Mortgage Default Risk Management

Yuchen Mei

Department of Statistics and Actuarial Science, University of Waterloo

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US Homeownership Rates 1965 – 2013

Rate: United States
Q1-1965 to Q4-2013
Not Seasonally Adjusted Homeownership Rate

Data Extracted on July 2, 2014 (11:28 pm) EDT
These data are subject to sampling and nonsampling error. For more information see http://www.census.gov/hhes/www/housing/hvs/qtr112/q112src.html.
## Mortgage Assets vs Corporate Equity

<table>
<thead>
<tr>
<th>Percentage of assets held by</th>
<th>Mortgage 2007</th>
<th>Mortgage 2013</th>
<th>Corp. Equity 2007</th>
<th>Corp. Equity 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household</td>
<td>13</td>
<td>10</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Financial Institutions</td>
<td>22</td>
<td>16</td>
<td>19</td>
<td>19</td>
</tr>
</tbody>
</table>
A Mortgage Contract

- A borrower
- A lender
- Loan secured by the property
- Repayment scheme – FRM & ARM
- Risk factors considered by lenders
  - Loan-to-Value (LTV)
  - Credit history, e.g. FICO
  - Loan-to-Income
  - Prime/Subprime
The Two Risks to Lenders

- Default Risk
  - Nonpayment of principal or interest
  - Property foreclosed and sold
  - Loss = loan balance - selling price + cost
  - Triggers: financial illiquidity, low property value, etc.

- Prepayment Risk
  - Acceleration of payment
  - Through refinancing or property sale
  - Triggers: low mortgage rate, moving/relocation, etc.
The Recent Financial Crisis

- House Price Declines
  - Default Foreclosure
    - Increased Housing Supply
  - Reduced Mortgage Payment
    - Economic Activity Slows
      - Liquidity Freezes
    - Banks Incur Losses

Motivation
Default Risk
Mortgage Insurance
Property Index Linked Mortgage
Reference

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Mortgage Default Risk Management
A Multiple State Model

1. Active

2. Delinquency

3. Prepay

4. Default
What Is Mortgage Insurance (MI) ?

“Insurance against financial loss by reason of nonpayment of principal, interest or other sums agreed to be paid under the terms of any note or bond or other evidence of indebtedness secured by a mortgage,...”

– MGIMA(2000) by NAIC
A Typical MI Contract

Suppose: 30-year FRM
MI contract:
- Between the lender and the insurer
- Premium: upfront/annual, paid by the borrower
- Coverage: part/full of the balance
- Effective from origination to termination of mortgage loan
<table>
<thead>
<tr>
<th>LTV &gt; 80%</th>
<th>required by lenders</th>
</tr>
</thead>
<tbody>
<tr>
<td>The largest public insurer</td>
<td>FHA</td>
</tr>
<tr>
<td>Insurance-in-force 2013</td>
<td>1090 billion</td>
</tr>
<tr>
<td>Market share 2013 (dollar)</td>
<td>10.66%</td>
</tr>
<tr>
<td>Premium structure</td>
<td>upfront plus annual</td>
</tr>
<tr>
<td>Coverage</td>
<td>100% of the loss</td>
</tr>
<tr>
<td>Private insurers</td>
<td>A few</td>
</tr>
<tr>
<td>Coverage</td>
<td>20-30% of claim amount</td>
</tr>
<tr>
<td>Government guarantee</td>
<td>No</td>
</tr>
<tr>
<td>Industry combined ratio 2008</td>
<td>238%</td>
</tr>
<tr>
<td>Receivership</td>
<td>PMI, RMIC</td>
</tr>
</tbody>
</table>
Genworth Financial Inc Common S

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Recommendations for supervisors from BIS(2013)

- Mortgage originators and insurers align their interest
- Maintain strong underwriting standards
- Build long-term reserves
Property Index Linked Mortgage (PILM)

- Borrowers pay less when house price declines
- Payments linked to a property index
- Less defaults
- House price risk shared by lenders and borrowers
Two Important Assumptions

Assumption

Default rate increases with current LTV.

- Statistical evidence from real data
- Strategic default from survey data [Guiso et al.(2013)]
  - Default when have the ability to pay
  - Indistinguishable from normal defaults
  - Propensity increased when mortgage deeper in the water
Two Important Assumptions

Assumption

*Foreclosure causes loss.*

- To lenders
  - Foreclosure discount
  - Explicit cost: insurance/management/tax/legal/commission
  - Could be 30-60% of loan balance

- To borrowers
  - Moving/relocation, possibly recourse
  - Worse credit $\Rightarrow$ Higher financing cost in the future
  - Bad feeling, Social stigma

- Negative externalities
S&P Case-Shiller Home Price Index 10-City
PILM Contract Design

- Ambrose & Butttimer (2012)
  - Adjustable Balance Mortgage (ABM)
  - Current LTV ≤ 1

- Shiller et al. (2013)
  - Continuous Workout Mortgage (CWM)
  - Payments directly linked to index

- Adjustment frequency
- Upper bound
- Pricing (contingent claim model/multiple state model)
Will Borrowers Choose PILM?

- PILM = FRM + Put on index
- Is the derivative worth the premium?
- Multi-period utility analysis
Two Issues

- Basis risk between individual property and the index
  - Over-adjustment – extra loss
  - Under-adjustment – strategic default
- Prepayment after a downward adjustment
  - Prepayment penalty


Questions