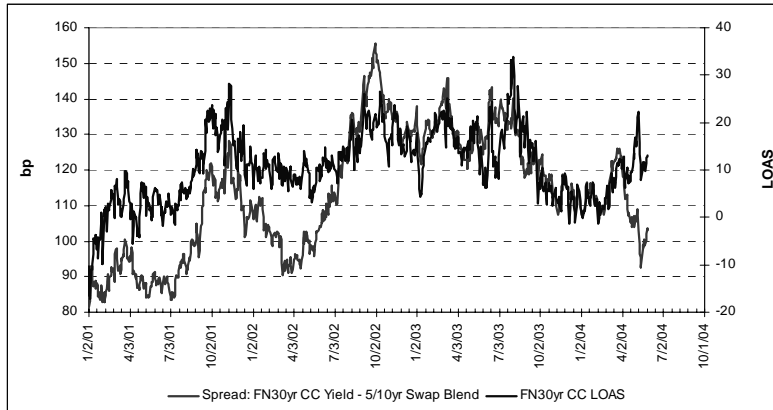


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Chart 5

RBS Greenwich Capital

Relative value ex option costs

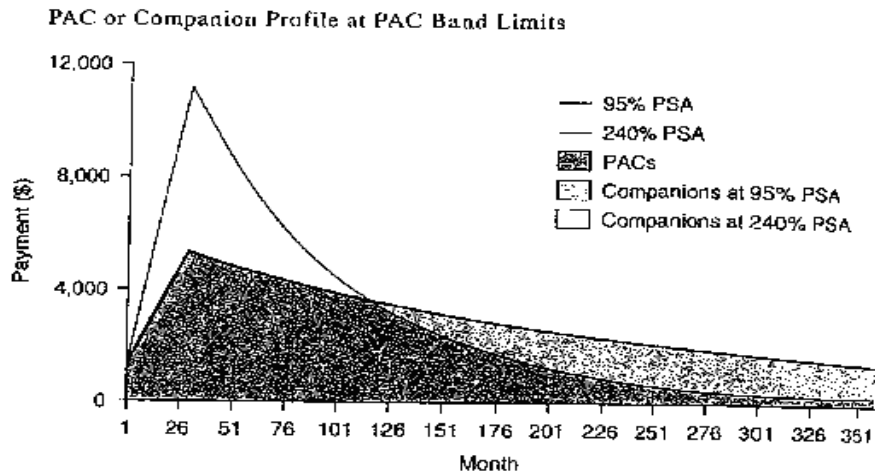


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Chart 6

RBS Greenwich Capital

Structure can improve stability: PAC CMO



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Chart 7

Traditional

- Risk preference determines allocation to MBS
- 15% looks like minimum risk point

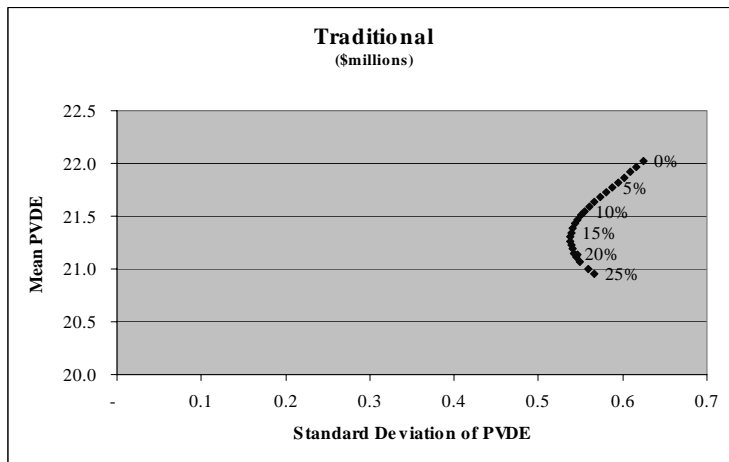


Chart 8

Traditional

- 5th Percentile shows that adding MBS decreases reward while slightly increasing downside risk

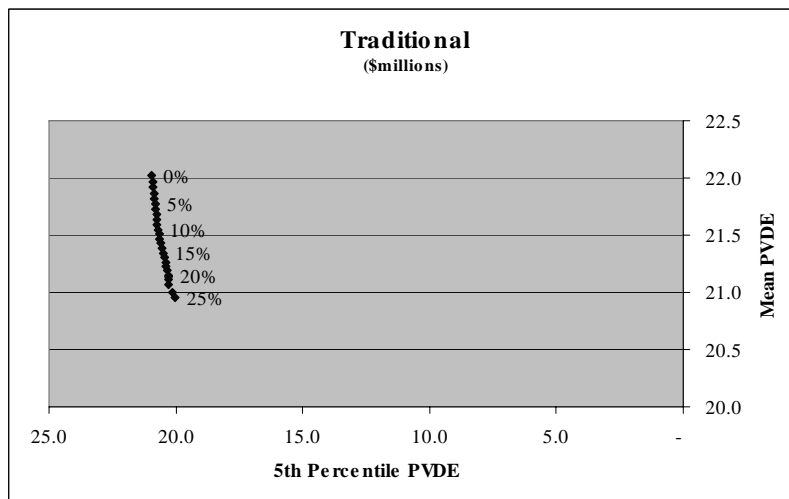


Chart 9

Traditional

0% Allocation dominates other strategies

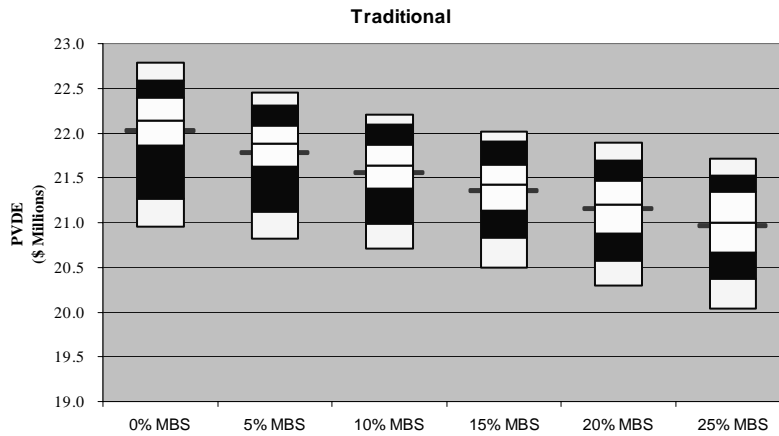


Chart 10

Deferred Annuity

Adding MBS decreases risk and decreases reward

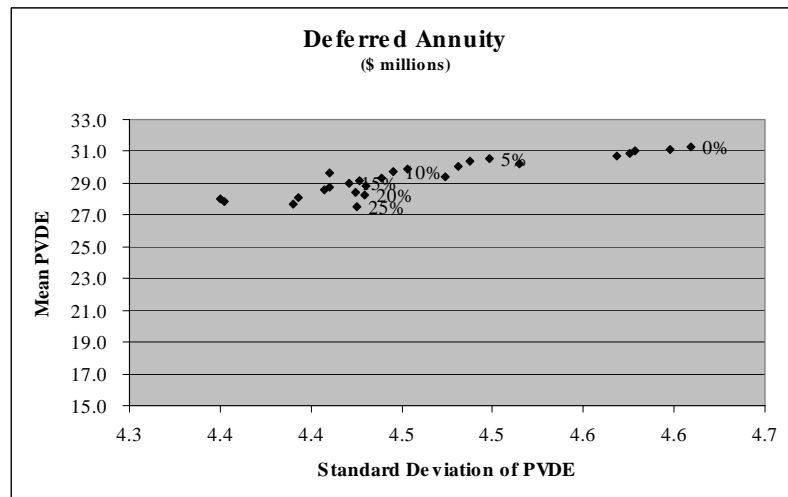


Chart 11

Deferred Annuity

Adding MBS increases downside risk and decreases reward

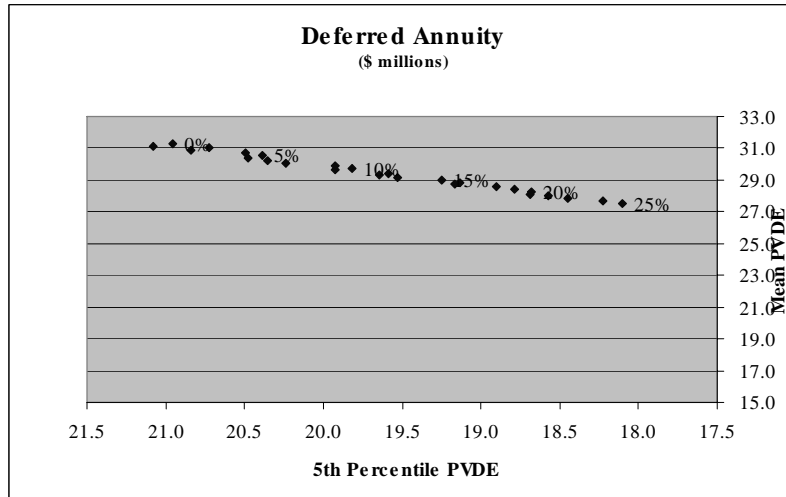


Chart 12

Deferred Annuity

0% MBS allocation dominates other allocations

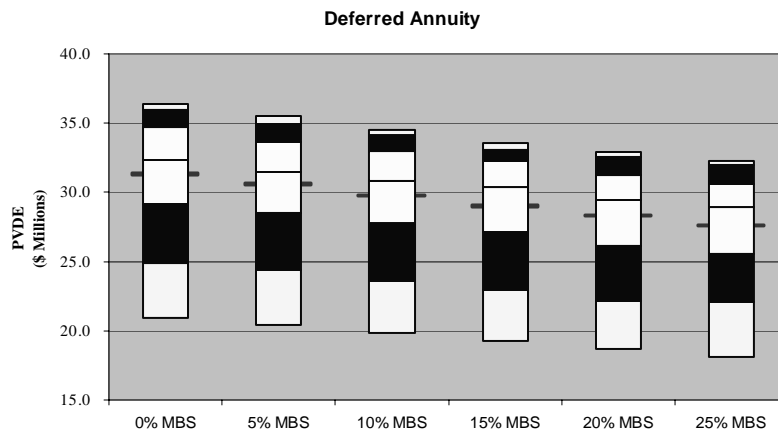


Chart 13

Are MBS Attractive Today?

- MBS Yields are near an historic high compared to credit yields

MBS Yield Vs Credit Yield



Chart 14

Example of Maturity Bucket Efficient Frontier

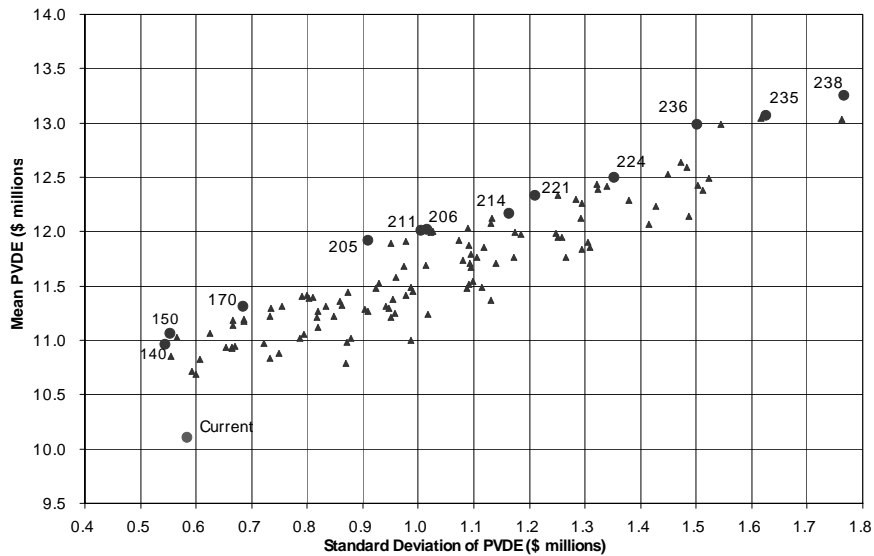
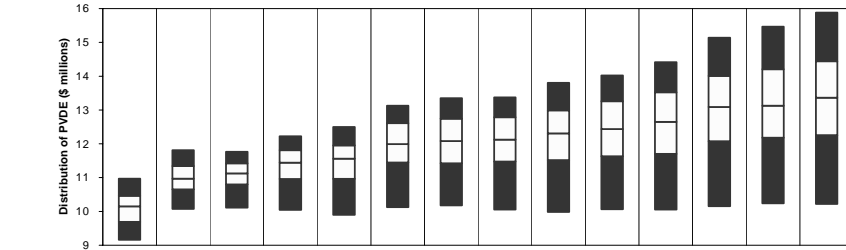


Chart 15

Maturity Bucket - Distribution of Results



Strategy	Current	140	150	170	171	205	206	211	214	221	224	236	235	238
Rebalance Asset Mix:														
1-3	54	-	-	-	-	-	-	-	-	-	-	-	20	20
3-5	42	20	20	20	-	20	-	20	20	20	20	20	-	-
5-7	61	60	40	40	60	40	60	20	-	20	-	20	20	-
7-10	85	-	20	-	-	-	-	20	40	-	20	-	-	20
10-20	5	-	-	20	20	-	-	-	-	20	20	-	-	-
20+	-	20	20	20	20	40	40	40	40	40	40	60	60	60
Duration	4.6	6.1	6.4	7.0	7.3	7.6	7.9	7.9	8.3	8.5	8.8	9.1	8.8	9.1
Book Yield	4.68%	4.33%	4.46%	4.60%	4.78%	4.73%	4.91%	4.87%	5.01%	5.01%	5.15%	5.14%	4.94%	5.07%
Percentile:														
95%	11.0	11.8	11.8	12.2	12.5	13.1	13.4	13.4	13.8	14.0	14.4	15.1	15.5	15.9
75%	10.5	11.3	11.4	11.8	12.0	12.6	12.7	12.8	13.0	13.3	13.5	14.0	14.2	14.4
50%	10.1	11.0	11.1	11.4	11.6	12.0	12.1	12.1	12.3	12.4	12.6	13.1	13.1	13.4
25%	9.7	10.7	10.8	11.0	11.0	11.4	11.4	11.5	11.5	11.6	11.7	12.1	12.2	12.3
5%	9.2	10.1	10.1	10.0	9.9	10.1	10.2	10.1	10.0	10.1	10.1	10.2	10.2	10.2
Std Dev	0.6	0.5	0.6	0.7	0.8	0.9	1.0	1.0	1.2	1.2	1.4	1.5	1.6	1.8
Mean	10.1	11.0	11.1	11.3	11.4	11.9	12.0	12.0	12.2	12.3	12.5	13.0	13.1	13.3

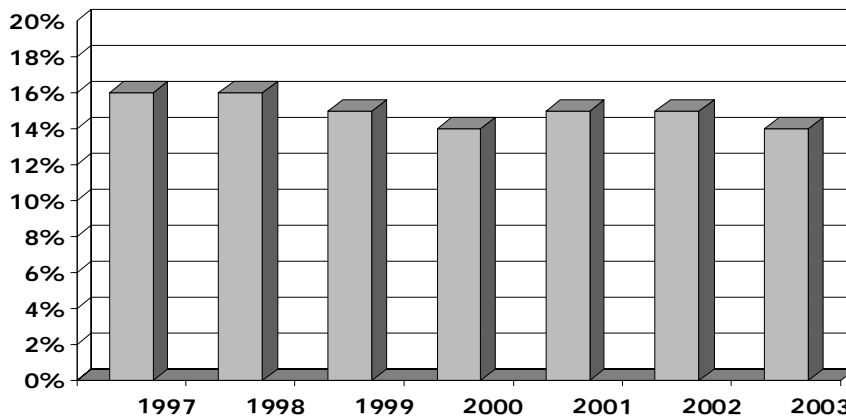
Swiss Re Group
iii

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Chart 16

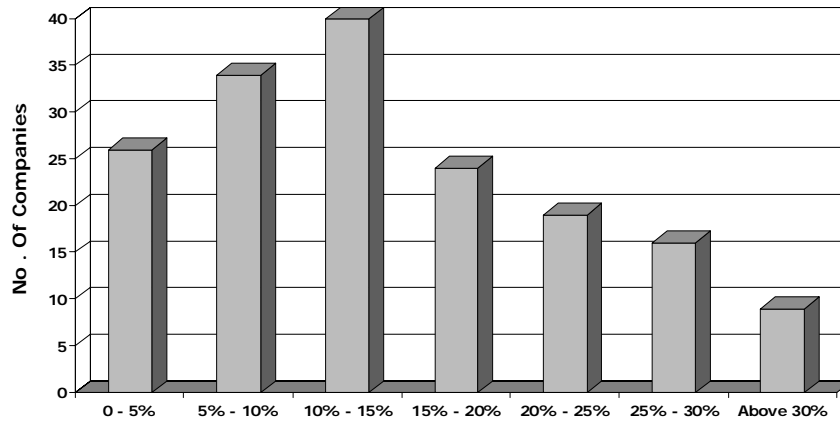
RMBS as a Percentage of Invested Assets



Moody's Investors Service

Chart 17

Distribution of RMBS as a % of Invested Assets for Moody's Rated Universe



RMBS as a % of Invested Assets
Data as of 2003



Moody's Investors Service