Mortgage Default Risk Management

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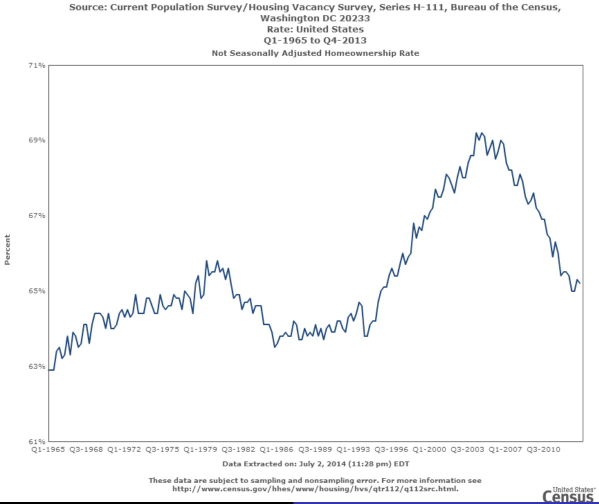
Outline

US Homeownership Rates 1965 – 2013



Mortgage Assets vs Corporate Equity

Percentage of assets held by	Mortgage		Corp. Equity	
	2007	2013	2007	2013
Household	13	10	12	14
Financial Institutions	22	16	19	19

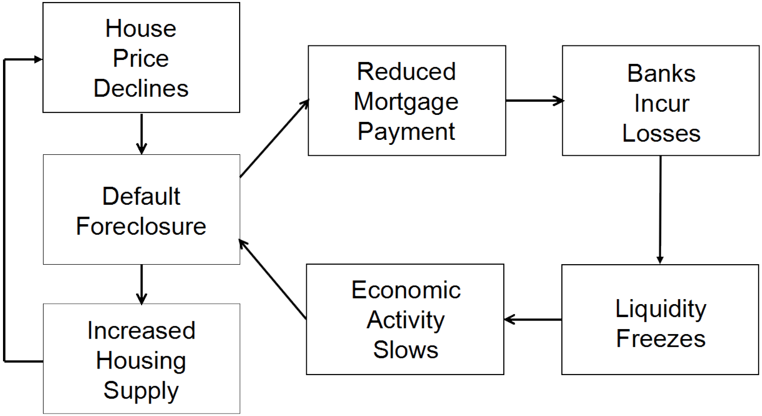
A Mortgage Contract

- 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

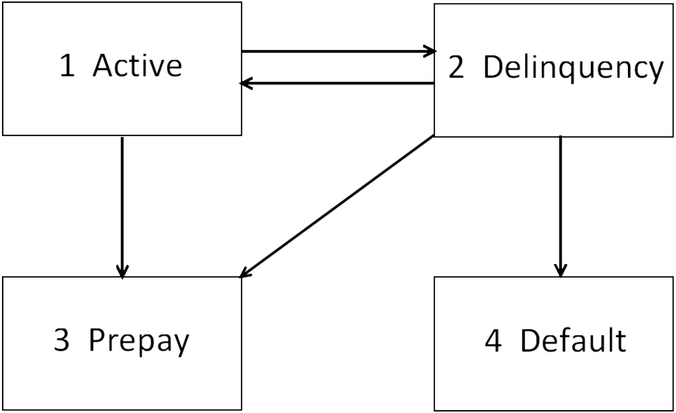
The Two Risks to Lenders

- 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



A Multiple State Model



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

MI Market in US

LTV $> 80\%$	required by lenders
The largest public insurer	FHA
Insurance-in-force 2013	1090 billion
Market share 2013(dollar)	10.66%
Premium structure	upfront plus annual
Coverage	100% of the loss
Private insurers	A few
Coverage	20-30% of claim amount
Government guarantee	No
Industry combined ratio 2008	238%
Receivership	PMI, RMIC

Genworth Financial Stock Prices

Risk Management for MI

Recommendations for supervisors from BIS(2013)

- Mortgage originators and insurers align their interest
- Maintain strong underwriting standards
- Build long-term reserves

Mortgage Contract Innovation

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

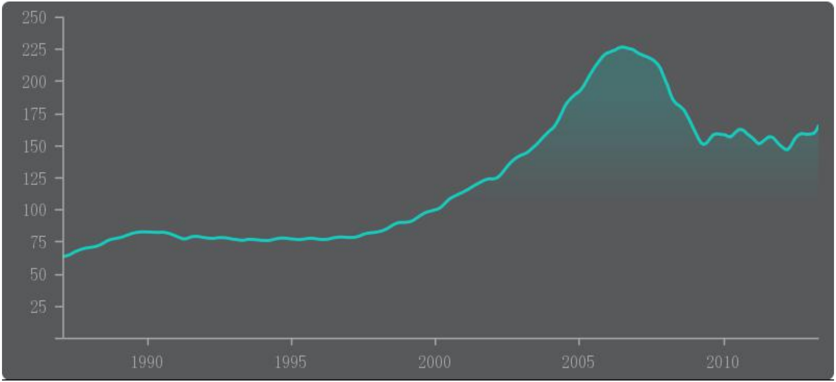
Two Important Assumptions

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 & Buttimer(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

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Questions