Reimagining the U.S. Mortgage Market

Deborah Lucas
Sloan Distinguished Professor of Finance and
Director MIT Golub Center for Finance and Policy
Overview

• Historical notes
  – U.S. market structure
  – International comparisons
  – Housing market boom and bust

• The bailout and its aftermath
  – Valuing the GSEs’ gov’t support
  – Credit risk transfer (STACR and CAS securities)

• Leading reform proposals
The large federal footprint in the U.S. mortgage market has its roots in policy responses to the Great Depression

- **FHLBs**, created to lend to thrifts, credit unions, & savings banks to increase mortgage supply
- **FHA**, created to provide mortgage default risk insurance to lenders
  - **Invented 30-year fixed rate mortgage(!)**
- **Fannie Mae**, to create secondary mortgage market by purchasing FHA-insured loans from lenders & thus provide liquidity to support flow of credit
  - in ’68 split into 2 entities: 1) Fannie Mae, to purchase (non-govt-insured) conforming mortgages to set underwriting standards; & 2) Ginnie Mae, to provide liquidity on MBS pools of govt-backed mortgages
  - **Freddie Mac**, created in 1970 to provide competition for Fannie Mae & to further increase availability of funds
$10 trillion in single (1-4) family home mortgages outstanding
About 70% are securitized. The rest are held on bank balance sheets.
The policy challenge: How to bring private capital into the securitization market and reduce the government role?
Role of Fannie & Freddie in mortgage finance

1: Bundle conforming mortgages into MBS and provide a guarantee
   - May be socially valuable in providing liquidity to mortgage market
   - Puts taxpayers at risk from underpriced insurance

2: Purchase some of those guaranteed MBS for the firms’ own portfolios
   - Firms borrow at low rates to invest in higher-yielding MBS. Akin to hedge funds with a government guarantee

3: Also given some affordable housing goals
International comparisons

Source: John Campbell

Figure 1. Homeownership Rate and Mortgage Debt-to-GDP Ratio

The graph shows the relationship between the homeownership rate and mortgage debt-to-GDP ratio for various countries, including Denmark, Netherlands, United Kingdom, Ireland, Sweden, Australia, United States, Portugal, Spain, Germany, Finland, France, Japan, Belgium, Greece, and Italy.
Figure 3. Homeownership Rate and Government Participation in Housing Finance
Many other countries have well-developed mortgage markets and high home ownership rates with less government involvement, but they don’t rely on 30-year fixed rate mortgages.
U.S. House Price Index (real)

<table>
<thead>
<tr>
<th>House-price index</th>
<th>Prices in real terms</th>
<th>Price to income</th>
<th>Price to rent</th>
<th>Percentage change</th>
</tr>
</thead>
<tbody>
<tr>
<td>$'000, 2016 prices</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

- Atlanta
- Baltimore
- Boston
- Chicago
- Dallas
- Denver
- Detroit
- Houston
- Los Angeles
- Las Vegas
- Miami
- Minneapolis
- New York
- Philadelphia
- Phoenix
- Pittsburgh
- Portland
- Riverside
- San Diego
- San Francisco
- Seattle
- St Louis
- Tampa
- Washington, DC
- United States

Q1 1980 to Q2 2016
Residential mortgage debt
Fannie stock price history and bond ratings

Federal National Mortgage Assctn Fnni Me
OTCMKT: FNMA - May 9, 1:37 PM EDT

1.88 USD ↑ 0.14 (8.05%)

<table>
<thead>
<tr>
<th>1 day</th>
<th>5 day</th>
<th>1 month</th>
<th>3 month</th>
<th>1 year</th>
<th>5 year</th>
<th>max</th>
</tr>
</thead>
</table>

Nationally Recognized Statistical Rating Organization

<table>
<thead>
<tr>
<th></th>
<th>S&amp;P</th>
<th>Moody's</th>
<th>Fitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior long-term debt</td>
<td>AA+</td>
<td>Aaa</td>
<td>AAA</td>
</tr>
<tr>
<td>Short-term debt</td>
<td>A-1+</td>
<td>P-1</td>
<td>F1+</td>
</tr>
<tr>
<td>Subordinated debt</td>
<td>AA-</td>
<td>Aa2</td>
<td>AA-</td>
</tr>
<tr>
<td>Preferred stock(1)</td>
<td>D</td>
<td>Ca</td>
<td>C/RR6</td>
</tr>
<tr>
<td>Outlook</td>
<td>Stable</td>
<td>Stable</td>
<td>Stable</td>
</tr>
</tbody>
</table>

(1) Does not include senior preferred stock issued to Treasury.
Post-crisis key events and policies

- Housing and Economic Recovery Act of 2008 (HERA)
  - Placed GSEs into federal conservatorship
  - Established preferred stock (PS) purchase agreements whereby Treasury’s purchases ensure solvency
  - Total draws on Trs’y capped at $455 billion; $258b is left today ($118b Fannie, $140b Freddie)
  - PS paid 10% dividend
    - Resulted in additional PS purchases in order to pay for dividend
- “3rd amendment” to HERA in Aug. 2012 replaced 10% dividend with sweep of all profits to Treasury
- Large reductions in retained mortgage portfolios
- Creation of STACR and CAS securities to satisfy mandate for credit risk transfer to private sector
Valuing the GSEs’ gov’t support

- What was the cost of the federal bailout?
- Has that cost been recovered?
- What is the value of the current Treasury backstop?
- Would privatization cost money or make money for taxpayers?
- How subsidized are current Fannie and Freddie guarantee fees?
Why valuation deserves more attention

• Most reform proposals involve massive transfers of risk and resources between the public and private sectors
  – Balance sheet assets
  – Explicit and implicit guarantees

• Unbiased valuations are essential for transparency, objective policy evaluation, and taxpayer protection

• Perceptions of cost influence likelihood of reform

• Challenges
  – Complexity of valuing contingent claims
  – There is not conceptual agreement on meaning of “cost”
    • Budgetary costs understate full economic costs
What was the value of the federal bailout? Has that value been recovered?

- Naïve cash flow analysis
- Fannie Mae
  - Total cash from Treasury = $116 billion
  - Total cash to Treasury = $147 billion
  - Net $31 billion to Treasury
- Freddie Mac
  - Total cash from Treasury = $71 billion
  - Total cash to Treasury = $98 billion
  - Net $27 billion to Treasury
What was the value of the federal bailout? Has that value been recovered?

- Problems with naïve cash flow analysis
  - (1) Neglects time value and risk premium
  - (2) Neglects ex ante value of insurance provided
What was the value of the federal bailout? Has that value been recovered?

• Problems with naïve cash flow analysis
  – (1) Neglects time value or risk premium
  – (2) Neglects ex ante value of insurance provided

• Discounting cash flows at 10% addresses (1)
  – NPV of Treasury payments to Fannie of $6.6 billion
  – NPV of Treasury payments to Freddie of $2.7 billion
  – By this accounting Trs’y has NOT recovered the full value
  – This estimate may be conservative because 10% was a below-market rate at time of commitment (Wall, 2014)
What was the value of the federal bailout? Has that value been recovered?

• Problems with naïve cash flow analysis
  – (1) Neglects time value or risk premium
  – (2) Neglects ex ante value of insurance provided

• **Economic cost** is an *ex ante* concept that takes into account the entire distribution of future outcomes
  – Relevant question is, what was value of the put option at the time they were put into conservatorship?
    • Includes scenarios where more cash is paid in and less is recovered

• **Conclusion:** taxpayer cost was over $100 billion more than what the GSEs have paid Tsr’y to date.
What is the value of the current Treasury backstop?

- Contingent claim valuation model calibrated to current market conditions and Fannie Mae’s balance sheet
  - Simulated over a 5-year horizon
  - No further payments on outstanding Treasury preferred stock
  - Implies a fair premium rate on the undrawn Treasury lines of about 4.4%; a $5 billion premium payment in 2017
    - Estimate is quite sensitive to several key assumptions.
  - Fair premium exceeds recent sweep payments to Treasury
  - Residual value of < $3 billion at end of 5 years after premiums paid
Would privatization cost money or make money for taxpayers?

- Will depend on specifics of reform proposal
- Key considerations
  - Current guarantee fees are below market
  - Systems are aging
  - Significant value to private investors could only arise from underpriced gov’t guarantees or monopoly/duopoly power
- Suggests that little money will be made on a well-constructed privatization proposal
  - but the indirect benefits could be enormous (fiscal transparency, innovation, more equitable pricing, …)
How subsidized are current Fannie and Freddie guarantee fees?

- Still working on the answer
- Currently guarantee fees are a policy choice, not a market outcome
- There are new market signals about the cost of mortgage credit risk thanks to the mandate for credit risk transfer (CRT)…
Structured Agency Credit Risk (STACR®)

Debt Notes, Series 2015-DN1

**STACR 2015-DN1**

$880,000,000

Global Capital

*Best RMBS Deal of the Year* award for

2015 US Securitization Awards
Figure 1. Types of Investors in STACR/CAS Debt Issuance Transactions
Transaction Diagram

Actual Principal Payments

Specified Credit Events and Modification Events

Reference Pool

Class A-H
(Reference Tranche Only)

STACR Issued Notes

Class M-1
(Note and Corresponding Reference Tranche)

Freddie Mac pays coupon on Notes, and its obligation to pay interest on the Notes and to repay principal on the Notes is reduced for Credit Events and/or Modification Events on the Reference Pool based on an actual loss approach.

Class M-2
(Note and Corresponding Reference Tranche)

Class M-3
(Note and Corresponding Reference Tranche)

Class B
(Note and Corresponding Reference Tranche)

Retained

Class M-1H
(Reference Tranche Only)

Class M-2H
(Reference Tranche Only)

Class M-3H
(Reference Tranche Only)

Class B-H
(Reference Tranche Only)

Classes of Reference Tranches

<table>
<thead>
<tr>
<th>Class</th>
<th>Initial Class Notional Amount</th>
<th>Initial Subordination(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A-H</td>
<td>$30,521,016,850</td>
<td>4.25%</td>
</tr>
<tr>
<td>Class M-1 and Class M-1H(2)</td>
<td>$318,757,355</td>
<td>3.25%(3)</td>
</tr>
<tr>
<td>Class M-2 and Class M-2H(4)</td>
<td>$318,757,356</td>
<td>2.25%(5)</td>
</tr>
<tr>
<td>Class M-3 and Class M-3H(6)</td>
<td>$398,446,695</td>
<td>1.00%(7)</td>
</tr>
<tr>
<td>Class B and Class B-H(8)</td>
<td>$318,757,357</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
## Interest

The following Classes of Notes bear interest at the applicable per annum interest rates (each, a "Class Coupon") shown in the following table. The initial Class Coupons apply only to the first Accrual Period. We determine One-Month LIBOR using the ICE Method as described under "Description of the Notes — Interest".

<table>
<thead>
<tr>
<th>Class of Notes</th>
<th>Initial Class Coupon</th>
<th>Class Coupon Formula</th>
<th>Class Coupon Subject to Minimum Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-1</td>
<td>1.08175%</td>
<td>One-Month LIBOR + 0.90%</td>
<td>0%</td>
</tr>
<tr>
<td>M-2</td>
<td>2.03175%</td>
<td>One-Month LIBOR + 1.85%</td>
<td>0%</td>
</tr>
<tr>
<td>M-3</td>
<td>3.48175%</td>
<td>One-Month LIBOR + 3.30%</td>
<td>0%</td>
</tr>
<tr>
<td>M-1F(1)</td>
<td>0.58175%</td>
<td>One-Month LIBOR + 0.40%</td>
<td>0%</td>
</tr>
<tr>
<td>M-2F(1)</td>
<td>1.28175%</td>
<td>One-Month LIBOR + 1.10%</td>
<td>0%</td>
</tr>
<tr>
<td>M-3F(1)</td>
<td>2.48175%</td>
<td>One-Month LIBOR + 2.30%</td>
<td>0%</td>
</tr>
<tr>
<td>M-12(1)</td>
<td>1.55675%</td>
<td>Weighted average coupon(2)</td>
<td>0%</td>
</tr>
<tr>
<td>MA(1)</td>
<td>2.297134615%</td>
<td>Weighted average coupon(3)</td>
<td>0%</td>
</tr>
<tr>
<td>B</td>
<td>9.38175%</td>
<td>One-Month LIBOR + 9.20%</td>
<td>0%</td>
</tr>
</tbody>
</table>

### STACR 2016-DNA3 Proxy Cohort Performance

#### Reference Pool Proxy

![Reference Pool Proxy Chart](chart.png)
Serious Delinquency Rates

Serious Delinquency Rates: Single-Family Loans

Sources: Fannie Mae, Freddie Mac, MBA Delinquency Survey and Urban Institute.
Note: Serious delinquency is defined as 90 days or more past due or in the foreclosure process.

How much risk is privatized with CRT?

- Goal in 2016: transfer risk on 90% of targeted single-family, 30-year, fixed-rate mortgages

- In practice considerable risk is retained by F&F
  - E.g., in STACR DNA1, all non-HARP loans funded between October 1, 2012 and December 31, 2012 = $96 billion, versus $34 billion in final reference pool
  - Exclusions from reference pool tend to reduce investor risk
    - All defaults in first few years
    - Loans with original LTV > 80%
    - HARP and loans that fail filters
    - Principal forgiveness in non-defaulted restructurings is cost to F&F
    - But also excluded are safer 15-year mortgages and LTV < 60%.
How much risk is privatized with CRT?

• Goal in 2016: transfer risk on 90% of targeted single-family, 30-year, fixed-rate mortgages

• In practice considerable risk is retained by GSEs
  – Amortization and prepayments reduce average life of risk-bearing tranches
    • An episode of rapid prepayment and low early defaults would considerably reduce risk exposure on STACRs to high subsequent defaults
  – Until recently all first-loss tranches were retained. Some now sold but in more limited amounts
    • E.g., 16 bps is market price of total pool risk for STACR DNA3; only 9 bps in securities sold to market
How much risk is privatized with CRT?

- Goal in 2016: transfer risk on 90% of targeted single-family, 30-year, fixed-rate mortgages

- Would risk be transferred in a serious market downturn?
  - May be reluctance to transfer risk when it is expensive because of pressure to keep rates affordable
  - Structure is much like pre-crisis Private Label Securities
    - PLS market evaporated during the crisis
    - Will STACRs be the CDOs of the next crisis? (P. Willen)
Role of Fannie & Freddie in mortgage finance

1: Bundle conforming mortgages into MBS and provide a guarantee
   - May be socially valuable in providing liquidity to mortgage market
   - Puts taxpayers at risk from underpriced insurance

2: Purchase some of those guaranteed MBS for the firms’ own portfolios
   - Firms borrow at low rates to invest in higher-yielding MBS. Akin to hedge funds with a government guarantee

3: Also given some affordable housing goals
Government system
- No private capital
- Gov’t insures conforming loans

Treasury 3: Secondary Guarantee
- Private capital has first-loss
- Higher g-fees
- Govt still large presence

Treasury 2: Guarantee expands in crisis
- Govt insures 10% of loans in normal times
- Insures 100% in a crisis

Treasury 1: Fully private system
- Is the government guarantee latent and unpriced?

A Treasury White Paper laid out the three options here
How conforming mortgages would be financed under one hybrid model plan

**Changes from status quo**

1. Competing well-capitalized securitizers
2. Explicit guarantee
3. Guarantee applies to MBS, not institutions
4. Fee for the guarantee
5. No portfolios, no associated debt
Evaluation of hybrid model

• Addresses some of the most serious shortcoming of current system without radically changing it

• Criticisms from right and left
  – Maintains government role
  – Hard to price government insurance; it would be underpriced
  – Anti-housing because mortgage rates would go up
  – (Another) sop to Wall Street – lets them go into securitization and they will engineer the government guarantee to cover the rest of their activities
Conclusions

• The government footprint in the $10 trillion U.S. mortgage market is at a historical high; it has deep historical roots

• Post-crisis efforts to bring in some private risk capital have created new investment opportunities

• The status quo is ultimately unsustainable. Better alternatives exist but change is unlikely in the near-term

• Thank you!
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  - Deborah Lucas (Director)
  
  - Doug Criscitello (Executive Director)
  
  - Andrew Lo, Robert Merton, Jonathan Parker (co-directors)
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