Securitization and Loan Performance:
A Contrast of Ex Ante and Ex Post Relations in the Mortgage Market

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Three layers of agency problems in two papers

- Liar's loan? Effects of Origination Channel and Information Falsification on Delinquency
  - Bank vs. third-party (correspondents and brokers): origination channel
  - Lender vs. borrower: information falsification
- Securitization and Loan Performance: A Contrast of Ex Ante and Ex Post Relations in the Mortgage Market
  - Originator vs. investors: securitization

Motivation

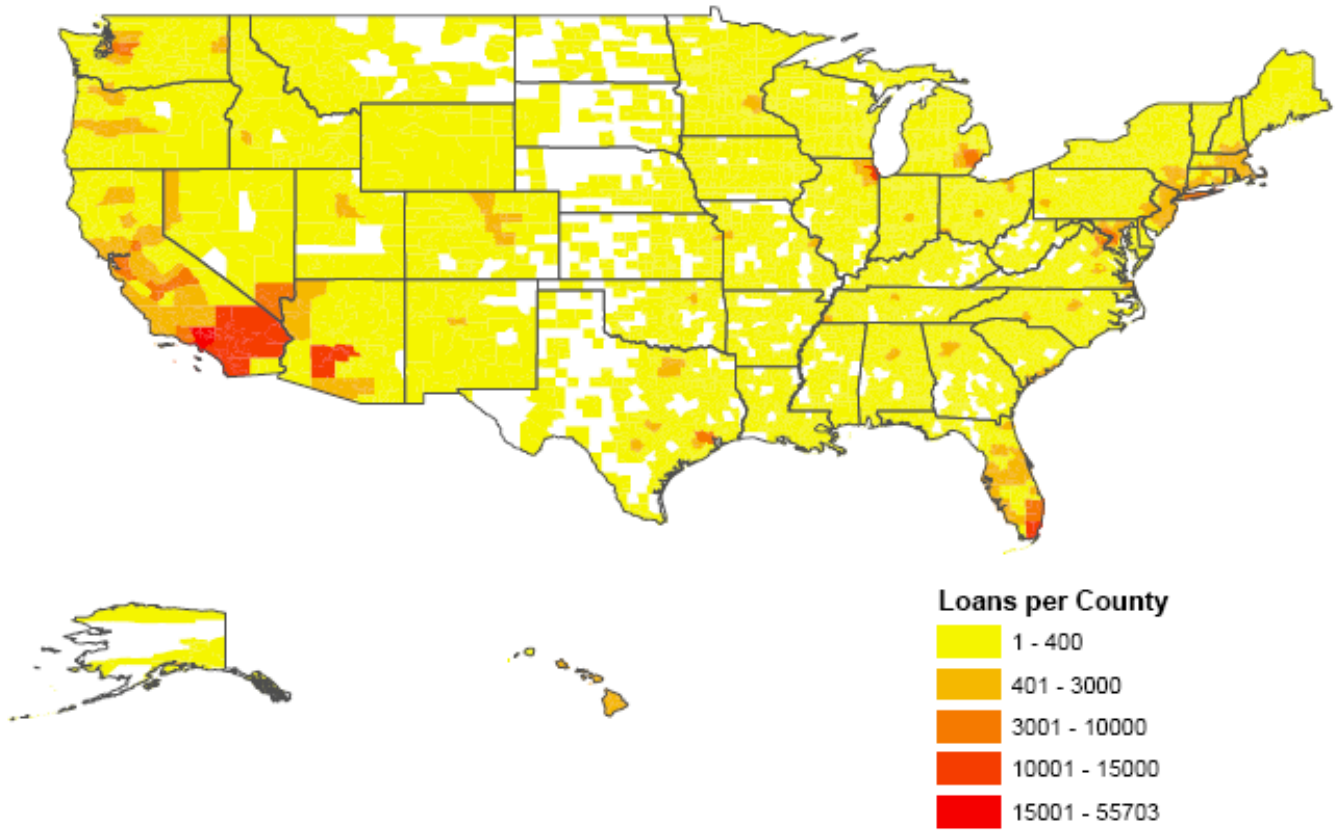
- Benefits of loan sale:
  - Reduce the impact of bank- or region-specific shocks.
  - Enhance a bank's liquidity.
- Costs of loan sale:
  - Reduced incentives for monitoring by the lender.
  - Inefficiency in ex ante contracting and ex post renegotiation
- Often cited as a major cause for loosening lending standards.
  - Macro effect: Led to rapid expansion of low-doc and brokered loans, which are of worse quality.
  - Micro effect: The lender lowers the standard on a particular loan if it has a higher probability of being securitized.

Ex ante and Ex post relations

- The contrasts between:
  - The prospects of loan sale and loan performance, given information at loan origination. Positive.
  - The actual loan sale and loan performance, given information when the loan is offered for sale. Negative.
- Help reconcile mixed evidence in prior research.
- Explain the irony that the moral hazard on the lending bank's part ended up hurting the bank the most.
- Accurate calibration of the information at loan origination is essential.

Data: 700,000 + loans

issued in Jan. 2004 – Feb. 2008 by a top national mortgage bank.

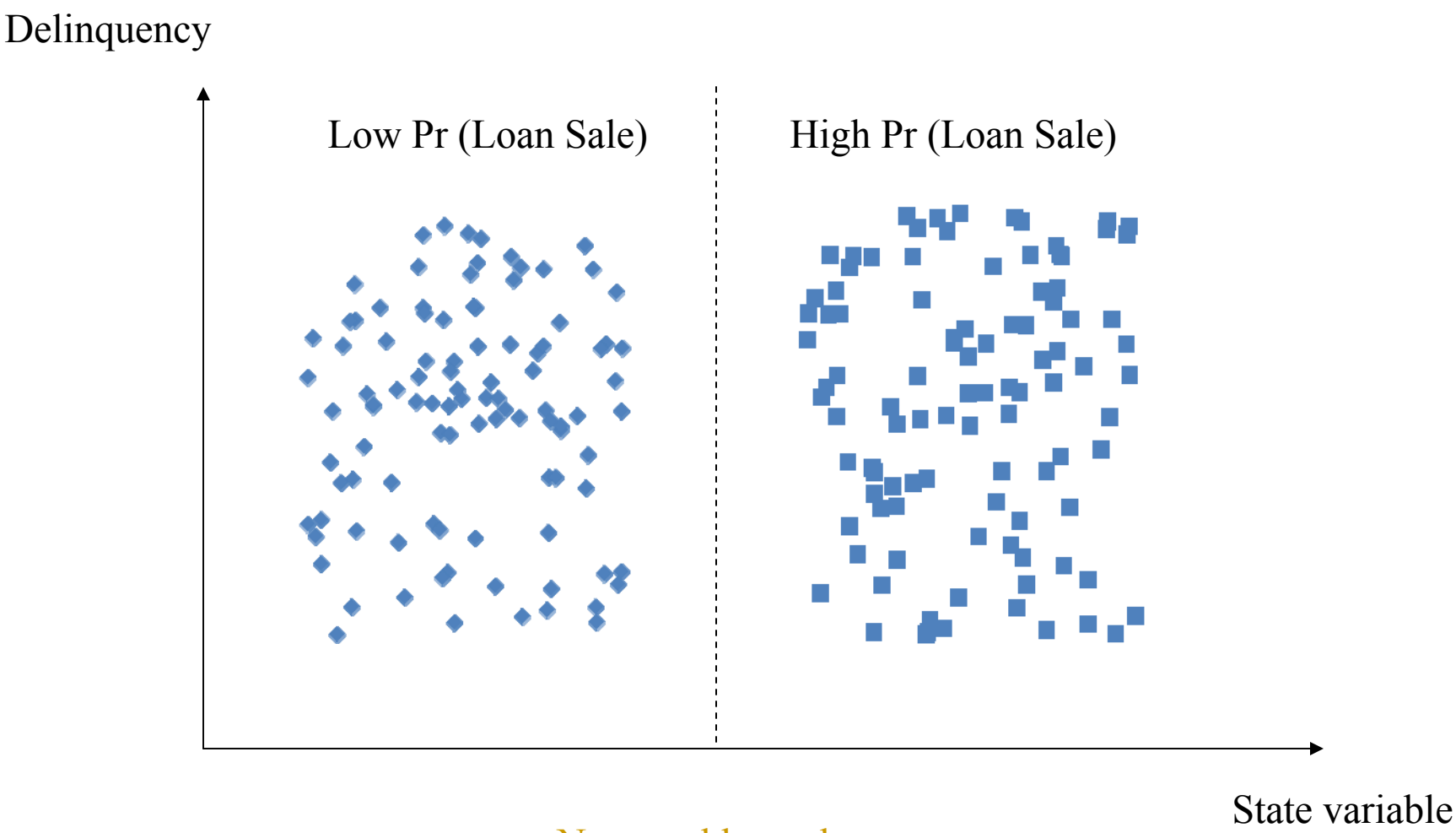


Sample representativeness

	Our sample	General market
% loans originated by third party	90%	60%-70%
% loans securitized	89%	60%-80% for all; 75-91% for subprime
% low-doc	70%	25%
% subprime	15%	18-21%
LTV	About the same	
Loan amount	Our sample is about 15% higher	
Credit score	Our sample is about 5-8 points lower	
Demographics	Our sample has higher % of Hispanic borrowers	
Annual growth 2004-2006	> 50%	30-40%
% Delinquency (early 2009)	26%	11% for all, 39% for subprime

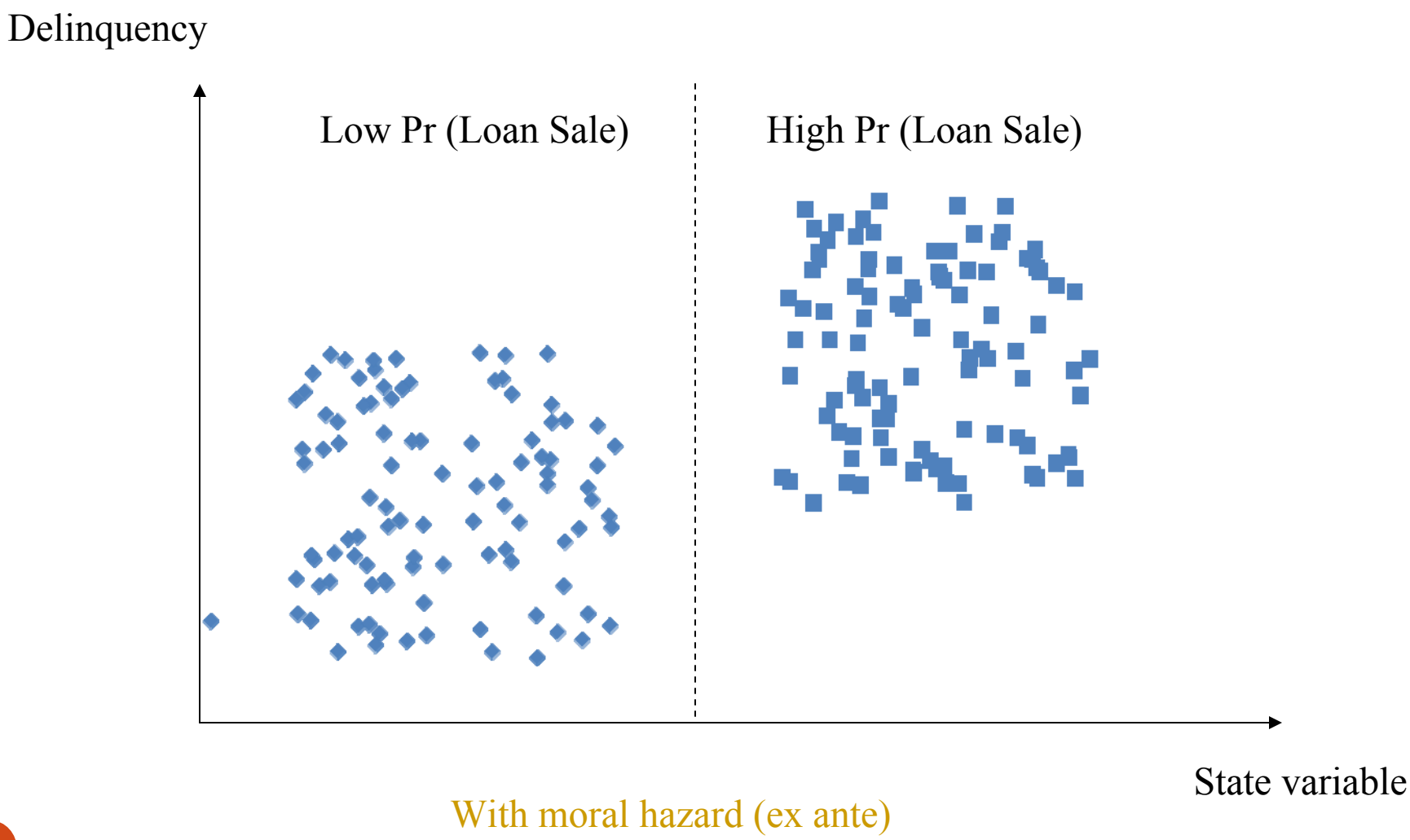
- "Outsource origination to distribution" model.
- A representative yet amplified version of the boom-bust cycle.

From Ex Ante to Ex post (I)

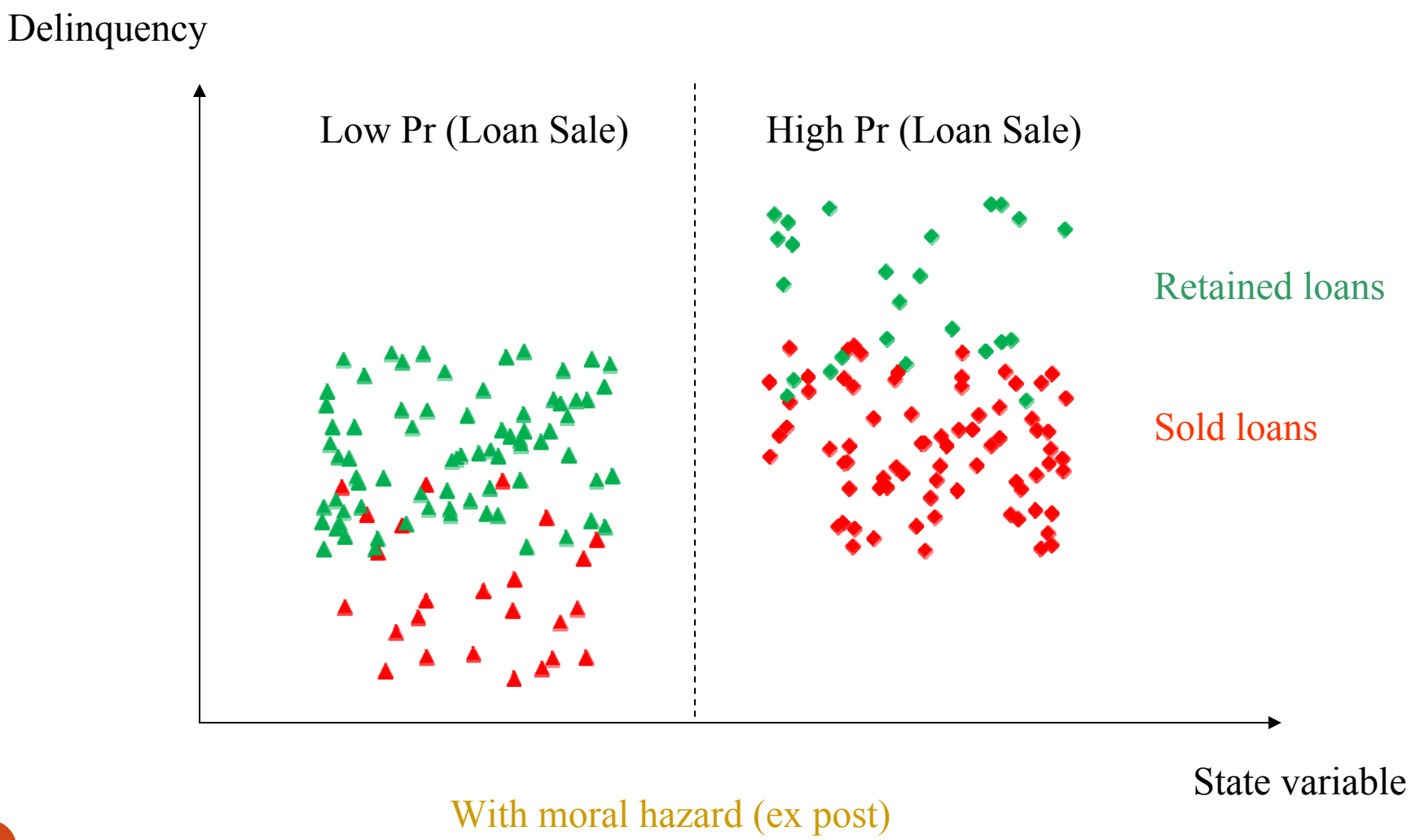


No moral hazard

From Ex Ante to Ex post (II)



From Ex Ante to Ex post (III)



Ex ante: bank issues worse loans that are more likely to be sold.
Ex post: does the bank get to keep the better loans?

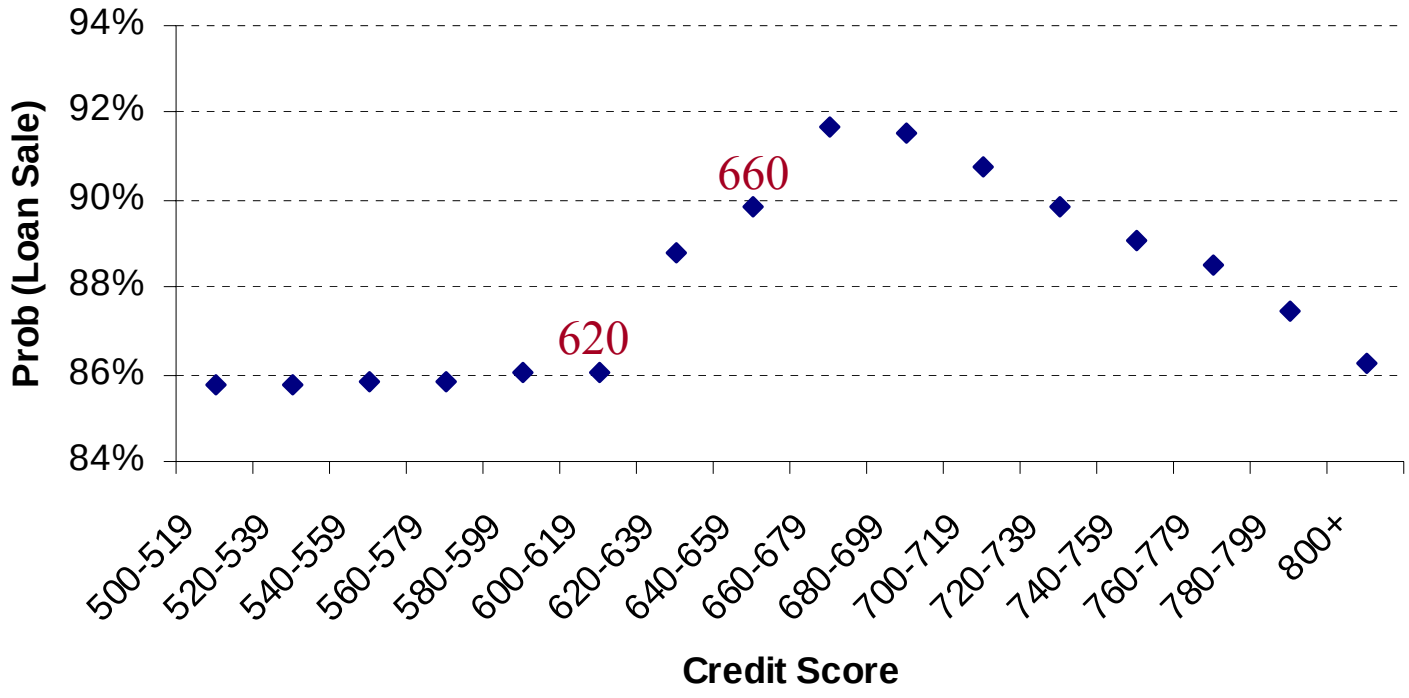
	(1) Bank/Full-Doc	(2) Bank/Low-Doc	(3) Broker/ Full-Doc	(4) Broker/ Low-Doc	Full Sample
Sold	13.7%	18.1%	23.2%	31.7%	28.2%
Retained	10.2%	24.5%	27.2%	39.0%	32.9%
Difference	3.4%	-6.5%	-3.9%	-7.3%	-4.7%
All Loans	13.3%	19.0%	23.8%	32.4%	28.7%
(p-value)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Identifying the ex ante relations

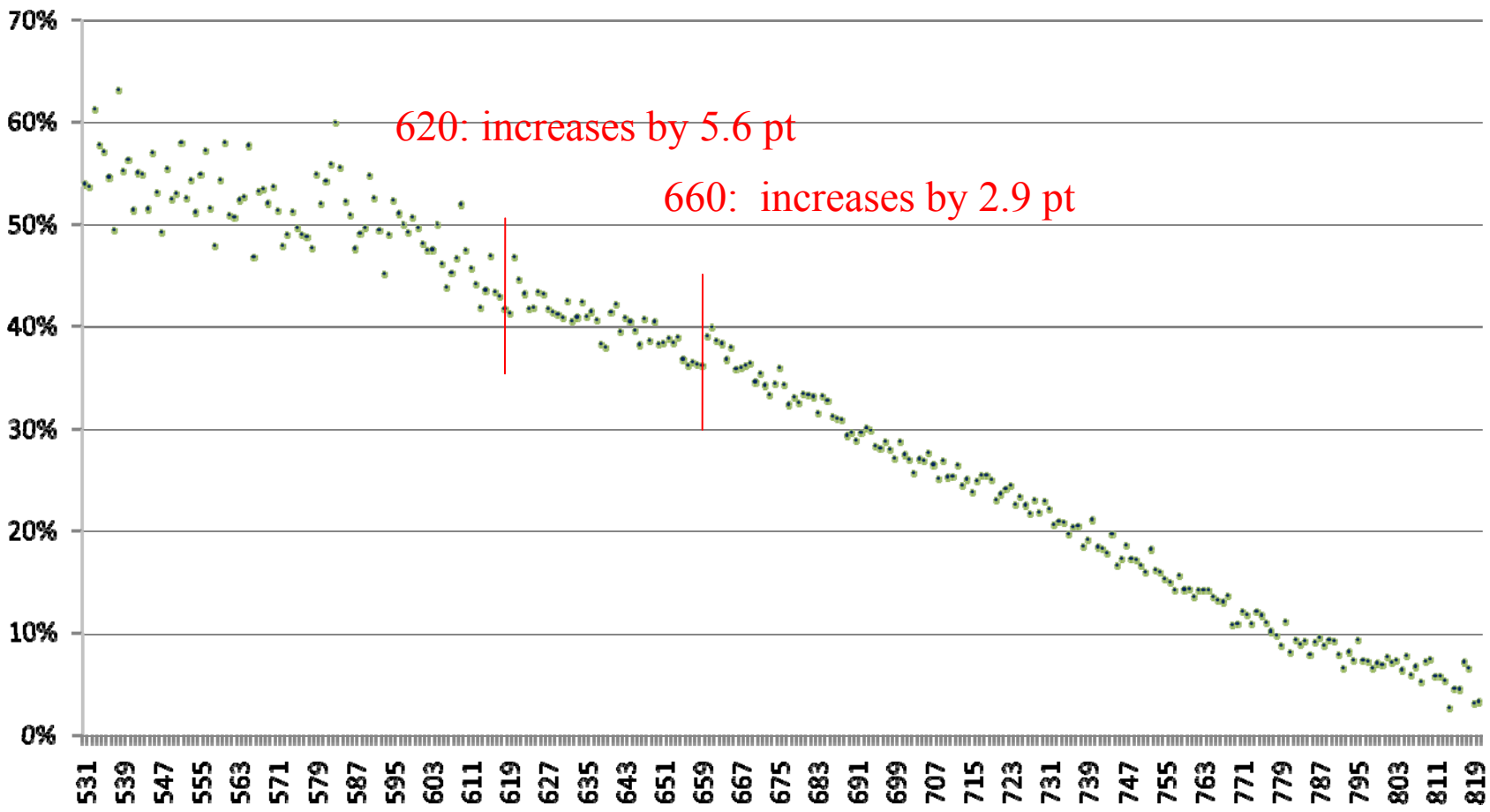
- Need state variables that affect loan sales but not loan quality.
- Extend the Keys, Mukherjee, Seru, and Vig's (2010) method that achieves identification through discontinuities at certain threshold values of credit score.
  - Control for a complete set of observable loan characteristics at origination.
  - Allow for jumps of other covariates at the same credit score threshold values.
  - Discuss the implications of credit score manipulation.

Threshold values in credit score
(where loan sale probability is discontinuous)

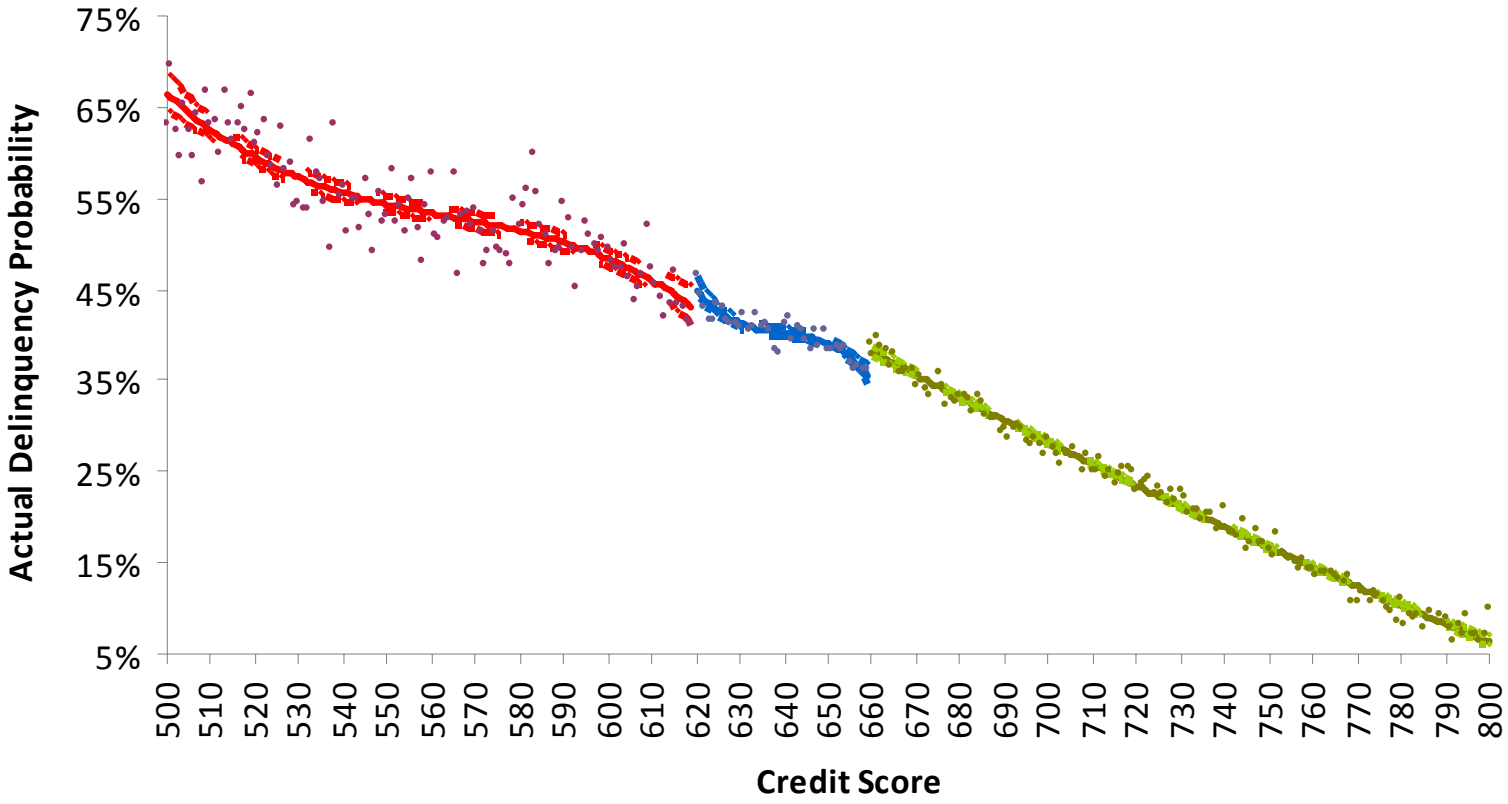
$$LoanSale_i^* = \sum_{j=2}^{18} \gamma_j (CreditScore_i \in CreditScoreRange_j) + \beta X_i + \lambda_t + \varepsilon_i$$



Jump in delinquency, too?: Raw data

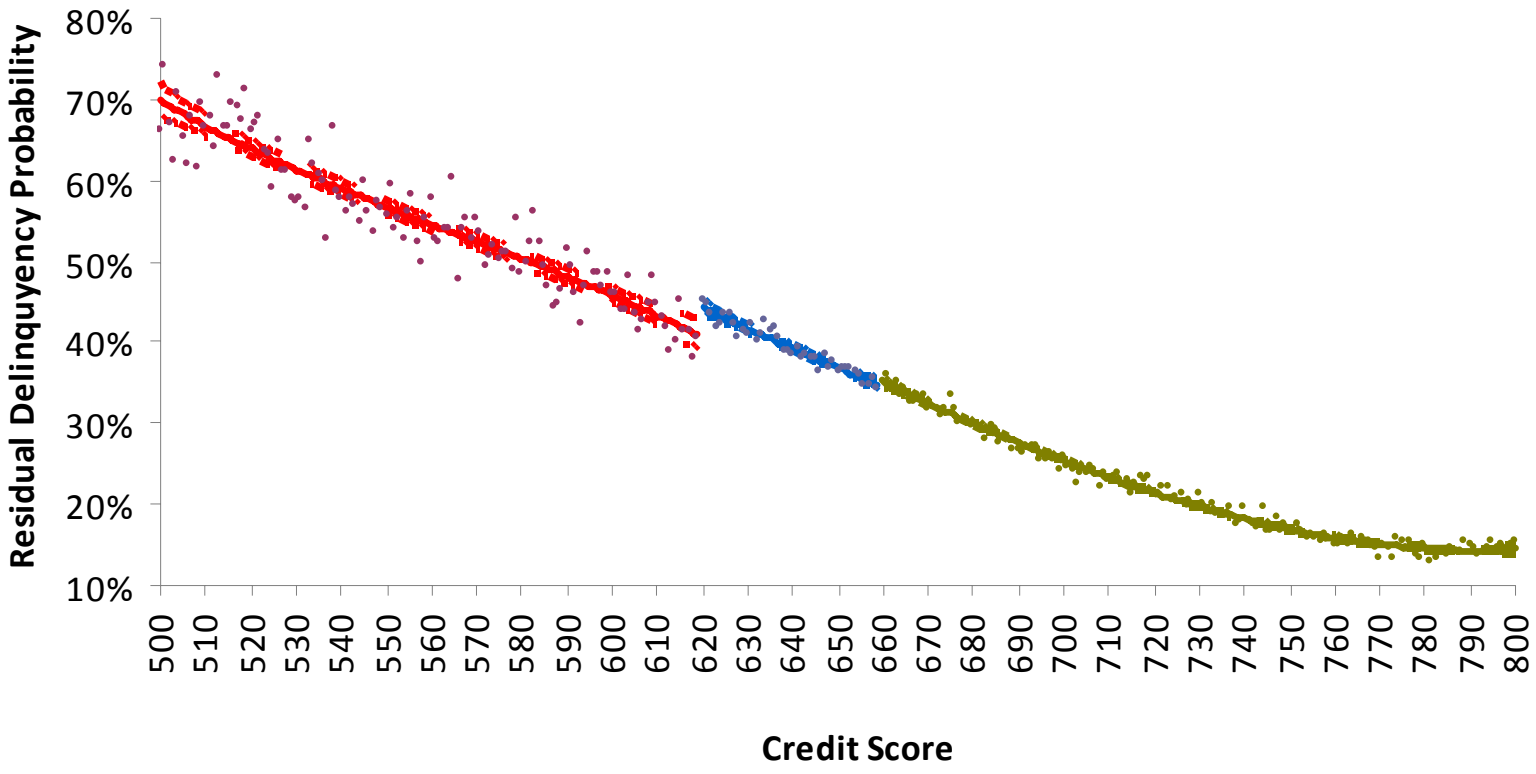


Polynomial regressions on raw data



Covariates jump, too!

Credit score ranges	[618,619] vs. [620,621]		[658,659] vs. [660,661]		Effect on
	Mean difference	t-stat	Mean difference	t-stat	Delinquency
ARM	-0.060	-4.08	-0.017	-3.93	+
Age	-0.103	-3.38	-0.030	-3.08	n.s.
Asian	0.006	1.09	-0.001	-0.25	n.s.
Black	-0.051	-3.30	-0.009	-1.67	+
Broker	0.059	6.24	0.021	5.47	+
CashResv	0.406	7.60	-0.100	-4.92	-
CLTV	0.020	1.81	-0.001	-0.39	+
Female	-0.048	-2.98	-0.011	-1.45	n.s.
FirstOwner	0.132	5.04	0.018	2.59	-
HardPenalty	0.058	7.33	-0.003	-0.65	+
Hispanic	0.091	4.27	0.014	2.52	+
Income	-0.190	-6.27	0.014	0.65	n.s.
Incomemiss	0.189	11.62	0.011	1.41	+
InitialRate	-0.596	-5.13	-0.163	-2.84	+
IO	0.137	11.86	0.017	2.52	+
Loan	0.196	6.09	0.018	1.53	+
LowDoc	0.283	19.69	0.036	5.63	+
OneBorrower	0.113	6.60	0.000	-0.04	+
OptionARM	0.074	19.31	0.022	3.95	+
OwnerOccup	-0.089	-2.41	0.005	1.03	-
Refinance	-0.158	-6.51	-0.028	-3.65	+
SecondLien	-0.037	-2.85	0.021	3.46	+
SelfEmploy	0.041	3.20	0.001	0.10	+
Tenure	-0.164	-2.14	-0.102	-3.19	-



Jumps are different:

• 620: Weak screening concerns hard to observe/quantify attributes. Jump is strengthened with control.

• 660: The bank loosens standards based on the observables. Jump disappears after control.

Modeling of Ex Post Relation

$$Delinquency_i^* = X_i\beta + \varepsilon_i,$$

$$LoanSold_i^* = Z_i\gamma + \eta_i, \quad \Rightarrow \left(\varepsilon\left(X_i\hat{\beta}\right), \eta\left(X_i\hat{\gamma}\right)\right) \sim BiN(0,0;1;1;\hat{\rho})$$

$$\rho = corr\left(\varepsilon_i, \eta_i\right).$$

- Possibly in X but not in Z: HMDA information.
- Possibly in Z but not in X: market information between origination and sale dates.
- Three possibilities:
  - Hypothesis 1: Neither the bank nor the investors possess additional information beyond the observables at origination. $\rho = 0$.
  - Hypothesis 2: And the bank possesses soft information beyond the observables and uses it strategically. Investors have no additional information. $\rho > 0$.
  - Hypothesis 3: And investors possess better information at the time of the loan sale than the bank did at loan origination. $\rho < 0$.

Overview: Kept loans are worse!

	(1) Bank/Full-Doc		(2) Bank/Low-Doc		(3) Broker/Full-Doc		(4) Broker/Low-Doc	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
ρ	-0.037	[-1.68]	-0.047	[-3.11]	-0.110	[-10.35]	-0.102	[-18.31]
APE	-0.80%		-1.30%		-2.46%		-3.00%	
Wald test of ρ = 0:								
chi2(1) and p-val	2.83	0.09	9.67	0.00	107.10	0.00	335.26	0.00

Average partial effect (APE): the effect on delinquency for one standard-deviation increase in the shocks to loan sales propensity.

Control for quick delinquencies (within 6 months)

	(1) Bank/Full-Doc		(2) Bank/Low-Doc		(3) Broker/Full-Doc		(4) Broker/Low-Doc	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Early delinq.	-0.2388***	[-3.03]	-0.3636***	[-6.17]	-0.2763***	[-11.95]	-0.4660***	[-47.57]
ρ	0.0093	[0.32]	-0.0009	[-0.05]	-0.0416***	[-3.61]	-0.0212***	[-3.26]
APE	0.20%		-0.02%		-1.01%		-0.62%	
Wald test of ρ = 0:								
chi2(1) and p-val	0.10	0.75	0.00	0.96	13.01	0.00	10.63	0.00

- Bank channel comes clean once quickly delinquent loans are excluded.
- The magnitude on the Broker loans is more than halved.

Further control for housing price index (HPI)

	(1) Bank/Full-Doc		(2) Bank/Low-Doc		(3) Broker/Full-Doc		(4) Broker/Low-Doc	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Early delinq.	-0.1725**	[-2.11]	-0.2796***	[-3.75]	-0.2612***	[-10.41]	-0.4623***	[-32.72]
HPI 6m after	3.9323***	[10.35]	3.7111***	[9.33]	3.5420***	[12.29]	3.7576***	[9.29]
ρ	0.0114	[0.37]	0.0214	[1.00]	-0.0034	[-0.25]	0.0012	[0.14]
APE	0.24%		0.57%		-0.08%		0.03%	
Wald test of ρ = 0:								
chi2(1) and p-val	0.14	0.71	1.01	0.32	0.06	0.80	0.02	0.89

All selection effects explained for.

Summary

- Opposite ex ante and ex post relation between loan sale and loan quality.
  - Significant deterioration in loan quality when probability of loan sale jumps up discretely.
  - Significant lower loan quality for retained loans based on information observed at loan origination.
  - Close to randomization when information observed since origination is incorporated.
- The ex post victimization of the bank does not refute ex ante agency problem on its part.