

Mortgage Insurance

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Agenda

- **Private Mortgage Insurance (PMI)**
 - Overview
 - Pricing/Reserving Considerations

- **Government Sponsored Entities (GSE) Credit Risk Transfer**
 - Overview
 - Pricing Methods

Private Mortgage Insurance (PMI)

The Product

- **Definition** = *“PMI is arranged by the lender and provided by private insurance companies. PMI is usually required when you have a conventional loan and make a down payment of less than 20 percent of the home’s purchase price. If you’re refinancing with a conventional loan and your equity is less than 20 percent of the value of your home, PMI is also usually required.”*

- **Product Features:** Lender paid vs borrower paid; Single payment vs monthly payments; Coverage

- **Product Pricing:** Rate cards based on LTV, FICO, etc; Varying duration

- **Capital Requirements:** Private Mortgage Insurer Eligibility Requirements (PMIERS); Rating agencies

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Private Mortgage Insurance (PMI)

The Players

- **Private Mortgage Insurance (PMI)**
 - Legacy Carriers: United Guaranty (AIG), Radian, MGIC, Genworth
 - Posts-Crisis Entrants: Essent, Arch (acquired United Guaranty in '16), NMIG

- **Competing Government Programs:** FHA, Veteran Affairs, USDA

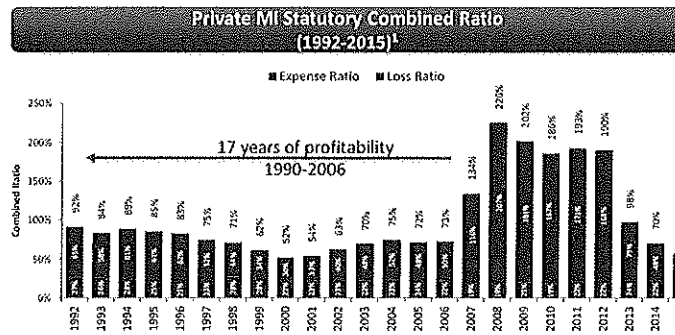
- Ten years ago compared to now:

Data Year: 2006			Data Year: 2015		
State/Territory: Total US			State/Territory: Total US		
Line of Business: Mortgage Guaranty			Line of Business: Mortgage Guaranty		
Rank	Company Name	Direct Premiums Written (\$000)	Rank	Company Name	Direct Premiums Written (\$000)
1	Mortgage Guaranty Group	1,332,684	1	Arch Insurance Group	1,152,538
2	Arch Insurance Group	935,729	2	Mortgage Guaranty Group	1,088,592
3	Radian Group	919,778	3	Radian Group	1,008,448
4	PMI Mortgage Group	812,268	4	Genworth PC Group	636,958
5	Genworth PC Group	584,456	5	Essent Guaranty Group	368,930
6	Old Republic Insurance Group	534,923	6	PMI Mortgage Group	235,437
7	Triad Guaranty Insurance Corporation	256,705	7	Old Republic Insurance Group	193,703
All Other		393	8	National Mortgage Insurance Group	114,211
Total		5,376,936	All Other		160
			Total		4,859,375

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Private Mortgage Insurance (PMI) Industry Results

- Combined Ratio Results:

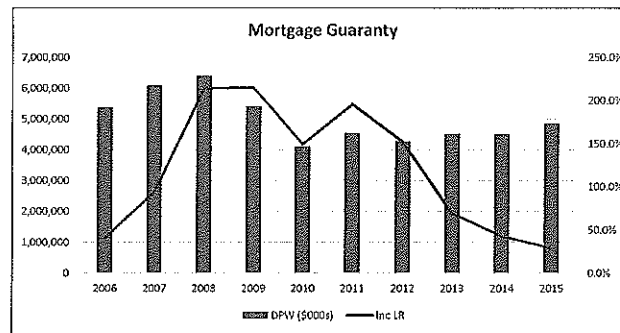


Source: NMI Investor Day 2016

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Private Mortgage Insurance (PMI) Industry Results

- Calendar Year Results:



Source: AM Best statutory data

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Private Mortgage Insurance (PMI)

Miscellaneous

- Line of Business = ASLOB 6 = Mortgage Guaranty
- **Reinsurance:** Due to the significant capital requirements from PMIERs most of the monoline companies need surplus relief through reinsurance
 - Quota Share
 - Aggregate Stop Loss
- **Contingency Reserves:**
 - Statutorily determined. Available to provide additional loss & LAE payments in event of adverse experience. This is a write-in liability in the statutory annual statement
 - Unique to Mortgage Guaranty compared to traditional P&C lines
 - Size varies but can often be as high if not higher than the company's loss & LAE reserve

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- **Government Sponsored Entities (GSE) Credit Risk Transfer**
 - Overview
 - Pricing Methods

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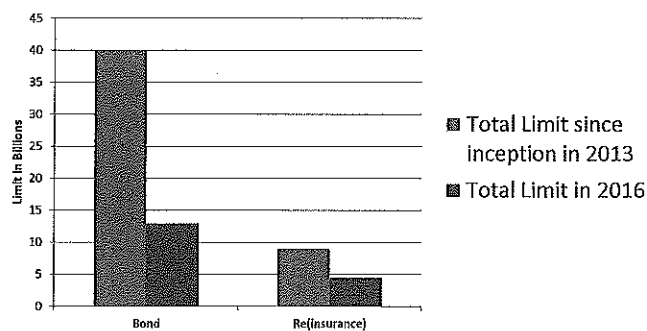
Government Sponsored Entities (GSEs)

- GSEs are financial services corporations created by the United States Congress to enhance the flow of credit to targeted sectors of the economy and to make those segments of the capital market more efficient and transparent, and to reduce the risk to investors and other suppliers of capital
- The GSEs create mortgage liquidity by buying loans from originators, securitizing them, and selling bonds into the capital markets
- Fannie Mae and Freddie Mac were put into conservatorship in 2008 and are now supervised by the Federal Housing Finance Agency (FHFA)

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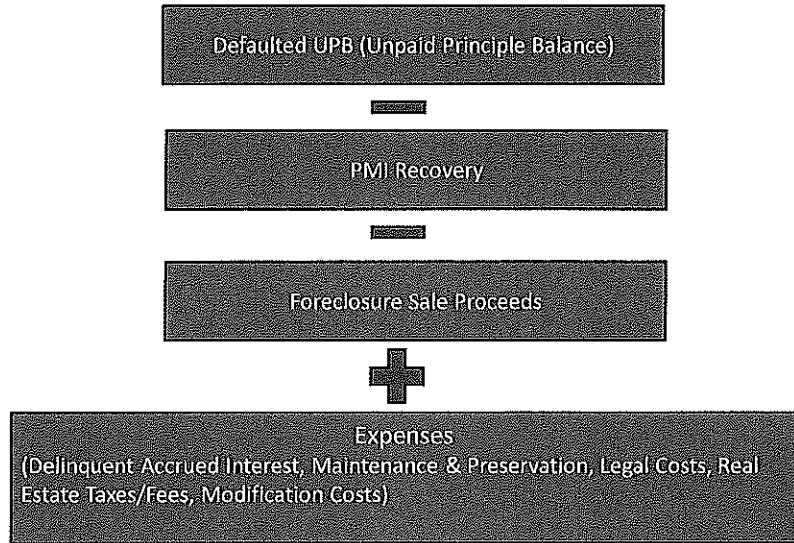
GSE Credit Risk Transfer

	Bond	(Re)insurance
Freddie Mac	STACR (Structured Agency Credit Risk)	ACIS (Agency Credit Insurance Structure)
Fannie Mae	CAS (Connecticut Avenue Securities)	CIRT (Credit Insurance Risk Transfer)



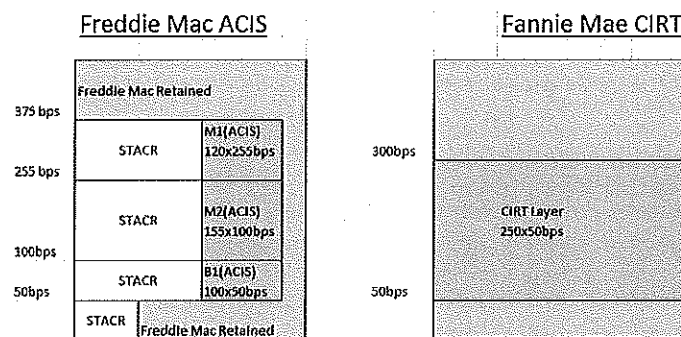
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What is a Covered Loss?



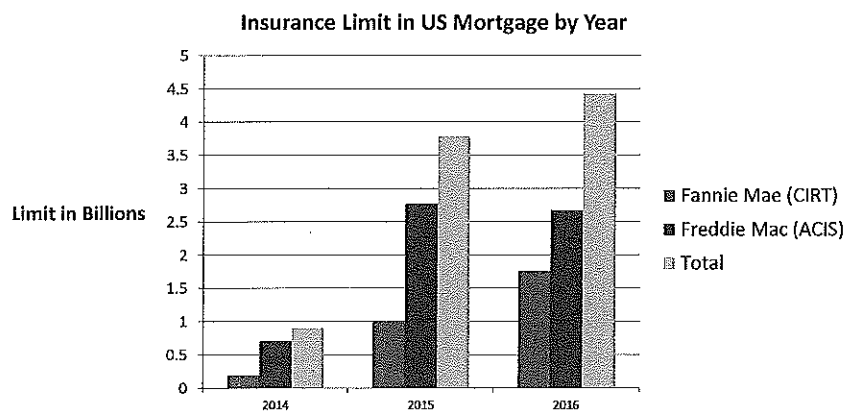
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GSE Credit Risk Transfer Structure



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US Mortgage Re(insurance) Limit



Source: FHFA Credit Risk Transfer Report Dec 2016

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Pricing GSE Transactions

- Three methods
 - Historical data analysis
 - Forward looking econometric
 - Deterministic scenarios

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Pricing GSE Transactions

- Historical Data Analysis
 - Use loan level data available from Freddie and Fannie to construct triangles by LTV, FICO score and region
 - Weigh together the triangles based on the mix of LTV, FICO and Region in the reference pool
 - Select a return period for the global financial crisis years (2006-2009)
 - Derive expected losses for each layer
 - May include a cat load for earthquake based on vendor modelling

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Pricing GSE Transactions

- Forward looking Econometric
 - Use econometric variables such as unemployment, interest rates and home price index to derive default rate curves (frequency) using historical data
 - Use historical data to derive loss given default (severity) curves based on the values of the above econometric variables
 - Simulate paths of the econometric variables to derive loss amounts at various points in time
 - Significant correlation between econometric variables (such as unemployment and HPI) and loss values (frequency of defaults highly correlated with severity of default)

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Pricing GSE Transactions

- Deterministic scenarios
 - Essentially same approach as the forward looking approach but without assigning probabilities to various frequency/severity assumptions
 - May include “replay” of financial crisis years, depression years, etc.

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Pricing GSE Transactions

- Premium Determination
 - Premium (by layer) is paid annually based on rates applied against the unpaid balance of the reference pool
 - The run-off of the reference pool determines the premium
 - Each layer has a different mean average life which determines expected premium. But MAL changes in high loss scenarios.
 - Prepayment rate key driver of run-off in positive scenarios
 - High loss scenarios cause the UPB to decrease more rapidly giving a lower premium
 - Layers have close-out provisions that truncate the premium paid in low loss scenarios
 - Premium needs to be derived separately for each scenario or simulation path

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