

# Differences Across Originators in CMBS Loan Underwriting

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# Introduction

- CRE: “second wave” of financial crisis
  - High delinquency rates (9.5% of loans originated since 2005 now delinquent)
  - CMBS market shutdown & future refinancing waves
- Like RMBS, observers cite distorted incentives for quality underwriting standards as a primary cause
- At the same time, CMBS portfolios contain fewer loans, and individual loan characteristics much more transparent.
- To what extent does CMBS underwriting quality vary across originator types?
  - 6 key types characterized by capital and corporate structure
- Evidence on incentive distortions? (adverse selection, moral hazard)

# Types of originators

- Commercial banks
- Insurance
- Investment banks
- Finance companies
- Foreign conduits
- Domestic conduits

# Preview of findings

- Conduits and foreign entities perform worst.
- Insurance companies and commercial banks perform best.
- Results hold both before and after controlling for observed loan characteristics.
- Possible interpretation: originator types differ in their sources of warehouse funding, involvement in balance-sheet lending, capitalization, and investment in CMBS.

# Data

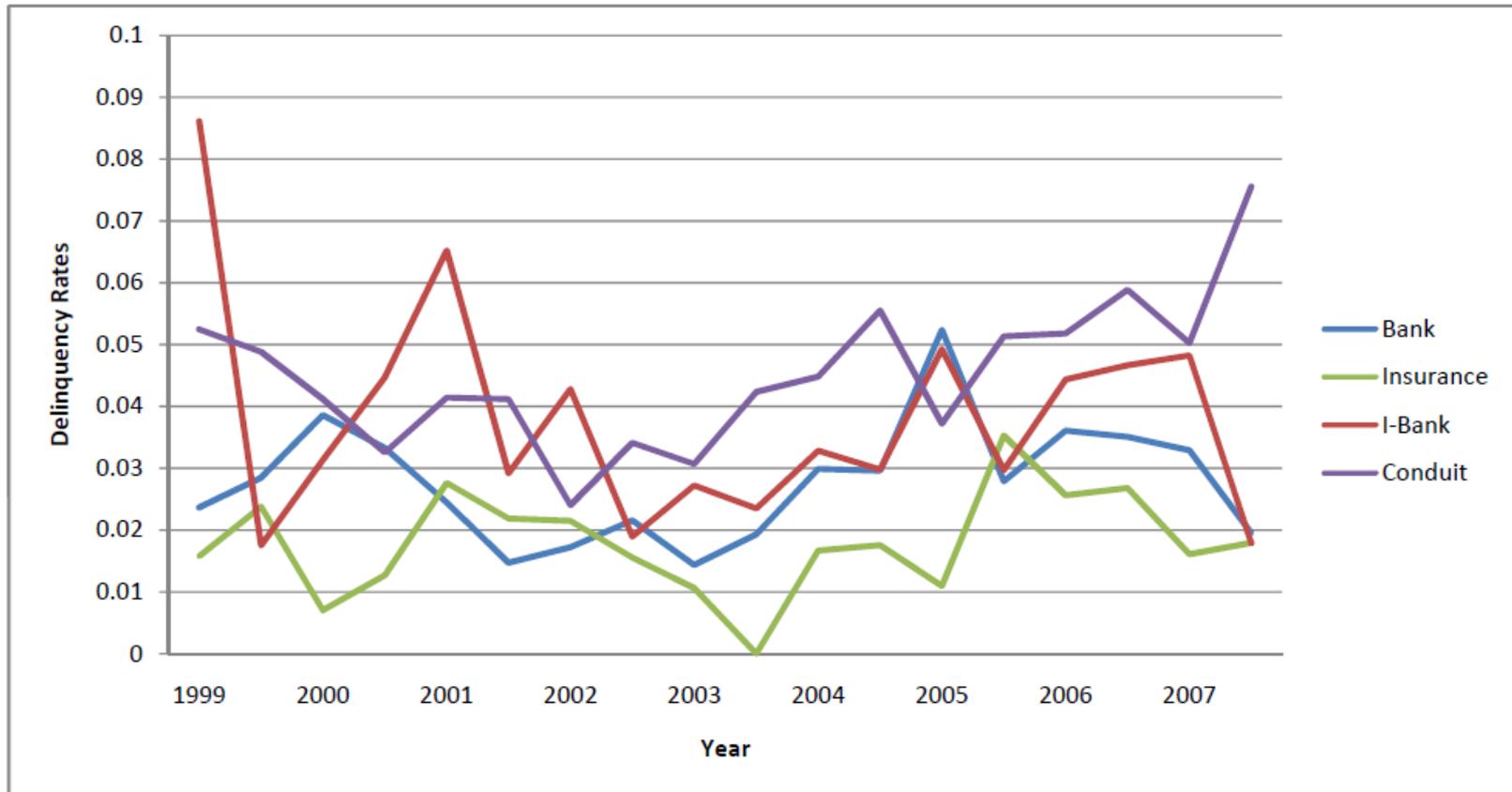
- Sample of 31,657 fixed-rate loans sold into any CMBS from 1999 to 2007
- Loan characteristics at origination
- Matched originators to top holders (using NIC) and classified into 1 of the 6 types
- Payment history through July 2010

# Cumulative Delinquency Rates

- Delinquency = 60+ days delinquent or in special servicing

Originator Type	Comm. Bank	Insur. Co.	Inv. Bank	Fin. Co.	Foreign Entity	Domestic Conduit
% ever delinquent	7.38%	4.68%	8.93%	8.76%	10.10%	12.89%

# Cumulative Delinquency Rate by Originator Type



- Delinquent = ever 60 days late
- Year = year of origination

# Differences in loans across originator types

- Loan characteristics
  - DSCR, LTV, coupon
- Delinquency rates conditioning on loan characteristics

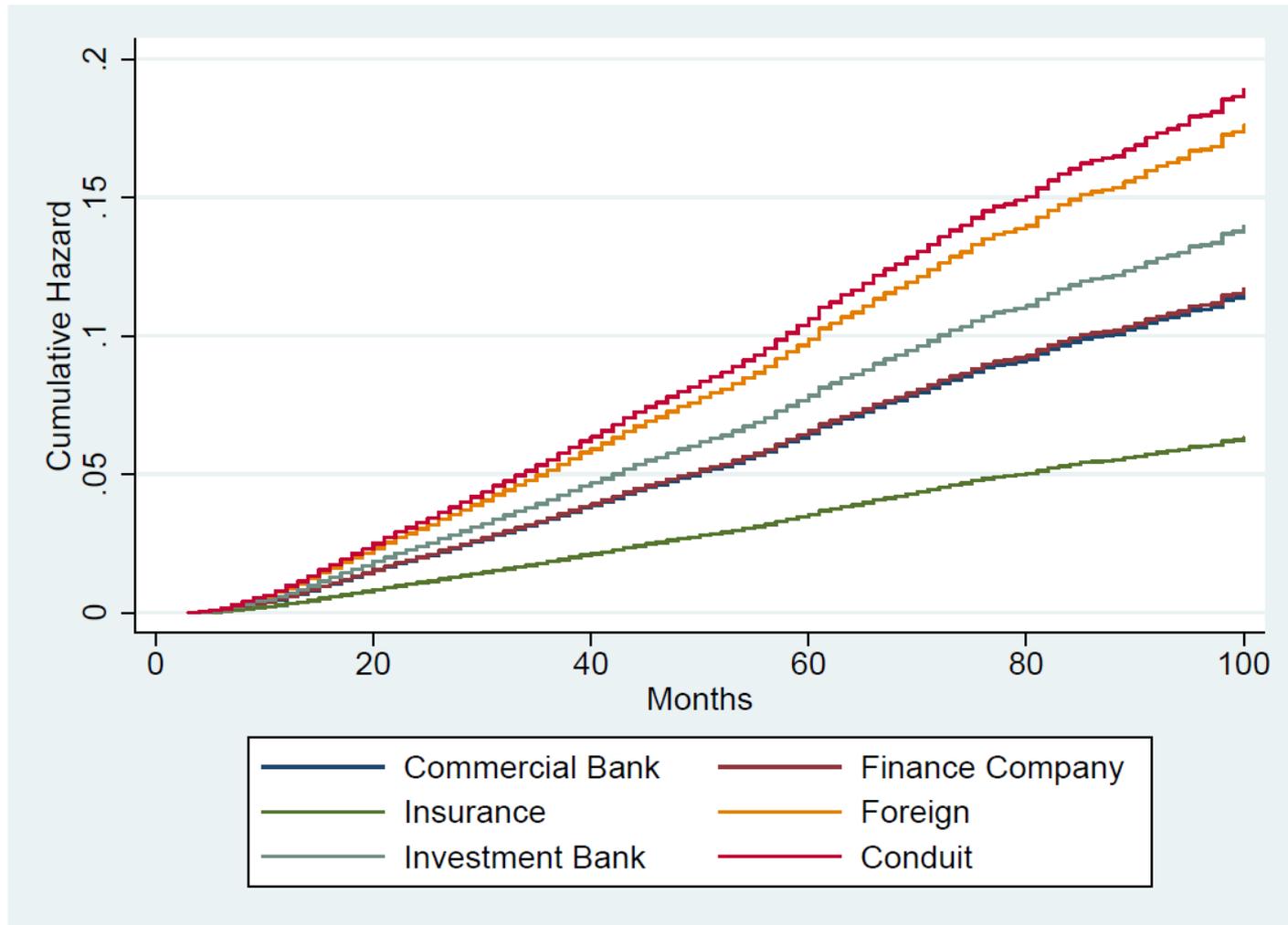
# Loan Characteristics at Origination

Mean (Std. Dev.)	DSCR	Occupancy	Coupon Spread	Loan Amount	LTV Ratio	Cumul. Default
Commercial Bank	1.49 (0.46)	94.59 (7.37)	1.47 (0.65)	9.71 (14.87)	68.15 (12.46)	7.38%
Insurance	1.49 (0.39)	96.02 (6.32)	1.55 (0.7)	8.15 (11.34)	64.45 (11.92)	4.68%
Investment Bank	1.5 (0.4)	94.73 (7.54)	1.46 (0.65)	10.87 (16.93)	69.02 (10.37)	8.93%
Finance Company	1.45 (0.34)	93.33 (7.37)	1.57 (0.7)	8.68 (11.01)	70.16 (10.08)	8.76%
Foreign Entity	1.41 (0.26)	94.86 (6.98)	1.55 (0.76)	8.58 (12.99)	70.82 (9.19)	10.10%
Domestic Conduit	1.39 (0.3)	94.13 (7.53)	1.63 (0.71)	10.36 (15.75)	70.56 (9.45)	12.89%
Total	1.47 (0.4)	94.69 (7.28)	1.5 (0.68)	9.59 (14.63)	68.73 (11.33)	8.30%

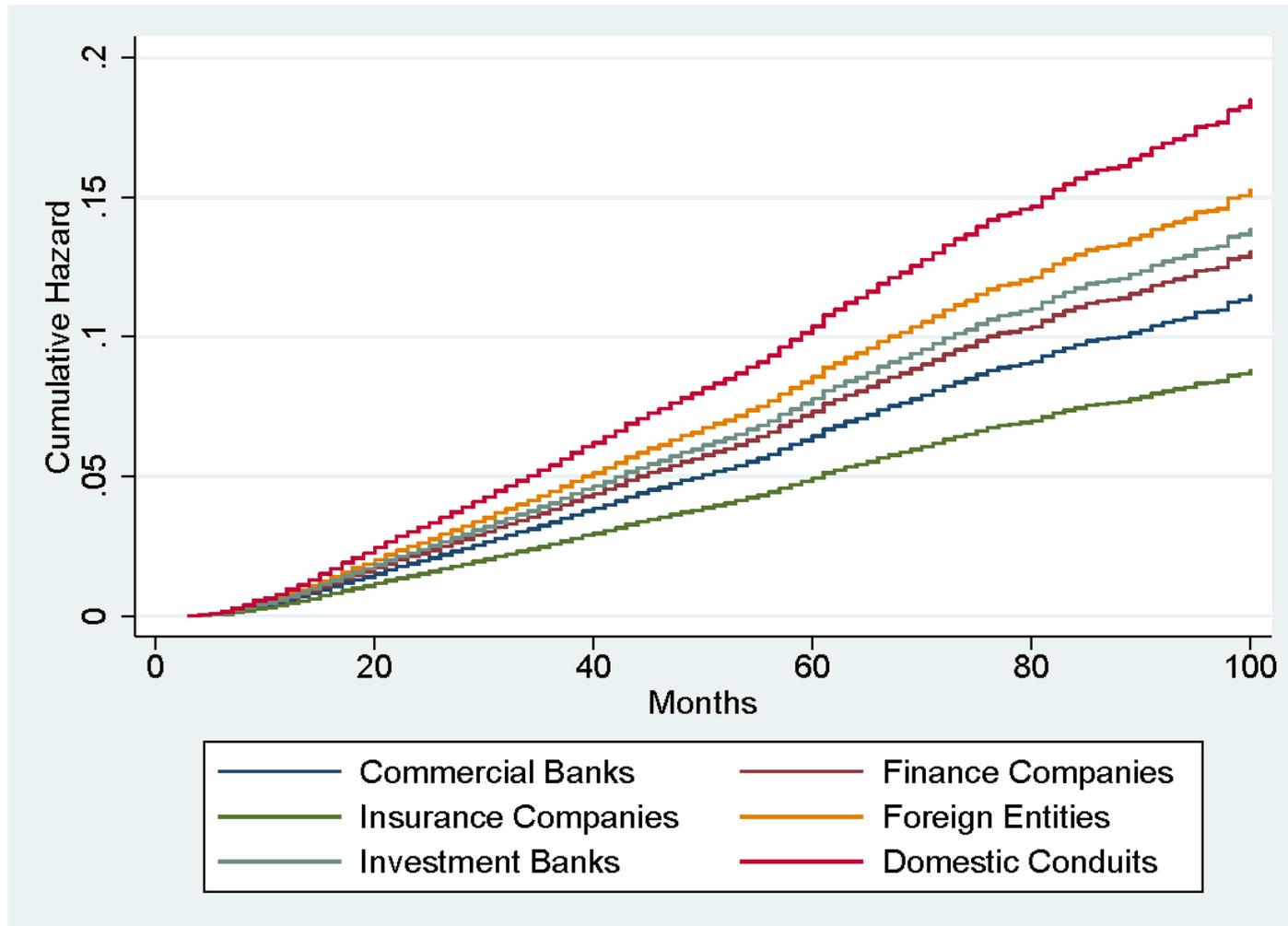
# Cox Proportional Hazards Model

- Outcome: how long before a loan first became delinquent?
- Hazards differ across originator types.
- Controls for vintage, region, and property type.
- Differences remain, even after controlling for underwriting characteristics.
- Also find evidence of deterioration from early to later vintages, even after controlling for observable underwriting characteristics.

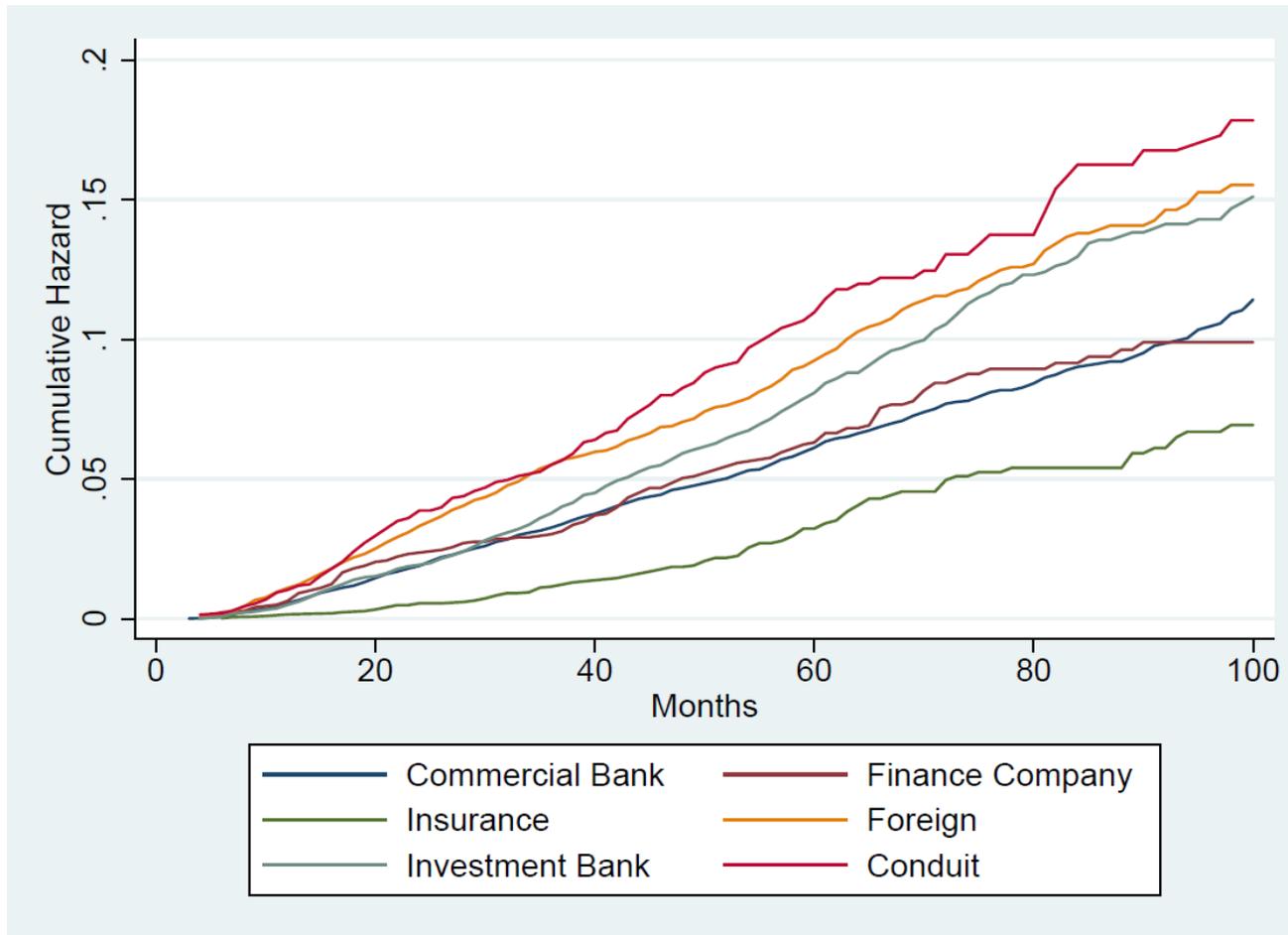
# Cumulative Hazards Evaluated at Means Conditional on Originator Type



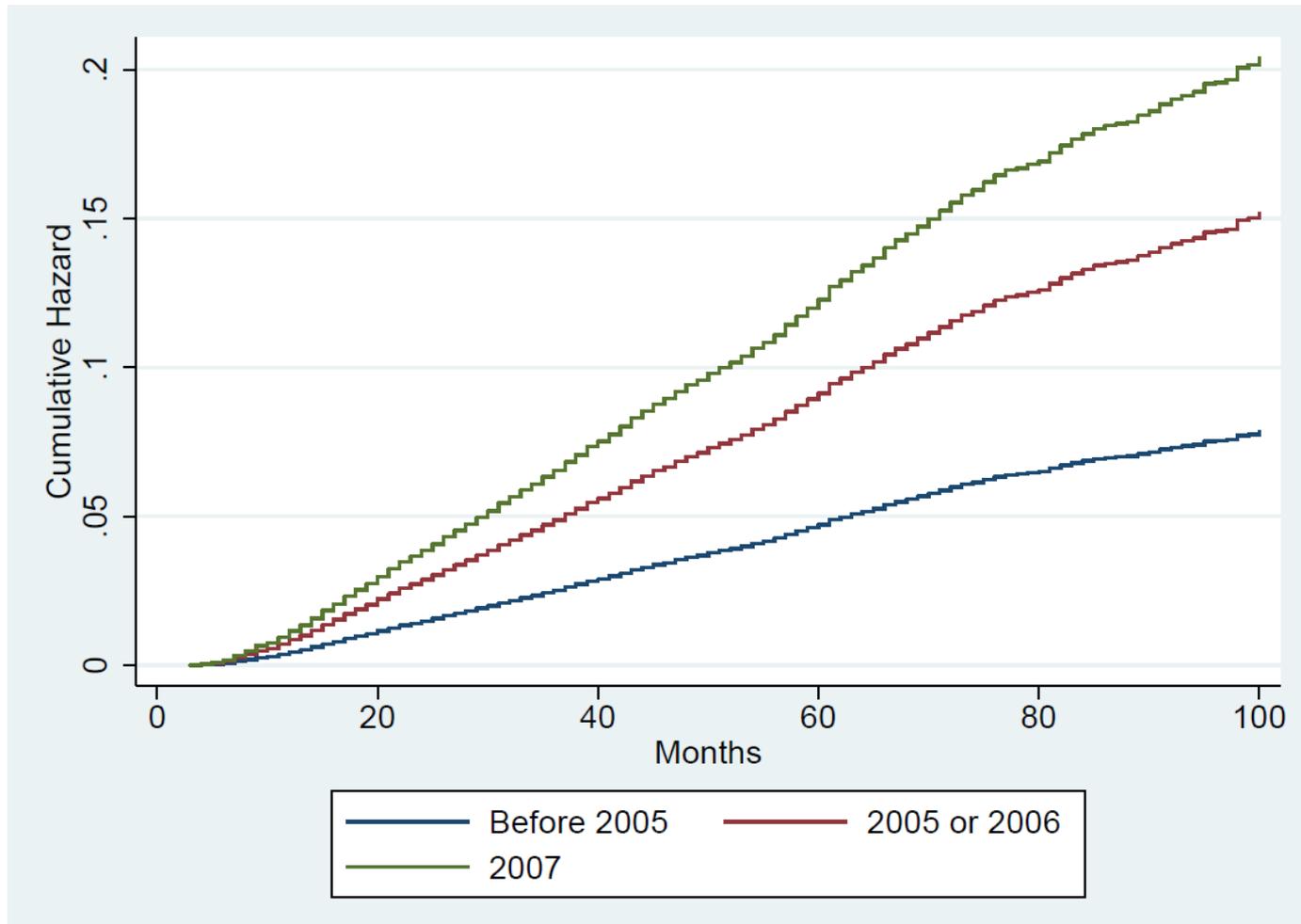
# Cumulative Hazards Evaluated at Entire-Sample Means



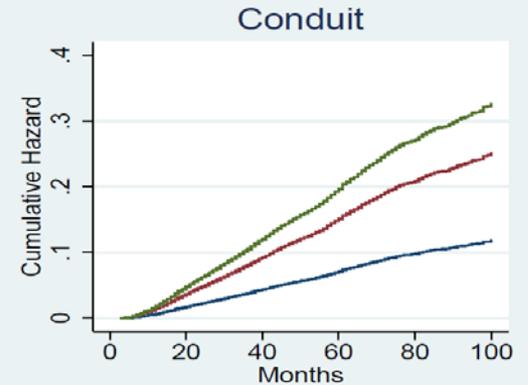
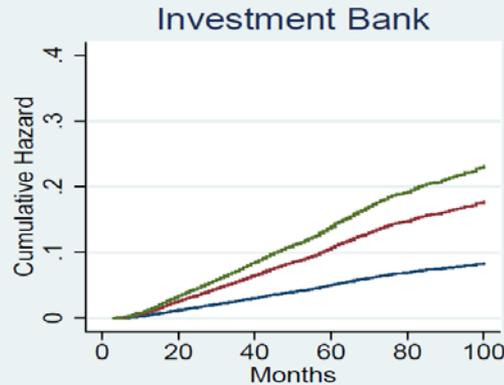
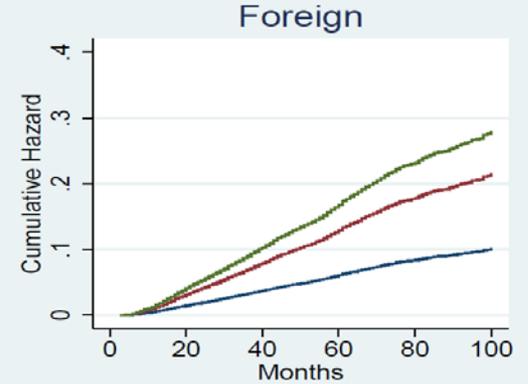
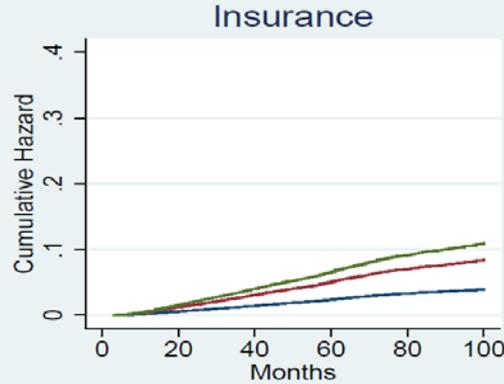
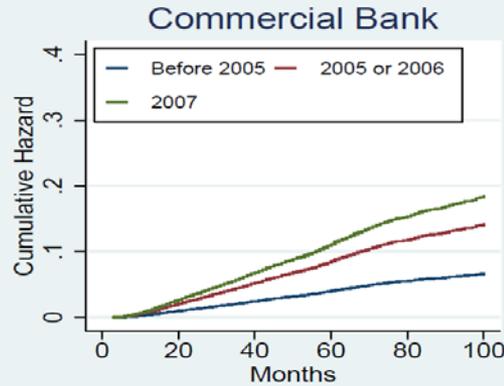
# Cumulative Hazards Estimated Separately by Originator Type



# Cumulative Hazards by Vintage



# Cumulative Hazards by Originator Type and Vintage



# Institutional Features Affecting Underwriting (1)

	Warehouse loans	Balance-sheet lenders
Commercial bank	X	X
Insurance company	X	X
Investment bank	X	
Finance company	X	X
Foreign entity	Depends	
Domestic conduit		

# Institutional Features Affecting Underwriting (2)

- Warehouse Funding: Internal vs. External
  - Moral hazard: does originator hold mortgage for appreciable period of time prior to securitization?
  - External funding may be more costly → product differentiation toward riskier loans
- Balance sheet lending
  - Adverse selection: Does originator choose which loans to securitize?
  - Possible spillovers in lending technology (origination cost for given level of quality)
  - Capitalization: Correlated with risk preferences.

# Institutional Features Affecting Underwriting (3)

- Possible reason for difference between commercial banks vs. insurance companies:
  - Insurance companies have proportionally more balance-sheet CRE lending (10% vs. 5 to 8%)
  - Anecdotally, we know that insurance companies invested heavily in CMBS – maybe some of them collateralized by their own originations.

# Discussion

- Standard underwriting characteristics only partly explain loan performance. Despite reputation for transparency, CRE loan performance affected by originator type.
- Adverse selection an often-cited cause of poor performance, but evidence suggests presence of mitigating factors among balance sheet lenders (e.g., better overall pools, higher K)
- Must interpret conservatively: some sources of unobserved heterogeneity may be observed by investors.

# Extensions

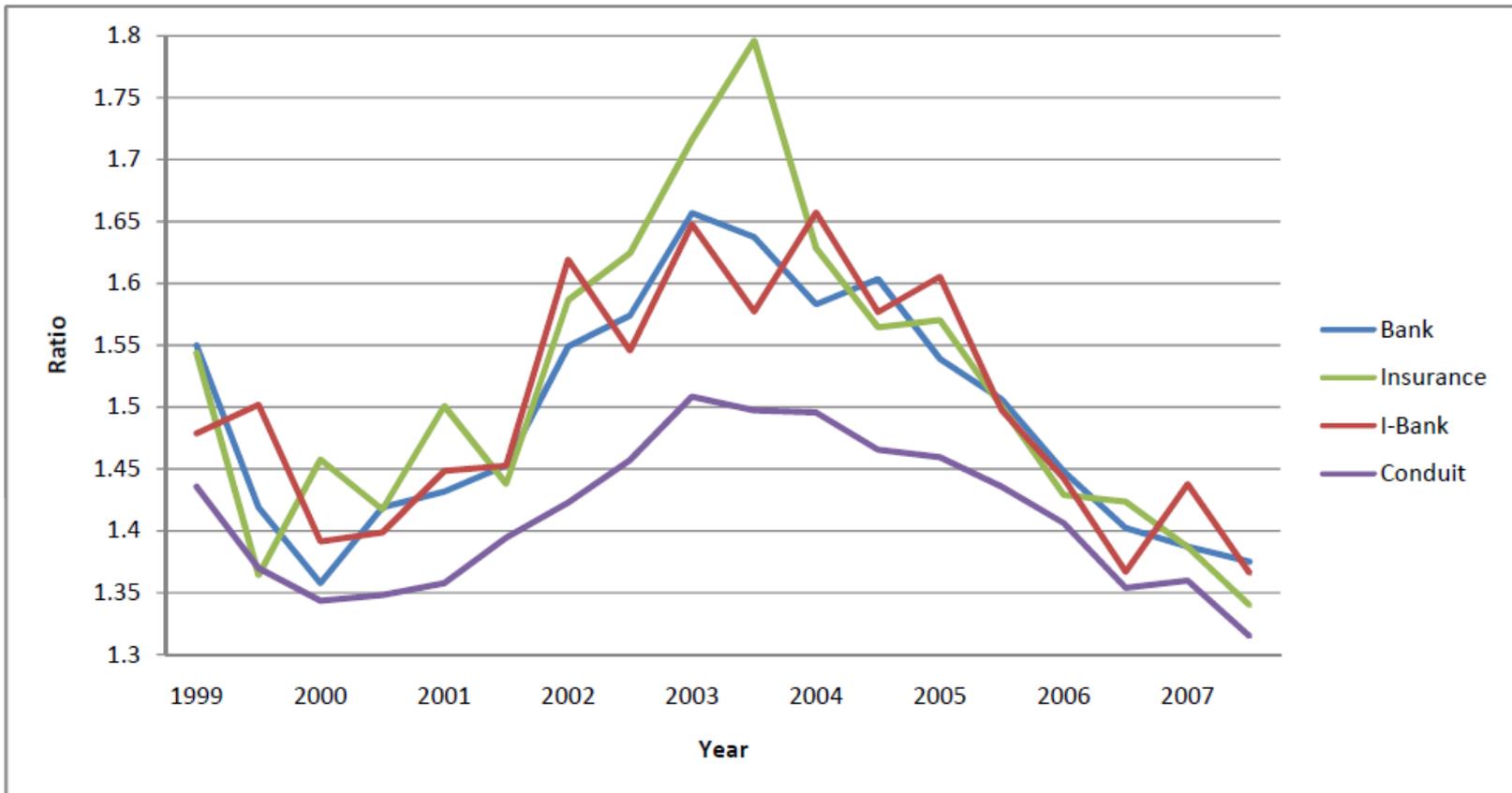
- Can we test underwriting differences more directly?
  - Compare underwritten NOI to realized NOI by originator type.
  - For 6 percent of loans, rating agencies impose a haircut on DSCR (15 percent on average) or LTV (36 percent on average).
- Are differences across originators reflected in pricing of CMBS securities?

# Conclusion

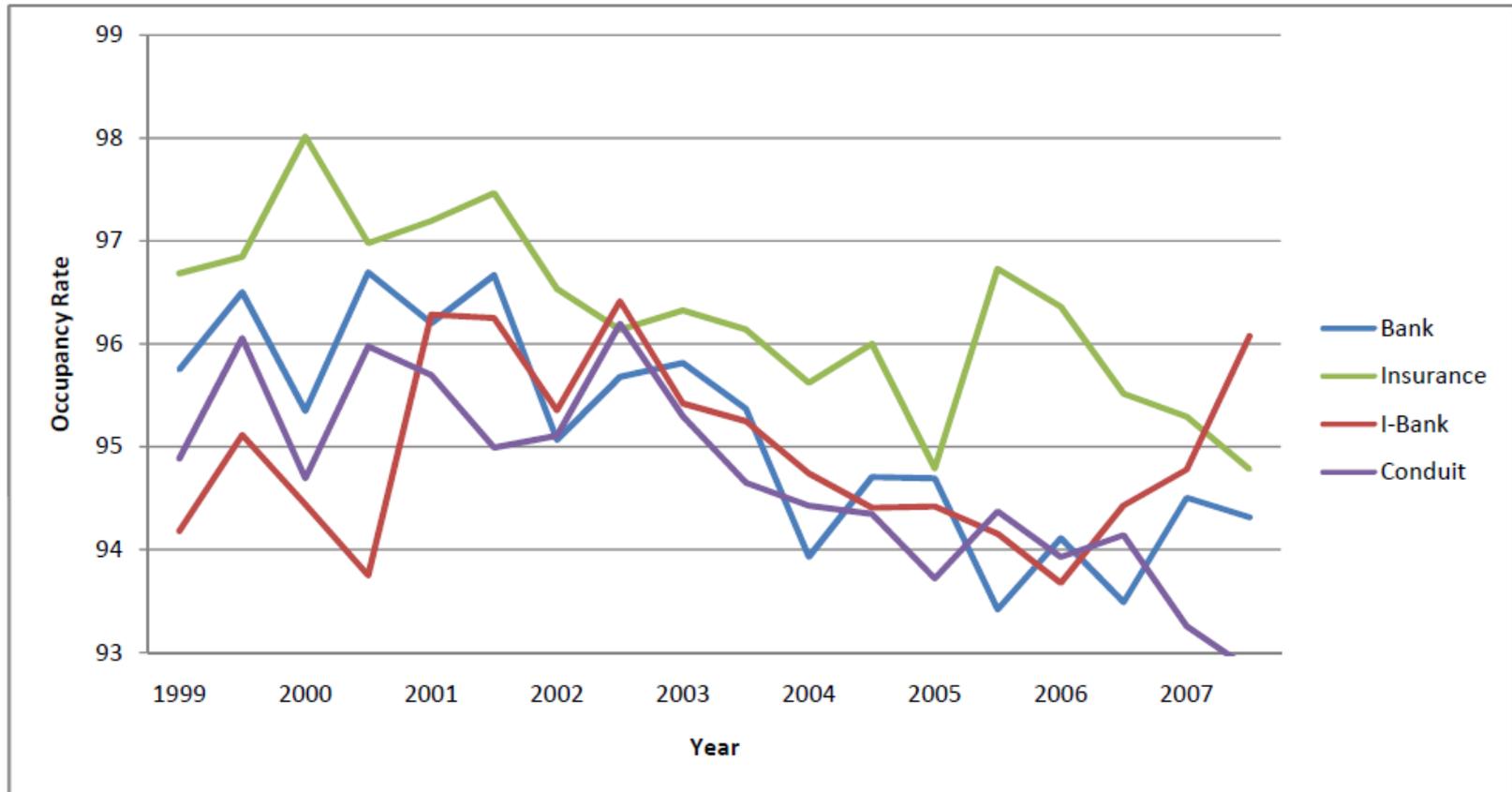
- Differences in loan performance across originator types, before and after controlling for underwriting characteristics.
- Insurance companies and commercial banks best.
- Foreign entities and conduits worst.
- Underlying drivers behind these differences merits further study.

Extra slides

# Average Debt-Service Coverage Ratio by Originator Type

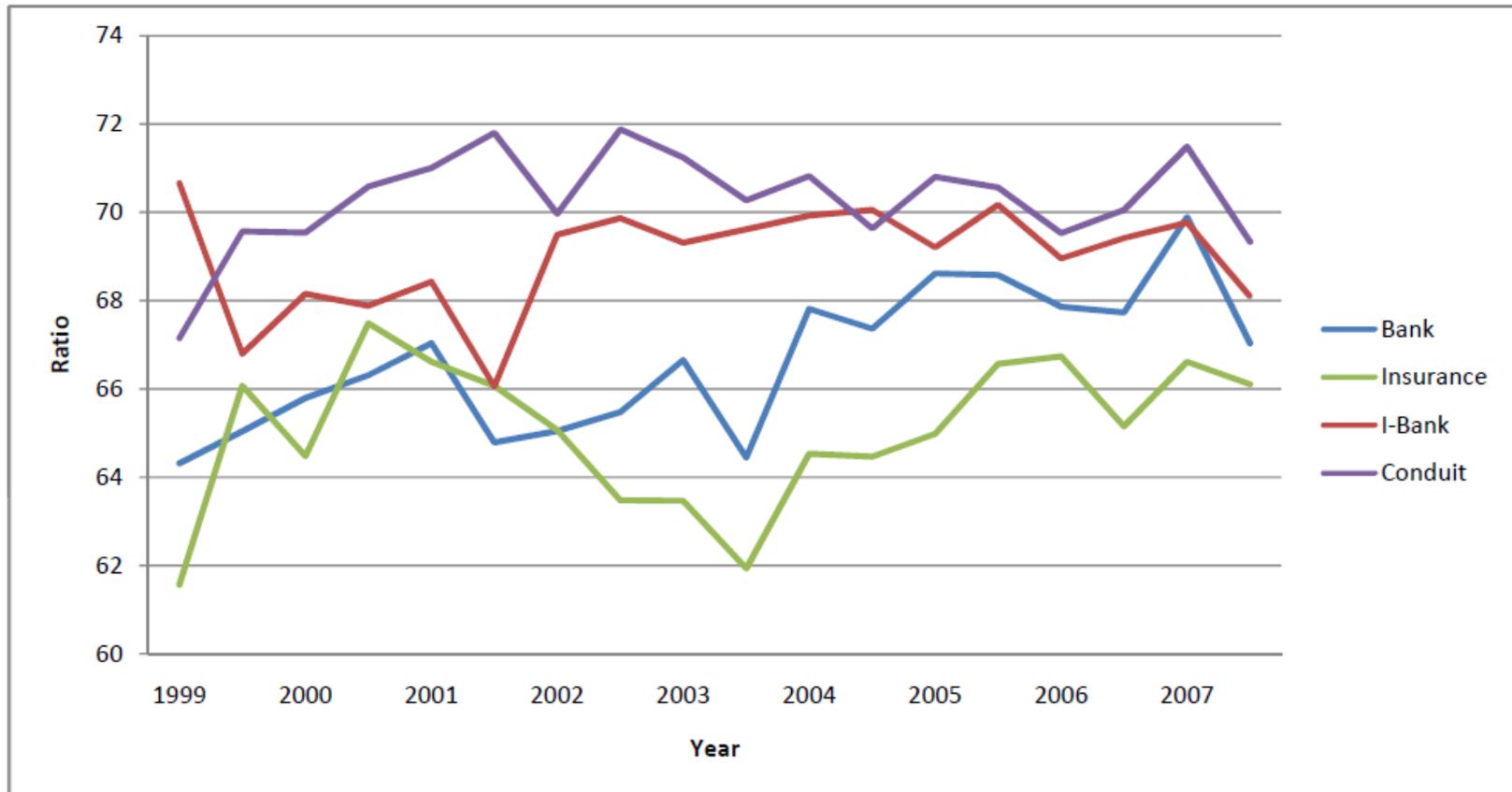


# Average Occupancy by Originator Type



- Insurance companies have higher occupancy over nearly all years, especially in the late 2000's.

# Average Loan-to-Value by Originator Type



# Logit Model

- Outcome: whether a loan ever becomes delinquent.
- Variation: distinguish between regular on-time payment and prepayment.
- Older loans have had more time over which to become delinquent. Control for this using vintage.
- Regress on underwriting variables, originator type, vintage (originator type)\*(vintage).
- Are there differences across types and vintages after controlling for underwriting variables?

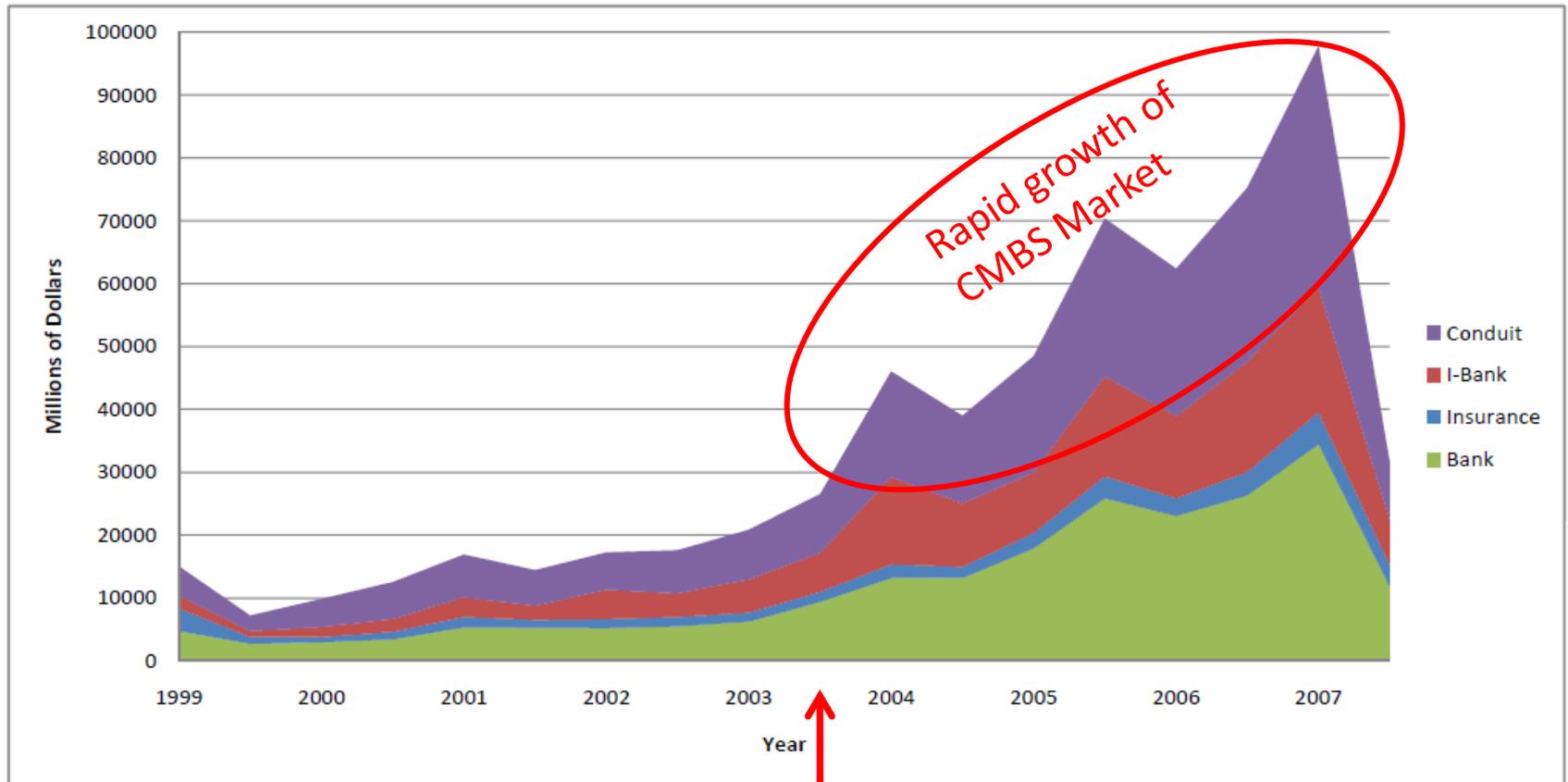
# Logit Model Results

Loan Characteristics at Origination	Coefficients (Standard Error)	Originator Type and Vintage Effects	Coefficient (Standard Error)
Debt-to-Service Coverage Ratio	0.044 (0.104)	Commercial Bank	
Occupancy	-0.025*** (0.003)	Insurance	-0.287** (0.144)
Coupon Spread	0.324*** (0.039)	Investment Bank	0.202** (0.082)
Loan Amount	0.011*** (0.0012)	Finance Company	0.077 (0.123)
Loan-to-Value Ratio	0.052*** (0.0033)	Foreign	0.163* (0.086)
		Conduit	0.230* (0.131)
		Vintage <= 2004	
		Vintage = 2005	0.153* (0.091)
		Vintage = 2006	0.225** (0.09)
		Vintage = 2007	-0.534*** (0.124)

# Multinomial Logit Results

- 19 percent of loans prepay, less than for RMBS.
- Compared with simple logit, effects of various explanatory variables on delinquency is essentially unchanged.

# Total Volume of Originations by Originator Type



- Growth of CMBS market began in mid 2003 and 2004

# Sources

- Cox, D.R. 1972. Regression Models and Life-Tables. *Journal of the Royal Statistical Society, Series B* 34:187-220.

# Hazard Model: Explanation of Coefficients

- Coefficients of variables are in Hazard Ratio form.
  - For example, consider a continuous random variable  $x_i$ . The hazard rate given  $x_1, \dots, x_n$  is:

$$h(t \mid x_1, \dots, x_i, \dots, x_n) = h_0(t) \exp(x_1 \beta_1 + \dots + x_i \beta_i + \dots + x_n \beta_n)$$

- Now consider the hazard rate given a unit increase in  $x_i$ :

$$h(t \mid x_1, \dots, x_i + 1, \dots, x_n) = h_0(t) \exp(x_1 \beta_1 + \dots + (x_i + 1) \beta_i + \dots + x_n \beta_n)$$

- Thus the ratio of the two hazard rates is:

$$\frac{h(t \mid x_1, \dots, x_i + 1, \dots, x_n)}{h(t \mid x_1, \dots, x_i, \dots, x_n)} = \exp(\beta_i)$$

# Hazard Model: Explanation of Coefficients

- Interpretation of Results:
  - The coefficient we report in the tables is  $\exp(\beta_i)$ , or the hazard ratio.
  - If  $\beta_x > 1$ , then an increase in  $x$  implies a higher hazard ratio (and thus a higher probability of delinquency)
  - If  $\beta_x < 1$ , then an increase in  $x$  implies a lower hazard ratio (and thus a lower probability of delinquency)