Overview and Motivation Behind Government Sponsored Enterprise Credit Risk Transfer

CAS 2016 Annual Meeting

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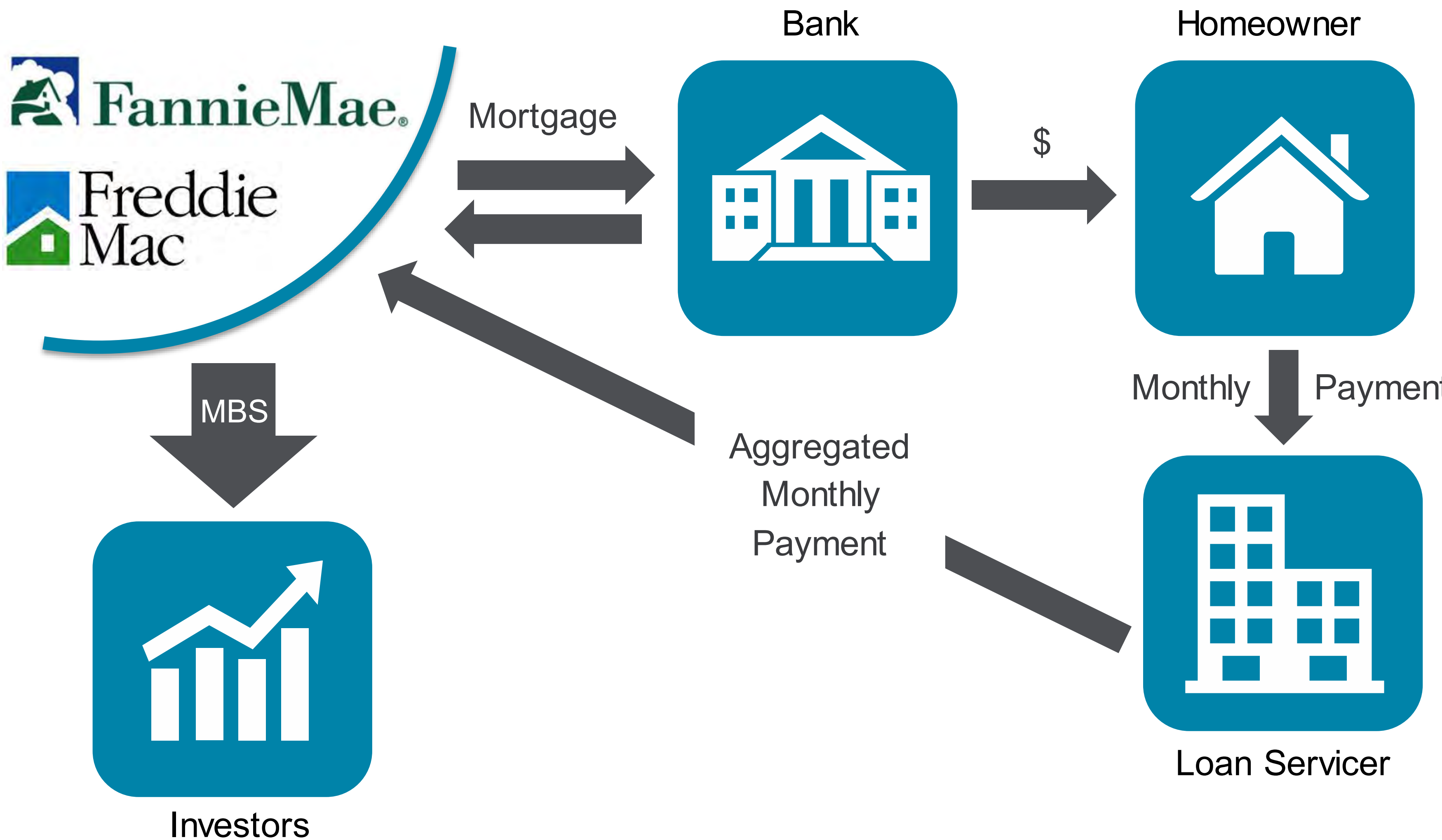
Overview of U.S. Mortgage Loan Origination Process



Overview of the Government Sponsored Enterprises (GSEs)

- GSEs are chartered by the federal government to extend financing liquidity for the agriculture and real estate sectors
- The GSEs create mortgage liquidity by buying loans from originators, securitizing them, and selling bonds into the capital markets
- Currently, 60% to 70% of new single family loans originated are passing through either Fannie Mae, Freddie Mac or Ginnie Mae (through the FHA)
- Fannie Mae and Freddie Mac were put into conservatorship by the Federal government in 2008 and are now supervised by the Federal Housing Finance Agency (FHFA)
- Historically,
  - Primarily transferred only interest rate risk and prepayment risk to bond holders
  - The main source of default risk protection was from Private Mortgage Insurers covering only high-LTV loans (representing approximately 1/3 of total portfolio)
- FHFA has encouraged the GSEs to “de-risk” by finding private sources of default risk protection
  - Roughly 80% through new types of bond issuances
  - Remaining 20% through (re)insurance on portfolios of mortgages

2016 Conservatorship Scorecard

Goal	Weight	Scorecard Objective
MAINTAIN	40%	Increase access to mortgage credit for creditworthy borrowers
		Develop post-crisis loss mitigation activities and prepare for the expiration of HAMP and HARP
		Continue to responsibly reduce the number of severely-aged delinquent loans and real estate owned properties
		Maintain new multifamily business volume at $36.5 billion or below (excluding certain mission-related activity)
REDUCE	30%	**Single-family**: Complete credit risk transfers (CRT) on 90% of the newly acquired loans that are targeted for risk transfer; CRT has evolved into a core business practice for the GSEs
		Multifamily: Continue current multifamily credit risk transfer initiatives and explore additional risk transfer opportunities
		Retained Portfolio: Continue to implement approved retained portfolio plan to meet, even under adverse conditions, the annual PSPA requirements and $250 billion PSPA cap by December 31, 2018
		Support FHFA's development of its risk measurement framework for evaluating enterprise business decisions during conservatorship
BUILD	30%	**Common Securitization Platform (CSP)** implementation timeline: Release #1: In 2016, implement the CSP for Freddie Mac's existing single-class securities Release #2: In 2018, implement the Single Security on the CSP for both Fannie Mae and Freddie Mac
		Provide support for mortgage data standardization initiatives: (UCD) Uniform Closing Disclosure Dataset (ULAD) Uniform Loan Application Dataset

- "Freddie Mac is shifting its credit risk business strategy from a buy-and-hold company to a buy-and-sell company"
  - Mike Reynolds, Freddie Mac vice president of credit risk transfer
- "We remain committed to managing and distributing credit risk and building liquidity in this risk-sharing market"
  - Rob Schaefer, Fannie Mae vice president of credit enhancement strategy & management

GSE Credit Risk Transfer Solutions

Fannie Mae and Freddie Mac utilize multiple forms of credit risk transfer, including:

Private Mortgage Insurance

- Takes first loss position on above 80% LTV loans
- Mainly monoline entities; mix of legacy carriers and post-crisis start ups
- Arch, Essent, Genworth, MGIC, NMI, Radian, UGC

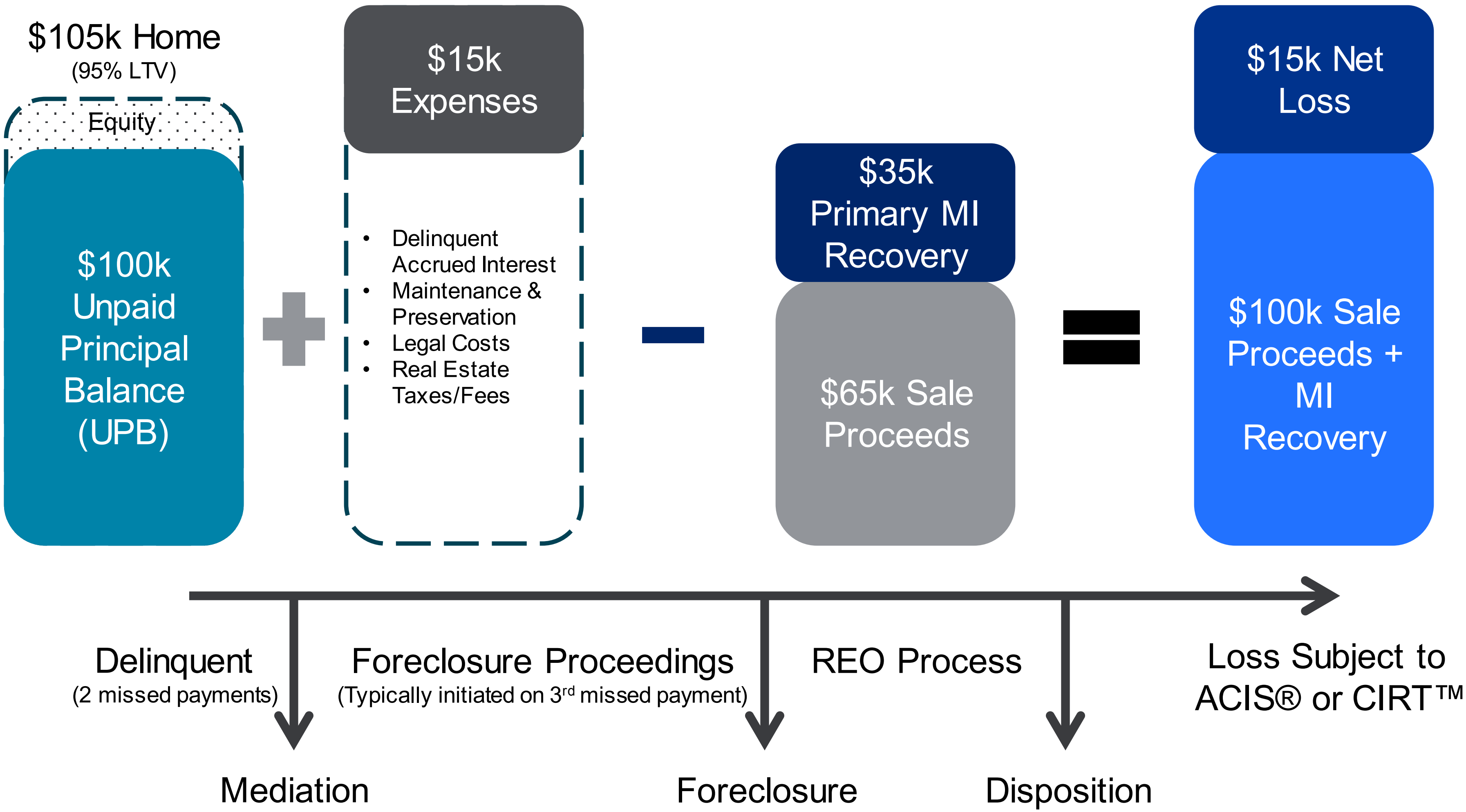
Debt Notes Freddie STACR® & Fannie CAS

- Over $35 billion of principal issued since program inception
- Spreads range from 85bps to 1275bps depending on tranche
- Hedge funds, Pension funds, HNW investors, Life & P&C insurers

Multi Line (Re)insurance Freddie ACIS® & Fannie CIRT™

- Over $8 billion of limit placed since inception, partially collateralized
- Cumulative rates on line may range from 2% to 85% depending on layer and prepayment speed

Loan Level Illustration of Covered Loss in GSE CRT Transactions

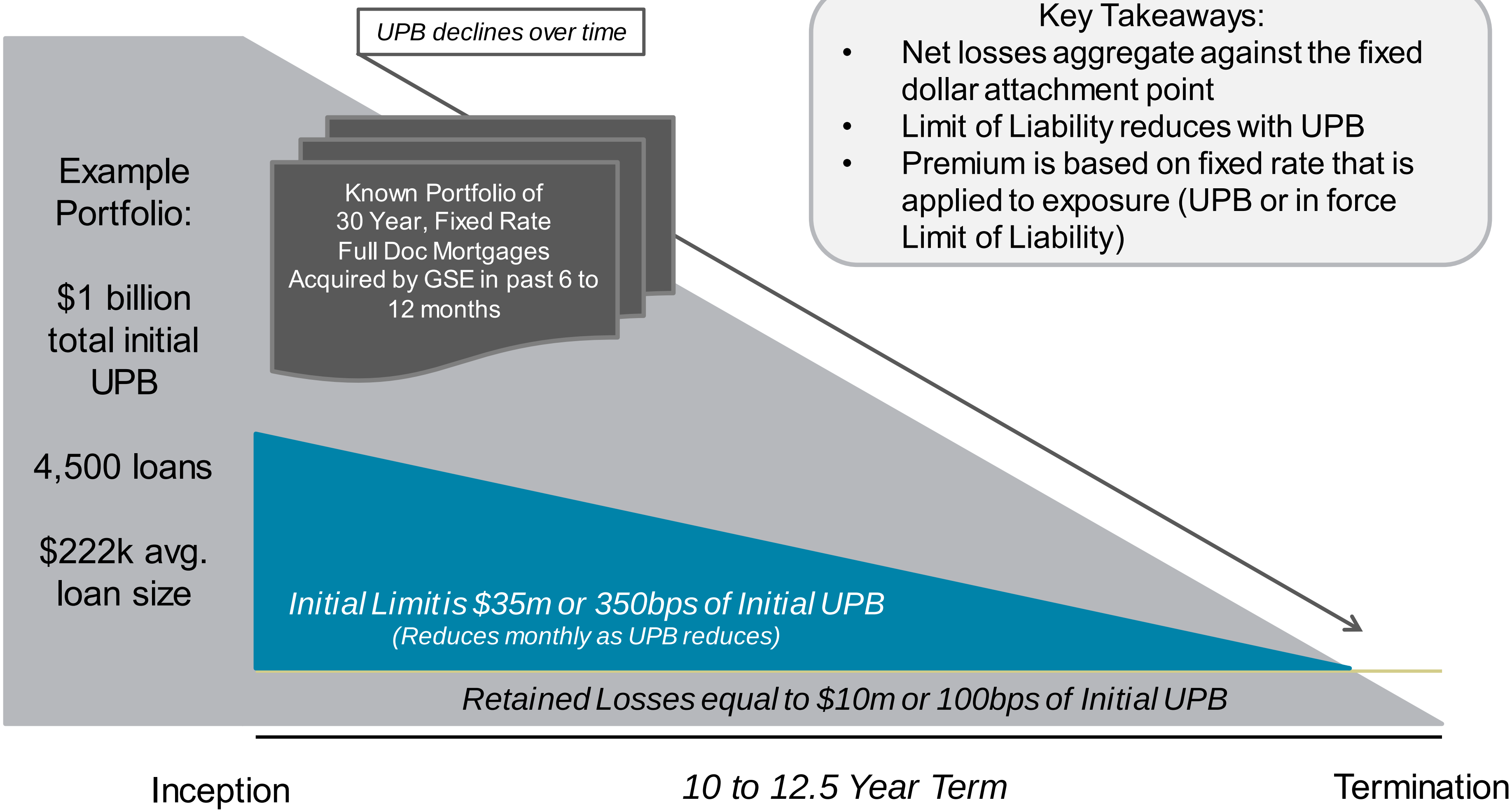


Cumulative Losses and Reducing Outstanding Limit of Liability

Illustrative Aggregate Excess of Loss Example

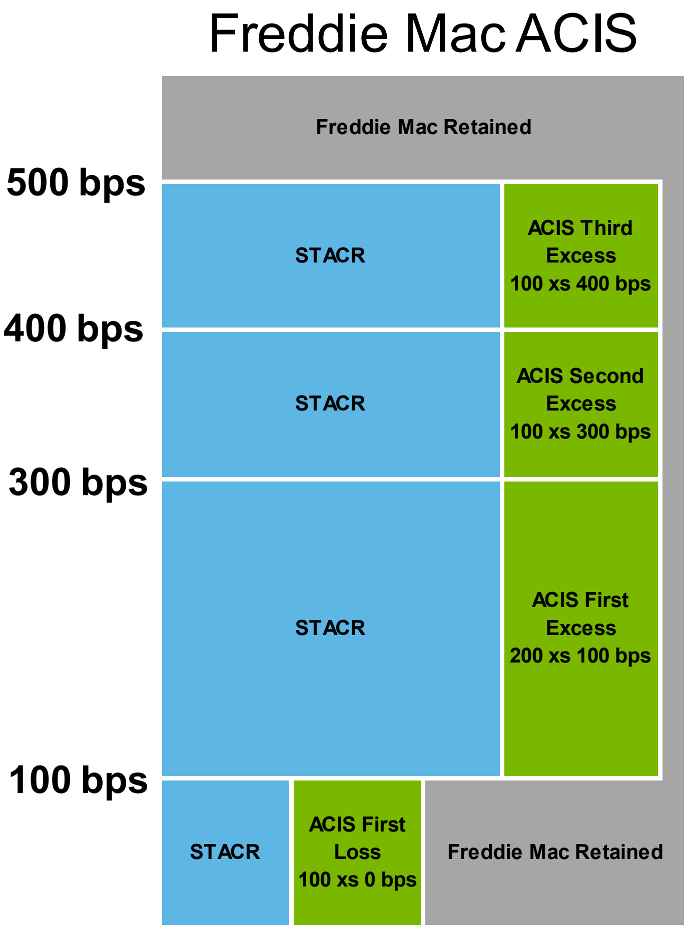
Key Takeaways:

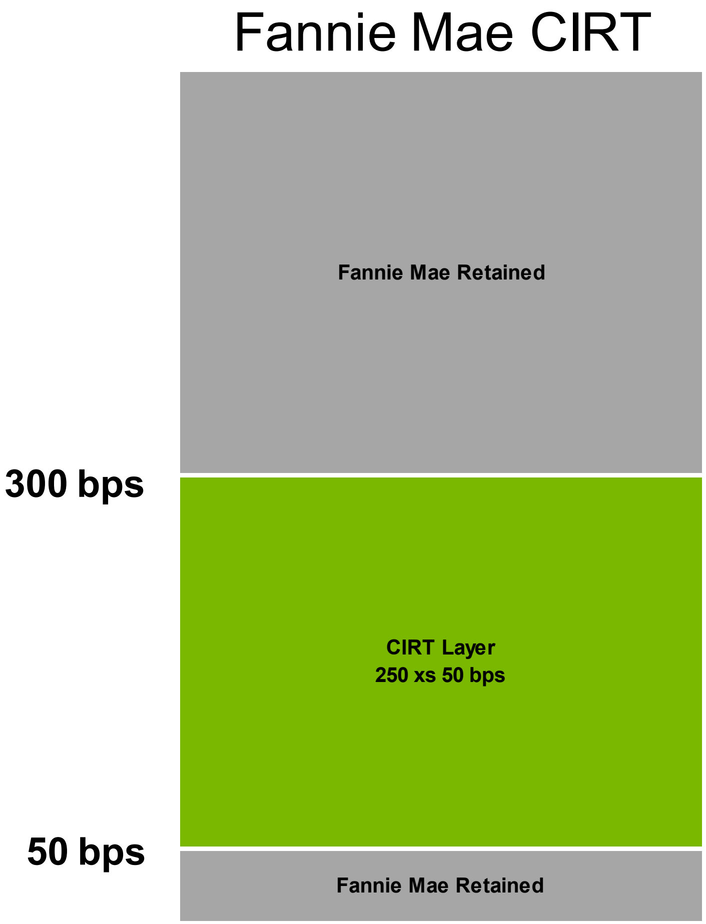
- Net losses aggregate against the fixed dollar attachment point
- Limit of Liability reduces with UPB
- Premium is based on fixed rate that is applied to exposure (UPB or in force Limit of Liability)



Illustrative Structure for Freddie Mac ACIS and Fannie Mae CIRT

Hypothetical GSE CRT Structures

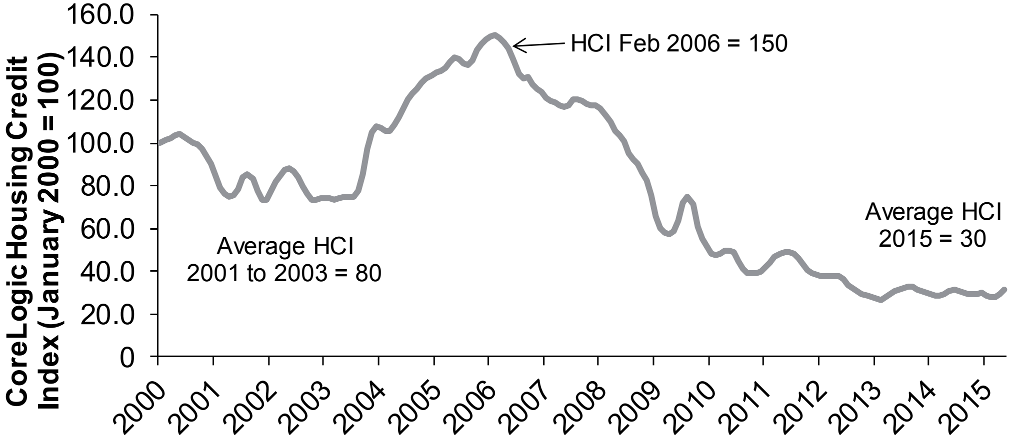




Multiple Ways to Estimate Pool Level Mortgage Default Risk

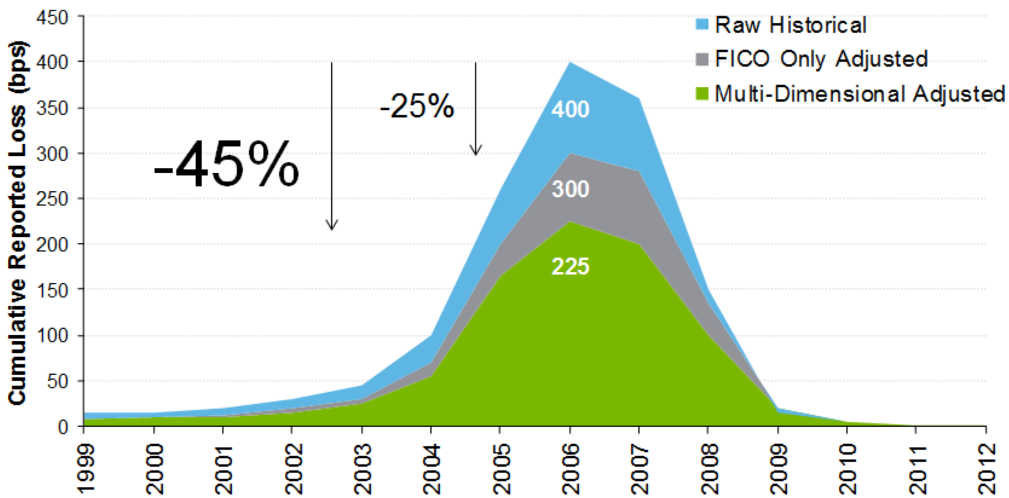
Method	Pros	Cons
Historical Experience Rating	▪ Easy to understand ▪ Based on actual events	▪ Hard to fully adjust for changes in UW characteristics ▪ Simple actuarial methods don't handle calendar year effects well
Scenario Based Cash Flow Modeling	▪ Easy to understand ▪ Can design exact scenario that one cares about	▪ Usually no explicit tie between macroeconomics and modeled default / prepay
Scenario Based Loan Level Modeling	▪ Can design exact scenarios based on macroeconomics ▪ Can capture very granular nuances in loans comprising pool	▪ More challenging to understand drivers of results vs. cash flow or experience based modeling ▪ Uncertainty around out of sample performance
Stochastic Loan Level Modeling	▪ Of methods above, only one that can generate full probabilistic distribution of outcomes	▪ Hardest to understand ▪ Requires thoughtful modeling and calibration of home prices and interest rate distributions and correlations ▪ Uncertainty around out of sample performance

Material Changes in Mortgage UW Environment Post-Crisis



CoreLogic Housing Credit Index (HCI):

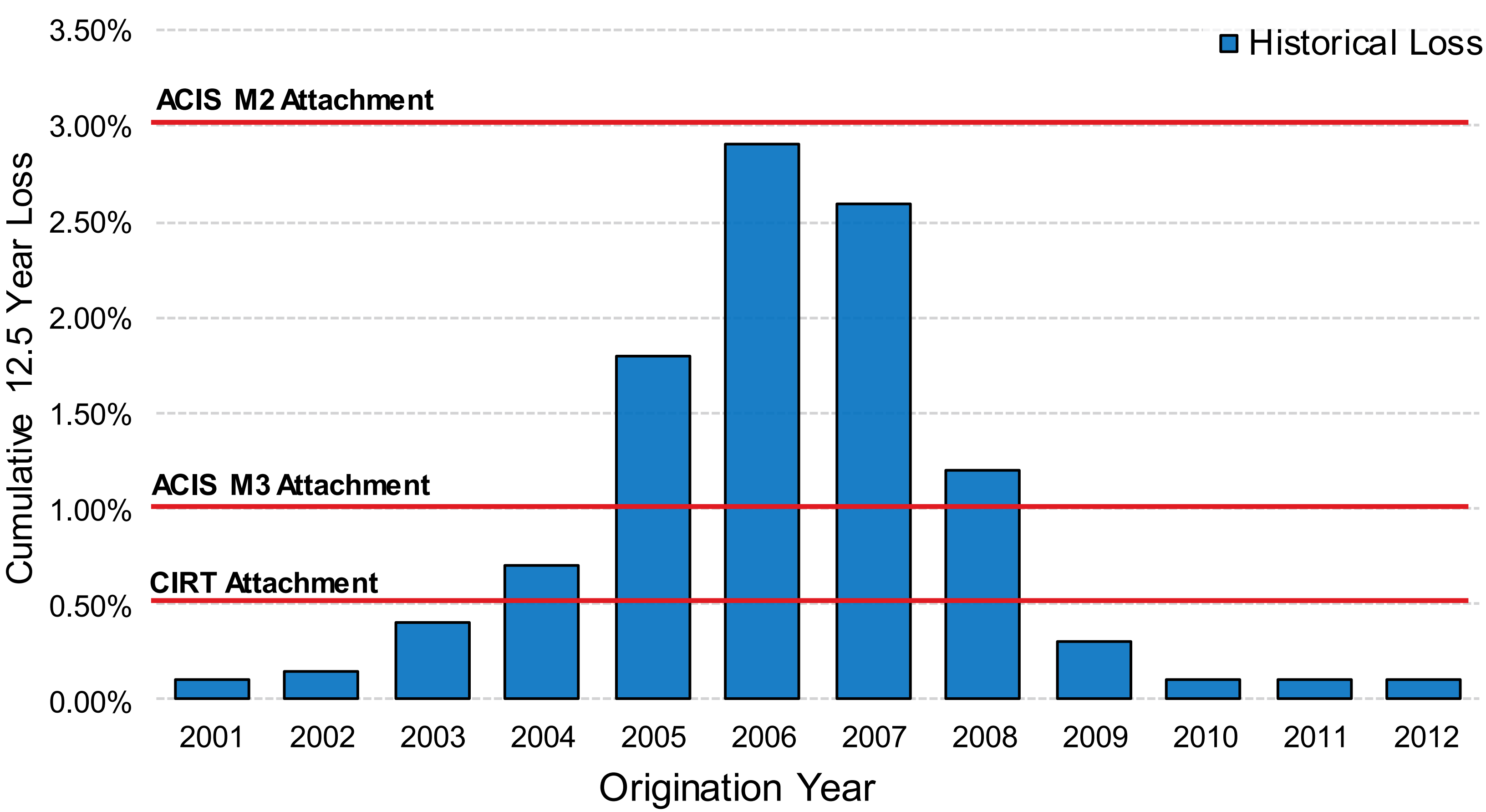
Current credit standards 5x tighter than at market peak



45% reduction in loss when adjusting for post-crisis improvement in key UW characteristics

Loss Experience for GSE Originations of 30 Year Fixed Rate Loans

Historical GSE Mix Adjusted Low LTV Experience Losses



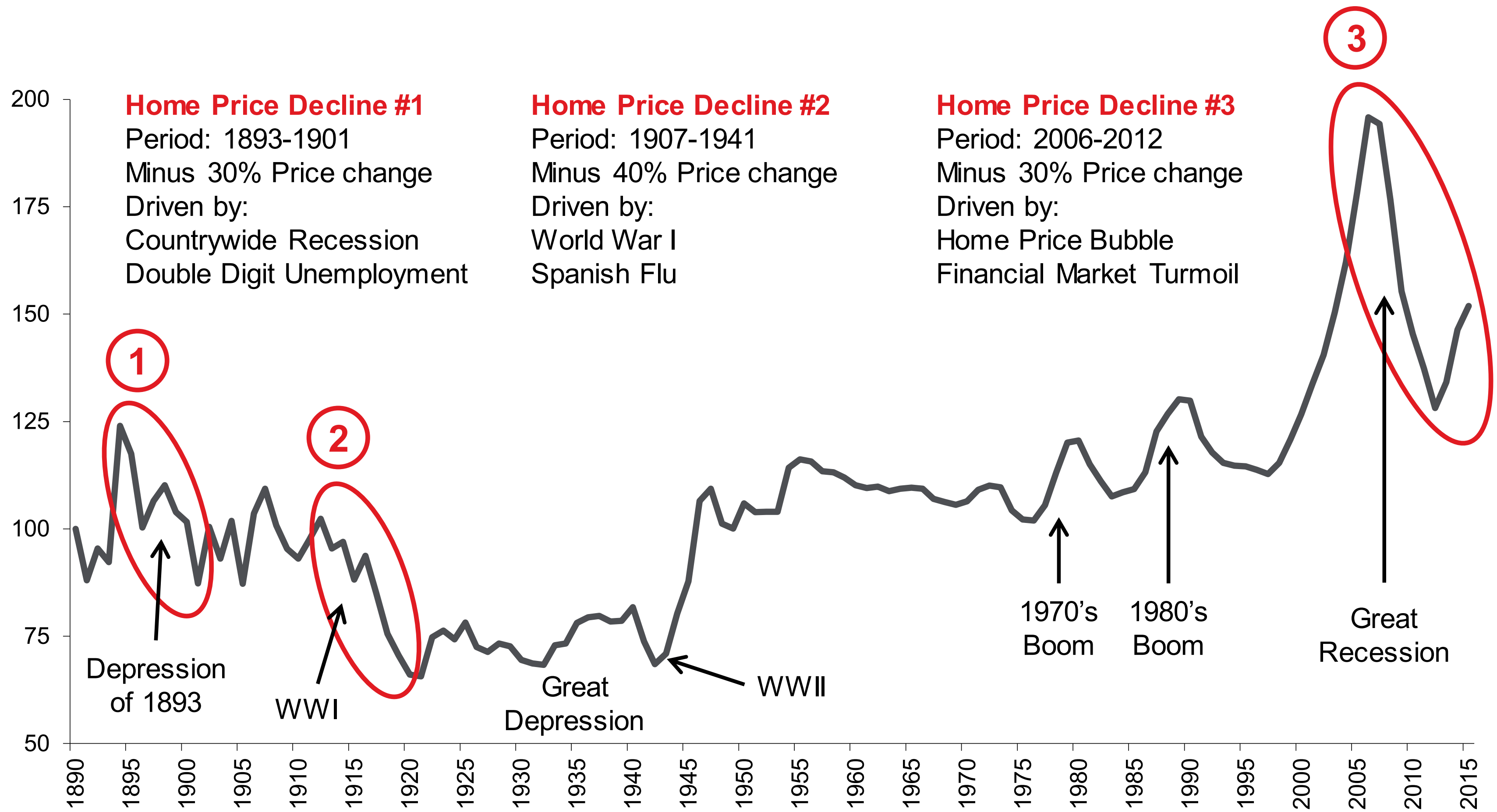
Losses approximated based on analysis and review of Fannie Mae and Freddie Mac loan level data and mix adjusted to recent origination 60 to 80 LTV underwriting characteristics. Does not include modification losses. Individual GSE results will vary

At Least 5 of 12 Years in Recent Historical Period are Affected by Great Recession

Long Term Nationwide Home Price Index through 2015

Sale Price of Existing Homes Factoring Out the Effect of Inflation, 1890 = 100

Three Major Nationwide Downturns in 125 years



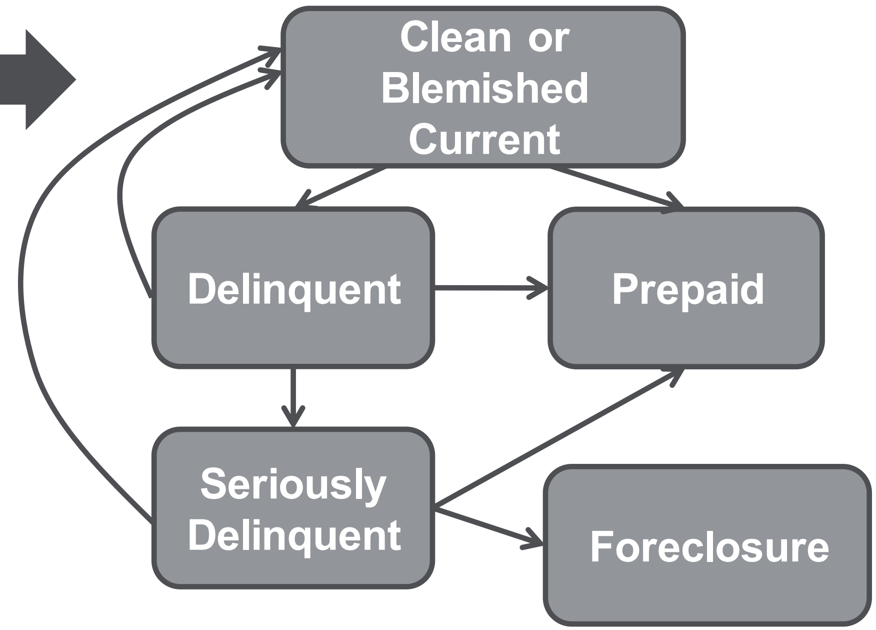
Source: U.S. Home Price and Related data, for Figure 3.1 in Robert J. Shiller, Irrational Exuberance, 3rd. Edition, Princeton University Press, 2015, as updated by author

Projecting Cumulative Default Rate
Model Based Approach

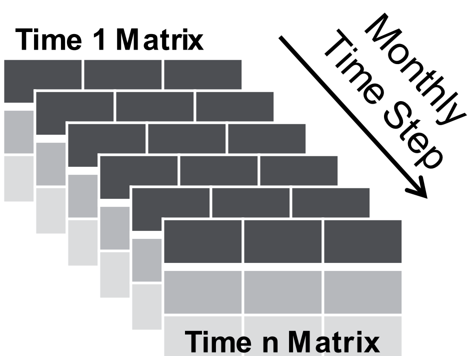
Illustrative Loan Level Default Transition Matrix

	Current	Seriously Delinquent	Foreclose	REO	Disposed	Prepaid
Current	90.0%	5.0%				5.0%
Seriously Delinquent	15.0%	50.0%	30.0%			5.0%
Foreclose			90.0%	10.0%		
REO				75.0%	25.0%	
Disposed					100.0%	
Prepaid						100.0%

Simulation



Analytical Solution

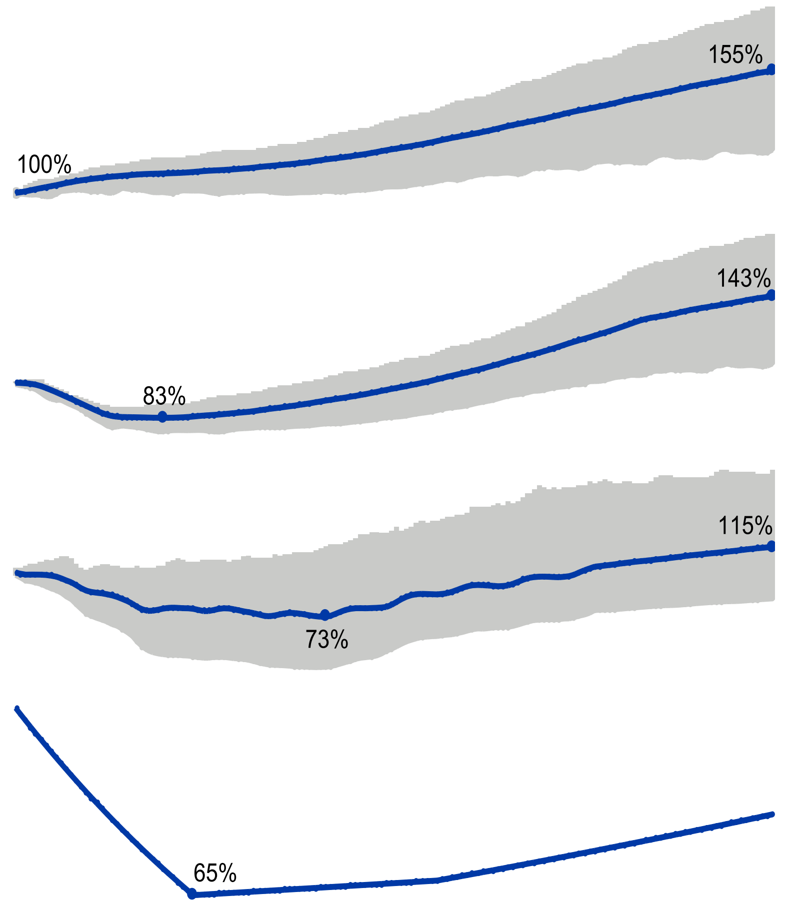


- Both solutions work at loan level
- Projected interest rate and home price levels are used at each time step to calculate transition probabilities
- Analytic solution multiplies matrices to arrive at result
- Simulation generates a discrete path for each loan over time

Overview of Scenarios Modeled

Scenario	Description	Modeled Loss
Baseline	Steady long term annualized home price growth rate of 3% to 5%	15 bps
Moody's S4	~17% home price decline over 2 years with slower recovery	80 bps
2007 Replay	Replay of actual home price paths from Great Recession using CoreLogic HPI	180 bps
Down 35%	Nationwide 35% downturn over three years with slow recovery	300 bps

Home Price Paths

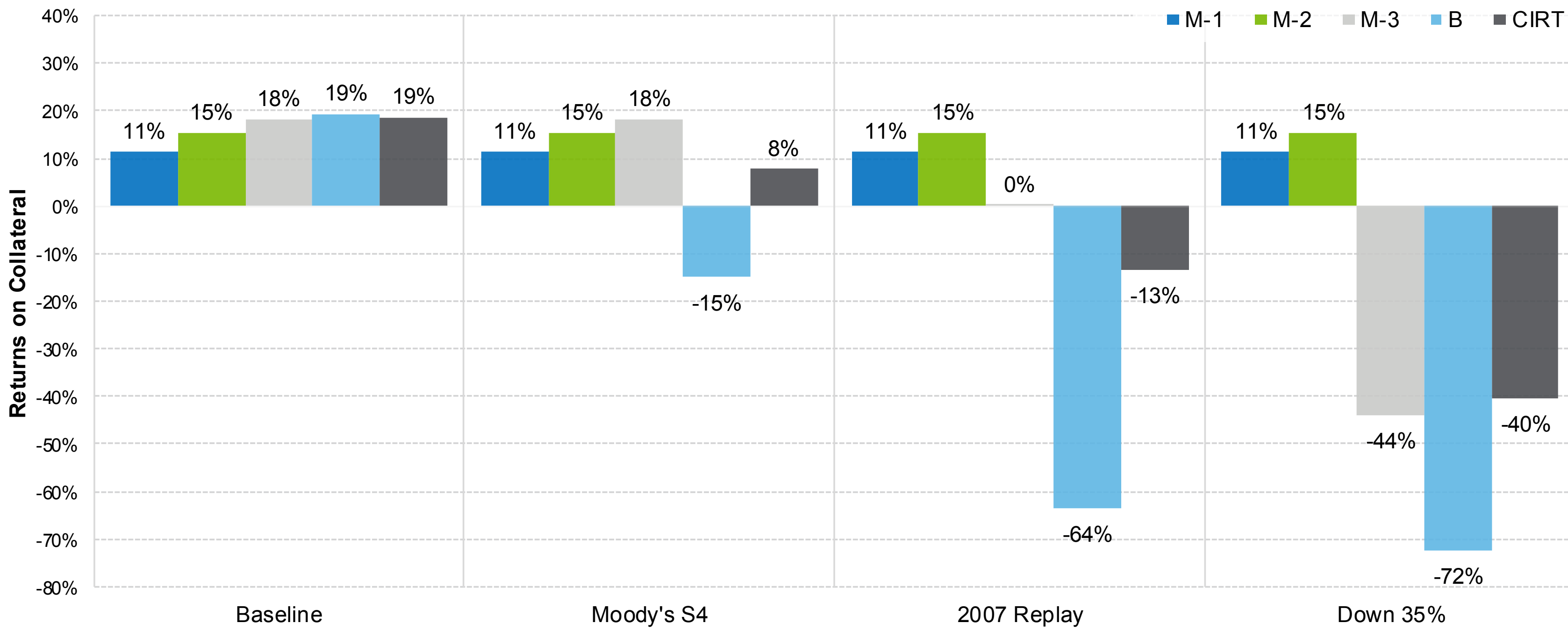


Blue line represents UPB weighted mean home price path
Grey shading represents best and worst state level home price paths

All Scenarios Modeled using Core Logic Risk Model 4.9.2 using recent GSE 30 year fixed rate acquisitions at a loan level with data available at treaty inception

Estimated Nominal Pre-Tax Returns on Collateral by Scenario

	Baseline Scenario				Moody's S4 Scenario				Replay of the Great Recession				US Down 35% Scenario			
Layer	LR	ROL	LOL	**ROC**	LR	ROL	LOL	**ROC**	LR	ROL	LOL	**ROC**	LR	ROL	LOL	**ROC**
M-1	0%	1%	0%	**11%**	0%	1%	0%	**11%**	0%	1%	0%	**11%**	0%	1%	0%	**11%**
M-2	0%	6%	0%	**15%**	0%	6%	0%	**15%**	0%	18%	0%	**15%**	0%	24%	0%	**15%**
M-3	0%	24%	0%	**18%**	0%	42%	0%	**18%**	94%	42%	40%	**0%**	325%	30%	97%	**-44%**
B	18%	82%	15%	**19%**	152%	52%	79%	**-15%**	341%	29%	100%	**-64%**	375%	27%	100%	**-72%**
CIRT	0%	20%	0%	**19%**	44%	26%	11%	**8%**	196%	26%	51%	**-13%**	326%	27%	89%	**-40%**



- Using average 2016 pricing levels by layer and representative collateral levels for majority of GSE CRT participants. Individual collateral levels will vary by structure and result of counterparty review
- Analysis based on representative reference pool and structure

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