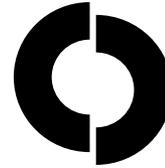




FURMAN CENTER
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Comptroller of the Currency
Administrator of National Banks

Determinants of the Incidence of Loan Modifications

Vicki Been, Max Weselcouch, Ioan Voicu, Scott Murff

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The views expressed in this paper are those of the authors alone and do not necessarily reflect those of the Office of the Comptroller of the Currency or the Department of the Treasury.

Motivation

- 7.4% of all outstanding mortgages are delinquent¹
- From November 2007 through March 2011, over 2.1 million mortgages were modified²
- Successful modifications could benefit the
 - Borrower
 - Lender
 - Servicer
 - Neighborhood

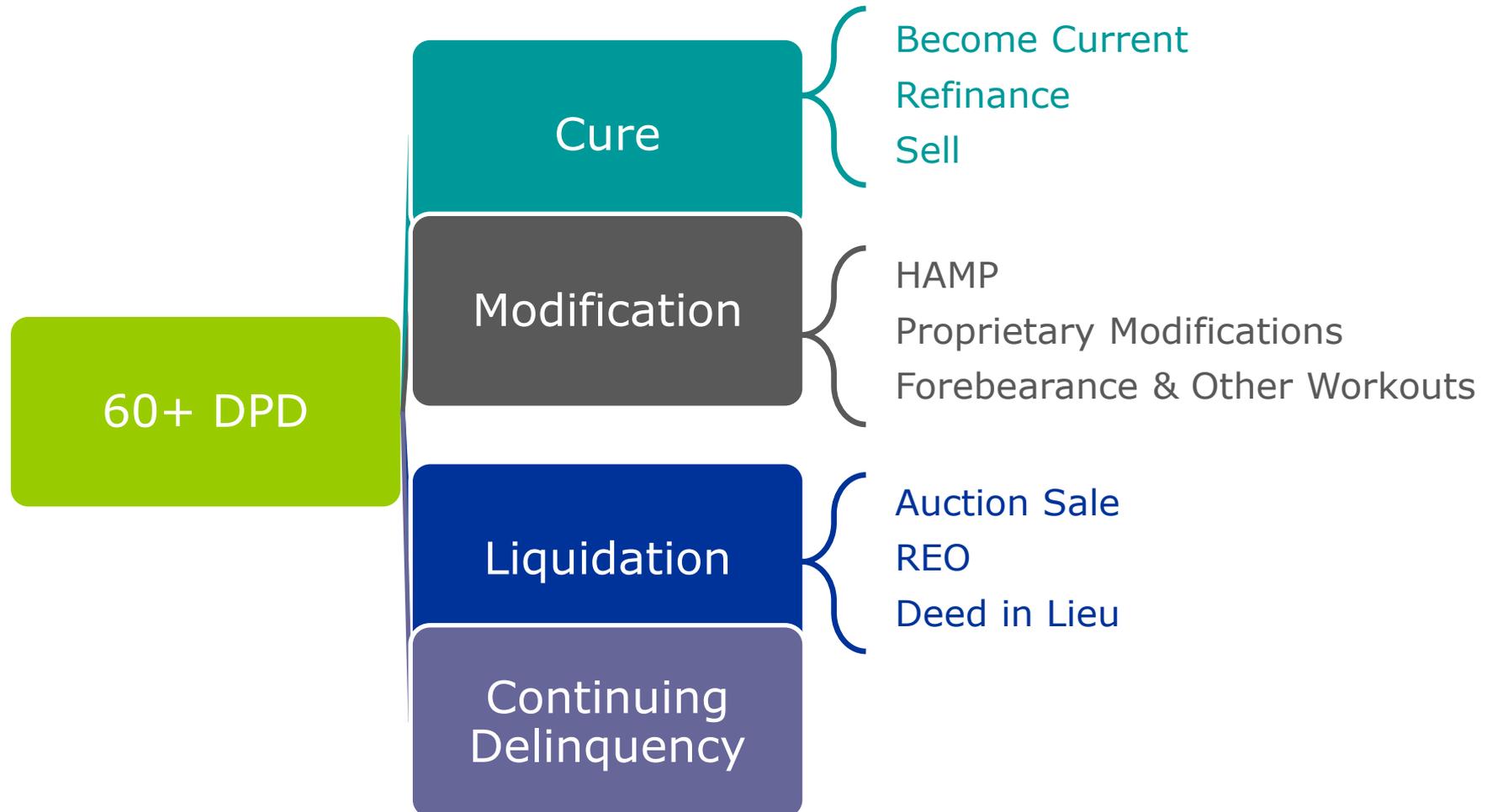
1. Mortgage Bankers Association. *Mortgage Delinquency Survey*. May 2012

2. Office of the Comptroller of the Currency. *OCC Mortgage Metrics Report for the Second Quarter of 2011*. September 2011

Research Question

- ❑ What determines whether the borrower and servicer are able to agree to a modification?
 - Loan characteristics
 - Borrower and property characteristics
 - Neighborhood characteristics

Outcomes of Delinquent Loans



Theoretical Model

- Outcomes are determined through a negotiation between the borrower and the servicer
- The borrower is acting to minimize the sum of a) the loss of her investments in the house, b) the costs of the outcome (including, e.g., effect on future borrowing), and c) the costs of housing
- The servicer is acting to maximize the net present value of this loan for the lender/investor, and to minimize the risk of encouraging others to strategically default

Econometric Model

- Multinomial logit that models the outcomes of delinquent loans as a function of relevant factors, accounting for the competing risks of the various outcomes
- Data is structured in event history format, with each observation representing one month in which a loan remains in default or in foreclosure proceedings. A loan drops out of the sample after the first change of status relative to the initial status.
- When the data is set up in event history format, the multinomial logit produces the same likelihood function as a discrete time proportional hazards model.

$$\text{PROB}(O_{it} = j) = \frac{e^{\beta_j X_{it}}}{1 + \sum_{j=1}^4 e^{\beta_j X_{it}}}, \text{ for } j=1, 2, 3, 4$$

$$\text{PROB}(O_{it} = j) = \frac{1}{1 + \sum_{j=1}^4 e^{\beta_j X_{it}}}, \text{ for } j=5$$

where $\text{PROB}(O_{it} = j)$ is the probability that the i th loan will have outcome j in month t , outcome (5) is the reference outcome, X_{it} are the explanatory variables, and β_j are the coefficients to be estimated.

Data Sources

- Monthly loan performance data for New York City through OCC Mortgage Metrics
 - First lien loans originated from 2004 to 2008
 - Monthly loan performance information for 2008 through 2010
 - Both prime and subprime loans (national coverage is two thirds of the market)
 - Use all loans that were 60-day delinquent at some point from 2008 through 2010

Data Sources

- NYC Automated City Register Information System (ACRIS) for mortgage deeds
- HMDA for race of borrower
- NYC Real Property Assessment Database (RPAD) for property characteristics
- Center for NYC Neighborhoods (CNYCN) for foreclosure counseling records
- Furman Center quarterly neighborhood repeat sales price indices
- Public Data Corp. neighborhood level *lis pendens* rates
- NYC Police Department neighborhood level crime data
- 2000 Census neighborhood demographics

Data Matching Methodology

- 6 stage hierarchical matching algorithm to match loans in OCC Mortgage Metrics to a mortgage deed in ACRIS to determine the unique parcel identifier of each property.

Stage 1: Raw values of date, zip code and loan amount

Stage 2: Raw values of date and zip code, loan amount rounded to \$1,000

Stage 3: Raw values of date and zip code, loan amount rounded to \$10,000

Stage 4: Raw values of loan amount and zip code, date allowed to differ by up to 60 days

Stage 5: Raw values of zip code, loan rounded to \$1,000, date allowed to differ by up to 60 days

Stage 6: Raw values of zip code, loan rounded to \$10,000, date allowed to differ by up to 60 days

Variables included in our model

Loan Characteristics

Credit Class
Product Description
ARM * Margin at Origination
Interest Only at Origination
Full Documentation
Product Group
Loan Purpose
Relative interest rate at origination (fixed rate mortgages)
Relative interest rate at origination (adjustable rate mortgages)
Debt-to-income at origination
Investor type
Servicer Fixed Effects ()
Percentage of loans in neighborhood originated by the servicer, 2004 – 2008
Current Unpaid Balance
Number of months post-adjustment (adjustable rate mortgages)
Loan Age (months)
Default Time (months)
Current LTV
Has a Junior Lien on the Property

Borrower and Property Characteristics ()

Owner Occupier
Property Type
Borrower Race/Ethnicity
Current FICO Score
Received Foreclosure Counseling

Neighborhood Characteristics ()

% Non-Hispanic Black
% Hispanic
% Non-Hispanic Asian
% Foreign Born
% >65 Years Old
% of households with Children
Median Household Income (1999)
% of adults with a Bachelor's degree or higher
Homeownership Rate
Crime Rate

Local Market Conditions

Unemployment Rate
Recent Foreclosure Rate
Neighborhood Positive HP Appreciation
Neighborhood Positive HP Appreciation * HP Appreciation
Neighborhood Negative HP Appreciation * HP Appreciation

Other Controls

Origination Year
Borough
Quarter of Loan Performance

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Descriptive Statistics: Outcomes

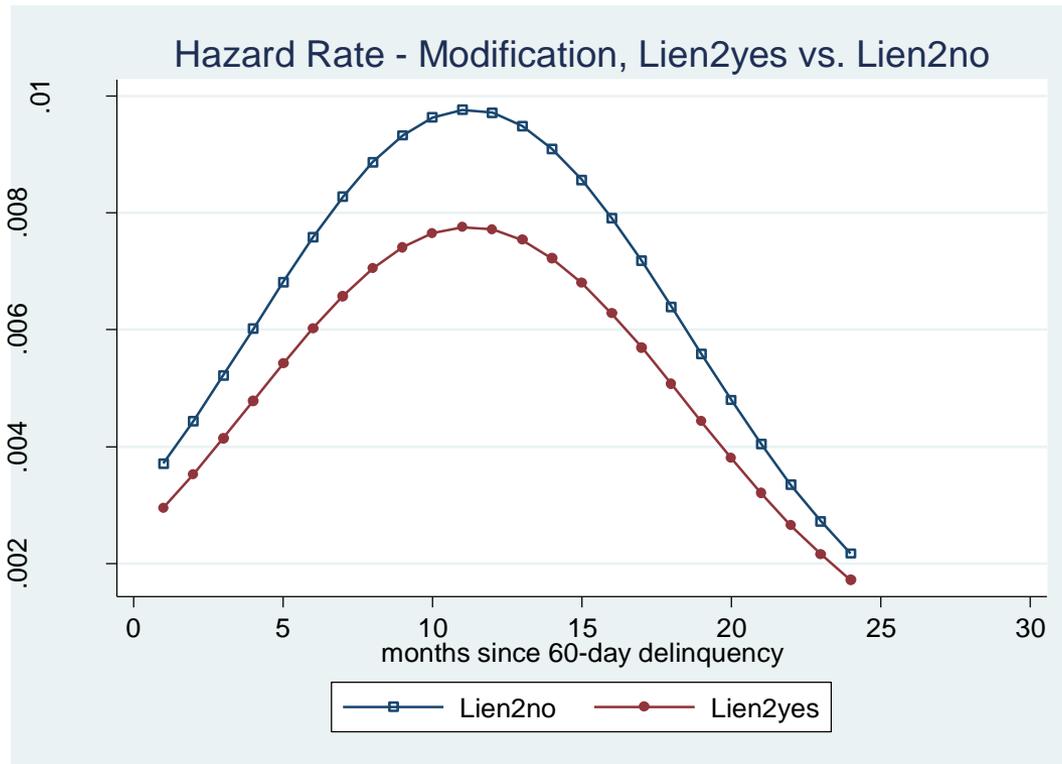
Outcomes of Seriously Delinquent Loans

Outcome	% of all loans
Cure	17.3
Modification	31.7
Liquidation	8.1
Delinquency Continues	42.9

Results: How do loan characteristics affect probability of outcomes?

- Non-prime more likely to be modified than prime
- But other risky loan types (junior liens, IO loans, undocumented loans)
 - Make borrowers less likely to cure on their own
 - Make it less likely the loan will be modified
- As LTV rises (borrower has less, or negative, equity)
 - The likelihood of modifications rises
 - The likelihood of curing falls
- Interest Rate Adjustments
 - Loans are less likely to be modified as time since initial rate adjustment increases

Results: Probability of Modification for Loans with Junior Liens



Results continued

- Loans held in portfolio were more likely to be modified than securitized loans held by private investors
- Servicers matter!

How do borrower characteristics affect outcomes?

- Borrowers with a greater decline in FICO scores between origination and default are less likely to get a modification.
- But borrowers with higher current FICO scores are less likely to receive modifications.

How does race affect outcomes?

- Borrower's race is not a significant predictor of likelihood of getting a modification
- However, loans in majority black or Hispanic neighborhoods are more likely to be modified

How do other neighborhood characteristics affect outcomes?

- Neighborhood house price appreciation
 - In neighborhoods with negative appreciation, servicers are less likely to modify as depreciation increases
 - In neighborhoods with positive appreciation, servicers are more likely to foreclose
- Borrowers in neighborhoods with high foreclosure rates are less likely to receive modifications or to cure on their own

How does foreclosure counseling affect probability of outcomes?

- Borrowers who received foreclosure counseling are about 30% more likely to receive a modification

Institutional players

- Loans held in portfolio are significantly more likely to be modified than securitized loans held by private investors
- Servicers matter!

Policy Implications

- Need for coordinated approach in modification outreach & counseling programs
- Findings may suggest need for additional attention to certain servicers
- Are modifications being granted to those most likely to succeed?

Thank you!

Max Weselcouch

max.weselcouch@nyu.edu