Servicing Securitisation through Inefficient Foreclosure

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BdT-TSE conference on Securitization
Banque de France

- Foreclosure is relevant
  - 1.8 million US properties foreclosed in 2012 (RealtyTrac)
  - 10.9 million homeowners (26% of all homes with an outstanding mortgage) were at least 25% underwater in January 2013 (FT, 17 Jan 2013)

- Foreclosure is costly
  - Lenders: lost $\approx 50\%$ of their investment (Levitin and Goodman, 2009)
  - Negative spillovers to the neighbourhood (Campbell et al., 2011)

- Public involvement: Home Affordable Modification Program in U.S.
  - developed by US Treasury in 2009 to reduce foreclosures
Motivation

Observations about recent wave of foreclosures

1. Securitised loans foreclosed more often than bank-held loans
   - Agarwal et al. (2011a, b); Piskorski et al. (2010); Kruger (2014)

2. Foreclosures seem to be ‘excessive’
   - PV of foreclosure < PV of modification (Li & Garrison, 2011)

3. Mortgage servicers have biased incentives towards foreclosures
   - Kruger (2014): get reimbursed for foreclosure but not modification costs; Robo signing; Renegotiation problem with dispersed investors

Questions

- Where is the link: securitisation ↔ foreclosures?
- Why inefficient foreclosures?
- Why such incentive contracts for servicers?
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- Why such incentive contracts for servicers?
This model and key ingredients

- Securitisation under adverse selection (security design)
  - Securitiser more informed about credit risk of borrowers than investors
  - Costly signal of quality via junior tranche retention (DeMarzo & Duffie 1999)

- Strategic decision of foreclosure policy (moral hazard)
  - Foreclosure policy is not contractible, i.e. at servicer’s discretion
  - Potentially costly. Limit exposure to future aggregate risk

This paper does NOT have strategic defaults of borrowers
Results preview

- **Ex post** inefficient foreclosures to reduce **ex ante** signalling cost
  - An endogenous novel link between securitisation and foreclosure
  - Too much (little) foreclosure for bad (good) mortgage pools ex-post

- Third-party servicing to enforce commitment
  - Servicing contracts contain endogenously ‘biased’ incentives

- Bad states feature observations in recent crisis
  - with some (new) empirical implications
A framework of mortgage securitisation

- Impatient banks (discount factor $\delta < 1$ between $t = 1$ and $t = 3$)
- Competitive and patient investors

$t = 0$ 
- Originator endowed with mortgages

$t = 1$
- Originator receives private information $\theta_i$
- Securitiser designs and sells MBS $F_i$

$t = 2$
- Some mortgages become delinquent
- Servicer foreclose $\lambda_i$ fraction and sells properties

$t = 3$
- Delinquent mortgages recover with prob. $\theta_i$
- All agents paid off

- In-house servicing: Securitiser = servicer (= originator)
- Third-party servicing: Securitiser $\neq$ servicer (= originator)
  - Originator sells cash flow right to the securitiser, but remains as a third-party servicer
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Servicing Securitisation

Kuong & Zeng

October 2015
Foreclosure changes mortgage pool cash flow

Suppose $\lambda_i \in [0, 1]$ delinquent mortgages foreclosed at $t = 2$

\[ V_G = \pi \]

\[ V_B + L(\lambda_H) + (1 - \lambda_H)X \]

\[ V_B + L(\lambda_L) + (1 - \lambda_L)X \]

\[ L(\lambda) \in [0, X) \] is the total proceeds from sales of foreclosed properties
- assumed to be increasing and concave

Key property: Foreclosure reduces exposure to borrowers’ re-default risk and aggregate risk in economy (e.g. unemployment, house prices)
Foreclosure changes mortgage pool cash flow

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$\pi \rightarrow V_G$

$\pi \rightarrow \theta_H \rightarrow V_B + L(\lambda_H) + (1 - \lambda_H)X$

$\pi \rightarrow \gamma \rightarrow V_B + L(\lambda_H)$

$\pi \rightarrow \gamma \rightarrow \theta_L \rightarrow V_B + L(\lambda_L) + (1 - \lambda_L)X$

$\pi \rightarrow \gamma \rightarrow \theta_L \rightarrow V_B + L(\lambda_L)$

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**Key property:** Foreclosure reduces exposure to borrowers’ re-default risk and aggregate risk in economy (e.g. unemployment, house prices)
Foreclosure and securitisation under full information

- At $t = 1$, type $i$ securitiser chooses a security
  - Given full information, any security is correctly priced
  - Optimal security is full equity (pass-through securitisation)

- At $t = 0$, S chooses to commit a foreclosure policy $(\lambda_L, \lambda_H)$
  - As the equity is always issued at fair price, S chooses foreclosure policy to maximise the mortgage pool expected cashflow

$$
(FOC_{i}^{FB}) : \frac{\partial L(\lambda_{i}^{FB})}{\partial \lambda_{i}} - \theta_{i}X = 0 \quad \forall \ i \in \{H, L\}
$$

- $\{\lambda_{L}^{FB}, \lambda_{H}^{FB}\}$ is the ex-post efficient benchmark
- This is also the foreclosure policy for bank-held mortgages.
- $\lambda_{L}^{FB} > \lambda_{H}^{FB}$: pools with lower recovery value should be foreclosed more
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Next, we turn to securitisation under asymmetric information.

We will first study the case with third-party servicing
Securitisation with third-party servicing

Timeline

At $t = 0$, Bank 2 offers Bank 1 a menu of contracts to buy the cash-flow rights

- If Bank 1 declines, he securitises the pool at $t = 1$ and services it in-house
- Otherwise, he becomes third-party servicer. Bank 2 becomes securitiser

At $t = 1$, both banks become informed of the pool quality

- Servicer chooses a contract from the menu (need IC)
- Securitiser designs MBS and sells it to investors

At $t = 2$, in the bad state some loans become delinquent

- Servicer makes foreclosure decisions (also need IC)
Securitisation with third-party servicing

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Assumption and equilibrium concept

Backwards induction and PBE at the securitisation stage

- Investors use security design $F$ to form belief about $\theta$
- focus on least-cost separating equilibrium

Assumption: the choice of servicing contract is NOT a signal

- Investors observe the menu offered at $t = 0$
- But not the choice by the servicer at $t = 1$
- This assumption allows direct comparison to security design literature
The servicing contract \( \{ \alpha, \beta, \tau \} \) specifies payments contingent on cash flow realisations:

- \( \alpha \): percentage fee based on repayment cash flows
- \( \alpha\beta \): percentage fee based on foreclosure cash flows
- \( \tau \): flat sales transfer at \( t = 1 \)

At \( t = 2 \), servicer chooses \( \lambda_i \) to maximise

\[
\max_{\lambda_i \in [0,1]} \alpha[\beta L(\lambda_i) + (1 - \lambda_i)\theta_i X]
\]
Third-party servicing allows commitment in foreclosure

\[ \beta \text{ determines equilibrium foreclosure chosen by the servicer} \]

\[ \beta \frac{\partial L(\lambda_i)}{\partial \lambda} = \theta_i \chi \]

- If and only if \( \beta_i = 1 \), servicer chooses \( \lambda_i^{FB} \)
- \( \lambda_i^s(\beta) \) increases in \( \beta \)

**Result:** Securitiser can commit to foreclosure policy \( \lambda_i \) by offering different \( \beta \)

- separation of ownership and decision
- assuming no renegotiation of servicers’ contract ex post, which seems to be true in practice
Security design: the result

With a pre-committed foreclosure policy \((\hat{\lambda}_L, \hat{\lambda}_H)\):
- low type securitises all cash flows
- high type sells the optimal security \(\mathcal{F}_H\) that resembles debt in the bad state
- in line with Leland and Pyle (1977), DeMarzo and Duffie (1999)
Securitisation with third-party servicing achieves the same outcome as if the securitiser can commit to a foreclosure policy *ex ante*.

\[
\max_{\lambda_H, \lambda_L} \gamma \left( \delta \mathbb{E}_H[\tilde{C} - \mathcal{F}_H(\tilde{C})] + p(\mathcal{F}_H) \right) + (1 - \gamma) \mathbb{E}_L[\tilde{C}]
\]

s.t. optimal security \( \mathcal{F}_H \) given \( \lambda_i \)

- The original problem solves for optimal \( \{\alpha_i, \beta_i, \tau_i\} \)
- \( \beta_i \) determines equilibrium foreclosure
- \( \alpha_i \) and \( \tau_i \) ensures participation and incentive compatibility
Ex-ante foreclosure policy design

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Foreclosure with third-party servicing

The equilibrium foreclosure with third-party servicing distorts towards the extremes, i.e.

\[ \lambda_{tp}^H \leq \lambda_{H}^{FB} < \lambda_{L}^{FB} \leq \lambda_{L}^{tp} \]

Third-party servicers are given endogenously biased incentives

\[ \beta_{H} \leq 1 \leq \beta_{L} \]

The inequality is strict when \( \pi \) is low, i.e. information asymmetry is more relevant
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Main results

Mechanism: *Ex ante* optimal foreclosure policy

\[ \lambda_{tp}^H < \lambda_{FB}^H < \lambda_{FB}^L < \lambda_{tp}^L \]

- **Trade-off:** total cash flow of the portfolio v.s. signalling cost
- **Deviate from** \( \lambda_{FB}^i \) to reduce low type’s mimicking incentives

\[
\text{Mimicking payoff} = p(F_H) + \text{retained claim} \leq U_L(\lambda_L)
\]

- **Key forces:** Foreclosure decreases the riskiness of the cash flow
  - \( \lambda_{tp}^H < \lambda_{FB}^H \): ↑ riskiness, ↓ value of risky debt due to concavity
  - \( \lambda_{tp}^L > \lambda_{FB}^L \): ↓ riskiness, ↓ value of levered equity due to convexity

Result: two-sided distortions in foreclosures facilitate securitisation
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**Mechanism: Ex ante optimal foreclosure policy**

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Result: two-sided distortions in foreclosures **facilitate** securitisation
Securitisation with in-house servicing

If the mortgages are serviced in-house, the servicer is also the holder of the residual claims:

- This potentially creates conflict of interests
- Foreclosure policy is chosen at $t = 2$ to maximise his own profit. Can’t commit ex ante.
Comparing to securitisation with in-house servicing

Inefficiency of in-house servicing

Optimal security design is similar

- $\mathcal{F}_H$ resembles debt and $\mathcal{F}_L$ is full pass-through equity
- Note: although the game is quite different because of the timing

Foreclosure decision at $t = 2$

- $L$ type chooses first best foreclosure $\lambda_{ih}^L = \lambda_{FB}^L$
- $H$ type holds levered equity $\rightarrow$ chooses zero foreclosure $\lambda_{ih}^H = 0$

Excessive forbearance as risk-shifting. Classic equity holder-creditor conflict
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Comparing to securitisation with in-house servicing

Value of commitment and the role of servicer

**Value of commitment** the ex ante expected payoff under in-house is strictly less than that under third-party servicing

$$\gamma U_H(\lambda_H^{tp}, \lambda_L^{tp}) + (1 - \gamma) U_L(\lambda_L^{tp}) > \gamma U_{ih}^H + (1 - \gamma) U_{ih}^L$$

The role of servicer here is to allow commitment

- If there is some cost of contracting, e.g. legal, bargaining or indirect agency cost, then some in-house servicing can arise in equilibrium
- In the paper we currently assume an exogenous cost $\kappa$
Value of commitment and the role of servicer

Value of commitment: the ex ante expected payoff under in-house is strictly less than that under third-party servicing

\[ \gamma U_H(\lambda_H^{tp}, \lambda_L^{tp}) + (1 - \gamma) U_L(\lambda_L^{tp}) > \gamma U_H^{ih} + (1 - \gamma) U_L^{ih} \]

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Servicing securitisation through inefficient foreclosures

- Securitisation under asymmetric information
  - Costly retention of levered equity as signal

- Strategic foreclosure of delinquent mortgages
  - Without commitment, excessive forbearance as risk-shifting
  - Committing *ex post* inefficient foreclosure reduces *ex ante* signalling cost
    - Two-sided distortion in foreclosure towards extremes

- The role played by third-party servicers
  - Allows the securitiser to commit by separation of decision and ownership
  - Biased incentives arise endogenously

- Policy: regulating in foreclosure policy and servicers’ incentives may obstruct securitisation
Incentive problems of securitisation
- *Ex post* liquidation: This paper

Inefficient loan foreclosures
- Typically excessive foreclosures
  - Asymmetric information between lender and borrower (Wang et al. 2002, Riddiough and Wyatt 1994)
  - Free-rider problem among creditors (Gertner and Scharfstein 1991)
- This paper: Two-sided inefficiency arises even when servicer has discretion

Role of the servicer in mortgage securitisation
- Pooling improves servicer’s incentive (Mooradian and Pichler 2014)
- This paper: Optimal contracting with servicer mitigates frictions in the tranching problem
Empirical predictions

- Foreclosure rate (conditional on borrowers’ defaults)
  - Third-party servicing $>$ In-house servicing
  - Low quality (ex post) securitised $>$ Bank-held [vice versa]
  - Variation in foreclosure rate: Securitised $>$ Bank-held

- Marginal foreclosure with third-party servicer
  - Negative NPV in low quality (ex post) securitised pool [vice versa]

- Third-party servicer’s contract
  - Biased towards foreclosures in low-quality mortgage pools [vice versa]