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The Risk-Shifting Hypothesis: Evidence from Sub-Prime Originations

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THE RISK-SHIFTING HYPOTHESIS

EVIDENCE FROM SUBPRIME ORIGINATIONS

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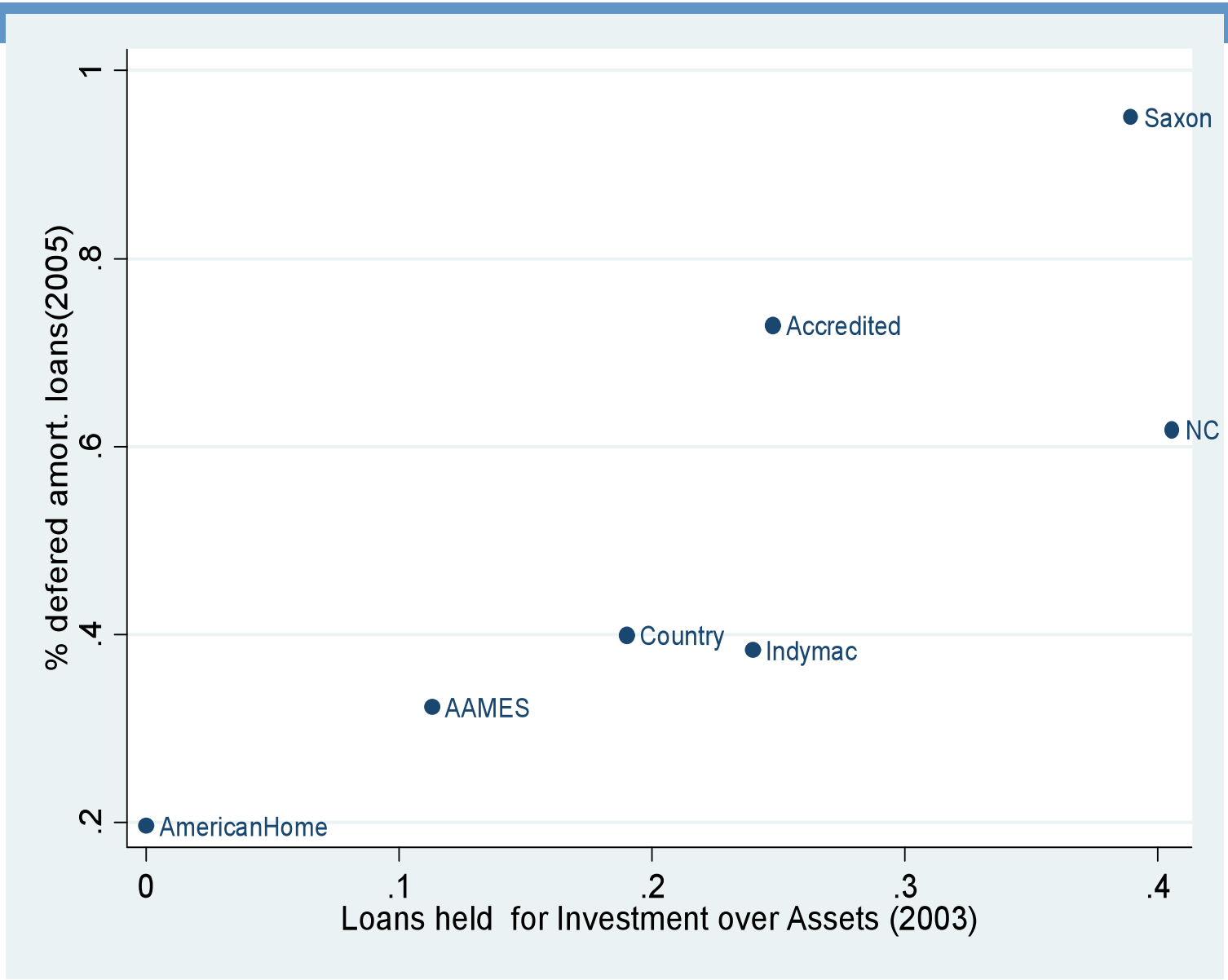
Scope of the Paper

- Characterize portfolio choice of a financial institution in distress
- Forensic analysis of lending behavior of a large US mortgage originator prior to the crisis
  - New Century, who defaulted on feb 2007
    - one of the largest subprime mortgage originators
    - Representative of industry
  - Internal data on loan applications & repayment histories

Findings

- canonical model of risk-shifting → 2 predictions
  - RS = leveraged bet on own survival (=home prices ↗)
    1. Issue more « home price-sensitive » loans
    2. Issue more loans in regions whose property prices are correlated with own assets
- NC did exactly that, starting in 2004
  - Monetary tightening: NC in financial distress b/c owned a large loan portfolio (exposed to credit & interest risk)
  - NC made leveraged bet on own survival
    1. Massive issues of deferred amot. loans (home price sensitive)
    2. Issued massively in regions correlated with own asset

Originators with large loan portfolios also risk-shifted



Contributions

- Crisis narrative
  - OTD mortgage issuers carried large balance sheets in 2004
    - Skin in the game is bad, ex post
  - 2004 Monetary Tightening → Risk Shifting
    - Franchise value of weak intermediaries went down
    - Macro & micro prudential intertwined
- Costs of financial distress literature
  - Look @ micro-data from a distressed firm
  - Characterize **empirical « signature » of risk-shifting**
    - Distressed firms overinvest in « survival contingent » assets

Road Map

1) A simple risk-shifting framework

2) Impact of 2004 monetary shock on NC's assets

3) Subsequent portfolio choice

Simple Risk-shifting framework

What kind of risk matters in risk shifting?

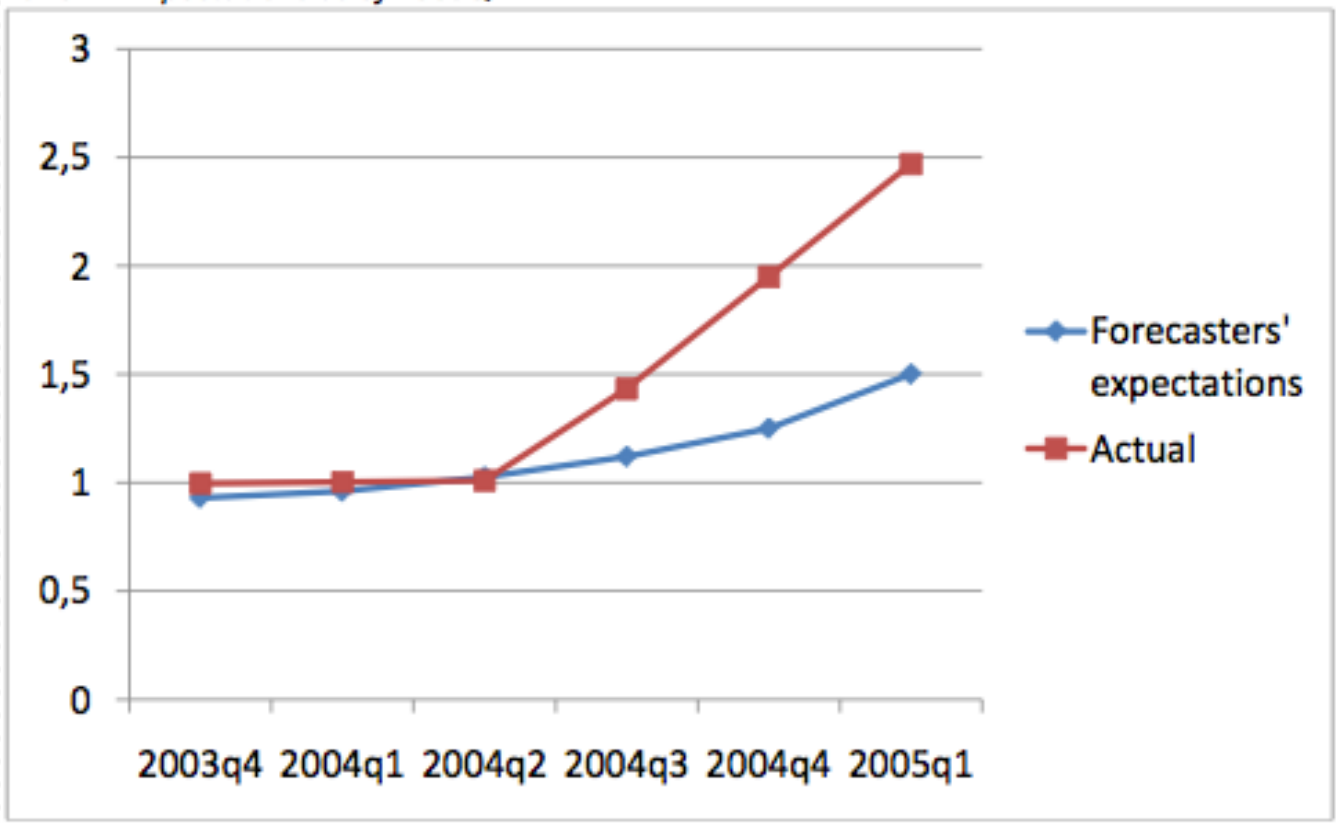
- Assume risk neutral investors
- S=1 if NC survives: P(S=1)=p
- marginal project's gross return: $R=1+\alpha+\beta.(S-p)+\varepsilon$
- Expected return: $E(R) = 1+ \alpha$
- …but value for shareholders:

$$pE(R|S=1) = p\ (1+ \alpha) + \beta.(1-p)\ p$$

- Shareholders are biased towards high β projects
  - … not any kind of risk
  - distorsion can be quite big, even far from insolvency

The 2004 Monetary shock

Panel A: Expectations as of 2003Q4



Impact of tightening on NC's assets

- Less growth options
  - increase in monthly payment / less refinancing (60% of sales)
- FRM holdings: interest rate risk
  - $2.4bn FRM held as investment end 2003…
  - …but financing is variable rate, indexed on LIBOR
  - $360m of cash flows disappear (2003 equity=$500m)
- ARM holdings: default risk
  - About 5bn of ARMs held as investment end of 2003
  - Became riskier as monthly payments went up
  - ARM delinquency rate went up from 10 to 30%

Evidence of Risk-Shifting

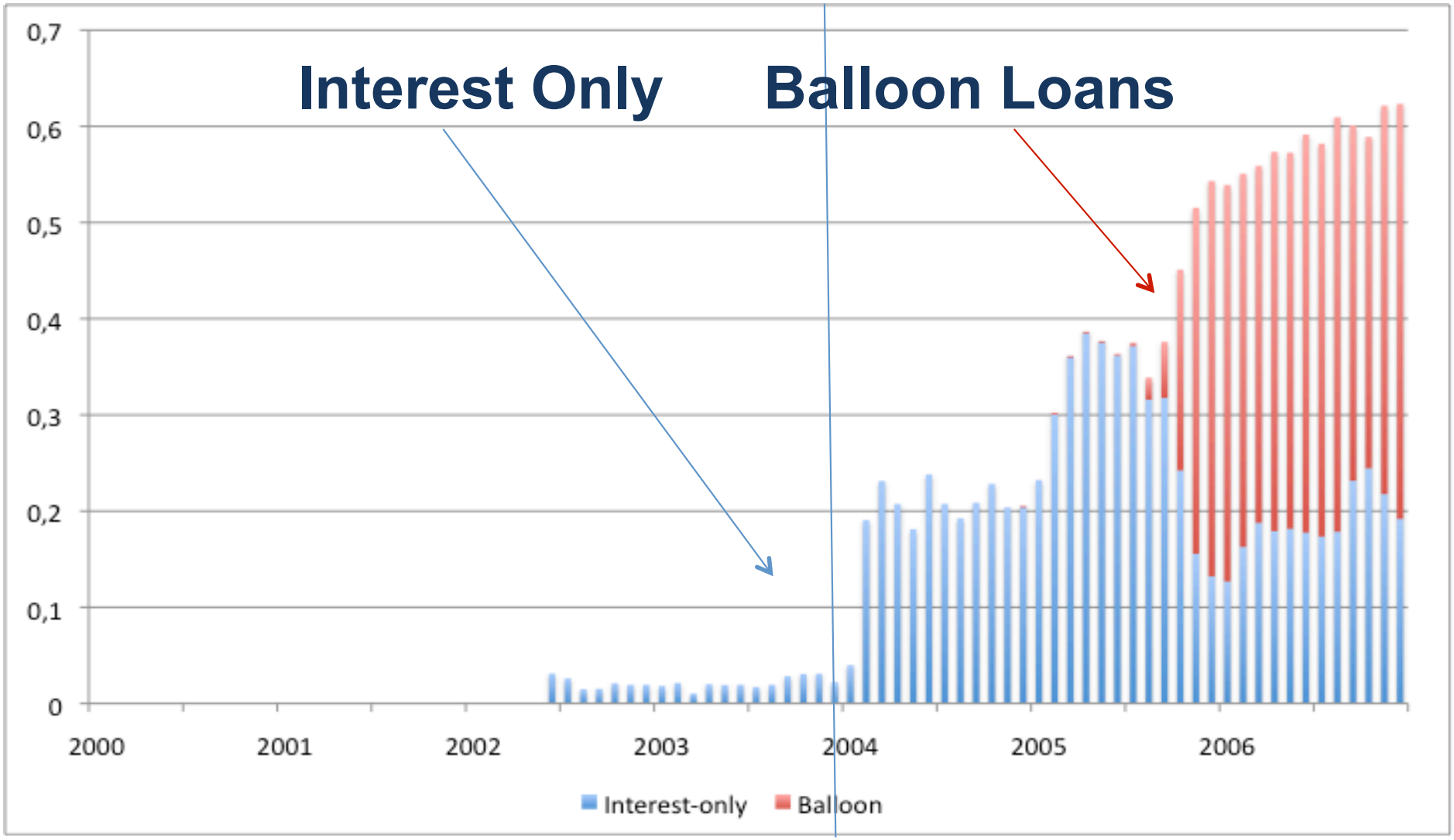
Prediction #1

- NC issues more loans correlated with Survival
- Survival = « property prices continue going up »

➔ NC should issue « home-price sensitive » loans

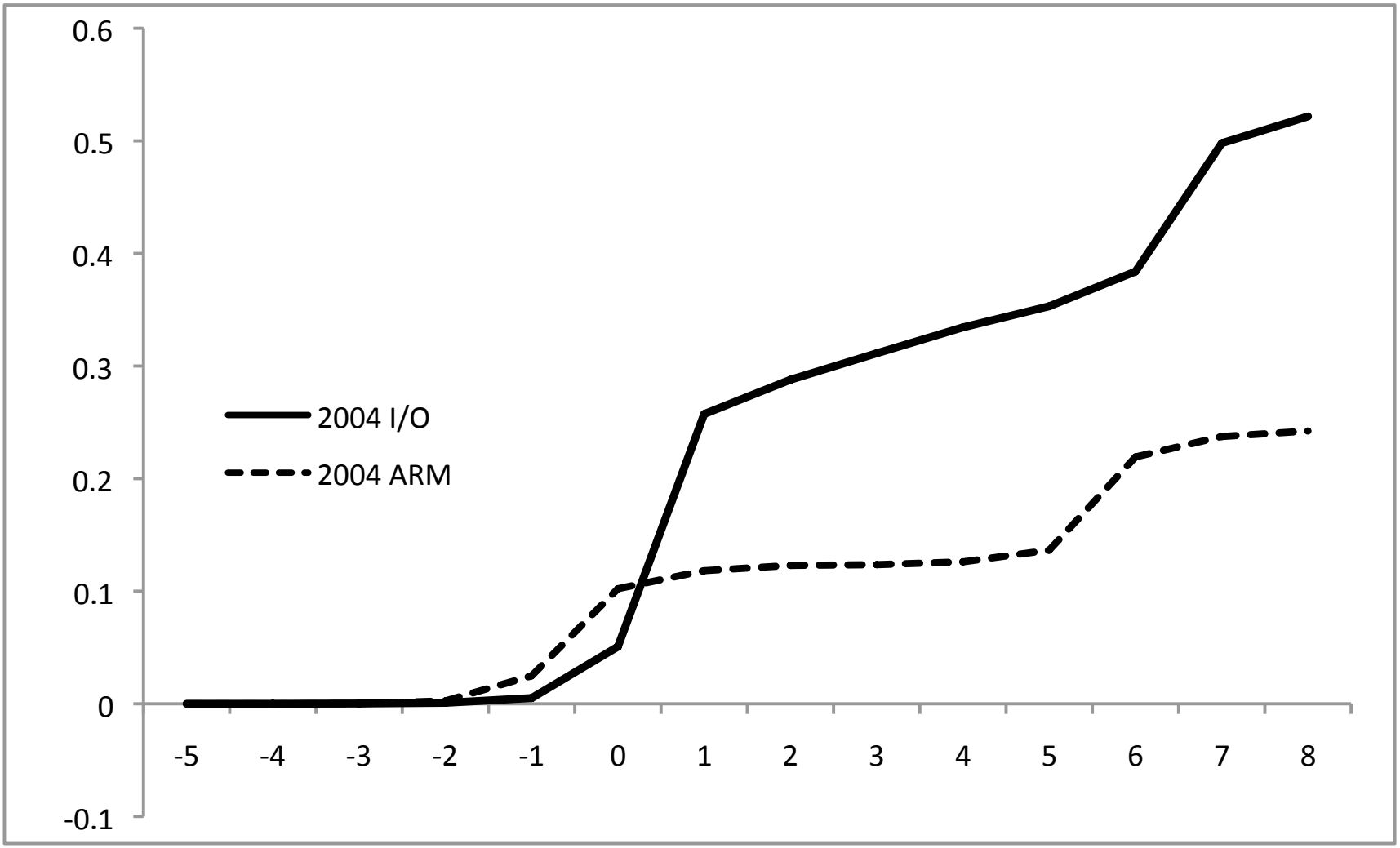
- Deferred amortization loans
  - Started in 2004
  - Became big
  - Are more home-price sensitive than ARMs or FRMs
    - After 2 years: big payment shock
    - If home price go up, easy to refinance
    - If they go down, borr. cannot refinance / default strategically

% loans with deferred amortization

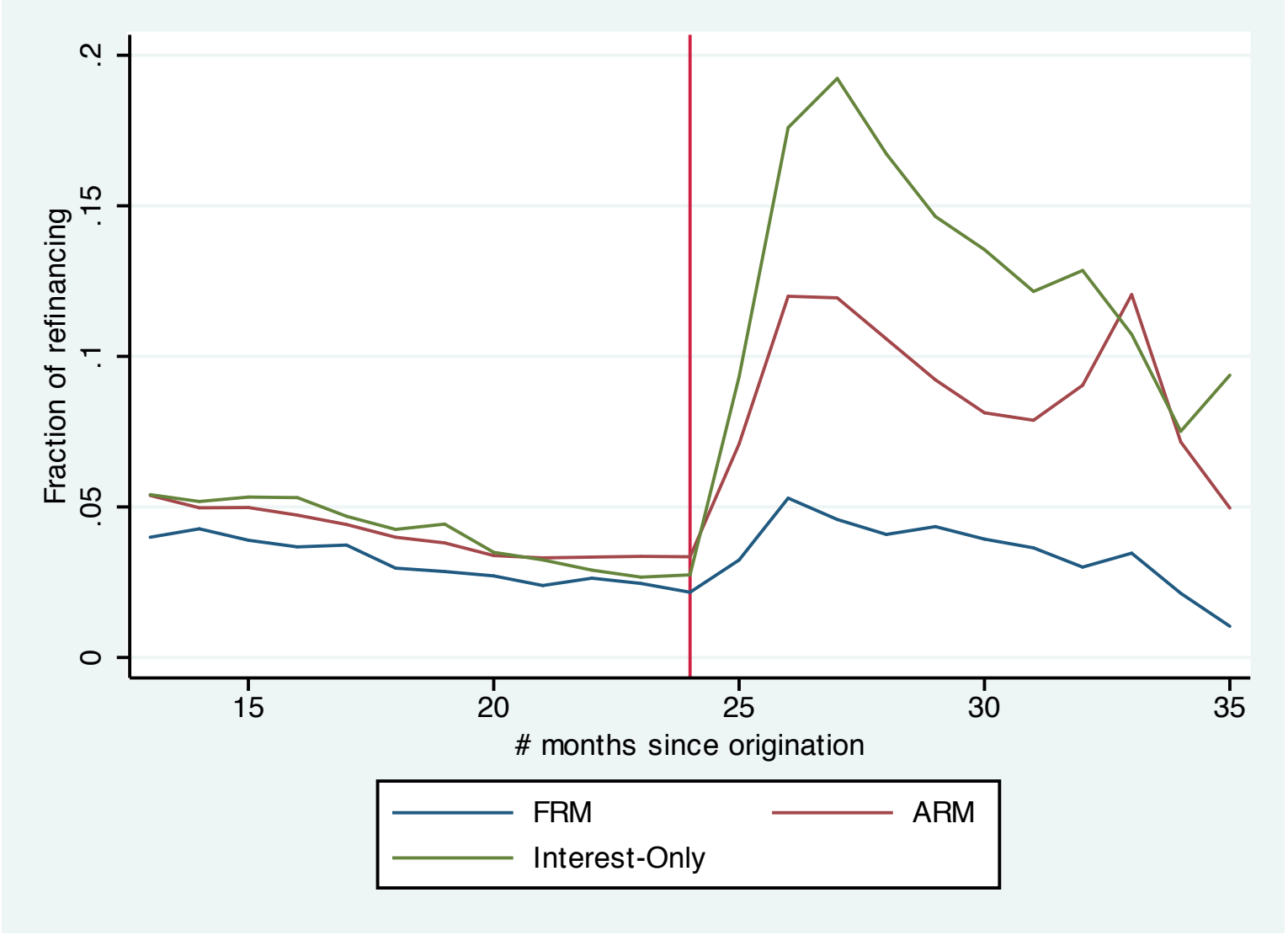


The monthly payment shock:

growth of payment at reset compared to origin



Refinancing spike when monthly payment spikes



I/O loans: more « home price sensitive »

- Unconditional probability of delinquency
  - Higher if price growth is slow (<10% since origination)
    - For FRMs & ARMs: +9ppt
      - Some strategic default
      - (small) payment shock on ARMs as rates go up
  - Effect much bigger for I/O loans
    - For I/O: +16ppt
      - Difference is statistically significant

- this is related to difficulties to refinance
  - increase in delinquencies takes place after 2 years

Prediction #2

- NC issues more loans correlated with Survival
- Survival = home prices of loans in portfolio go up
- ➔ NC should issue more loans, and more I/O loans, in regions whose home prices are correlated with loans in portfolio

- Regress:

$$\text{Total loans}_{\text{region s}} = a + b.\beta_{\text{region s/NC loan portoflio}} + \text{controls}$$

$$\%\text{I/O}_{\text{region s}} = a + b.\beta_{\text{region s/NC loan portoflio}} + \text{controls}$$

more loans in correlated regions

Table 5: MSA level amount of loans originated in 2004

	MSA level log of origination				
	Whole sample				Non-core states
β	2***	.38***	.37***		.38***
	(7)	(3.6)	(3.4)		(2.8)
β Q2				-.012	
				(-.13)	
β Q3				.073	
				(.82)	
β Q4				.28***	
				(3.1)	
log(origination 2003)		1***	1***	1***	.98***
		(30)	(29)	(29)	(20)
Low income			-.42	-.61	-1.1
			(-.28)	(-.41)	(-.52)
Low education			-.27	-.25	-9.6
			(-.19)	(-.17)	(-1.6)
Constant	14***	-.081	.061	.33	3
	(58)	(-.14)	(.082)	(.42)	(1.4)
Observations	352	351	351	351	287
R^2	.11	.88	.88	.88	.84

more I/O loans in correlated regions

	Fraction of IO loans				
	Non-Core States				
	(1)	(2)	(3)	(4)	(5)
β	.17***	.18***	.11***		.08***
	(8.4)	(8.3)	(6.2)		(5.2)
Log(origination 2003)	.024***	.024***	.019***	.026***	.0091***
	(7.3)	(7.3)	(5.2)	(7.4)	(2.8)
Low Income		.072	.26	-.015	-.23
		(.2)	(.67)	(-.039)	(-.7)
Low Education		.055	-.28	.1	.12
		(.18)	(-.51)	(.3)	(.49)
β Q2				.034***	
				(3.5)	
β Q3				.044***	
				(4.3)	
β Q4				.12***	
				(7.9)	
Price/Income$_2$000					.03***
					(8.2)
Observations	351	351	287	351	351
R^2	.39	.39	.22	.36	.52

Barlevy&Fisher effect

Conclusion

- Monetary policy led NC to take on more risk to maximize shareholder value
- Alternative interpretations?
  - « Interest-only » made loans affordable as rates rose.
    - But then, why not stop lending? Which assumption on risk preference?
  - Governance: these guys didn't care
    - Top executives hold more than 7% in 2005, didn't sell
  - It was pure optimism
    - Hard to fight this but…
    - RS imposes more structure on data.