MORTGAGE BACKED SECURITIES AN ACTUARIAL APPROACH TO CASH FLOW ANALYSIS

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Disclaimer

- This presentation contains our views and these views are not necessarily identical to the views of the cosponsors of the program nor the employers or clients of the speakers

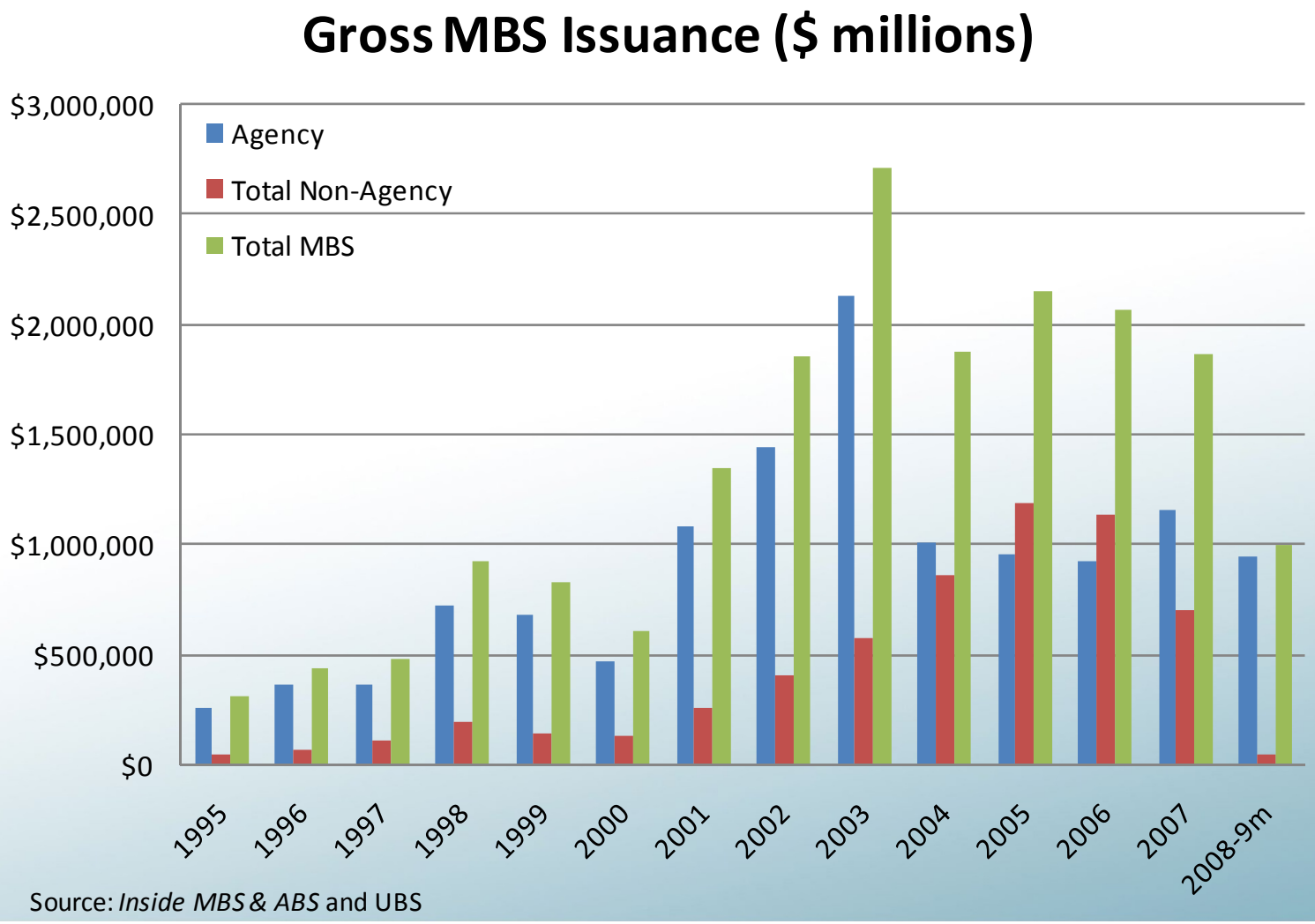
Agenda

- Background on the MBS market
- Current situation
- Actuarial model presentation

Background

- Gross Issuance
- Agency vs. Non-Agency Issuance
- Split by non-agency type (prime, subprime, alt-a)

Gross Issuance



Source: *Inside MBS & ABS* and UBS

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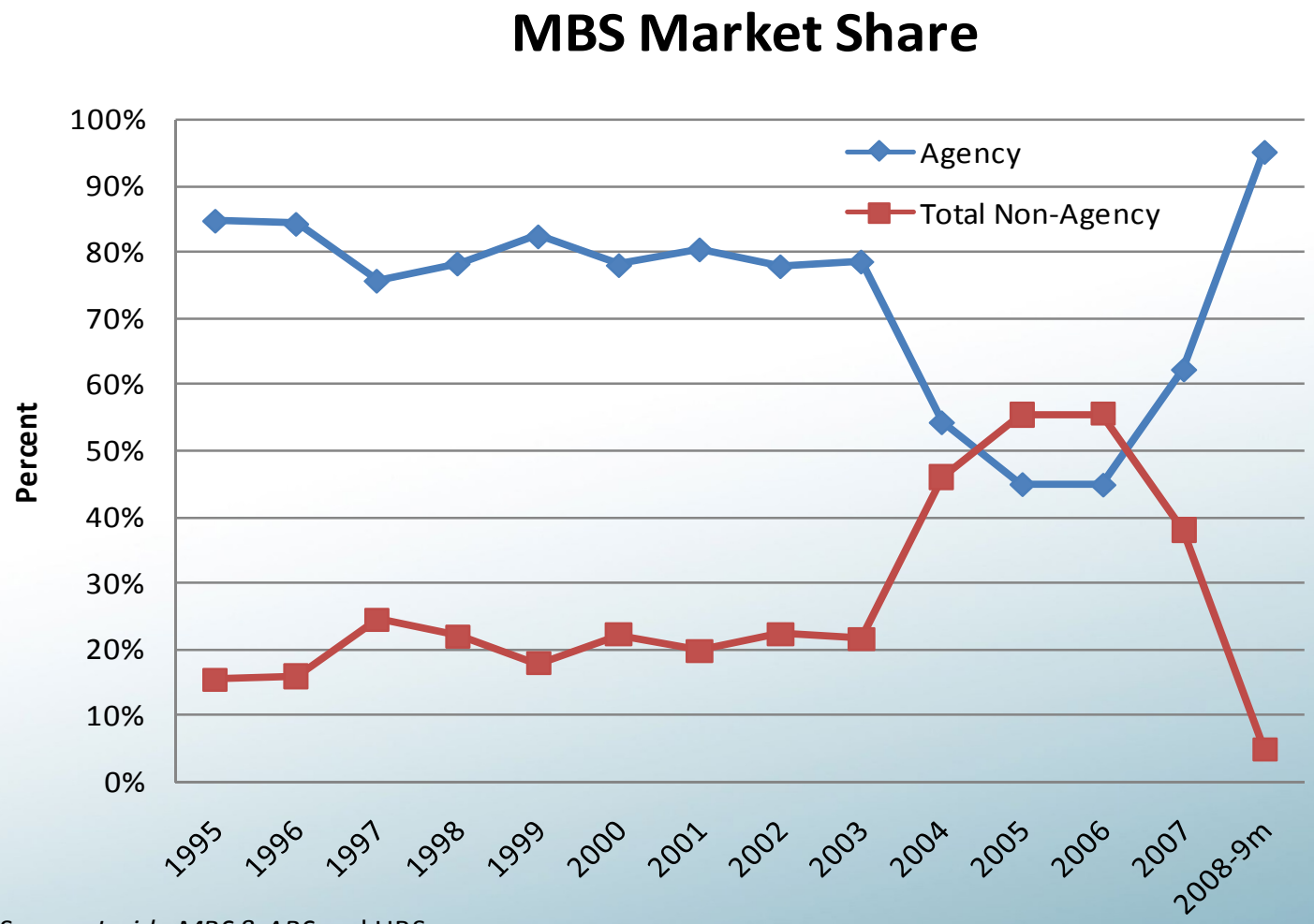
Agency vs. Non-Agency



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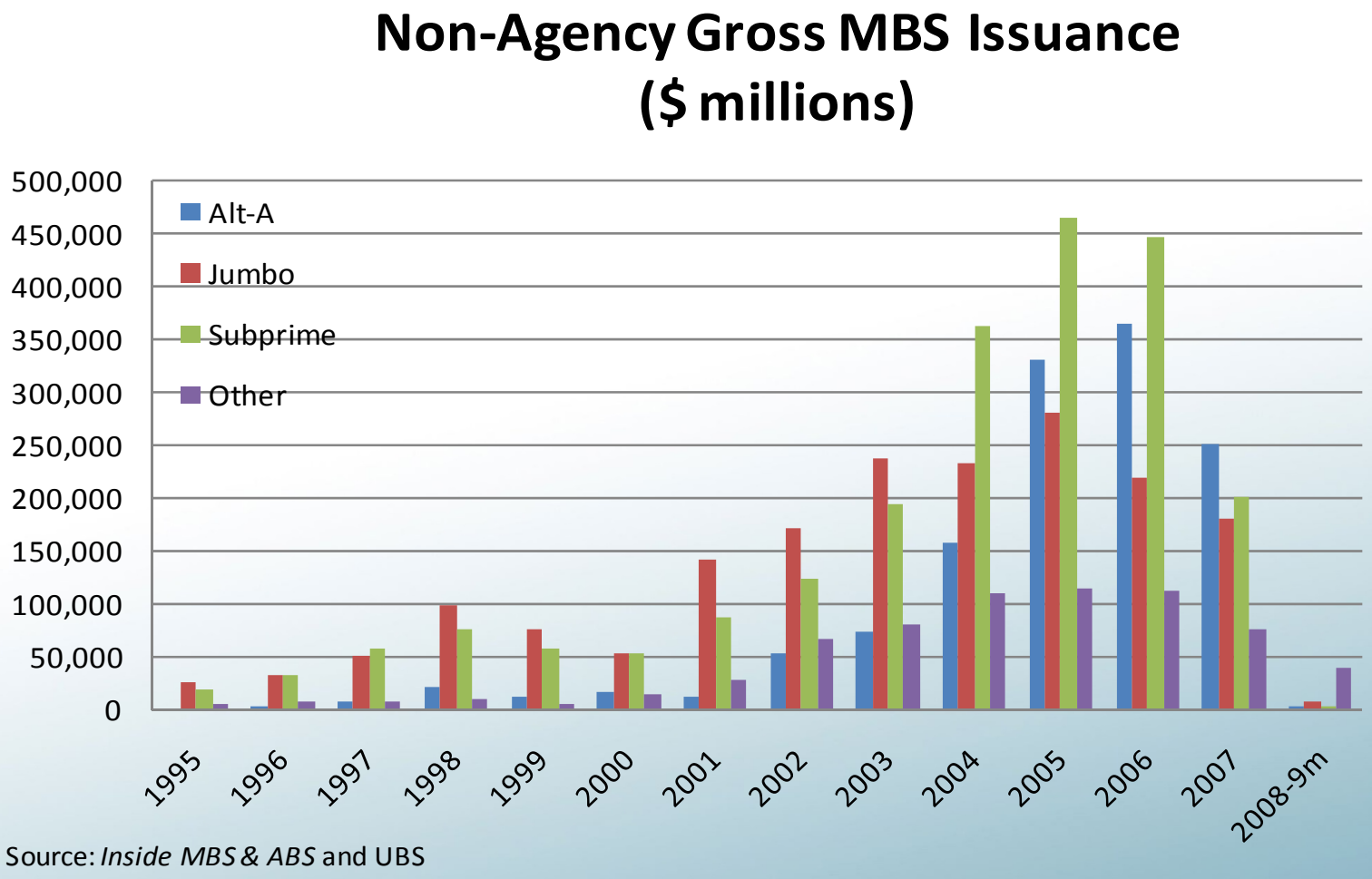
Non-Agency by Type



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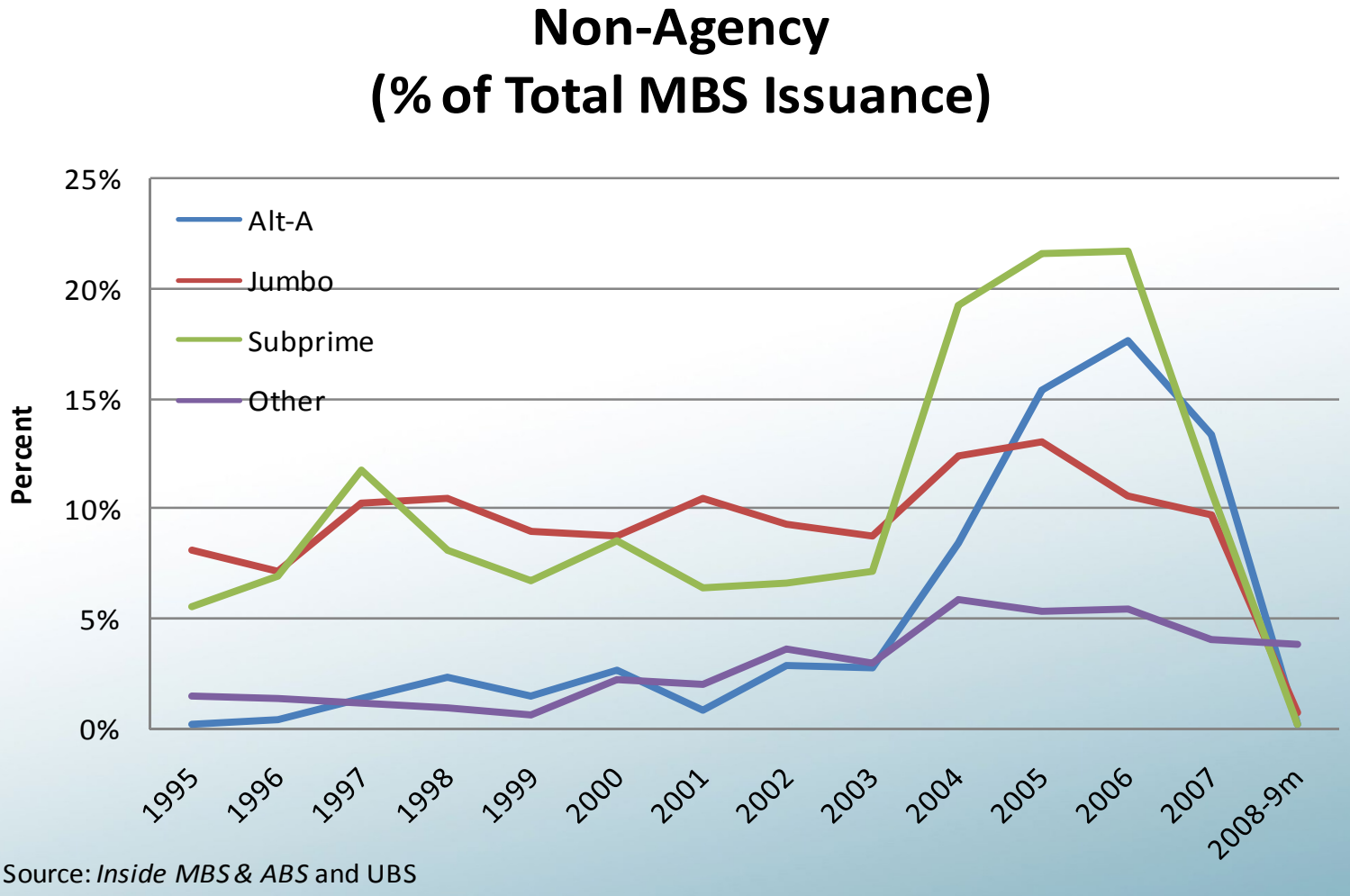
Non-Agency by Type



Source: *Inside MBS & ABS* and UBS

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Current Situation

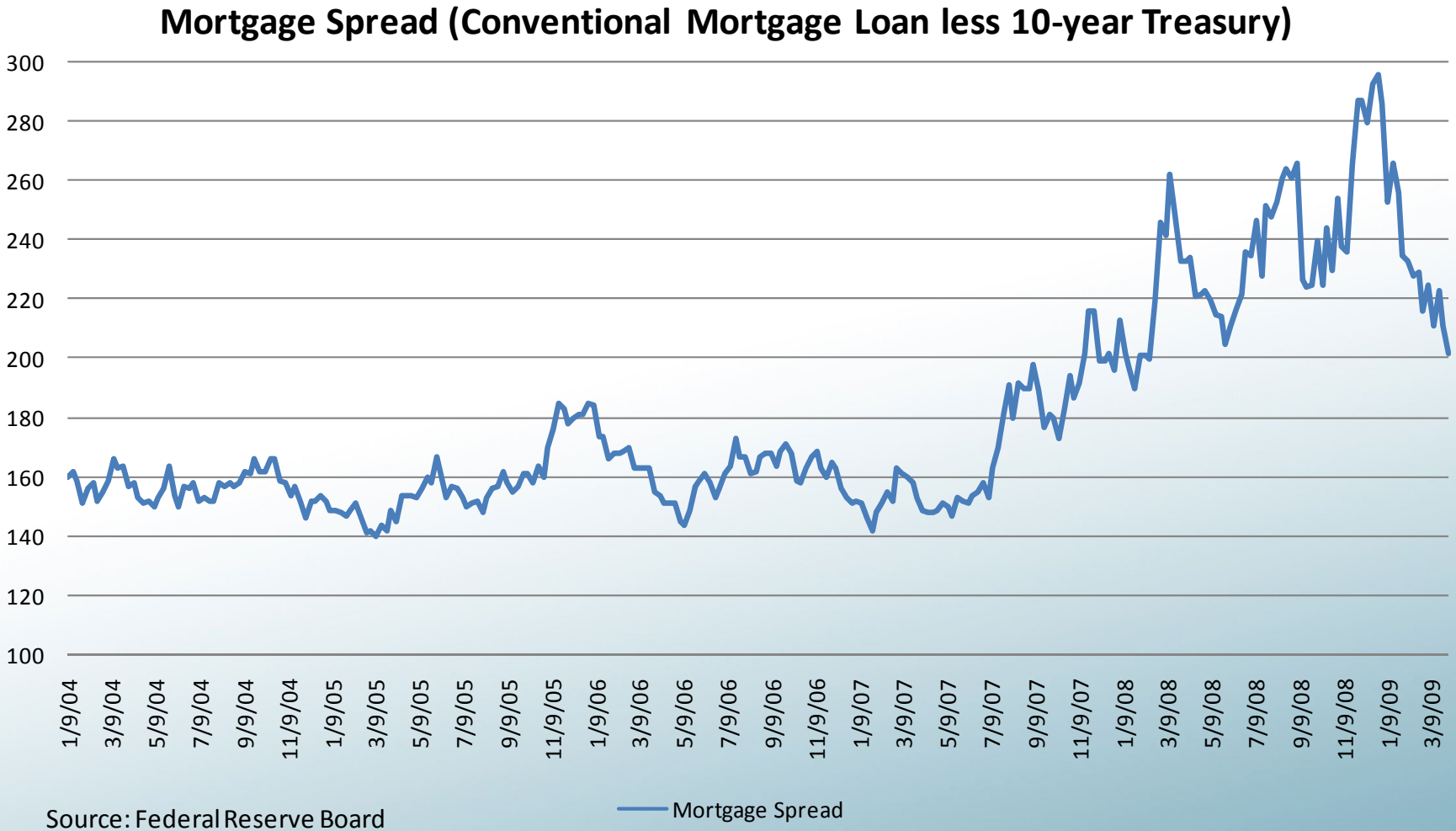
- What happened?
  - Liquidity evaporated
  - Market values eroded
- Why is valuation needed?
  - GAAP Accounting regulations still require a value (FAS 157)
  - Risk quantification
    - Distribution of assumptions and valuations

Liquidity Evaporated

- Broker/Dealers of non-Agency MBS unwilling to provide liquidity [1]
- Forced liquidations of MBS set market prices [1]
- Pricing vendors find it difficult to obtain “real” prices
- Bid - Ask spread is 10-30 points depending on collateral and the depth of distress [2]

[1] **AD&Co's 16th Annual Conference: The Times They Are A-Changin‘**
[2] **”Getting Out of the Mess” by Dave Hurt at the Loan Performance Symposium March 11, 2009**

Liquidity Evaporated



Source: Federal Reserve Board

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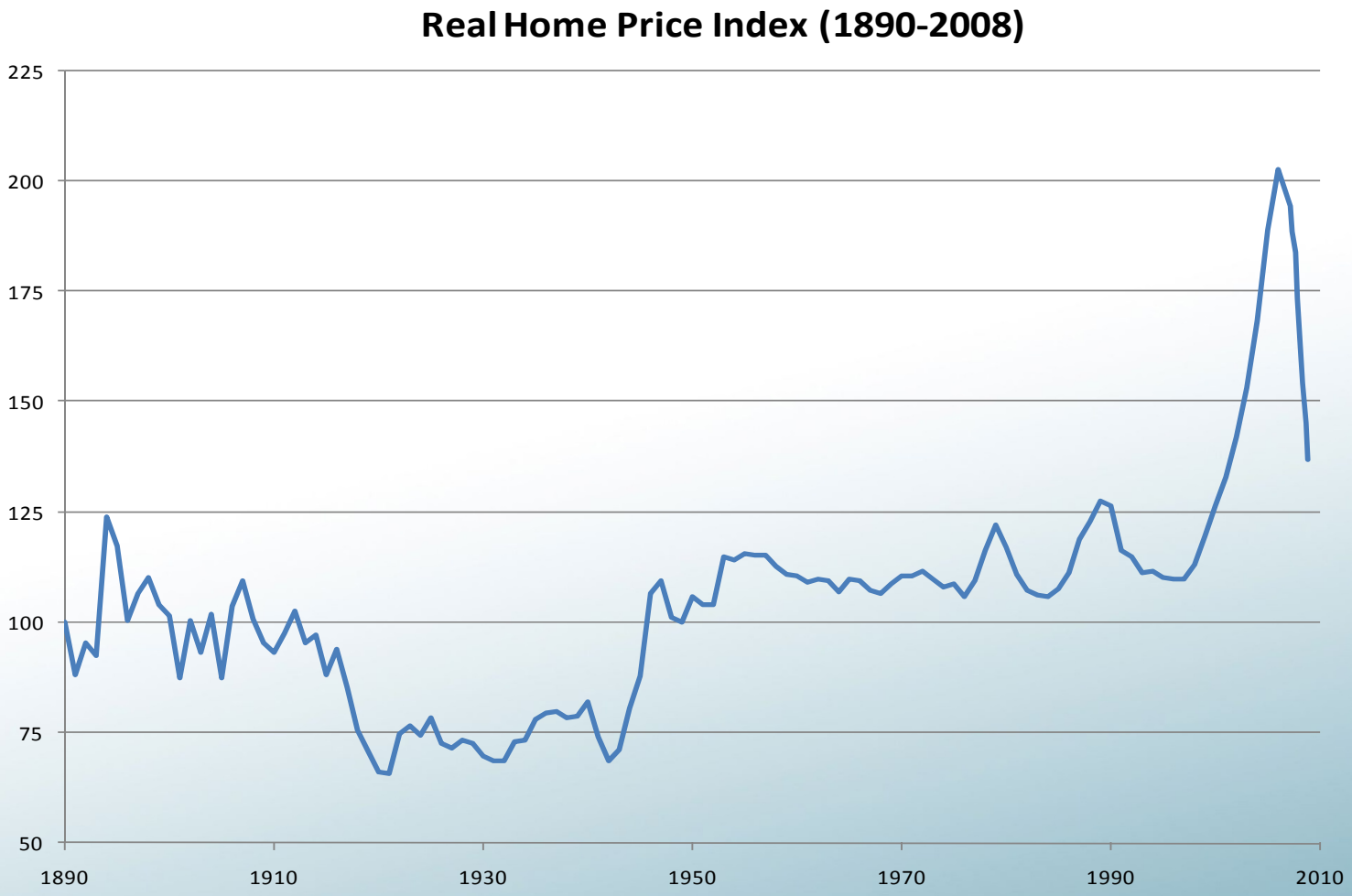
Erosion of Market Values



Source: http://www.econ.yale.edu/~shiller/data.htm

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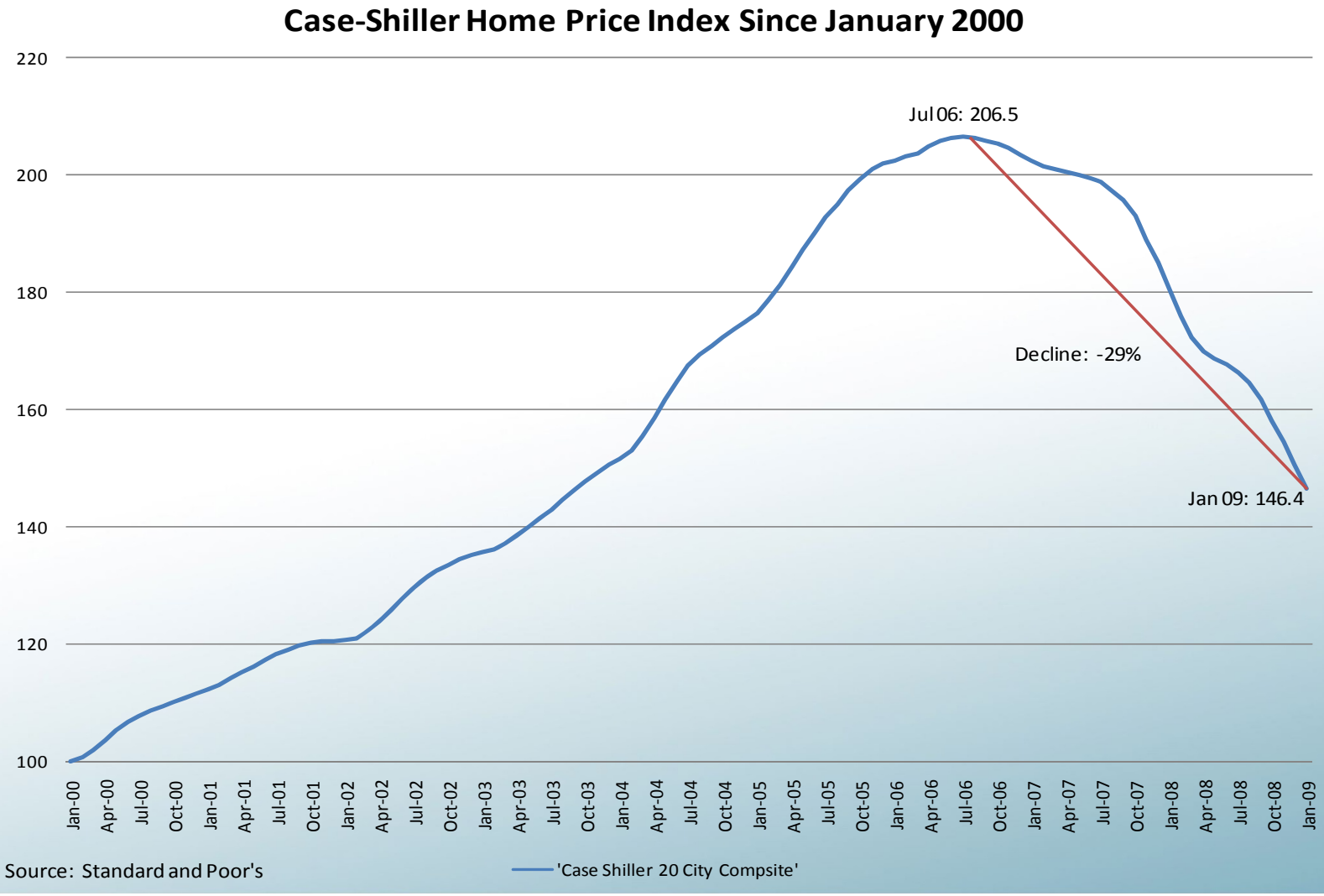
Erosion of Market Values



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Erosion of Market Values

Source: Bloomberg

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Erosion of Market Values

- ABX HE AAA 2007-2 Index Components

ACE Securities Corp. Home Equity Loan Trust, Series 2007-HE4
Bear Stearns Asset Backed Securities I Trust 2007-HE3
Citigroup Mortgage Loan Trust 2007-AMC2
CWABS Asset-Backed Certificates Trust 2007-1
First Franklin Mortgage Loan Trust, Series 2007-FF1
GSAMP Trust 2007-NC1
Home Equity Asset Trust 2007-2
HSI Asset Securitization Corporation Trust 2007-NC1
J.P. MORGAN MORTGAGE ACQUISITION TRUST 2007-CH3
Merrill Lynch First Franklin Mortgage Loan Trust, Series 2007-2
MERRILL LYNCH MORTGAGE INVESTORS TRUST, SERIES 2007-MLN1
Morgan Stanley ABS Capital I Inc. Trust 2007-NC3
Nomura Home Equity Loan, Inc., Home Equity Loan Trust Series 2007-2
NovaStar Mortgage Funding Trust, Series 2007-2
OPTION ONE MORTGAGE LOAN TRUST 2007-5
RASC Series 2007-KS2 Trust
Securitized Asset Backed Receivables LLC Trust 2007-BR4
Structured Asset Securities Corporation Mortgage Loan Trust 2007-BC1
SOUNDVIEW HOME LOAN TRUST 2007-OPT1
WaMu Asset-Backed Certificates WaMu Series 2007-HE2

GAAP Valuation Still Needed

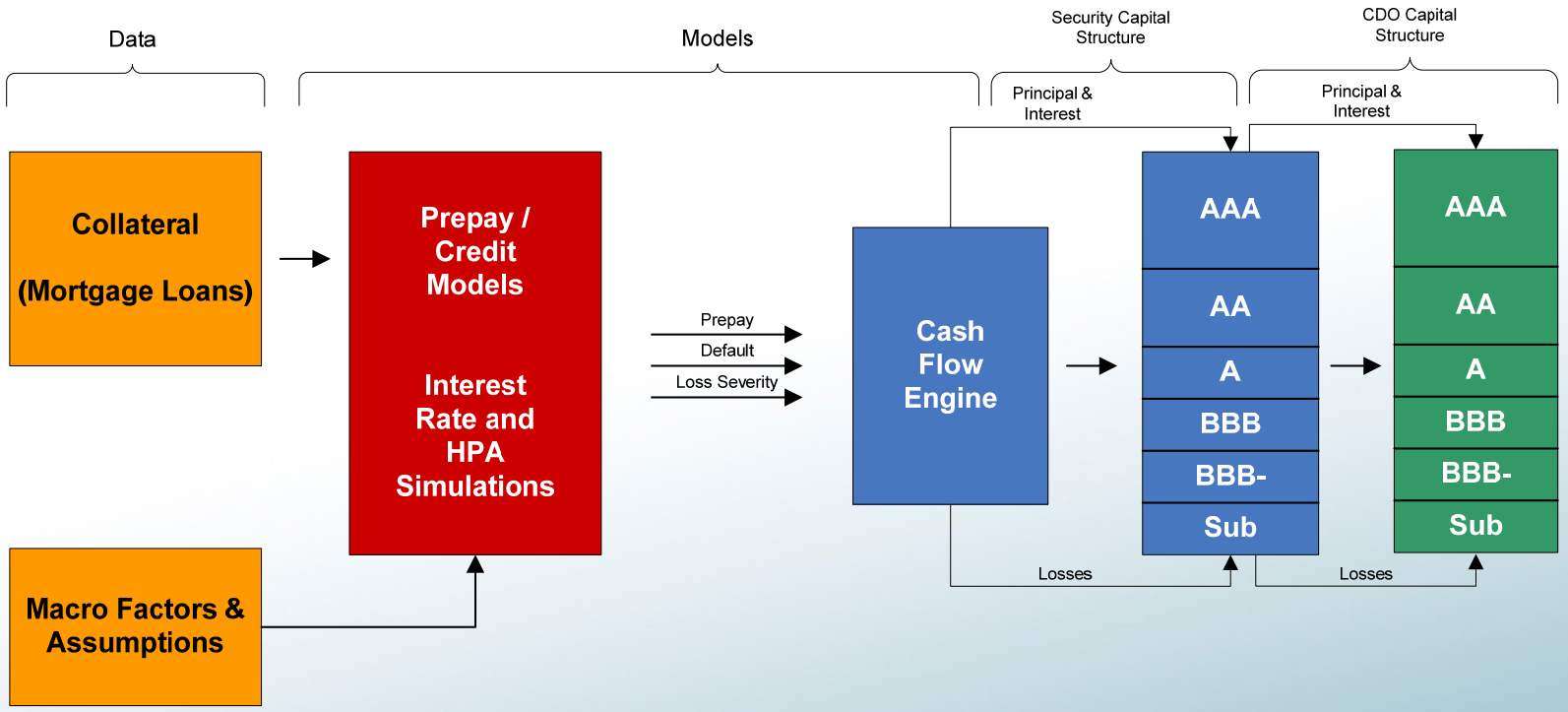
- Mark to Market
  - FAS 157 required companies to value holdings
    - Level 1 – based on market price
      - Recent observed prices could be due to forced liquidation
    - Level 2 – based on related price (ex. spread to treasuries)
      - Spreads can reflect lots of different risks (credit, liquidity,…)
    - Level 3 – based on model price
- Mark to Model pricing developed from loan level data
  - FASB relaxation of mark-to-market rules
  - Perhaps an ‘intrinsic value’ based on full range of scenarios

Risk Quantification

- The following table has daily percent changes of DJIA under a Normal Distribution assumption and reality

Percent Move (1916-2003)	Normal Distribution Assumption	Reality
<>3.4%	58	1001
<>4.5%	6	366
<>7%	1 in 300,000 years	48

MBS Valuation Flowchart



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Model Framework

- Purpose: to model the prepayment and loss rate assumptions to be used in a cash flow engine
- Prepayment Model
  - Willingness
  - Ability
- Loss Model
  - Ultimate loss rate development methods
  - Frequency of foreclosure
  - Severity of foreclosure
- Cash Flow Engine
  - Assigns collateral cash flows to security structure based on triggers
    - Triggers include prepayments, delinquencies and loss rates

Model Characteristics

- Transparent
  - Actuarial Standards of Practice
  - Model documentation
- Credit Focus
- Utilize loan level experience
  - Loan Performance or other sources
  - Macro assumptions such as default rates, home price changes

Prepayment Model

Goal: estimate percentage of loan amounts that will prepay

- Willingness
  - Interest rate differential (refinancing, cash-out)
  - Loan/Product type
  - Fixed/Adjustable rate
  - Seasonality
- Ability
  - Home price changes
  - FICO scores
  - LTV – original and current
  - Lending standards/policies
- Federal government initiatives

Ultimate Loss Rate Development Methods

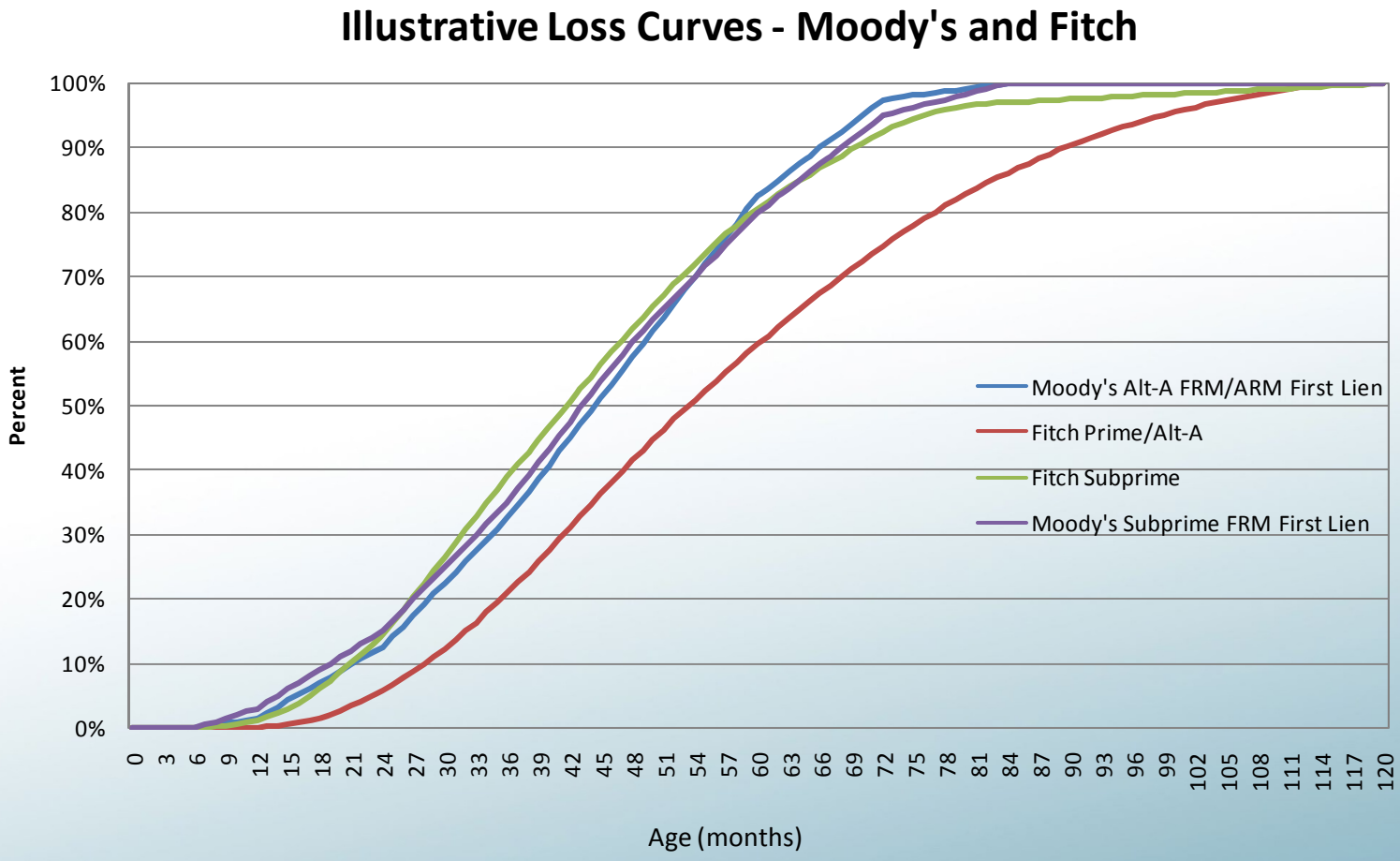
Goal: estimate percentage of loan amounts that will default and severity of default

- 'Paid' Loss Development Factor (LDF)
- 'Incurred' LDF
- A priori ultimate loss rate (ULR) development
- Adjusted 'paid' BF method
- 'Incurred' BF

Ultimate Loss Rate ‘Paid’ LDF

- ‘Paid’ losses to date
  - Can calculate from loan level data
  - Providers such as Bloomberg also provide this data
    - Receive data from trustees/servicers of loans
- Cumulative loss curve by age of loan
  - Examples on next slide
  - What % of the losses should we expect to see at a certain loan age
- Ultimate loss = ‘paid’ losses / % expected to be ‘paid’

Ultimate Loss Rate 'Paid' LDF



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Ultimate Loss Rate “Incurred” LDF

- ‘Paid’ losses to date
- Take current delinquencies to ultimate loss
  - Roll rate projections (project the % of delinquencies that default)
- Severity (% of loan that is not recoverable)
- Incurred losses = ‘paid’ losses + estimate of defaults x severity
- Utilize incurred loss curves to calculate ultimate loss rate
- Challenges/pitfalls

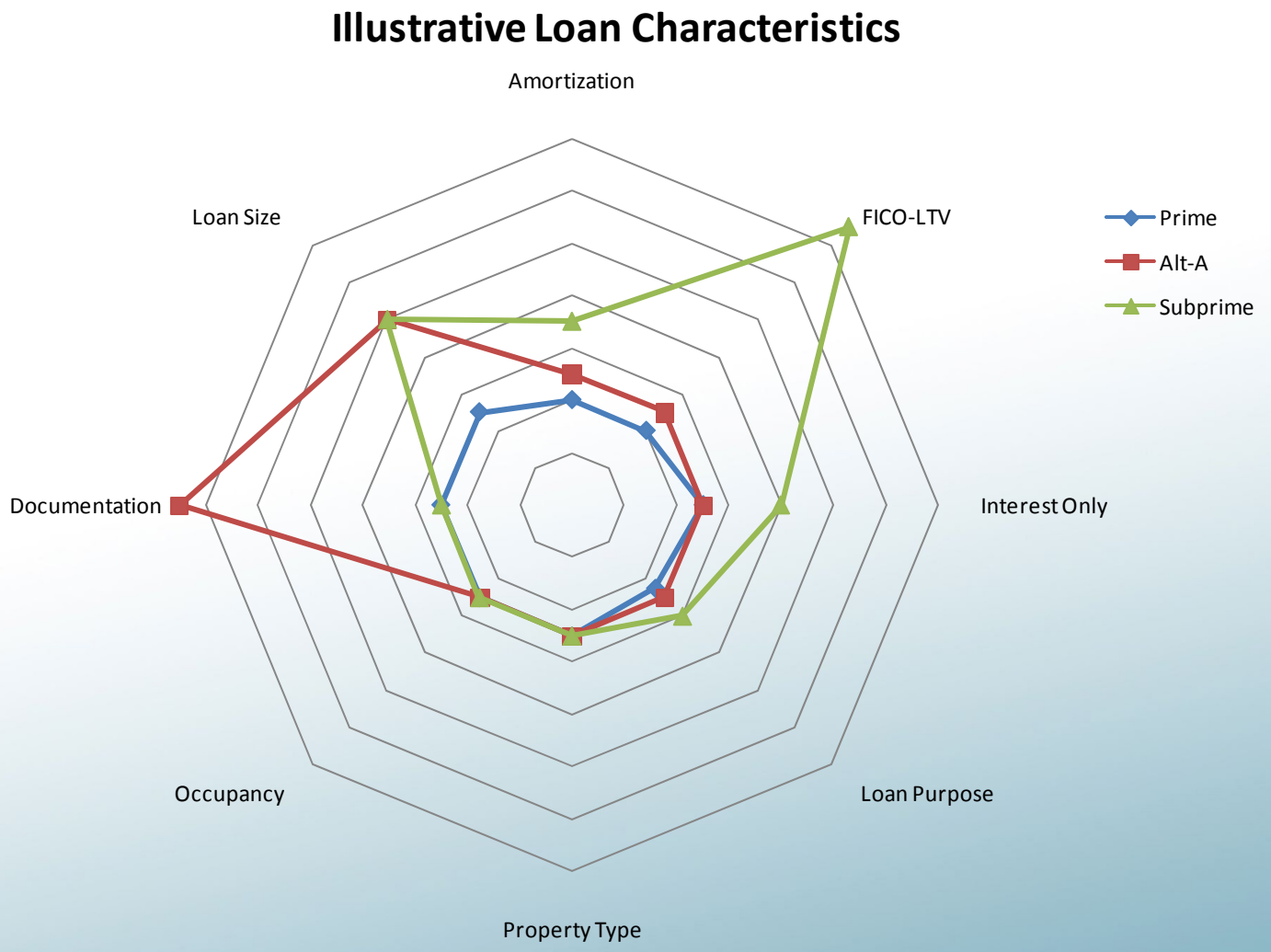
A Priori ULR Development

- Frequency of foreclosure
- Severity given default
- Unadjusted a priori ultimate loss rate = frequency x severity
- Critical considerations for loan level collateral
  - Underwriting characteristics (FICO, LTV, documentation, etc.)
  - Economic conditions the loan is exposed to

A Priori Development - Frequency

- Frequency of Foreclosure
  - Historical data
  - Specific loan characteristics
    - FICO
    - LTV
    - Amortization type (fixed, adjustable rate)
    - Interest only
    - Loan purpose (refinance, purchase)
    - Property type (single family, condo)
    - Occupancy (owner, second home, investor)
    - Loan documentation (full, low, none)
    - Loan size (jumbo, conforming)
  - Future foreclosure estimates
    - Take delinquencies to ultimate loss
    - Economic variables (e.g., home price changes - see chart on slide 32)

A Priori Development - Frequency



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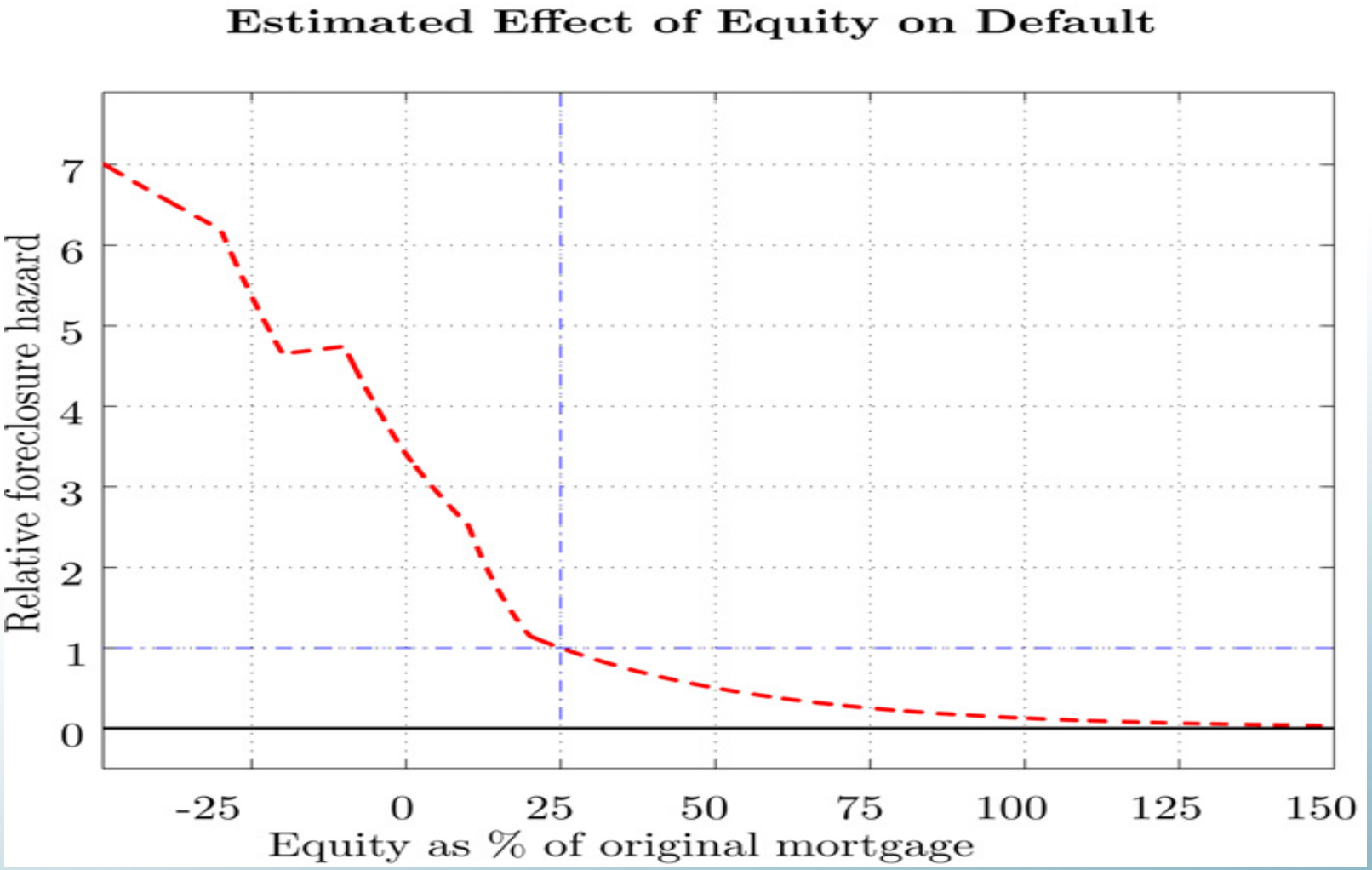
A Priori Development - Frequency



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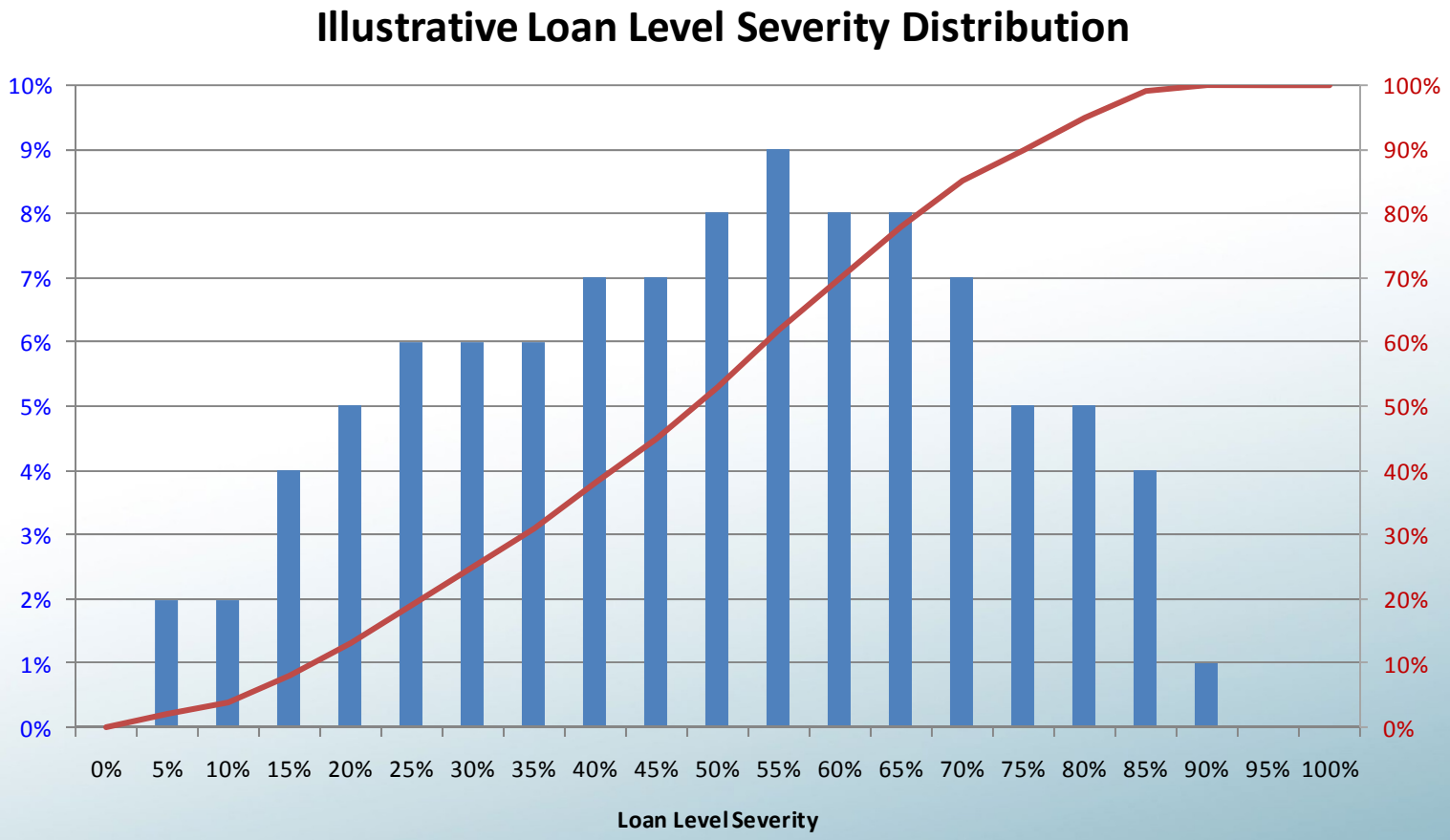
A Priori Development - Severity

- Severity of Default
  - Home price changes
  - Costs of foreclosure (disposal, realtor, legal, upkeep)
  - Accrued interest
  - Current economic situation
    - Home price depreciation results in higher severity
    - Government intervention may impact severity
      - Bankruptcy law changes
      - FHA refinancing
      - Public/private partnerships
      - Interest claw back from 38% to 31% debt to income
      - Others…

A Priori Development - Severity



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Ultimate Loss Rate Adjusted Paid BF

- Paid losses to date
- A priori persistency adjustment
  - Actual persistency = unpaid balance / original balance
  - A priori persistency = anticipated unpaid balance
  - Adjustment needed to allow for more/less losses based on actual vs. anticipated exposure duration
- Adjust a priori ultimate loss (frequency x severity) by persistency factor
- Use loss curve to estimate % yet to be paid

Ultimate Loss Rate “Incurred” BF

- Utilize incurred loss curve
- Take a priori ultimate loss rate (from a priori development)
  - Utilize incurred loss curves to estimate % yet to be paid
- Incurred BF ultimate loss = incurred to date + estimate of yet to be incurred

Cash Flow Waterfall

- Tranche level cash flows based on deal prospectus
- Model needs to take into account specifics of the deal

Cash Flow Waterfall

Illustrative NPV of Cash Flow Waterfall Output

		Net Present Value (NPV)		
RMBS Tranche	Original Rating	Scenario 1	Scenario 2	Scenario 3
A	AAA	99.71	99.66	99.70
B	AAA	77.63	78.52	69.03
C	AA	79.09	7.81	1.64
D	AA	78.64	9.96	1.66
E	A	80.16	2.79	0.70
F	BBB	86.83	0.64	0.39
G	BBB	85.62	0.49	0.39
H	BB	0.94	0.40	0.39
I	BB	0.78	0.40	0.39
J	Not Rated	5.46	5.34	0.39
K	Not Rated	0.40	0.40	0.39

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Questions?

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