Evolution of Mortgage Securitization

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Evolution of Mortgage Securitization

• Bundling and Securitization of Mortgage in 1980’s
  – Pass-thrus: Credit risk borne by Government sponsored Enterprises (GSE)
  – Interest rate tranched products under REMIC (real estate mortgage investment conduit) tax treatment

• Private label securitization (PLS) starting with sub-prime, Alt-A non-conforming Jumbo mortgage products in the 1990’s

• Competition between GSEs and PLS at the boundaries of prime and non-prime in 2000’s

• Housing crisis starting in 2007 and collapse of the PLS market

• Concentration of securitization via GSE’s and FHA/VA/GNMA

• Credit Risk Transfer (CRT) transactions starting in 2013 to transfer mortgage credit risk from the GSEs to the private sector via securitized tranched products and insurance

• Future innovation in creating a liquid mortgage credit market
Evolution of Mortgage-backed Securities Research

Starting with the seminal Dunn & McConnell paper and a few selected pieces
Initial focus was on pricing and valuation of interest rate products

US Bond market Outstanding Debt – Source Freddie Mac

Outstanding Public and Private Bond Market Debt – $39.2 Trillion

- Treasury ($12.6) 32%
- Agency Debt ($2.0) 5%
- MBS ($8.7) 22%
- Money Market ($2.9) 7%
- Asset-Backed ($1.4) 3%
- Corporate Debt ($8.0) 20%
- Municipal ($3.7) 9%

1 Interest-bearing marketable coupon public debt.
2 Includes Freddie Mac, Fannie Mae, Federal Home Loan Banks, Farmer Mac, the Farm Credit System, and federal budget agencies (e.g. TVA).
3 Includes Ginnie Mae, Fannie Mae and Freddie Mac mortgage-backed securities and CMOs, CMBS and private-label MBS/CMOs.
4 Includes auto, credit card, home equity, manufacturing, student loans and other USD-denominated CDOs are also included.
5 Includes commercial paper, bankers acceptances and large time deposits.
6 Includes all non-convertible debt, MTNs and Yankee bonds, but excludes CDs and federal agency debt.

Note: Percentages may not add up to 100% due to rounding.

US single-family mortgage debt and value of housing stock – Source Freddie Mac

1 Value of U.S. housing stock includes homes with and without underlying mortgages.
2 U.S. home equity is the difference between the value of the U.S. housing stock and the amount of U.S. single-family mortgage debt outstanding.

Source: Federal Reserve Board’s Flow of Funds Accounts, June 11, 2015, Table B.101. Data as of March 31, 2015.
Annual Single-family Mortgage Origination – Source Freddie Mac

Note: Estimates and forecasts by the Office of the Chief Economist do not necessarily represent the views of Freddie Mac or its management, should not be construed as indicating Freddie Mac’s business prospects or expected results, and are subject to change without notice.

Historical 30-year fixed mortgage rates – Source Freddie Mac

Note: Points and fees are added to interest rates.
Components of Mortgage Risk

Mortgage product comprises two primary risks
• Market risk - interest rate risk and basis risks
• Credit risk

Mortgage Rate Funded Through TBA via GSEs
• Interest rate product demand impact - TBA funding
• Credit supply and demand impact – Credit Guarantee and Origination/Servicing economics
Components of Mortgage Rate

Risk Free Rate (Blend) + Swap Spread (Blend) + Option Cost (Market Risk) + OAS (Liquidity Risk) = Secondary Market Rate

Secondary Market Rate + Gfee + Servicing Spread + Primary Spread = Rate to Borrower

Credit Guarantee and Origination/Servicing Impact—Credit Supply Function
Role of GSEs from origination through securitization

The role performed by the GSEs from mortgage origination through securitization and beyond may be divided into five major categories:

1. Setting of standards for products and players in primary markets that are mostly outlined in the seller and servicer guides.
2. Sourcing, acquisition and aggregation of loans prior to securitization.
3. The mechanics of securitization that includes
   i. Security issuance
   ii. Disclosure
   iii. Master servicing
   iv. Bond administration
4. Assuming credit risk
5. Post securitization credit risk management operations as part of the trustee and master servicer roles.
US Nominal House Price Variation – Source Freddie Mac

Annual Changes in National House Prices

Percent

4.1%: 1952-2014 Average Growth Rate

Recession Year

Note: Growth rates for 1952 to 2014 are calculated using the annual average of certain third party and Freddie Mac indices.

Recent Home Price levels - Source Freddie Mac

Cumulative decline of 10% since June 2006
(NSA Series)

United States (NSA)

2015Q1 NSA Index Growth: 1.6%
2015Q1 SA Index Growth: 1.6%

United States (SA)

Freddie Mac House Price Index (December 2000=100)

1 National home prices use the Freddie Mac House Price Index for the U.S., which is a value-weighted average of the state indices where the value weights are based on Freddie Mac’s single-family credit guarantee portfolio. Other indices of home prices may have different results, as they are determined using home prices relating to different pools of mortgage loans and calculated under different conventions than Freddie Mac’s. Quarterly growth rates are calculated as a 3-month change based on the final month of each quarter. “SA” denotes ‘Seasonally Adjusted’ and ‘NSA’ denotes ‘Not Seasonally Adjusted’; seasonal factors typically result in stronger house-price appreciation during the second and third quarters. Historical growth rates change as new data becomes available. Values for the most recent periods typically see the largest changes. Cumulative decline, based on the NSA series, calculated as the percent change from June 2006 to March 2015.

Source: Freddie Mac.
Source FHFA – Fannie Mae and Freddie Mac Fees

Figure 1: Average Estimated Single-Family Guarantee Fees, 2009-2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Upfront Fee</th>
<th>Ongoing Fee</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>2009</td>
<td>9</td>
<td>13</td>
<td>22</td>
</tr>
<tr>
<td>2010</td>
<td>10</td>
<td>14</td>
<td>24</td>
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<tr>
<td>2011</td>
<td>12</td>
<td>15</td>
<td>26</td>
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<tr>
<td>2012</td>
<td>11</td>
<td>26</td>
<td>36</td>
</tr>
<tr>
<td>2013</td>
<td>11</td>
<td>40</td>
<td>51</td>
</tr>
<tr>
<td>2014</td>
<td>15</td>
<td>43</td>
<td>58</td>
</tr>
</tbody>
</table>

*Note: Components may not sum to total due to rounding. All fees for deliveries starting April, 2012 include 10 basis points passed to Department of the Treasury for TCCA.*
Source FHFA – Fannie Mae and Freddie Mac Fees

Figure A-7: Estimated Single-Family Guarantee Fee by Credit Score 2010-2014

<table>
<thead>
<tr>
<th>Basis Points</th>
<th>&gt;=720</th>
<th>660-719</th>
<th>&lt;660</th>
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<tbody>
<tr>
<td>2010</td>
<td>22</td>
<td>35</td>
<td>50</td>
</tr>
<tr>
<td>2011</td>
<td>24</td>
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<td>2012</td>
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<td>2013</td>
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<tr>
<td>2014</td>
<td>53</td>
<td>67</td>
<td>80</td>
</tr>
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Mortgage Credit Risk Sharing Alternatives

Two primary mechanisms for investment in credit

• Operating company that provides a guarantee to security holders for a certain class of senior securities
  – GSEs, insurance from MIs and diversified insurers/reinsurers or collateralized recourse from lenders and third parties

• Capital market structured products, either synthetic or cash, where a significant portion of the maximum potential losses are funded upfront
  – Private label security (PLS) transactions for RMBS and credit default swaps on mortgage reference pools.
Credit Risk Sharing Mechanisms in GSE Securitization

<table>
<thead>
<tr>
<th>Market</th>
<th>Back-end risk transfer after GSE securitization</th>
<th>Front-end risk assumption by players contemporaneous with GSE securitization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Markets</td>
<td>1. Freddie Mac’s Structured Agency Credit Risk (STACR) transaction</td>
<td>Securitization trusts created by lenders/aggregators and third parties to issue CLNs against loan collateral during GSE securitization:</td>
</tr>
<tr>
<td></td>
<td>2. Fannie Mae’s Connecticut Avenue Securities (CAS) transaction</td>
<td>JP Morgan Chase Madison Avenue Securities</td>
</tr>
<tr>
<td></td>
<td>3. Potential future credit linked notes (CLN) issued by GSEs</td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td>Deep MI coverage on securitized loans :</td>
<td>Deep MI coverage on flow business (e.g. Mortgage Bankers’ Association proposal, creation of forward credit market)</td>
</tr>
<tr>
<td></td>
<td>1. Fannie Mae’s National Mortgage Insurance Corp (NMI) deal</td>
<td></td>
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<tr>
<td></td>
<td>2. Freddie Mac’s Arch MI deal</td>
<td></td>
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</tbody>
</table>
Fannie Mae – Credit Risk Transfer via Connecticut Avenue Securities

Reference Pool
Subset of May – August 2014
Acquisitions $28.252BN

1. Fannie Mae issues 10-year debt: (1M-1 and 1M-2 Notes) Receives cash proceeds
2. Fannie Mae pays interest (uncapped LIBOR floater)
3. Fannie Mae repays principal less credit losses

Credit and prepayment performance of the Reference Pool loans determines performance of Notes

Class 1A-H
$27.193BN
96.25% thick
3.75% credit support (initial)
4.25% credit support (required)

Class 1M-1
$254.975MM
0.95% thick
2.80% credit support
Class 1M-1H
$13.420MM
(5.00% vertical slice)

Class 1M-2
$644.149MM
2.40% thick
0.40% credit support
Class 1M-2H
$33.903MM
(5.00% vertical slice)

Class 1B-H
$113.009MM
0.40% thick
0% credit support (first loss)

Note: Tranches labeled “H” are not issued or sold; risk retained by Fannie Mae
Future of Mortgage Securitization

• In current GSE framework, acquisition of mortgage credit and disposition via CRT

• Capital markets and insurance and reinsurance companies actively participating in CRT

• Revival of private label securitization still uncertain

• Future of GSE reform?

• Future of government guarantee/backstop?