

Who Owns Residential Credit Risk?

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The recent turmoil in the capital markets has been triggered by high delinquencies and expectations of losses from the residential mortgage universe. The big questions are whether these credit losses are likely to be overwhelming and whether the ultimate holders of risk are sufficiently capitalized.

Aggregate Losses Appear Manageable

Under stress assumptions where home prices drop by 30% over the next three years and credit conditions remain tight, losses in residential mortgages could be about \$240 billion. This is equivalent to an annual increase of \$50 billion, or 0.5% of US GDP, which is not terrible, in our view. We estimate that corporate bond market losses in the earlier part of this decade were comparable to our stress-case loss projections for residential mortgages.

The Large Players Look Okay...

The largest holders of loan exposure are the government-sponsored enterprises (GSEs), banks, thrifts, and mortgage insurance (MI) companies. The GSEs, banks, and thrifts look rather well-positioned to manage any surge in credit losses on their mortgage portfolios. MI companies have significant exposure, but there are some offsets from the increasing value of the stream of premiums they receive. Their biggest risk is potential ratings action, which can affect new business. With the exception of the MI providers, we don't see a cause for concern around the large holders of residential risk.

Securitized Markets: ABS CDOs House Bulk of the Risk

Although the securitized subprime and non-agency markets account for only about 25% of the outstanding mortgage universe, their share of aggregate losses is rather high. Much of the risk in these securitizations is in the investment-grade securities and has been almost entirely transferred to AAA collateralized debt obligation (CDO) holders. Some of the AAA CDO holders are well-capitalized institutions, but the players most at risk are monoline bond insurers. The actual principal losses on AAA CDOs will not materialize for a couple of years and these institutions don't need to mark the assets to market, but their risk is potential rating agency action on deals that they have written protection on.

Mark-to-Market Issues and ABCP Blues

In securities up the capital structure, especially AAAs, there is little risk of actual principal losses, but spreads have widened significantly in recent times. We expect a limited impact from these changes, however, because most players holding this risk don't have financing issues and have a large capital cushion. Contrary to popular opinion, the amount of AAAs with conduit vehicles is less than \$100 billion and potential supply should be absorbed over a three- to six-month horizon, in light of declining non-agency/subprime production.

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Disclaimer: Our analysis is on aggregate industry exposures. Some individual institutions in a given sector may have significantly different exposures.

WHO OWNS RESIDENTIAL CREDIT RISK?

The Context

The recent turmoil in the capital markets inspires the question: Who owns residential credit risk?

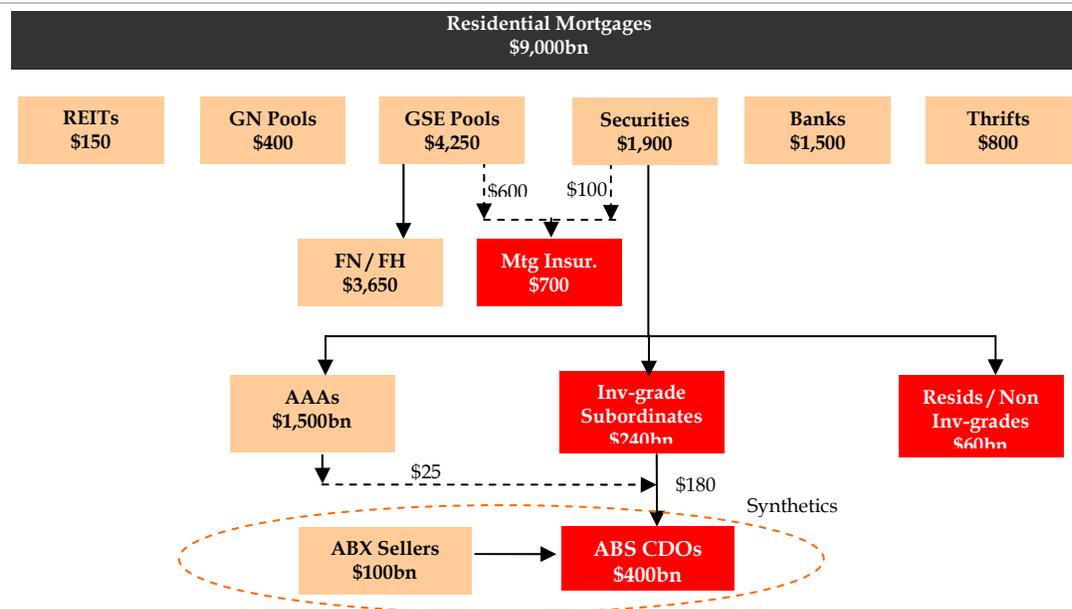
We don't need to spend much time explaining the relevance of this topic. The recent turmoil in the capital markets has been triggered by credit problems in the residential mortgage market. Pricing of residential credit pieces is now reflecting scenarios with a significant drop in home prices over coming years (about a 15%-25% drop in home prices over the next three years). In the last 30 years, there hasn't been a drop in home prices at a national level for a sustained period of time, and even regional housing market corrections have not been so extreme. That brings us to the first question we address in this piece: **Can losses in such stressed housing scenarios be overwhelming from the standpoint of the macroeconomy?** In addition to aggregate losses, the recent liquidity crunch is also the result of expectations around the potential failure of larger holders of risk. So, the other question we are interested in is: **Who owns residential credit risk and are these players sufficiently capitalized to handle the surge in credit losses?**

Our Approach

We examine the components of the residential credit balance sheet across base case and stressed scenarios.

We start by estimating aggregate market losses across various HPA scenarios and then delve into the ownership of risk. The residential credit balance sheet (Figure 1) is one easy way to visualize the flow of credit risk in the mortgage market. We first look at the large holders of loans: the GSEs, banks, thrifts, and mortgage insurers. A significant part of the credit risk in the residential market is in the securitized non-agency and subprime markets, although they account for only about a quarter of the outstanding balance. We delve into the structure of these sectors and try to assess the exposure of the ultimate holders. Finally, we look into potential mark-to-market issues in senior bonds and whether we need to be concerned about vehicles like asset-backed commercial paper (ABCP) conduits and structured investment vehicles (SIVs).

Figure 1. The Residential Credit Balance Sheet



Source: Lehman Brothers. As of June 30, 2007. We show the principal exposure of each sector to residential MBS. MI companies own the first loss piece on about \$700bn of mortgages. A significant portion of these mortgages are agency MBS.

1. DEFINING THE SCENARIOS

Home Price Appreciation is the Most Important Driver

Home price appreciation is the single most important factor in driving residential credit.

Before we delve into the credit exposure in the residential mortgage system, we should note that losses are largely a function of the macro environment. Of the many variables that can influence defaults and losses, the strength of the housing market and unemployment are considered to be the most important drivers. We choose **scenarios based only on housing** (captured by home price appreciation, or HPA) for two reasons. First, between the two variables, housing appears to have had a much bigger role in explaining defaults in recent times. Regions such as Michigan/Ohio, which had high default rates in the last few years, did have softer employment as well as housing markets, but the superlative performance of loans in California and Florida can only be explained by the state of housing. Second, recovery rates are almost entirely dependent on HPA.

The Housing Scenarios

We examine credit exposure in four scenarios: recent, 0% HPA, -8% HPA, and -12% HPA.

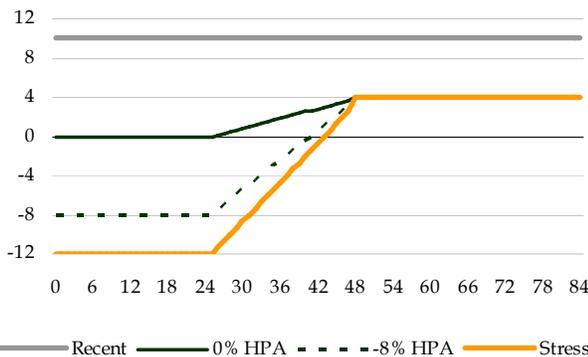
Throughout this piece, we discuss the credit exposure of mortgages in four different scenarios. The first simply captures the “recent” housing environment and serves as a benchmark. In the other three scenarios, we assume that HPA returns to a long-term average of 4% over a four-year horizon as shown in Figure 2. The “0% HPA” scenario is one that was almost the consensus expectation until two months ago. The “-8% HPA” scenario is easy enough to understand. The “**stress**” scenario assumes a **12% annual drop in home prices with refinancing problems for resetting borrowers.**

The Basis for These Scenarios

To put our scenarios in context, HPA has never been negative nationally. However, the ABX BBB index is currently pricing in a -8% HPA scenario.

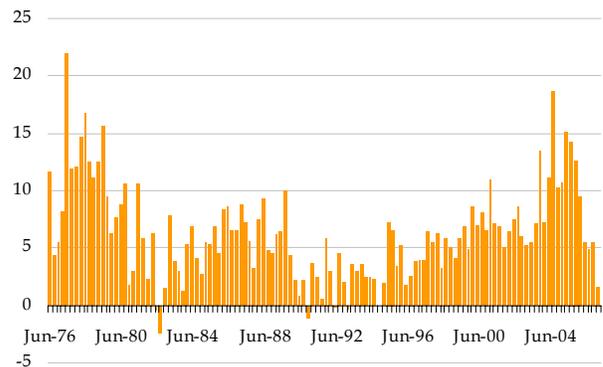
As is common knowledge now, there hasn’t been a drop in home prices on a national level for a sustained period over the last 30 years. Even at a regional level, the drop in Texas during the late 1980s and California during the early 1990s was about 12%-15% over a four-year period. That said, we have never seen such a run up in the housing market or the underwriting excesses as we did during the past few years. So, the basis for our scenarios is partly in the pricing of residential credit securities today. Pricing of BBBs in the ABX reflects the “-8% HPA,” which does seem plausible to us. This scenario would also bring home prices back in line with the income growth we have seen during the last five years. The stress scenario, on the other hand, assumes tight credit conditions for the next few years, pushing prices down by 30%-35% over the next three years. This is a rather pessimistic housing scenario, in our view.

Figure 2. HPA (Annualized) Across Scenarios, %



Source: Lehman Brothers.

Figure 3. Historical Home Price Appreciation, %



Source: Freddie Mac (National level, includes purchase and refinancings)

2. AGGREGATE LOSSES: NOT OVERWHELMING

Coming Up with Loss Expectations

Our loss projections depend on borrower characteristics, using early stage performance as an indicator.

Discussing the loss projection methodology itself could take up several pages, but that is not the primary purpose of this piece. We discuss it briefly here (Appendix A has more details). In addition to housing, our loss projections depend on borrower characteristics like FICO score, CLTV (combined loan to value ratio), occupancy status, documentation, loan size, and the channel of origination. To estimate performance across such characteristics, we use early stage performance on 2006 loans as an indicator. To arrive at the housing sensitivity, we look at delinquencies and loss severities across regions with variation in HPA rates. Finally, to the extent that seasoned pools have seen significant HPA, our loss projections would be lower due to the built-up equity in the house.

Seasoned Securities Should Have Lower Losses

Losses on subprime securities and recent vintages have higher losses than prime and seasoned securities.

Figure 4 shows the loss projections across sectors and scenarios. Understandably, **subprime securities and recent originations have much higher losses**. In the stress scenario, losses on recently originated subprime and alt-A loans are as high as 19% and 4%, respectively. Estimates for seasoned pools (we show 2004 as an example) are much lower due to the home price appreciation that these loans have seen as well as better underwriting. Loss estimates for subprime pools in the “stress” scenario are about 60% lower on 2004 originated pools compared with their 2006 counterparts.

A Significant Amount of Seasoned Originations...

Seasoned securities, which represent over 60% of the outstanding universe, have significant built-up equity.

The good news for the mortgage universe is that a sizeable portion (about two-thirds) was created in 2005 or earlier and has significant equity built-up. In fact, the agency universe has more than a third in loans from 2003 or earlier originations that have over 50% equity (Figure 5). The subprime and alt-A sectors, unfortunately, are more recent creations. This is important for two reasons. First, the loss projections for agency pools are likely to be lower not only because of better-quality borrowers, but also due to the built-up equity. Second, in aggregate, mortgage market loss projections will be a lot lower than “back-of-the-envelope” calculations would indicate.

Figure 4. Lifetime Loss Estimates Across Scenarios

	Recent	0% HPA	-8% HPA	Stress
2006 Vint.				
Jumbo	0.27%	0.64%	1.10%	1.60%
Alt-A	0.70%	1.64%	2.84%	4.11%
Subprime	2.37%	8.61%	13.23%	19.19%
2004 Vint.				
Jumbo	0.16%	0.33%	0.48%	0.60%
Alt-A	0.37%	0.72%	1.06%	1.32%
Subprime	1.52%	3.88%	6.32%	7.90%

Source: Lehman Brothers. These are losses in the securitized markets. Loans on bank /thrift balance sheets have better characteristics.

Figure 5. Outstanding Balance by Vintage \$ billions

	<=03	2004	2005	2006	2007	Total
Agency	1,572	622	848	901	307	4,250
Jumbo	510	474	614	465	286	2,350
Alt-A	71	142	320	375	292	1,200
Subpr	73	131	385	427	183	1,200
Total	2,226	1,369	2,168	2,168	1,068	9,000

Based on data from agency pools and loan performance and the Fed's Flow of Funds. Excludes HELOCs.

The subprime sector is expected to account for roughly 75% of projected losses.

...Should Keep Aggregate Loss at \$240 billion in a Stressed Scenario...

We show aggregate lifetime losses for the existing mortgage universe (Figure 6). If recent housing conditions had persisted, lifetime loss expectations would have been \$40 billion. If home prices stay flat over coming years, losses may increase threefold to more than \$110 billion and in the “stress” scenario, aggregate losses may be higher than \$240 billion. Understandably, most of the losses come from the subprime mortgage market. Although the sector accounts for less than 15% of the outstanding mortgage universe, its share of losses is about 75%.

Figure 6. Aggregate Loss Projections as a Function of HPA Scenario (\$bn)

	Size \$bn	Recent	0HPA	-8HPA	Stress
Agency	4,250	7.9	13.6	21.8	28.6
Prime	2,350	2.7	6.0	10.0	13.9
Alt-A	1,200	4.9	11.6	19.6	27.9
Subprime	1,200	22.8	77.8	122.5	171.3
Total	9,000	38.3	109.0	174.0	241.7

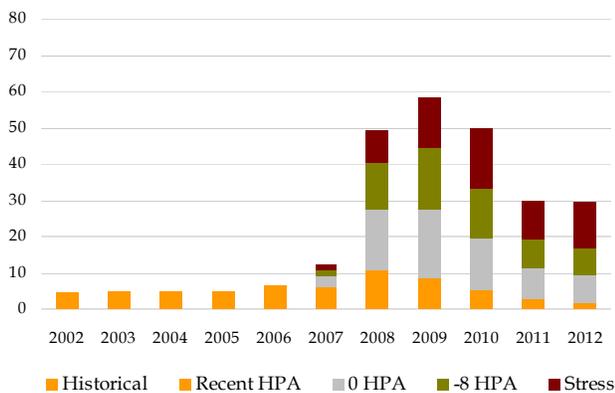
Source: Lehman Brothers. The “recent” scenario assumes 10% annualized HPA. The “stress” scenario assumes HPA is -12% (annualized) and credit conditions stay tight for a while.

...Which is not Devastating in Itself

In comparison with the GDP and historical losses in the high-grade/high-yield markets, projected mortgage losses seem manageable.

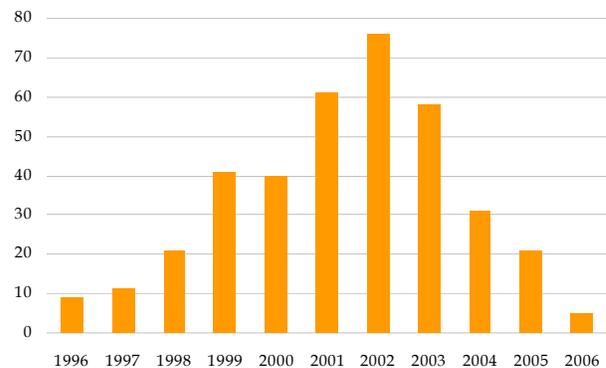
Note that the loss projections we have shown so far are life-time estimates. Annual losses in the mortgage market should increase from about \$8 billion to \$40 billion per year in the -8% HPA scenario and to \$50 billion in the stress scenario (Figure 7). Prima face, this doesn’t look devastating at 0.5% of GDP, especially in light of the wealth effects of a softer housing market. In the housing scenarios under consideration, equity extraction, which has been running at \$700-\$800 billion a year could drop to near zero. Another point of comparison is losses in the corporate bond market. For a few years during the past decade, the high-grade/high-yield markets together have seen losses higher than the “stressed” loss projections (Figure 8). Therefore, although residential credit losses should increase by a significant amount, we believe they are not overwhelming. The potential reason to care about these losses then is if players holding the risk are not sufficiently capitalized to absorb them. So, who owns this risk?

Figure 7. Most Residential Losses in 2008-10 (\$bn)



Source: Lehman Brothers. ‘Recent’ assumes 10% HPA (annualized) The stress scenario assumes -12 HPA with tight credit conditions

Figure 8. Corporate Losses Have Been Higher (\$bn)



Source: Lehman Brothers. Estimates based on default data from Moody’s, scaled up to the size of the corporate bond market.

3. WHO OWNS THE RISK?

Large Loan Holders: The GSEs, Depository Institutions, and MI Providers

The largest holders of residential loan exposure are the GSEs, banks, and savings institutions.

We can think of the total residential credit exposure in two parts: loans and securitizations. Although agency pools are technically securities, since the credit risk of the entire loan is held by one entity, we will treat that as loan exposure. **The largest holders of residential loan exposure are the GSEs, banks, and savings institutions.** The GSEs have about \$4.2 trillion between guarantees and loans on balance sheet. Banks and thrifts own about \$2.3 trillion in residential loans. Mortgage insurance companies have assumed equity risk on \$700 billion loans, mostly agency-wrapped. Ginnie Mae holds risk on \$400 billion loans, but since this is the exposure of the U.S. government, we have not estimated loss exposure of these loans. The rest, about \$2.0 trillion, is in subprime and non-agency securitizations.

Securitizations House the Worst-Quality Loans

Loans held on balance sheets appear to be of much better quality than securitized loans.

Figure 9 shows the type and quality of loans held by various credit market participants. Loans held by the agencies and banks/thrifts understandably appear to be of much better quality than the securitized markets. **While the agencies do hold some subprime exposure, it almost entirely to AAAs** and, hence, they hold limited credit risk there. Commercial banks and thrifts do have some exposure to subprime and second liens, but the bulk of their exposure is to prime loans. Although limited information is available with regard to the characteristics of borrowers, as we discuss shortly, based on the delinquencies quoted by the Federal Deposit Insurance Corporation (FDIC), **banks and thrifts appear to have the quality of the top half of non-agency securitizations.** Mortgage insurance providers mostly wrap agency-quality loans, which almost by definition have LTV ratios north of 80%.

Figure 9. Estimated Holdings of Various Credit Market Participants ⁽¹⁾

	Bal \$bn	Product Composition, %					Collateral Characteristics, %				
		Agency	Prime /Alt-A	Option ARMs	Sub- Prime	Seconds	FICO <700	Owner	Full-doc	Piggy- backs	Purch
GNMA	400	100%	–	–	–	–	95	100	–	–	45
GSEs	3,650	87%	13%	–	–	–	12	93	–	–	46
Banks ⁽²⁾	1,500	–	72%	5%	11%	11%	28	94	65	14	42
Thrifts ⁽²⁾	800	–	45%	32%	3%	7%	20	94	55	16	38
Mortgage Ins ⁽³⁾	700	84%	8%	–	8%	–	16	93	70	–	90
REITs	150	–	53%	9%	34%	3%	60	92	50	20	40
Securities	1,800	–	43%	6%	46%	5%	55	88	45	22	44
Total	9,000	46%	32%	5%	12%	4%	29	93	–	–	48

1. Source: Lehman Brothers. As of June 30, 2007. We show the principal exposure of each sector to residential MBS.
 2. We assume that within a given sector, the loans with banks and thrifts are of similar quality to the top half of securities.
 3. MI companies own the first loss piece on about \$700bn of mortgages. A significant portion of these mortgages are agency MBS
 4. We don't have CLTV information on agency securities

3.1 THE GSES: DELINQUENCIES ARE STILL LOW

The GSEs own credit exposure on \$4.2 trillion in loans including guarantees and loans on balance sheet. They also own \$400 billion in non-agency securities, but these are almost entirely AAA-rated. On about \$600 billion of their total portfolio, they have transferred equity risk to the MI companies.

Loss Projections Post-MI Look Contained

We should admit that it is a bit difficult to project losses on GSE portfolios. For one, there is no historical data on loan-level delinquency/default performance of agencies. We use conforming balance non-agency securities as a proxy and calibrate loss projections based on the aggregate delinquencies quoted on GSE portfolios. We estimate that **compared with similar conforming loans in the non-agency space, loans selected for an agency wrap have about 20%-25% lower delinquencies and defaults.** (Interestingly, unlike the rest of the market, aggregate delinquencies on agency loans have not increased in the last few months, as we show in Figure 10). Based on these estimates, even in the stressed scenarios, lifetime losses on agency pools should be just under \$30 billion and, after accounting for mortgage insurance, the exposure of the GSEs drops to about \$10.0 billion. This is **small in the context of \$17 billion in capital against guarantees and \$8 billion in annual guarantee fee revenues.**

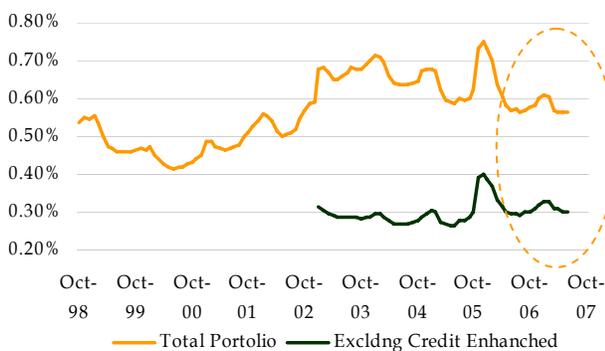
Losses on GSE portfolios should be small after accounting for mortgage insurance.

What if MI Companies Have Problems?

Although we believe there are no imminent concerns, recent headlines around some MI providers have raised a few questions about liquidity. But even if there is an MI provider event, note that premium payments are an ongoing stream (and not an upfront payment). As we discuss further on, even in the stressed assumptions, the value of the MI premium stream is shy of expected losses by only a small amount (Figure 11). Thus, the real exposure of the agencies to MI providers is not the entire \$19 billion that we show in the stress scenario, but a much smaller amount. There are some operational questions around the dealings of the GSEs with MI companies that we discuss below, but overall, we **see limited concerns around the credit exposure of the GSEs, even if there is an MI provider event.**

GSE exposure to counterparty risk from MI companies is limited, given the value of the MI premium stream.

Figure 10. Delinquencies on GSE Portfolios



Source: FN/FH monthly volume summaries. Seriously delinquent loans (90day plus)

Figure 11. Projected Losses vs. Guarantee Fees (\$bn)

	10 HPA	0 HPA	-8 HPA	Stress
Pre MI Losses	7.7	13.5	21.7	28.6
MI Exposure	4.9	8.8	14.3	19.1
Post MI	2.9	4.7	7.4	9.5
Annual G-Fee	8.1	8.1	8.1	8.1

The loss projections are over life and the g-fee premium collections are annual numbers. Capital held against guarantees is about \$17bn.

Questions Relating to the GSEs and Mortgage Insurance

1. What are the charter requirements of the GSEs with regard to higher LTV loans?

- ◆ Conventional single-family mortgage loans that the GSEs purchase or back with LTV ratios above 80% **at acquisition** need to be covered by one or more of the following: a) Primary mortgage insurance; b) a seller's agreement to repurchase or replace any mortgage loan in default; or c) retention by the seller of at least a 10% participation interest in the mortgage loans.
- ◆ In most cases, the GSEs use primary mortgage insurance.

2. What could the GSEs do if an MI company is downgraded?

- ◆ On loans/pools that already have mortgage insurance, the GSEs don't need to do anything. The GSEs may choose to potentially transfer insurance coverage to a different counterparty, but given the number of AA-rated providers available, it may not be feasible for the GSEs to find an alternative insurance provider.
- ◆ With regard to new insurance, the GSEs have a self-imposed threshold of Aa3 of AA-rating to buy MI protection.
- ◆ If an MI company is downgraded below this level, it is possible for the GSEs to potentially waive the requirement.
- ◆ It is not clear whether the change would be acceptable to OFHEO. At the very least, it appears the capital required by the GSEs on loans with MI from lower-rated providers would be different.

3. In the unlikely event of an MI collapse, what is the exposure of the GSEs?

- ◆ We don't have clear answers here. There is nothing documented regarding the GSEs' ability to potentially collect the MI premium payments themselves or transfer these payments to a different provider, in the event of an MI provider collapse.
- ◆ That said, it appears plausible that they have the ability to direct the course of future premium payments.
- ◆ The total value of future premium payments falls short of expected losses in stress scenarios only by a small amount. So, if the GSEs are able to redirect future MI premium payments, their exposure to these entities is not that significant.

3.2 BANKS AND THRIFTS: SIGNIFICANT CAPITAL CUSHION

Banks and Thrifts Have Changed Significantly in the Past Decade...

Banks and thrifts are much better positioned to manage mortgage losses today than in the 1980s/early 1990s.

Given the increase in residential mortgage losses, one natural question is whether there is risk of what we saw during the “savings and loan” crisis in the 1980s/early 1990s. Based on the FDIC, about 3000 depository institutions with about \$1 trillion in assets had failures during that period. **Banks and thrifts today** are rather different entities and **much better positioned to manage mortgage losses**. First, the growth in securitization has limited the amount of credit risk on bank/thrift balance sheets. Second, consolidation in the industry has created larger and better capitalized institutions.

...And Hold Better Loans

Aggregate delinquencies on bank/thrift portfolios have been running low given the better quality of loans on balance sheets.

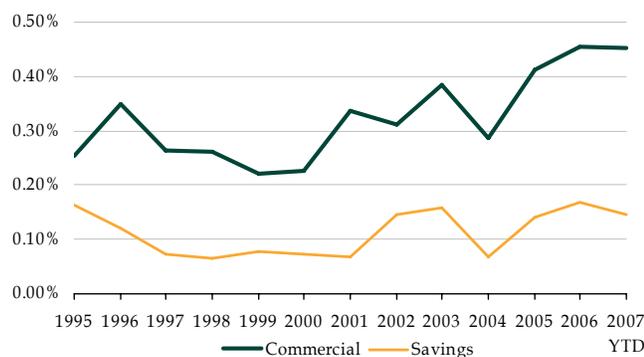
In general, commercial banks appear to favor fixed-rate products, whereas savings institutions tend to like ARMs. That said, banks have greater exposure to subprime/second-lien mortgages than their thrift counterparts. The quality of borrowers on thrift and bank balance sheets is much better than those in securities. In addition to anecdotal evidence to that effect, aggregate delinquencies on bank/thrift portfolios have been running rather low (Figure 12). Finally, there is a much larger share of seasoned loans in their portfolios than in securitizations. Losses on these loans should be smaller due to built-up equity.

Significant Cushion Against Losses

Banks and thrifts seem adequately capitalized to manage projected lifetime losses.

Figure 13 shows our loss estimates on bank/thrift portfolios across scenarios. Even under **stressed assumptions, lifetime losses on mortgages held by depository institutions should be under \$50 billion**. If we put this in the context of their capital, which is \$1.2 trillion, the losses look more than manageable. Moreover, the net interest margin on their mortgage portfolio in a single year is over \$50 billion. That said, between thrifts and commercial banks, we find the latter much better protected. Overall, while there could be one-off incidents of mortgage losses creating problems, depository institutions look extremely well-positioned to handle losses on the mortgage portfolios.

Figure 12. Delinquencies on Bank/Thrift Portfolios



Source: FDIC 90 day+ delinquencies (MBA) on single family loans. Commercial banks have a higher share of subprime and second-lien loans.

Figure 13. Projected Losses on Bank/Thrift Portfolios

	Bal \$bn	Losses Across HPA Scenarios, \$bn			
		10% HPA	0% HPA	-8% HPA	Stress
Banks	1,500	5.3	16.9	27.5	38.7
Thrifts	800	2.1	5.8	9.6	13.5
Total	2,300	7.4	22.7	37.1	52.2

We assume that the loans on bank /thrift balance sheets resemble the top 50%ile of securitized loans which would explain the recent delinquencies

3.3 MI PROVIDERS: THE JURY IS STILL OUT

The mortgage insurance industry has first-loss exposure on about \$700 billion in loans, mostly from agency pools. The total “risk-in-force” or the maximum exposure of the MI companies on these loans is about \$170 billion. Most institutions providing such insurance are monolines, although there a couple that are diversified financial institutions.

Higher Delinquencies: Offsets from Persistency

The delinquencies on MI portfolios have increased marginally in recent times (Figure 14). This may sound surprising, but the resilience could partly be due to the fact that the age of their portfolio has dropped in recent months. With second-lien loans coming under pressure since mid-2006, there has been reversion back to MI providers in recent months. It is likely that adjusted for age, their delinquencies have increased significantly. The good news for MI providers is increased persistency ratios. Persistency tracks the number of borrowers that are continuing to make premium payments from a year ago (equals 1-CPR). In a strong housing market, non-defaulting borrowers stop making MI payments over a two-year horizon as their effective LTVs drop below 80%. In a flat housing market like the present, they make payments for a much longer period (say 5-6 years). This should partly offset their increased losses.

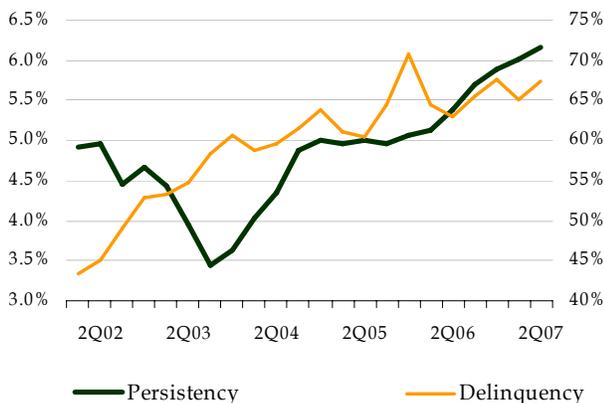
A slower housing market will extend the stream of MI premiums borrowers pay, offsetting some of the projected losses.

Potential Risk: Rating Agency Action

As we show in Figure 15, expected losses in the stress scenario for MI companies is about \$22 billion, which is equivalent to a fourfold increase from recent years. At the same time, due to increases in persistency, the value of their MI premium stream should increase from \$12 billion to \$20 billion. So, at an aggregate level, the industry doesn’t appear to have significant capital writedowns from their MI business alone. However, some of these institutions have investments in mortgage entities and bond insurers, where there could be potential losses. Besides, even flat net revenues could prompt rating agency action. The GSEs have a self-imposed rating cut-off of Aa3 for MI companies they accept insurance from. That said, the GSEs could waive this threshold in the event that an MI provider is downgraded. In addition, with second-lien loans practically unavailable and given the huge need of ARM resets with high LTVs, their new business could increase in coming months. In view of these counteracting forces, it is not clear whether there is likely to be an MI company event.

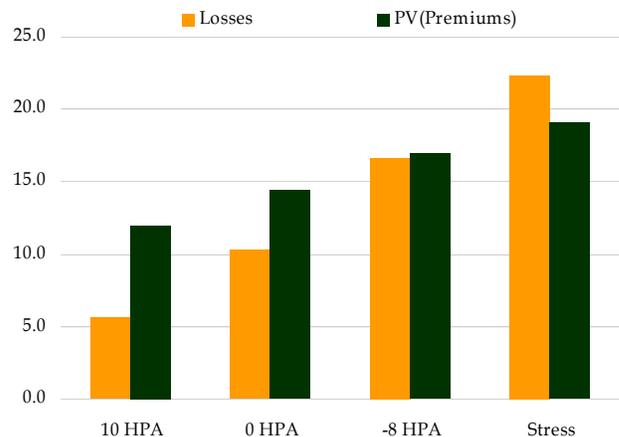
The risk to MI companies is potential rating agency action and exposure to other mortgage investments.

Figure 14. Trends in Persistency and Delinquencies



Source: 10-Qs of MI companies. Persistency tracks the share of borrowers from a year ago that are still making premium payments.

Figure 15. Losses vs. Premium Collections, \$ billions



The PV(premiums) shows the present value of premium collections from existing borrowers

The largest holders of mortgage loans are sufficiently capitalized against projected losses.

3.4 THE LARGEST LOAN HOLDERS LOOK OKAY FOR MOST PART

To summarize, with the exception of MI providers, most of the large holders of loan risk appear to be fairly well capitalized even under stressed scenarios (Figure 16). Banks and thrifts own most of the dollar losses, but in the context of capitalization, the losses on their portfolios look small. Stress scenario losses of \$50 billion (lifetime) are reasonably small compared with both capitalization and the net interest income on their mortgage portfolios. In the case of the GSEs, projected losses are a meaningful percentage of their outstanding capital, but one-year's guarantee fee revenues should cover their lifetime losses even in the stress scenarios. The big question is around MI providers. As it stands, they have significant exposure compared with their capitalization, but there are some offsetting factors as well. A lot depends on whether rating agencies downgrade them and, in that event, whether the GSEs continue to do business with these entities. Overall, we would be a little wary of MI company exposure, but at the same time, don't look for a disastrous outcome.

Non-agency and subprime securitizations account for over 60% of expected losses.

The Securitized Markets House Most of the Risk

Figure 16 shows another important point. Although the non-agency and subprime markets account for only a quarter of the outstanding mortgage balance, they account for over 60% of the expected losses. In the stress assumptions, securitizations could lose as much as \$150 billion spread out over a four- to five-year horizon. The big question is: who owns this exposure and are these players sufficiently capitalized?

Figure 16. Projected Lifetime Losses Across Major Sectors, \$ billions

	Portfolio Size ¹	Capital ²	Annual Revs.	Losses Across HPA Scenarios			
				10 HPA	0 HPA	-8 HPA	Stress
GSEs	3,650	45	8.0	2.9	4.7	7.4	9.5
Banks	1,500	1,050	37.5	5.3	16.9	27.5	38.7
Thrifts	800	230	20.0	2.1	5.8	9.6	13.5
MI Companies	700	25	5.2	5.7	10.2	16.6	22.3
Securities	1,800	300	33.3	21.5	68.3	107.9	150.7
Others	550	-	-	0.9	3.0	4.9	6.9
Total	9,000	1,650	104.0	38.3	109.0	174.0	241.7

1. We show the net exposure after MI for the size of GSE portfolios. "Others" include mostly Ginne Mae and REITs. Based on Fed's flow of funds, GSE monthly volume summaries and FDIC.

2. Capital is the book value of equity. The GSEs roughly have \$17bn against their guarantee business.

3. Annual revenues for the agencies only include estimates G-fee collections. For banks and thrifts, we quote estimates of net interest margins on their mortgage loan portfolios. For MI companies, we quote annual premium receipts.

Source: Lehman Brothers

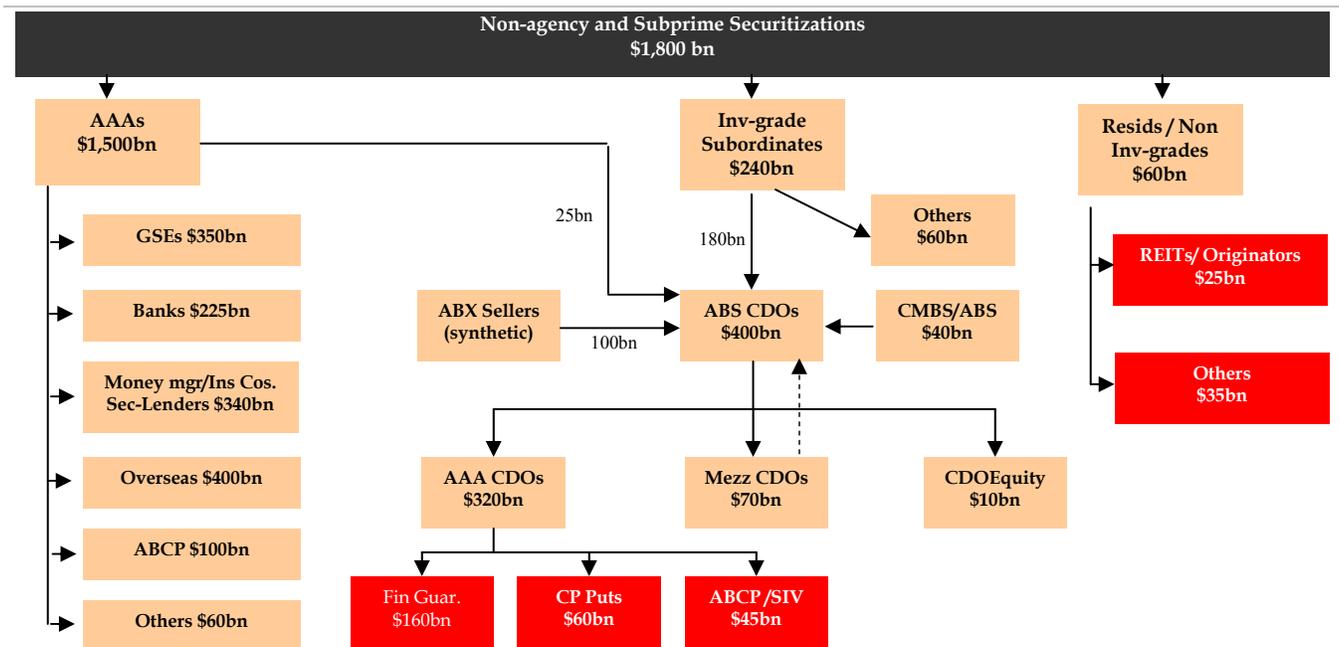
We divide the securitized universe into AAAs, investment-grade subordinates, and equity pieces.

4. THE SECURITIZED MARKETS: WHO OWNS THE RISK?

In order to understand the exposures in the securitized markets, it is worthwhile breaking up the nearly \$1.8 trillion universe into three groups: AAAs, investment-grade subordinates, and equity pieces (which mostly include non-investment grade subordinates in the prime market and NIM/residuals in the subprime markets). Figure 17 is self explanatory for the most part. Here are some points to note:

- ◆ **AAAs** account for about \$1,500 billion and in every sector, have limited risk of principal losses even under stressed assumptions. But it is worthwhile noting the distribution of AAA holdings, in light of the mark-to-market issues that we discuss later. Contrary to popular perception, the AAA holdings of ABCP vehicles are rather small (and were small even before the recent unwind). Most AAAs are held by money mangers, security lenders, the GSEs, and banks.
- ◆ **Investment-grade subordinates** are about \$240 billion in size. Exposure in most of these subordinates has been assumed by ABS CDOs. In addition, ABS CDOs have assumed exposure to the tune of \$100 billion in synthetics (mostly BBBs). As we discuss further on, through CDOs, investment-grade exposure from the residential market has been transferred for the most part to the holders of AAA CDO liabilities.
- ◆ **Equity pieces** in the residential mortgage market are about \$60 billion in size. (Incidentally, if the residual is held as an on-balance-sheet securitization with a REIT/bank we treat it as loan exposure, to avoid double counting). Holders of these equity pieces are difficult to track down. We estimate that about \$25 billion is held by REIT/originator banks and the rest is held probably by credit hedge funds, overseas investors, and dealers.

Figure 17. Distribution of Securities by Market Participant



Source: Lehman Brothers. As of June 30, 2007. We show the principal exposure of each sector to residential MBS. A significant part of Mezzanine CDOs are held by other CDOs (the dotted line)

4.1 ESTIMATING LOSSES IN SECURITIZATIONS

In order to estimate the distribution of losses, we pick representative deals in the subprime and the prime markets across vintages. We run bonds across the capital structure assuming losses in the four scenarios that we have discussed thus far. To keep the numbers comparable, we just estimate the bond principal losses (and not a price or present value impact).

Most of the Losses are from Subprime Securities...

AAAs are not expected to take principal losses across sectors and vintages.

Figure 18 shows how losses on underlying collateral translate into bond principal write-downs. There are a few important points to note. AAAs don't take any principal losses across sectors and vintages. This is true not just for super-seniors, but also for mezzanine or junior AAAs. Although it is not obvious from the table, even AAs don't take losses under the stress assumptions shown here. Understandably, much of loss exposure sits with subprime subordinates and equity pieces from the 2006-2007 originations. In the stress scenario, the subprime sector accounts for 85% of the total losses and post-2006 originations account for about 65% of this number.

...Investment-grade Bonds Can See Significant Losses

Even investment-grade subordinates take losses in stressed scenarios.

The losses on equity pieces are obviously capped out and, in more dire housing scenarios, investment-grade pieces start taking significant losses. In the flat housing market scenario, equity pieces assume the bulk of the \$70 billion in total losses. In the stress scenario, on the other hand, the losses on investment-grade pieces are almost comparable to those on equity pieces. This is important because, in addition to the risk in cash bonds, CDOs have sold a significant amount of synthetic protection on subprime BBBs. Furthermore, some of the losses in the equity pieces *are* expected, but most participants would have assumed—at least at the start of this year—zero losses on investment-grade pieces. So, who owns the risk in investment-grade securities?

Figure 18. Distribution of Loss Exposures across Securities (\$ billions)

		Recent	0 HPA	-8 HPA	Stress
AAAs		0.0	0.0	0.0	0.0
Investment-grade					
Prime	Post 2006	0.0	1.1	5.0	10.0
	Pre 2005	0.0	0.0	1.1	2.3
Subprime	Post 2006	0.5	9.0	22.1	40.4
	Pre 2005	0.1	2.9	13.7	20.2
Total Inv-grade		0.6	13.0	42.0	72.8
Equity Pieces					
Prime	Post 2006	2.6	5.7	7.0	7.8
	Pre 2005	1.5	3.1	3.7	3.8
Subprime	Post 2006	8.7	26.0	32.3	39.2
	Pre 2005	8.0	20.5	23.0	27.1
Total Equity		20.9	55.3	66.0	77.9

Source: Lehman Brothers

4.2 ABS CDOs: HOUSE MOST OF THE INVESTMENT-GRADE RISK

Composition of CDO Assets

ABS CDOs have synthetic exposure to subordinates beyond actual cash bonds bought.

ABS CDOs have absorbed almost every cash subprime subordinate that was created during the last 2-3 years. In addition, CDOs have sold synthetic protection to the tune of \$100 billion, mostly in those rated BBB/BBB-. As a result, the subordinate exposure of ABS CDOs is even larger than the cash subordinate universe outstanding. Figure 19 shows the amount of subordinates held by rating and type of CDO. The following points are worth noting. First, as is well known, high-grade CDOs have a much higher share of AA/A paper, whereas mezzanine CDOs have a heavy concentration of BBB/BBB-, mostly in synthetic form. Second, prime/alt-A subordinates find their way into high-grade deals, whereas mezzanine deals mostly have subprime subordinates. Third, although not visible from the table below, high-grade CDOs have greater exposure to other CDOs (mostly As).

Figure 19. Subprime/RMBS Holdings of ABS CDOs (\$ billions)

	High-grade CDOs		Mezz-CDOs		Total	% Prime /Alt-A
	<=2005	>=2006	<=2005	>=2006		
AAA	10.3	5.7	0.3	0.0	16.3	35%
AA	38.9	36.6	2.2	0.3	78.0	44%
A	19.2	42.4	7.6	1.2	70.4	34%
BBB	1.7	3.5	38.2	48.5	91.9	16%
BBB-	0.0	0.0	24.5	50.0	74.5	11%
BB	0.0	0.0	4.0	2.6	6.6	21%
Total	70.2	88.1	76.8	102.7	337.8	26%

Source: Lehman Brothers. The size of subordinates includes both cash bonds and synthetics.

Loss Expectations for CDOs: Even High-Grade CDOs Take Losses

Most of the losses to ABS CDOs are concentrated in mezzanine CDOs, but even high-grade CDOs take significant losses in stressed scenarios.

We estimate the losses (Figure 20) on just the subprime bonds/residential mortgage-backed securities (RMBS) held in ABS CDOs (and exclude any losses coming from CDO holdings). The total loss on ABS CDOs in the stress scenario is about double that on cash subordinates. How is that possible? The synthetic exposure of CDOs to BBB/BBB- has almost 100% principal writedowns in the stress scenario. Most of the losses are concentrated in mezzanine CDOs, especially 2006-2007 originations, but interestingly, high-grade CDOs take significant losses in stress scenarios as well. This is largely driven by their exposure to single-As, which do take losses in the stress scenarios.

Figure 20. Lifetime Loss Projections on ABS CDOs

Vintage	Bond Bal.	Losses Across HPA Scenarios (\$bn)			Stress
		Recent	0 HPA	-8 HPA	
High-grade					
Pre 05	70.2	-	-	-	0.5
Post 06	88.1	-	-	6.8	28.6
Total	158.3	-	-	6.8	29.1
Mezzanine					
Pre 05	76.8	0.1	5.5	26.4	39.3
Post 06	102.7	1.6	38.4	79.1	86.6
Total	179.5	1.7	44.0	105.5	125.9
All CDOs	337.8	1.7	44.0	112.3	155.0

Source: Lehman Brothers

The real liability holdings of CDOs are only AAAs and equity pieces.

Structure of ABS CDO Liabilities

The liability structure of CDOs is shown in Figure 21. Equity pieces are about 1% in high-grade deals and 5% in mezzanine CDOs. Similarly, AAA seniors have an enhancement of about 15% in high-grade deals and 30% in mezzanine deals. Interestingly, much of the non-AAA rated liabilities end up in CDOs again, so the real liability holdings of CDOs are only AAAs and equity pieces.

Figure 21. Liability Structure of ABS CDOs (\$ billions)

		AAA Senior	AAA Mezz	AA-BBB	Equity	Total Size
High-Grade	<=2005	76.2	9.3	3.3	0.8	89.6
	>=2006	108.7	13.7	4.5	1.0	127.8
Total		184.8	23.0	7.8	1.8	217.4
Mezzanine	<=2005	43.0	6.5	8.4	3.5	61.4
	>=2006	84.1	12.7	16.3	7.0	120.2
Total		127.1	19.2	24.7	10.6	181.6
All CDOs		311.9	42.2	32.5	12.3	399.0

Source: Lehman Brothers

The Bulk of These Losses Are Transmitted to AAA CDO Liabilities

Senior AAAs off CDOs have stress scenario losses of \$100 billion.

Estimating the true impact of these losses on CDO liabilities is rather difficult and we settle for an approximation. We assume that the liabilities pay sequentially. This implies that the loss projections we show on AAAs are really a lower bound for two reasons. First, CDO equity pieces do receive cash flows in initial months and, in some instances, are not constrained by triggers for a few years. Second, most of the mezzanine liabilities find their way back into CDOs and, hence, the losses are ultimately borne by AAA holders. As seen in Figure 22, senior AAAs off CDOs have stress-case losses of about \$100 billion, mostly concentrated in mezzanine CDO deals. The question then is: Who owns AAA CDO liabilities?

Figure 22. Loss Exposures of CDO Liabilities (\$ billions)

	10HPA	0 HPA	-8 HPA	Stress
High Grade CDOs				
AAA Senior	-	-	-	9.4
AAA Mezz	-	-	2.4	13.7
AA-BBB	-	-	3.4	4.5
Equity	-	-	1.0	1.4
Total	-	-	6.8	29.1
Mezzanine CDOs				
AAA Senior	-	8.7	56.5	76.9
AAA Mezz	-	8.3	17.3	17.3
AA-BBB	-	17.5	22.2	22.2
Equity	1.7	9.5	9.5	9.5
Total	1.7	44.0	105.5	125.9
All CDOs	1.7	44.0	112.3	155.0

Source: Lehman Brothers. These are lower bound estimates on AAAs (we assume sequential pay)

4.3 WHO OWNS AAA CDO LIABILITIES?

The largest portion of CDO risk is in the hands of non-levered participants.

Limited Holdings with Levered Participants

The CDO holdings of BSAM's hedge funds raised concerns recently about other levered players with similar exposure. But as Figure 23 shows, the bulk of the exposure in AAA CDOs appears to be in the hands of non-levered participants. The largest portion of this risk, about \$160 billion, is held by insurance companies and financial guarantors. Sometimes within a CDO structure, the AAA part of the capital structure is financed using ABCP. There is usually a put provider who assumes the CP if it doesn't roll. These institutions are typically AA-rated banks; they account for another \$60 billion of AAA CDO financing. ABCP conduits and SIVs have exposure to the tune of \$45 billion. That leaves only a small portion unaccounted for with other participants. So, the risk of other levered players holding AAA CDOs appears small.

While insurance companies and ABCP put providers are large, diversified institutions, monoline bond insurers are exposed to rating agency action.

Concerns Mostly Around Monoline Bond Insurers

The insurance companies and ABCP put providers are large, diversified institutions that can potentially withstand the losses of the magnitude projected, even in the stress scenarios. Financial guarantors, on the other hand, are monolines in a few cases that could potentially see capital problems, given the size of the losses projected. That said, since these institutions don't need to mark-to-market, there may not be an issue in the near term. The risk for these institutions is rating agency action. A potential downgrade of AAA CDO liabilities can result in ratings actions for these institutions which may trigger capital posting with their counterparties.

Figure 23. End Holders of AAA CDO Liability Risk

End Holder of Risk	Exposure, \$bn	Sensitivity Factors
Financial Guarantors and Insurance A/Cs	158	May be required to post capital upon company/asset downgrades, typically need to mark to market.
CDO SS Commercial Paper Put Providers	60	Would need to provide 100% liquidity in the event the CP is not rolled.
ABCP Conduits (Single and Multi-Seller)	29*	Not mark-to-market sensitive vehicles. Upon downgrades (except jump-to-default), securities are purchased at par by liquidity provider onto their balance sheet. No forced liquidations.
Structured Investment Vehicles	16*	Sensitive to severe mark-to-market on the total portfolio which might lead to liquidations. CDO exposures (ABS CDOs and other CDOs) are typically small (10% on average).
Other CDOs	8	Not mark-to-market sensitive, but are sensitive to severe downgrades.
Total accounted	272	
Unaccounted	40	Likely held by commercial and investment banks, insurance companies, foreign accounts, and hedge funds in both levered and unlevered form.
Total AAA CDO Outstanding	312	

*Figure reprinted from MBS Weekly Outlook dated July 5 2007
Source: Lehman Brothers, rating agency reports and company financials. * Denotes estimate. Rating agency ABCP/SIV reports provide total CDO exposure and do not break out ABS CDOs. We assume 50% of the CDO exposure is ABS CDOs.*

5.1 MARK-TO-MARKET LOSSES

We look at the mark-to-market implications of recent spread movements.

So far, we have looked at potential principal losses over coming years in the residential mortgage market. With regard to credit pieces, as we noted earlier, the pricing of ABX securities rated BBB/BBB- is reflective of the -8% HPA scenario that we have used throughout this piece. So the principal losses we quoted in the -8% HPA scenario would be also indicative of potential mark-to-market losses on credit pieces. (The only adjustment that needs to be made is for present value). Although senior bonds in the capital structure, especially AAAs, don't take losses even in stressed scenarios, their spreads have widened significantly in recent times. We could argue that the widening is unjustified from a credit standpoint—unlike other residential assets, the leverage of AAAs to collateral losses is rather low. Even the risk of downgrades seems limited. At the same time, given that the market is pricing AAAs at these levels, what is the mark-to-market implication for portfolios?

Who Owns AAA Residential Assets?

Mark-to-market losses on AAA residential assets do not have a significant impact on the capital markets.

Figure 24 shows the largest holders of AAA residential assets. In aggregate, if everyone marked assets to market, the impact of the recent widening in AAA spreads would have been \$60 billion, which is not insignificant compared with credit losses. But this doesn't have a significant impact on the capital markets. First, contrary to popular perception, the AAA holdings of ABCP conduits and SIVs are rather small. Most AAA securities are with the GSEs, banks, money managers, and securities lenders, who don't have short-term financing issues. Second, even if ABCP doesn't roll, most security-arbitrage vehicles have a AA-rated liquidity put provider who assumes the CP. Third, most players, like banks and thrifts, don't really need to mark their assets to market. Fourth, even when assets are marked to market, the implications for the players are limited. For example, although the GSEs mark their AAA assets to market, it doesn't impact their core capital computation and, hence, doesn't affect their leverage/asset size. So, while AAA losses look significant, they don't necessarily have meaningful implications.

Figure 24. Mark-to-Market Losses on AAA Residential Assets (\$ billions)

	AAA Holdings	Est. Mark-to-market Losses ¹	Mark-to-Market?	Comments
GSEs	350	13.4	Yes...	...But doesn't flow through into core capital
Banks/Thrifts	225	7.9	No	
Money Mgr/ Insur. Cos./ Sec-Lenders	340	13.6	Yes	
Overseas	400	17.9	?	
ABCP / SIV	100	4.8	Partly	SIVs are mark-to-market vehicles
ABS CDOs	25	1.0	No	
Others ²	60	2.1	Yes	
Total	1,500	60.8		

1. Based on the assumption that subprime and prime AAAs are wider by 125 bp and 80 bp, respectively.

2. Dealers/originators and levered players would make up the bulk of the "others" category.

Source: Estimates are based on the Flow of funds, Agency monthly reports, Fed's survey of overseas holdings, rating agency reports on ABCP vehicles, and Federal Reserve data on bank holdings

5.2 CONCERNS AROUND ABCP VEHICLES

The Mortgage Exposure of ABCP Vehicles is Smaller than Publicized

In aggregate, the exposure of ABCP vehicles to mortgage assets is just \$260 billion.

ABCP vehicles come in various flavors (Figure 25) and the total outstanding in ABCP paper is around \$1.3 trillion. The commercial paper market has been used by conduits as both a funding diversification strategy and a funding arbitrage strategy. Conduit programs would fall into the first category, where CP is typically used as another means of funding the assets, which are typically mortgage, auto, or credit card loans, receivables, and so on. In the case of SIVs and security-arbitrage (sec-arb) conduits, the CP market is used to fund longer-maturity assets, typically securities with CP. In aggregate, ABCP vehicles hold an estimated \$260 billion in mortgage assets, both loans and securities.

What if CP Doesn't Roll?

Various provisions come into play in the event that CP doesn't roll, facilitating a more orderly sale of assets.

The provisions that come into play in such an event vary across the various vehicles. In multiseller conduits and sec-arb vehicles, there is usually a liquidity put provider, typically a large AA-rated institution, that assumes the CP if it doesn't roll. SIVs are only partly funded through ABCP and have a significant loss cushion before an asset sale is required. In single-seller conduits, there is an automatic "extendibility" feature that allows the sponsor to find alternative forms of financing or sell assets. Based on some CP vehicles that have extended in recent weeks, the CP holders can vote to provide additional time for an orderly sale of assets.

What is the Risk of Unwind?

Potential future asset sales of \$20-\$25 billion can easily be absorbed over a 3-6 month horizon.

Single seller conduits and some security vehicles without a put provider are the most at risk of potential unwinds. In addition to the \$25 billion in supply of assets we have seen so far from these vehicles, we will likely see further sales of \$20-\$25 billion mortgages. This can be easily absorbed over a three- to six-month horizon, considering the drop in new supply of non-agency mortgages.

Figure 25. Size of ABCP Vehicles and Estimated Mortgage Holdings (\$ billions)

Type	Outstanding	CP Issued	Protection in the Event of Distress			
			U.S. Residential Assets	Extendible CP/Mkt Value Swap	Put Provider	Liquidity Provision
Multi Seller	750	713	68	-	713	-
Single-Seller	230	219	72	180*	-	-
Security Arbitrage	196	186	59	20*	166	-
SIVs	350	105	18	-	-	88*
CDOs with CP	45	45	45	-	45	-
Others	15	15	-	-	-	-
Total	1,586	1,282	261	200	924	88

*Source: Lehman Brothers, Moody's, S&P. * Denotes estimate of distribution. The aggregate residential exposures are estimates based on asset composition from rating agency reports. U.S. residential assets include both loans and securities.*

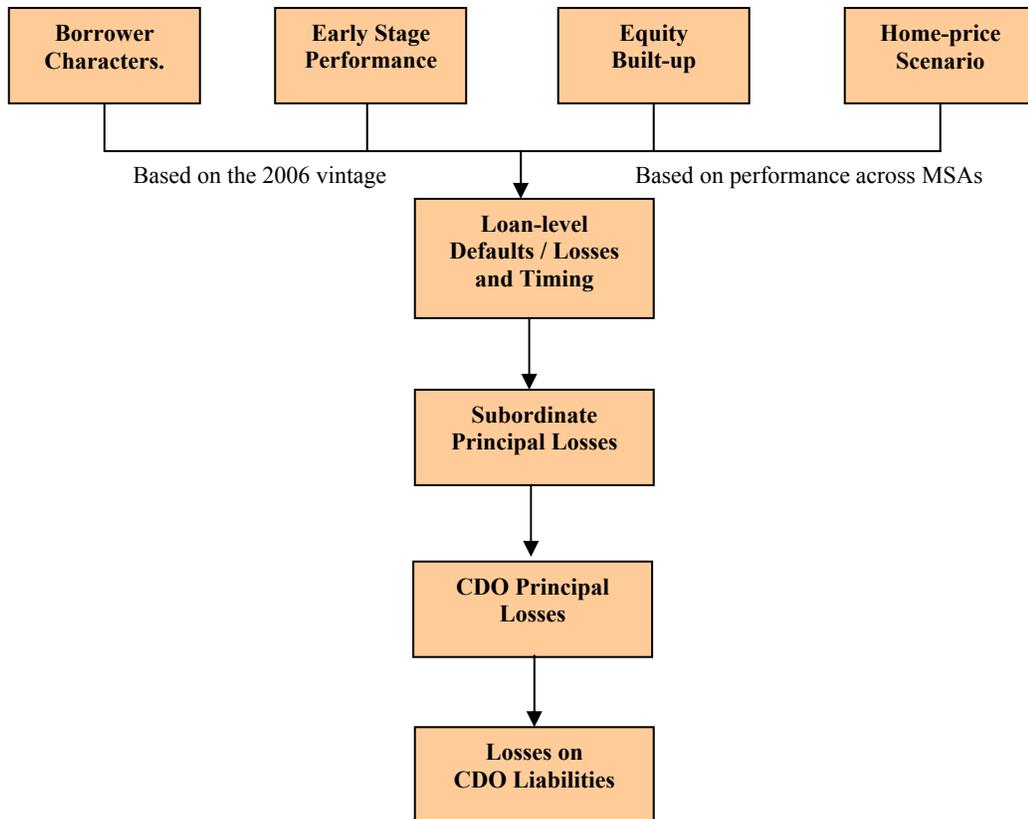
6. SUMMARY AND CONCLUSIONS

- ◆ The **aggregate losses** in the residential mortgage market under “stressed” housing conditions could be about \$240 billion, which is manageable, assuming it materializes over a five- to six-year horizon. The wealth effects of a softer housing market could be a much bigger drag on the economy. So, the real concern from the standpoint of residential credit losses is around the potential failure of entities holding this risk.
- ◆ The largest holders of residential credit risk in the United States, the **GSEs, commercial banks, and savings institutions**, look reasonably well positioned to handle the potential increase in credit losses. In the case of the GSEs, guarantee fee premiums in a year should be sufficient to cover potential losses over a five-year horizon in a stressed housing environment.
- ◆ **Mortgage insurance** providers have potential credit losses to the tune of \$20 billion under stressed housing assumptions. That said, increasing persistency and dwindling competition from the second-lien market could potentially offset some of this exposure. The big risk to MI companies is potential rating agency action.
- ◆ **Subprime and non-agency securitizations** house the bulk of the risk in residential mortgages. Although they account for only a quarter of the total outstanding balance, their share of losses is over 60%. Within these transactions, equity pieces assume most of the losses in a flat housing market, but in stressed housing assumptions, investment-grade pieces take significant principal losses.
- ◆ **ABS CDOs** have absorbed almost every investment-grade subordinate created in the residential mortgage space in recent years. In addition, they have sold synthetic credit protection on recently originated subprime BBBs. Consequently, their lifetime losses can be as high as \$150 billion in stressful housing scenarios. Much of the risk in CDOs is borne by the AAA liability holders, which include insurance companies, financial guarantors, commercial banks, and ABCP vehicles. Of these holders, monoline financial guarantors are at the most risk; the others have diversified businesses and larger capital cushions.
- ◆ Beyond credit losses, there are **mark-to-market concerns** for holders of senior securities, especially AAAs. During the last few weeks, AAA spreads have widened by as much 100-150 bp, resulting in implied losses of about \$75 billion. That said, a significant part of AAA holders don't have real mark-to-market issues. The only potential source of concern we see is ABCP conduits and SIVs, where we should expect to see further sales of \$20-\$25 billion.

APPENDIX A. PROJECTING CREDIT LOSSES

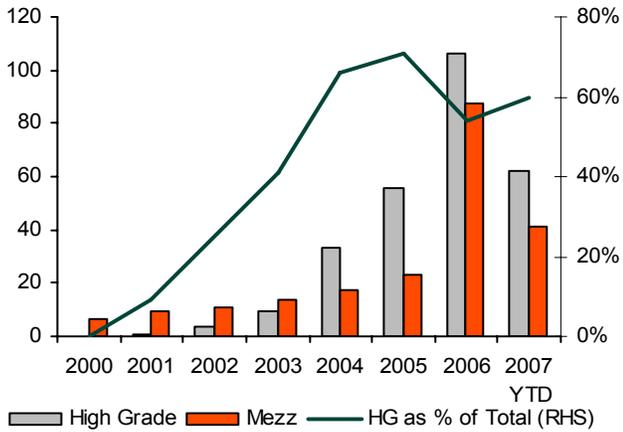
We estimate losses based on borrower characteristics like FICO score, CLTV, documentation, occupancy, loan-size and product type in addition to home-price appreciation scenarios. In order to estimate these numbers we do the following:

- ◆ We bucket loans by the above-mentioned characteristics and the origination-period.
- ◆ We compute the cumulative non-performers (CNP) on the 2006 vintage loans at 9 WALA. CNP is the sum of 90 day+ delinquencies and cumulative defaults.
- ◆ We compare the CNP at 9 WALA with a historical benchmark and scale up default assumptions accordingly.
- ◆ We then estimate sensitivity of defaults/loss severities to the housing market by looking at performance across MSAs with varying HPA. For negative housing scenarios (where data is limited), we extrapolate the sensitivity.
- ◆ The flow of default and loss information looks as shown in the chart below.



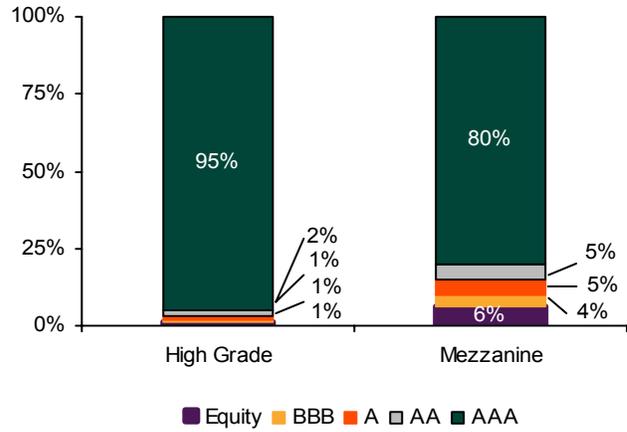
APPENDIX B: ASSET / LIABILITY STRUCTURE OF ABS CDOs

Figure 1. ABS CDO Issuance, \$ bn



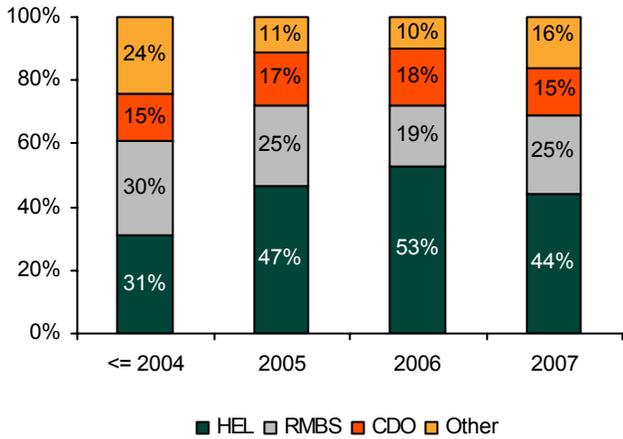
Source: Lehman Brothers.

Figure 2. ABS CDO Capital Structure



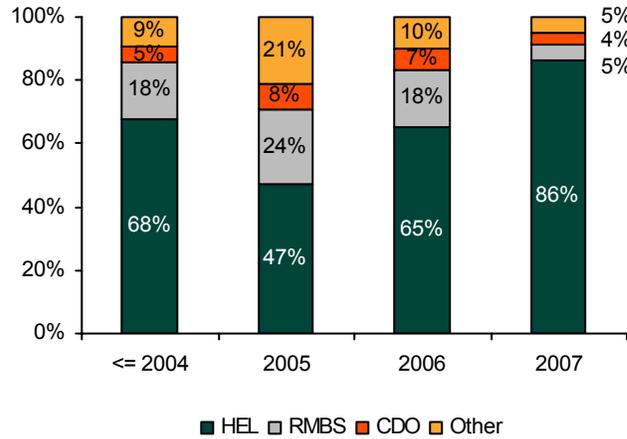
Source: Lehman Brothers.

Figure 3. Outstanding High Grade CDO Assets by Sector



Source: Lehman Brothers.

Figure 4. Outstanding Mezzanine CDO Assets by Sector



Source: Lehman Brothers.

Figure 5. Outstanding High Grade CDO Assets by Rating

	<= 2004	2005	2006	2007
AAA	9.9%	10.7%	5.4%	1.6%
AA	45.4%	32.2%	36.7%	28.2%
A	4.0%	27.6%	28.5%	36.1%
BBB	1.6%	1.2%	1.3%	3.2%

Source: Lehman Brothers.

Figure 6. Outstanding Mezzanine CDO Assets by Rating

	<= 2004	2005	2006	2007
AAA	0.4%	0.5%	0.1%	0.0%
AA	2.5%	4.4%	0.1%	0.3%
A	12.5%	4.8%	3.2%	0.5%
BBB+	20.2%	12.1%	15.3%	5.3%
BBB	24.0%	21.1%	26.8%	37.0%
BBB-	22.8%	19.7%	31.9%	46.6%
BB	3.4%	8.3%	5.7%	1.4%

Source: Lehman Brothers.

Explanation of the Lehman Brothers Mortgage Model

The Lehman Brothers Mortgage Valuation Model allows investors to analyze mortgage-backed (MBS), asset-backed (ABS) and commercial mortgage-backed securities (CMBS). The model collects pertinent and material information needed to evaluate and calculate the risk measures of the security. The model provides option-adjusted spreads and durations along with other risk measures using Lehman Brothers' Prepayment, Default, and Term Structure Models.

Analyst Certification

The views expressed in this report accurately reflect the personal views of Vikas Shilpiekandula and Olga Gorodetsky, the primary analysts responsible for this report, about the subject securities or issuers referred to herein, and no part of such analysts' compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed herein.

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