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Mortgage Losses: Loss on Sale and Holding Costs

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Mortgage Losses: Loss on Sale and Holding Costs

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Introduction

- Losses on mortgages very important
 - Interest rates, capital standards (Basel II & III), regulatory agencies (OCC etc..) and model validation
- Two parts of losses
 - Probability of Default & Prepayment
 - Lots of data and lots of paper
 - Loss given default (lgd) – relatively short literature
 - Lekkas et al. 1993, Crawford and Rosenblatt 1995, Pennington-Cross 2003, Clauretje and Herzog 1990, and Zhang, Li, and Liu 2010 Calem and LaCour-Little 2004, Qi and Yang 2009, Cordell, Geng, Goodman, and Yang 2013, An and Cordell 2017.
 - Current LTV matters a lot, product type and likely foreclosure laws

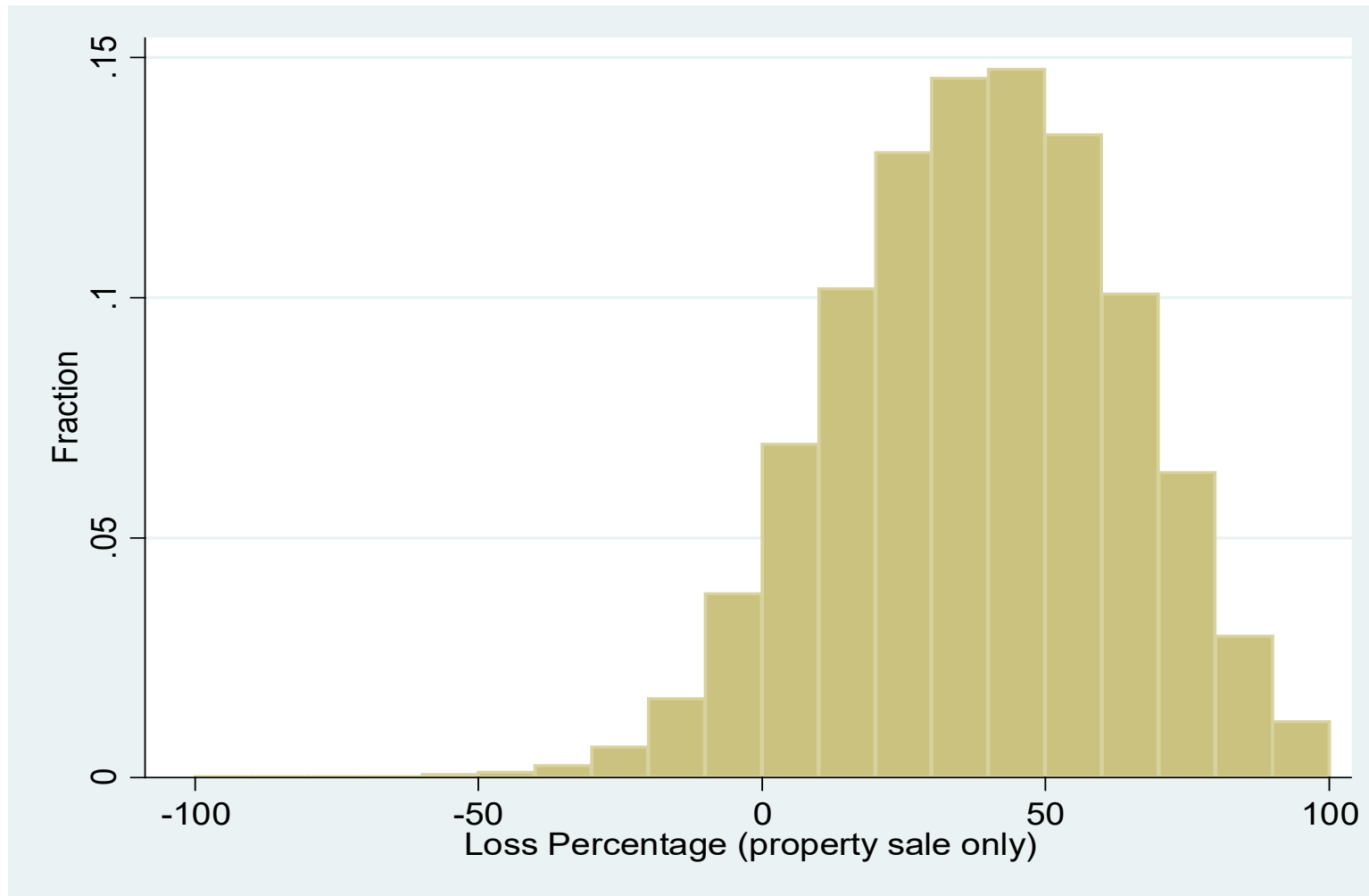
Introduction

- Many ways to measure losses
 - **Loss on sale:** $los_i = (upb_i - nsp_i) / upb_i$ (Lekkas et al. 1993, Crawford and Rosenblatt 1995, and Pennington-Cross 2003).
 - economic and financial considerations should determine this loss rate, not servicer and lender operational efficacy.
 - costs of selling the property or the net sale proceeds (Park and Bang 2014)
 - Loss on **original balance** (Clauretje and Herzog 1990, and Zhang, Li, and Liu 2010).
 - **Closer to the full costs** associated with a default
 - Proxies of lost interest payments, and proxies for insurance costs and real estate taxes (Calem and LaCour-Little 2004, Qi and Yang 2009 and Cordell, Geng, Goodman, and Yang 2013, An and Cordell 2017).
- Discount of Foreclosed Property
 - Forced sale urgency
 - Bankruptcy – urgency matters to discount (Campbell, Giglio and Pathak 2011)
 - Fear of vandalism (Campbell, Giglio and Pathak 2011)
 - Short sales at smaller discount (Goodwin and Johnson, 2017)
 - Lack of maintenance theory -- for example, Pennington-Cross (2006)
 - High LTV – less maintenance -- Harding, Miceli and Sirmans (2000)
 - Forced sale due to death – timing does not matter – must be maintenance (Campbell, Giglio and Pathak (2011)
 - Foreclosed property values declined more – why defaulted
 - largely unobservable

The Plan

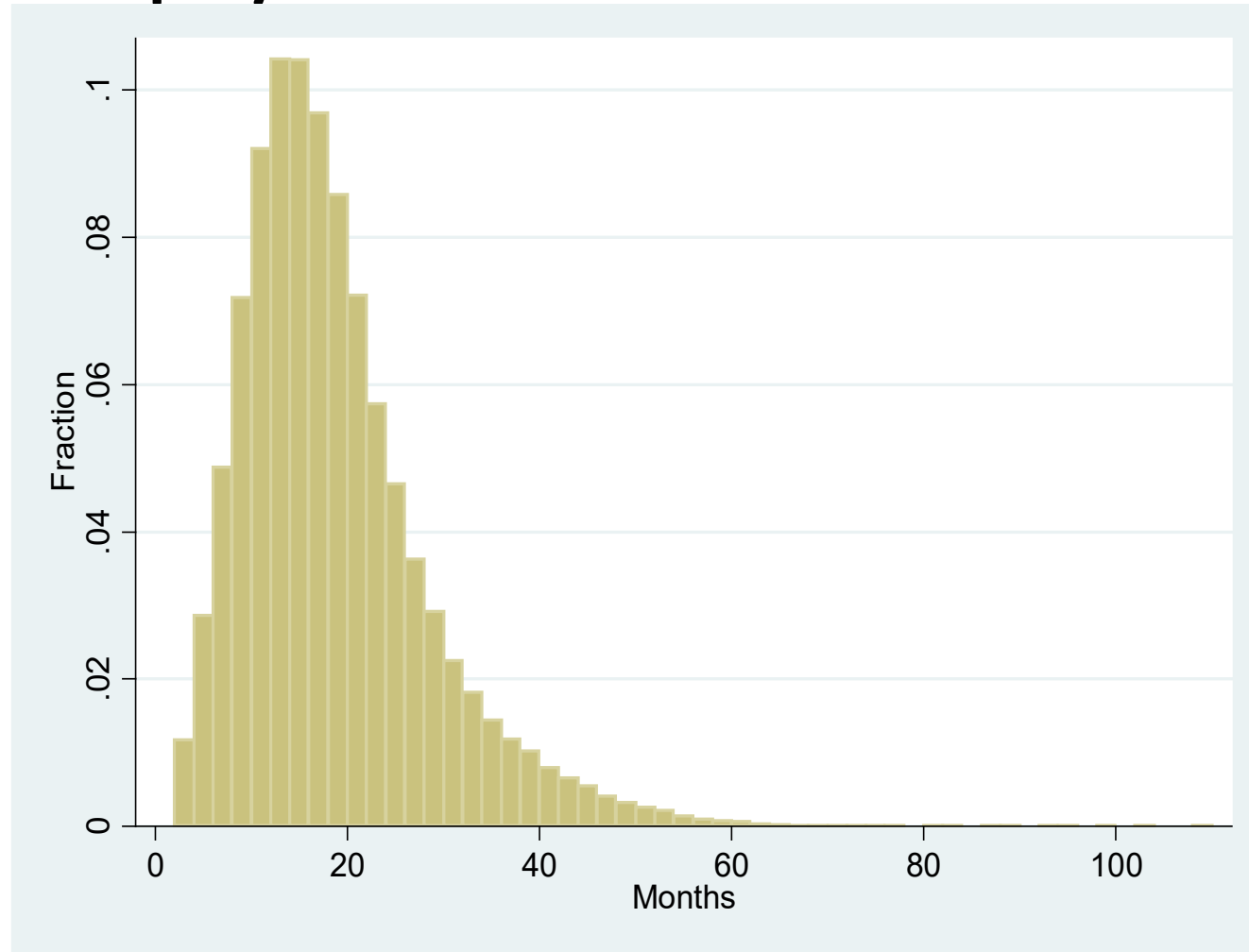
- Estimate loss on the sale: $los_i = (upb_i - nsp_i) / upb_i$
- Estimate default timeline: last payment date to zero balance date
- Estimate holding costs
- Calculate total losses
 - Holding + sale
- Issues
 - Selection
 - Endogeneity
 - Does length of the timeline affect the loss on sale?
 - Legal Rights of the borrower and lender

1. Loss on sale distribution



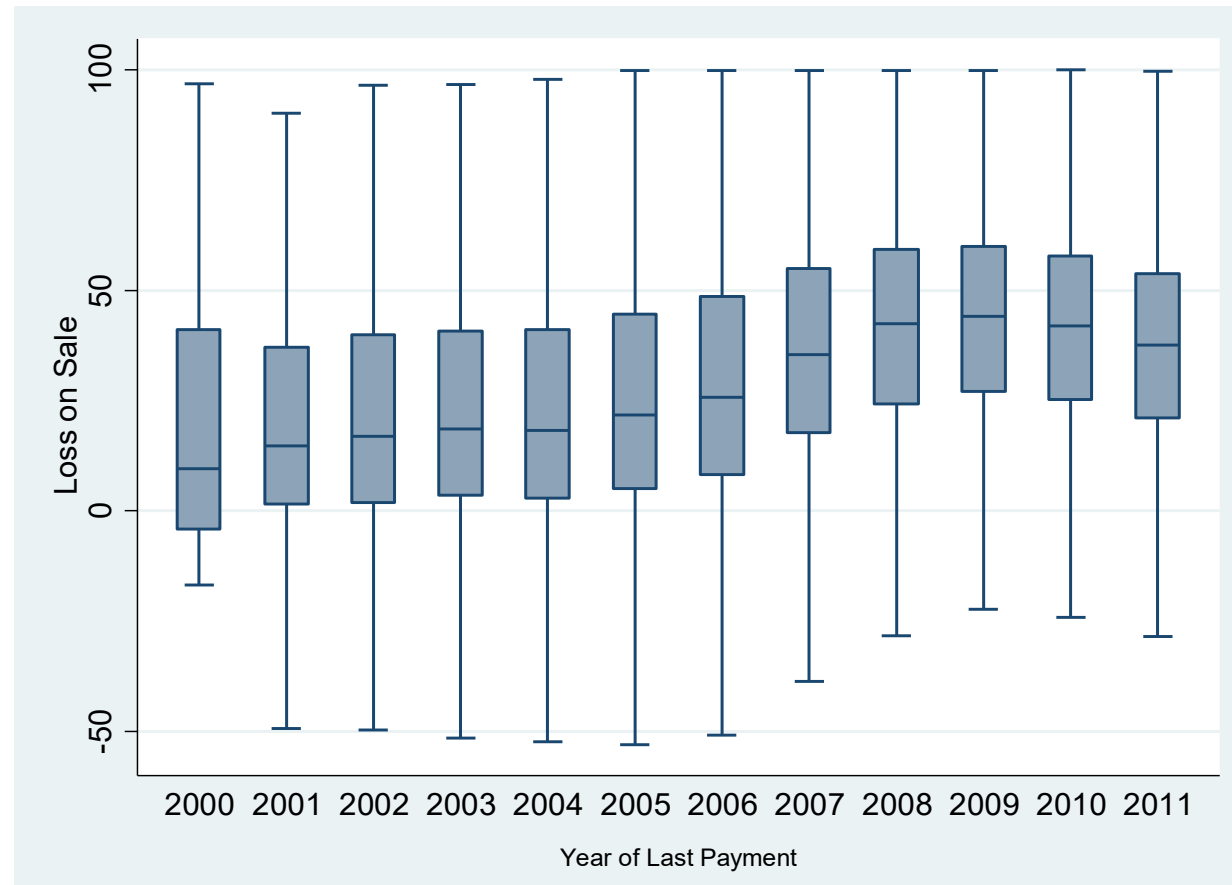
Loss Percentage equals unpaid balance at the end of the loan's life less the sale price divided by unpaid balance at the end of the loan's life. Each column represents the fraction of all loans in the bucket. The bucket is 10 percentage points wide. For example, the column just to the right of 0 on the x-axis indicates that approximately 7.5 percent of the loans had a loss percentage ≥ 0 and < 10 .

2. Default timeline distribution: last payment date to resolution date



Months equals the number of months from when the last payment was made by the borrower until the loan is fully resolved by Freddie Mac. The bucket is 2 months wide. For example, the column just to the right of 0 on the x-axis indicates that 0 percent of the loans were in default for months ≥ 0 and < 2 .

2. Default timelines over time: last payment year – box charts



The box includes the 25th to 75th percentile of the distribution and the line in the box is the median. The whiskers or lines leading out of the box extend to the last adjacent value (next value is more than one unit away).

3. Holding Costs

Variable	Mean	Standard Deviation
house value _i	\$164.64	85.95
months _i	21.33	9.46
legal _i	\$3.89	1.92
maintenance _i	\$6.71	6.84
taxes and insurance _i	\$5.83	6.26
miscellaneous _i	\$0.63	1.15

This information was only available for the 2005-2014 time period.

All dollars in 1,000s. Months is the number of months from the last payment date to zero balance. House Value is the estimate of the value at the zero balance date.

1. Loss on Sale (los_{it}) Results

Variable	V: Servicer & State	
	Coeff.	SE
ltv_{it}	0.50***	0.02
upb_{it}	-0.11***	0.00
$fico_i$	-0.88***	0.16
$first_i$	-1.55***	0.21
\Deltaurate_{it}	0.70***	0.13
$retail_i$	-3.04***	0.22
$cashrefi_i$	7.82***	0.36
$nocashrefi_i$	5.81***	0.31
fixed effects:		
origination year	X	
last payment year	X	
servicer	X	
state	X	
constant	9.51	8.59
R^2	0.39	
N	190,227	

*, **, and *** indicate that the coefficient is significant at the 10, 5, or 1 percent level. Ordinal Least Squares results allowing the errors to correlate within 3-digit zip codes.

1. Loss on Sale (los_{it}) Robustness

Variable	I: State-Year Interactions		III: Purchase Only	
	Coeff.	SE	Coeff.	SE
ltv_{it}	0.50***	0.02	0.49***	0.02
upb_{it}	-0.11***	0.00	-0.11***	0.00
$fico_i$	-0.88***	0.15	-0.14	0.17
$first_i$	-1.46***	0.21	-1.06***	0.21
$\Delta rate_{it}$	0.70***	0.13	0.87***	0.15
$retail_i$	-3.06***	0.21	-1.73***	0.28
$cashref_i$	7.75***	0.35		
$nocashref_i$	5.73***	0.30		
fixed effects:				
origination year	X		X	
last payment year	X		X	
last payment year *state	X			
state	X		X	
servicer	X		X	
constant	-21.06	5.99	-8.34	10.53
R^2	0.39		0.40	
N	207,162		82,574	

*, **, and *** indicate that the coefficient is significant at the 10, 5, or 1 percent level. Ordinal Least Squares results allowing the errors to correlate within 3-digit zip codes.

1. Loss on Sale (los_{it}) Selection

Variable	IV: Selection Correction	
	Coeff.	SE
ltv_{it}	0.49***	0.02
upb_{it}	-0.11***	0.00
$fico_i$	-0.42	0.31
$first_i$	-1.53***	0.21
$\Delta rate_{it}$	0.73***	0.13
$retail_i$	-3.01***	0.23
$cashrefi_i$	8.02***	0.34
$nocashrefi_i$	5.99***	0.30
Inverse Mills $_i$	-1.41	0.89
fixed effects:		
origination year	x	
last payment year	x	
last payment year *state		
state	x	
servicer	x	
constant	-7.46	8.65
R^2	0.38	
N	207,162	

*, **, and *** indicate that the coefficient is significant at the 10, 5, or 1 percent level. Ordinal Least Squares results allowing the errors to correlate within 3-digit zip codes.

2. Default Timeline Results (log of months)

II. Reo defaults: Full timeline		
Variable	Coeff.	SE
$\ln tv_{it}$	-0.096***	0.014
$\ln upb_{it}$	0.096***	0.004
$\ln fico_i$	-0.323***	0.015
$first_i$	0.012***	0.003
$\Delta rate_{it}$	0.006***	0.002
$retail_i$	-0.019***	0.002
$cashrefi_i$	0.021***	0.004
$nocashrefi_i$	0.016***	0.003
fixed effects:		
origination year	X	
last payment year	X	
servicer	X	
state	X	
constant	3.349***	0.106
R^2	0.33	
N	140,305	

*, **, and *** indicate that the coefficient is significant at the 10, 5, or 1 percent level. Ordinal Least Squares results allowing the errors to correlate within 3-digit zip codes.

2. Default Timeline & Loss on Sale

Variable	I: OLS		II: Contemporaneous IV		III: One Year Lag IV	
	Coeff.	SE	Coeff.	SE	Coeff.	SE
IV months _{it}	0.01	0.02	0.03	0.04	-0.01	0.04
ltv _{it}	0.50***	0.02	0.95***	0.03	0.49***	0.02
upb _{it}	-0.11***	0.00	0.19***	0.01	-0.11***	0.00
fico _i	-0.85***	0.15	-0.94***	0.18	-0.14	0.17
...						
origination year	X		X		X	
last payment year	X		X		X	
state	X		X		X	
servicer	X		X		X	
constant	-9.54	8.58	-9.83	8.59	-2.35	12.62
R ²	0.38		0.38		0.38	
N	207,162		207,162		206,773	
Endog. F-Stat	0.16		0.42		0.42	
First Stage Robust Partial R2	0.37		0.31		0.31	

*, **, and *** indicate that the coefficient is significant at the 10, 5, or 1 percent level. The instrument is the number of months from the last payment date to the end of the loan for the 3-digit zip code the property is located in. Specification II uses the contemporaneous zip code months. Specification III uses one-year lagged months. Specification IV uses 2-year lagged months. The standard errors are clustered at the three-digit zip code level.

WHAT?

- **Longer foreclosure holding period – higher losses: An and Cordell (2017)**
 - Why different?
 - Losses include lost interest and proxies for holding costs
 - by definition increases with the holding period defaulted loans may modify a little more
- **Lack Maintenance and Vandalism is the reason for the foreclosure discount: Campbell, Giglio and Pathak 2011**
 - Why different?
 - Only GSEs in this paper
 - GSEs do substantial maintenance
 - Bring back to average market quality for sale
 - Only include foreclosed property
- **Can directly measure maintenance costs**

3. Maintenance and other Holding Costs

	I. Legal		II. Maintenance		III. Taxes and Insurance	
Variable	Coeff.	SE	Coeff.	SE	Coeff.	SE
house value _{it}	1.47	0.04	16.25	0.18	25.49	0.13
month_ltz _{it}	46.35	0.46	141.31	1.87	327.96	1.38
zero balance year						
2006	231.76	26.89	-31.99	109.60	59.71	80.93
2007	355.50	26.41	-581.79	107.63	34.95	79.48
2008	579.30	23.88	-1,638.82	97.31	150.30	71.86
2009	806.27	21.76	-1,400.67	88.69	609.22	65.49
2010	978.16	20.67	-915.26	84.23	726.03	62.20
2011	1,109.96	20.47	768.82	83.41	825.51	61.60
2012	1,270.87	20.70	2,220.34	84.36	1,037.38	62.29
2013	913.45	21.31	4,900.31	86.86	745.33	64.14
state	x		x		x	
constant	1,486.47	114.52	-973.69	466.71	-7,609.06	344.64
R ²	0.42		0.24		0.50	
N	184,033		184,033		184,033	

4. Estimated Total Losses

	Representative loan
Total	40.5%
Loss on sale	32.7%
Holding Cost	7.9%
Legal	2.4%
Maintenance	2.3%
Tax and Insurance	2.9%
Miscellaneous	0.3%

Representative Loan

- Average: ltv_{it} , upb_{it} , $fico_{it}$, $first_{it}$, \Deltaurate_{it} , state fixed effect, and servicer fixed effects
- retail, purchase
- originated in 2006
- last payment made in 2010
- real estate owned

4. Estimated Total Losses: Loan Size

	Outstanding Loan Balance in \$1,000						
	50	100	150	200	250	300	350
Total	53.0%	47.7%	42.2%	36.7%	31.1%	25.5%	19.9%
Loss on sale	45.8%	40.1%	34.4%	28.7%	23.0%	17.3%	11.6%
Holding Cost	7.2%	7.6%	7.8%	8.0%	8.1%	8.2%	8.3%
Legal	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.5%
Maintenance	2.1%	2.2%	2.3%	2.3%	2.4%	2.4%	2.4%
Tax and Insurance	2.4%	2.7%	2.8%	2.9%	3.0%	3.1%	3.1%
Miscellaneous	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%

Representative Loan

- Average: l_{it} , upb_{it} , $fico_{it}$, $first_{it}$, $\Delta rate_{it}$, state fixed effect, and servicer fixed effects
- retail, purchase
- originated in 2006
- last payment made in 2010
- real estate owned

4. Estimated Total Losses: Credit Score

	FICO			
	500	600	700	800
Total	42.9%	41.6%	40.4%	39.3%
Loss on sale	34.3%	33.5%	32.6%	31.7%
Holding Cost	8.6%	8.2%	7.8%	7.6%
Legal	2.5%	2.4%	2.4%	2.4%
Maintenance	2.5%	2.4%	2.3%	2.2%
Tax and Insurance	3.3%	3.0%	2.8%	2.7%
Miscellaneous	0.3%	0.3%	0.3%	0.3%

Representative Loan

- Average: l_{it} , upb_{it} , $fico_{it}$, $first_{it}$, $\Delta rate_{it}$, state fixed effect, and servicer fixed effects
- retail, purchase
- originated in 2006
- last payment made in 2010
- real estate owned

5. Borrower and lender rights & mortgages

- **judicial foreclosure** proceedings
 - the foreclosure process takes longer
 - defaulted loans may modify a little more
 - cure less or more (in other words, empirical results are mixed)
 - little impact on the final outcome for the borrower.
- the right to **redeem** the property
 - less clear in terms of default rates but again is associated with longer foreclosure timeline.

(Collins, Lam and Gerardi 2011, Demiroglu, Dudley and James 2014, Lambie-Hanson and Willen 2013, Cordell, Geng, Goodman and Yang 2013, and Clauretje and Herzog 1990).

- Lender **recourse** beyond property taking
 - Decrease foreclosure rates – esp. if negative equity, ltv>100
 - (Ghent and Kudlyak 2011, Cha, Haughwout, Hayashi and Klaauw 2015).
- **Impact of losses?**
 - Time cost, dollar cost, or both?

5. Loss on Sale & Borrower and Lender Rights

	I. Complete Sample		II. Border Samples		III. Matched Samples on the Borders	
Variable	Coeff.	SE	Coeff.	SE	Coeff.	SE
judicial _i	3.30**	1.46	-1.73	2.23	-0.71	2.32
SSR _i	1.66	1.27	0.46	0.91	-0.04	1.41
recourse _i	0.75	1.17	-0.49	1.07	-1.20	1.02

Border Sample: 3-digit zip codes along state borders where the neighboring state has a different law.
Different sample for each test

Matched Sample: Closest 1 to 1 match across the border: unpaid balance, current ltv and last payment year.

5. Holding Period & Borrower and Lender Rights

	III. Matched Samples on the Borders	
Variable	Coeff.	SE
judicial _i	0.286***	0.025
srr _i	0.046*	0.024
recourse _i	-0.044**	0.021

Border Sample: 3-digit zip codes along state borders where the neighboring state has a different law.
Different sample for each test

Matched Sample: Closest 1 to 1 match across the border: unpaid balance, current ltv and last payment year.

Conclusion – Mortgage Losses

- Huge spatial variation – across states and within states
 - Empirical model does surprisingly well
- Holding costs matter but not as much as the sale
- No evidence holding period affects loss on the sale
 - Do affect total cash losses
- Legal
 - No evidence affect loss on sale
 - String impacts on the default holding period
 - Judicial extends holding period and holding costs
 - Recourse reducing the holding period
- Cash only losses: Did not include opportunity cost
- Living the GSE world