Financial Crisis and Bank Lending

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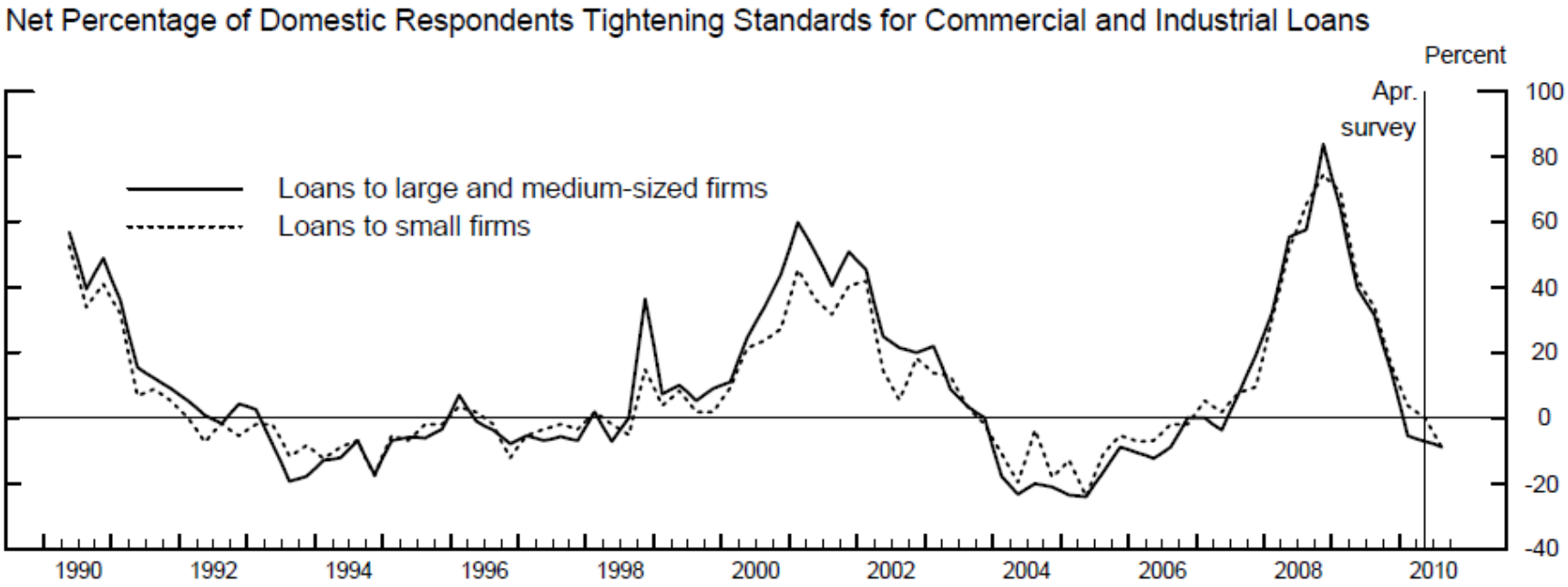
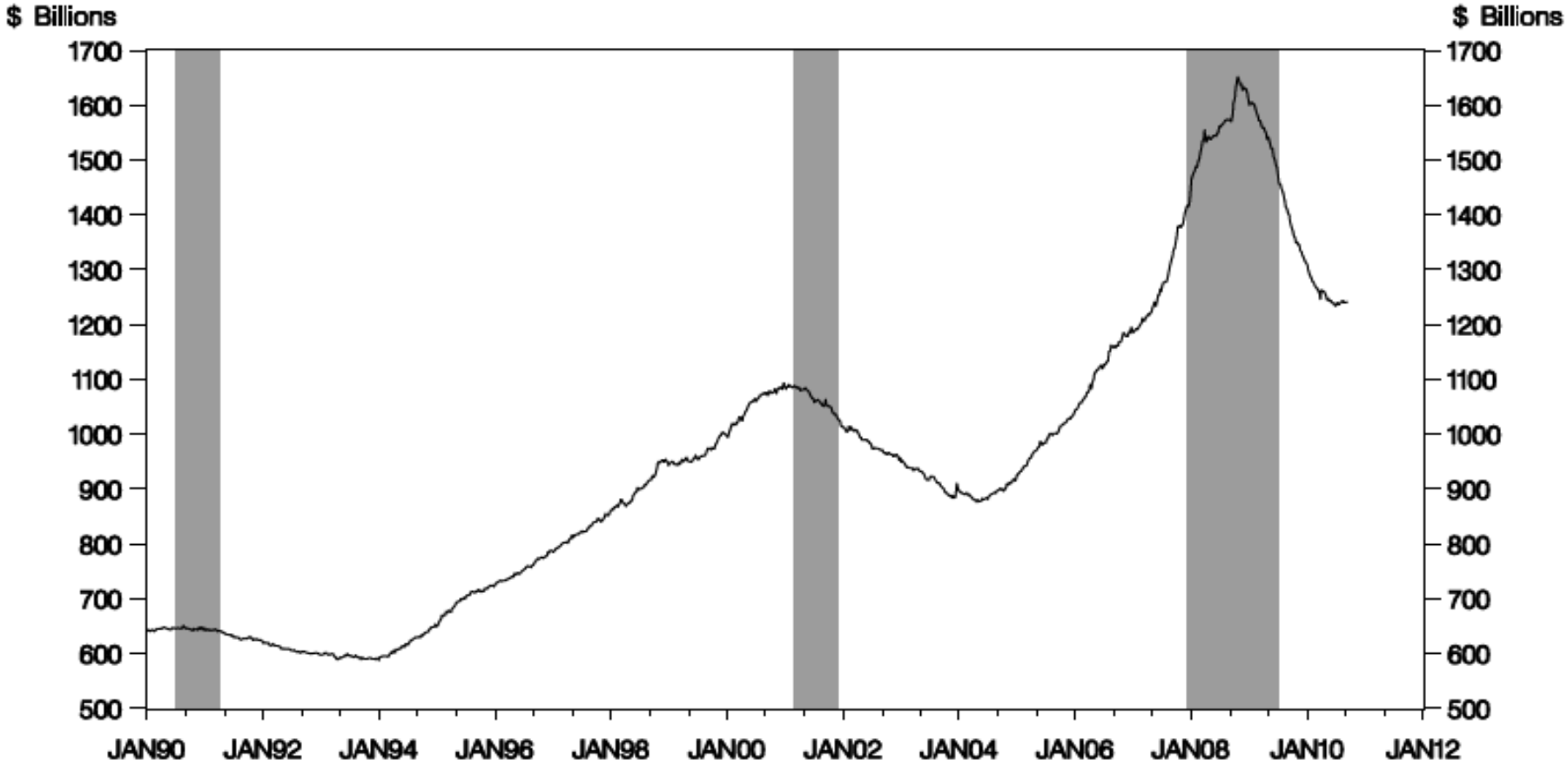
Senior Loan Officers Opinion Survey



BANK C&I LENDING, SEASONALLY ADJUSTED, WEEKLY



Last observation: 9/8/2010

Research Questions

- ***How*** banks tighten C&I loan terms?

- ***Why*** banks tighten credit?

Basic Ideas

- Use transaction data for over 1 million C&I loans from 1997-2010 to study loan terms during and after the crisis, controlling for loan characteristics and bank fixed-effects.

- Test supply-side effects on loan terms in cross-sectional regressions.

Data

- FR Survey of Terms of Business Lending (STBL)
  - Collects all C&I loans made by about 350 banks.
  - 1st business week of mid-month of quarter.
  - Include large and small banks from every District.
  - Start collecting risk rating in 1997:Q2.

- Bank financial data from Call Report

Data

- Sample period: 1997:Q2 to 2010:Q1.
- Exclude term loans.
- Exclude loans with repricing intervals > 1y.
- Report > 10 loans during the survey quarter.
- Final sample: 1,467,657 C&I loans by 419 banks.

Table 1: Descriptive Statistics for Sample Banks, 1997:Q2-2010:Q1
Mean (median)

	All Banks	Large Banks	Medium Banks	Small Banks
Total Assets (in $ millions)	31,392.3 (3,390.7)	95,956.8 (36,366.2)	3,605.5 (2,717.4)	548.0 (543.9)
Deposits-to-Assets	0.749 (0.764)	0.679 (0.685)	0.762 (0.774)	0.821 (0.834)
Capital-to-Assets	0.095 (0.087)	0.091 (0.084)	0.096 (0.088)	0.097 (0.089)
Delinquent Loans-to-Total Loans	0.021 (0.017)	0.023 (0.018)	0.020 (0.016)	0.020 (0.017)
Delinquent Loans-to-Loan Loss Allowance	1.324 (1.184)	1.400 (1.269)	1.270 (1.132)	1.335 (1.129)
Unused Commitments-to-Loans	0.448 (0.327)	0.687 (0.552)	0.389 (0.296)	0.235 (0.207)
Return on Assets (in %)	0.274 (0.301)	0.257 (0.310)	0.274 (0.305)	0.298 (0.282)
Number of Banks	419	97	237	154

Table 2: Descriptive Statistics for C&I Loans, 1997:Q2-2010:Q1

All loans

Mean (median) or fraction

	All Banks	Large Banks	Medium Banks	Small Banks
Loan Rate (in percent)	6.873 (7.000)	6.672 (6.750)	7.436 (7.750)	8.044 (8.500)
Loan Amount (in $ thousands)	337.4 (40.4)	392.5 (47.0)	175.9 (30.0)	78.0 (20.0)
Minimal Risk	0.019	0.017	0.024	0.033
Low Risk	0.085	0.087	0.066	0.149
Moderate Risk	0.460	0.451	0.491	0.469
Acceptable Risk	0.358	0.366	0.338	0.293
Special Mention	0.079	0.079	0.082	0.057
Not under Commitment	0.106	0.102	0.117	0.133
Secured	0.796	0.780	0.850	0.803
Number of Loans	1,467,657	1,111,828	317,044	38,785

How much banks tighten credit?

$$Y_{ijt} = \alpha X_{ijt} + \sum \lambda_t \text{Time}_t + \sum \mu_j \text{Bank}_j + \varepsilon_{it}$$

Y_{ijt} is the interest rate on loan *i* by bank *j* at time *t*;
X_{ijt} is vector of loan *i* characteristics:

- Log(loan size)
- Rating dummies
- Prime rate dummy
- Non-commitment dummy
- Collateral dummy

Table 3: Results of pooled time-series cross-section regression, 1997:Q2-2010:Q1
(Fixed-effect and time-effect coefficients not reported, robust standard errors in parentheses)

Panel A: All loans

	ALL	LARGE	MEDIUM	SMALL
PRIME	0.758***	0.838***	0.450***	-0.253
	(0.124)	(0.150)	(0.074)	(0.154)
LOANSIZE	-0.209***	-0.210***	-0.197***	-0.203***
	(0.019)	(0.023)	(0.018)	(0.016)
RATE2	0.227**	0.133	0.473***	0.950***
	(0.109)	(0.137)	(0.136)	(0.139)
RATE3	0.647***	0.562***	0.861***	1.362***
	(0.152)	(0.203)	(0.148)	(0.137)
RATE4	0.810***	0.692***	1.145***	1.741***
	(0.092)	(0.116)	(0.149)	(0.164)
RATE5	1.252***	1.190***	1.407***	1.893***
	(0.099)	(0.129)	(0.148)	(0.226)
NONCOMMIT	0.363***	0.333**	0.418***	0.299***
	(0.106)	(0.140)	(0.079)	(0.107)
SECURE	-0.089	-0.080	-0.148	-0.122**
	(0.075)	(0.088)	(0.108)	(0.050)
Adjusted R^2	0.807	0.804	0.808	0.779
N	1,467,657	1,111,828	317,044	38,785

Figure 1: Time Effect and Interest Rates

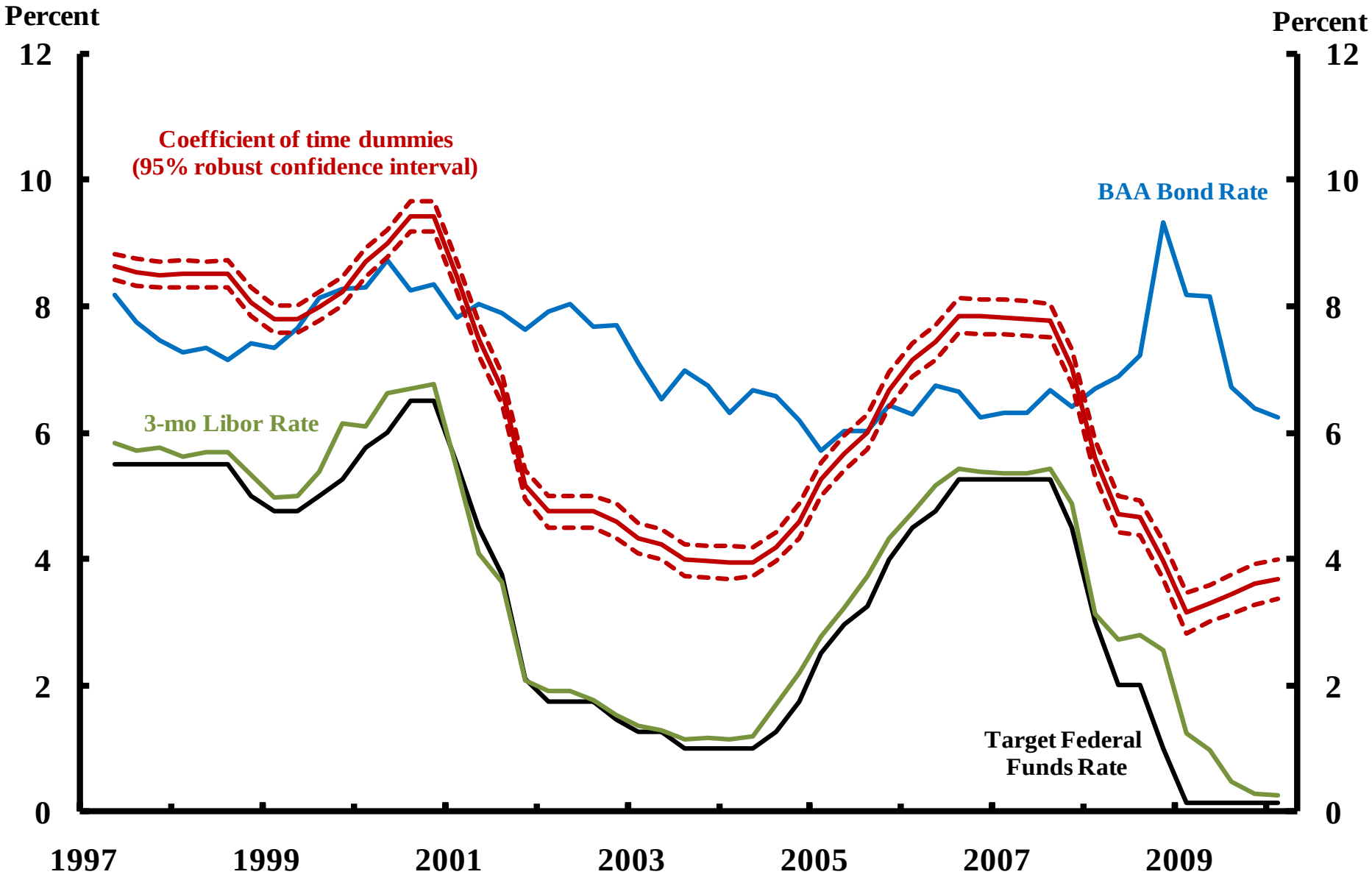


Figure 2: Spread of Coefficient of Time Effect Dummies over Fed Funds Rate

(95% confidence interval from robust standard errors)

All banks - all loans

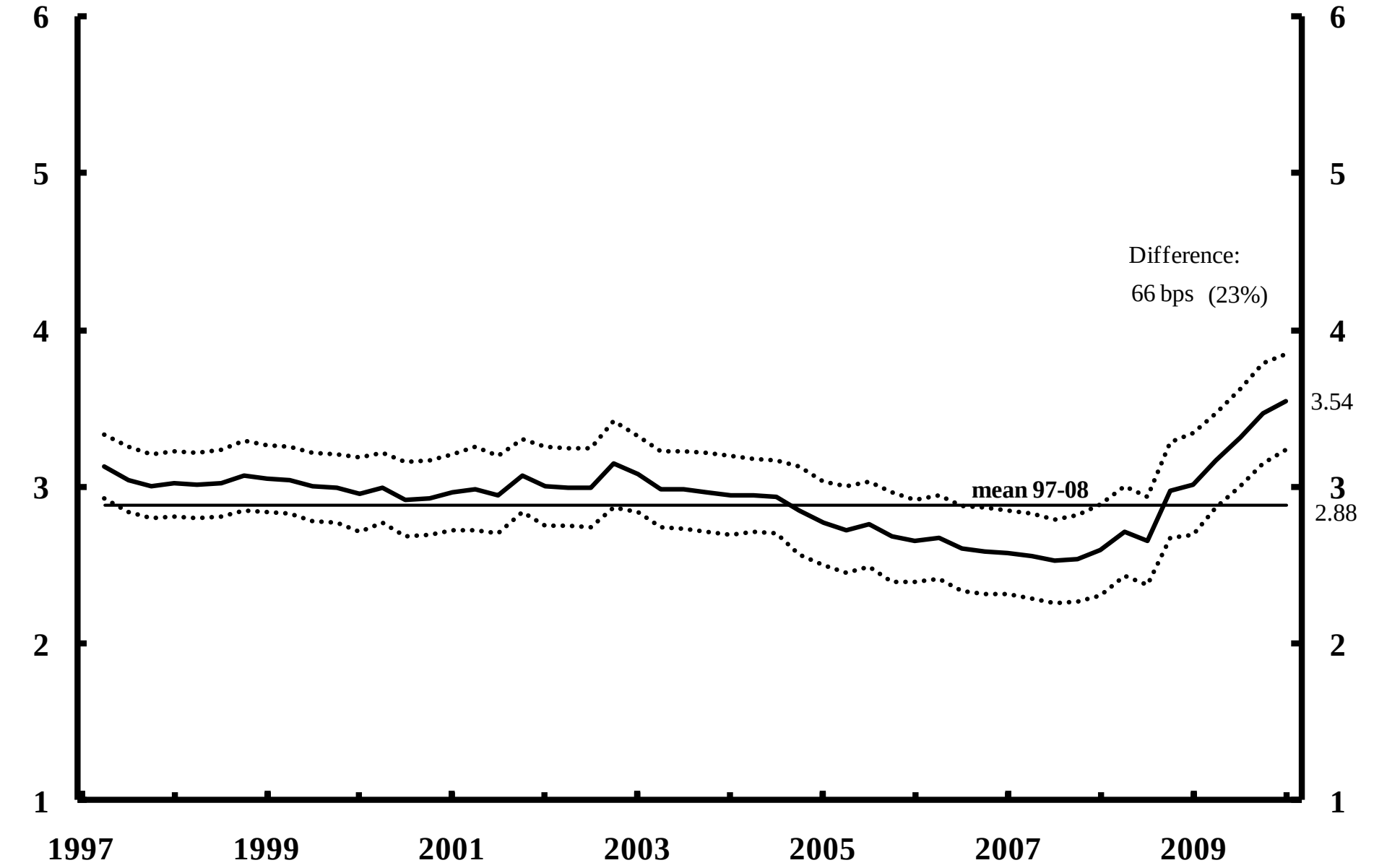


Figure 6: Spread of Coefficient of Time Effect Dummies over Fed Funds Rate

(95% confidence interval from robust standard errors)

All banks - large loans (>$1M)

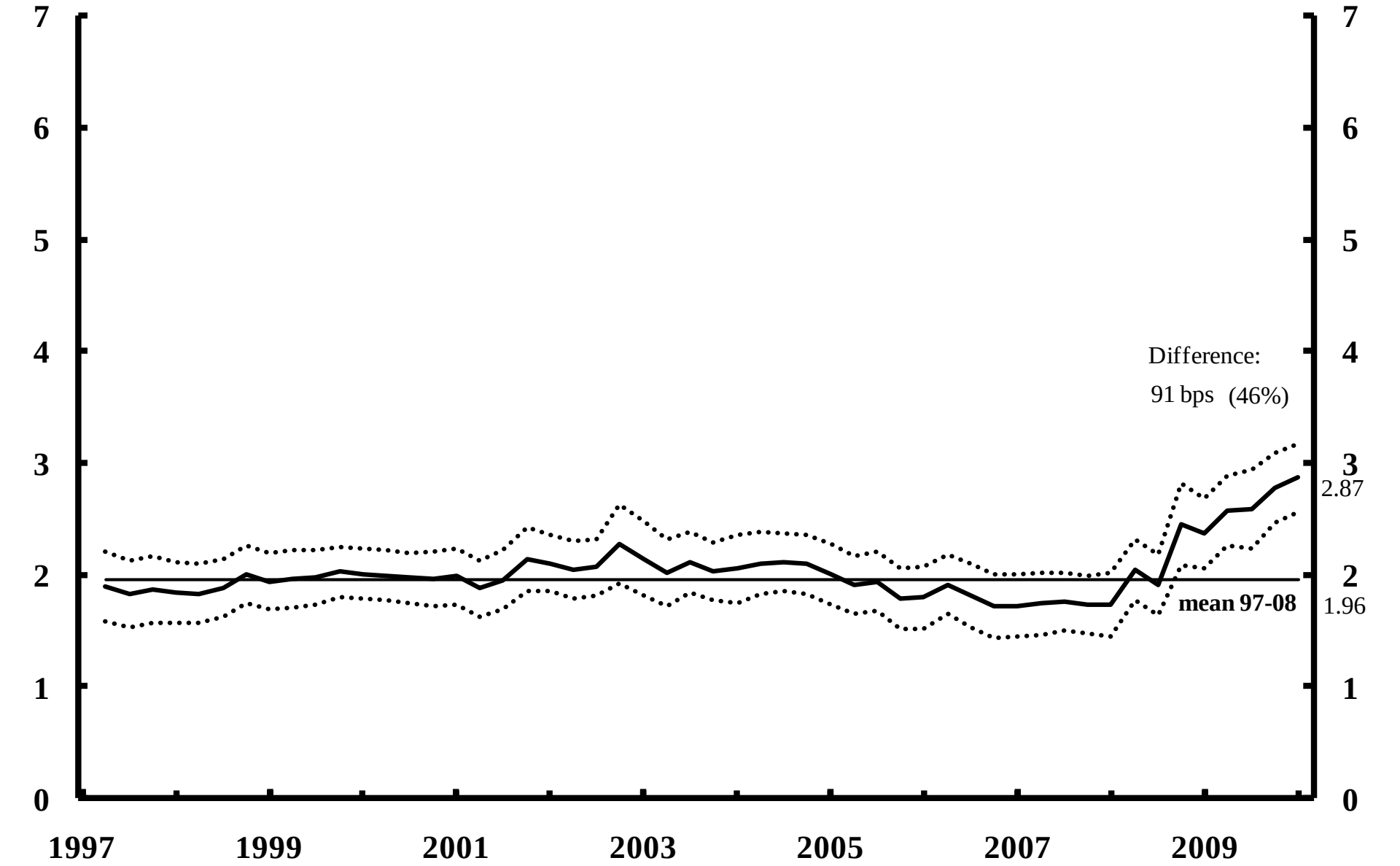
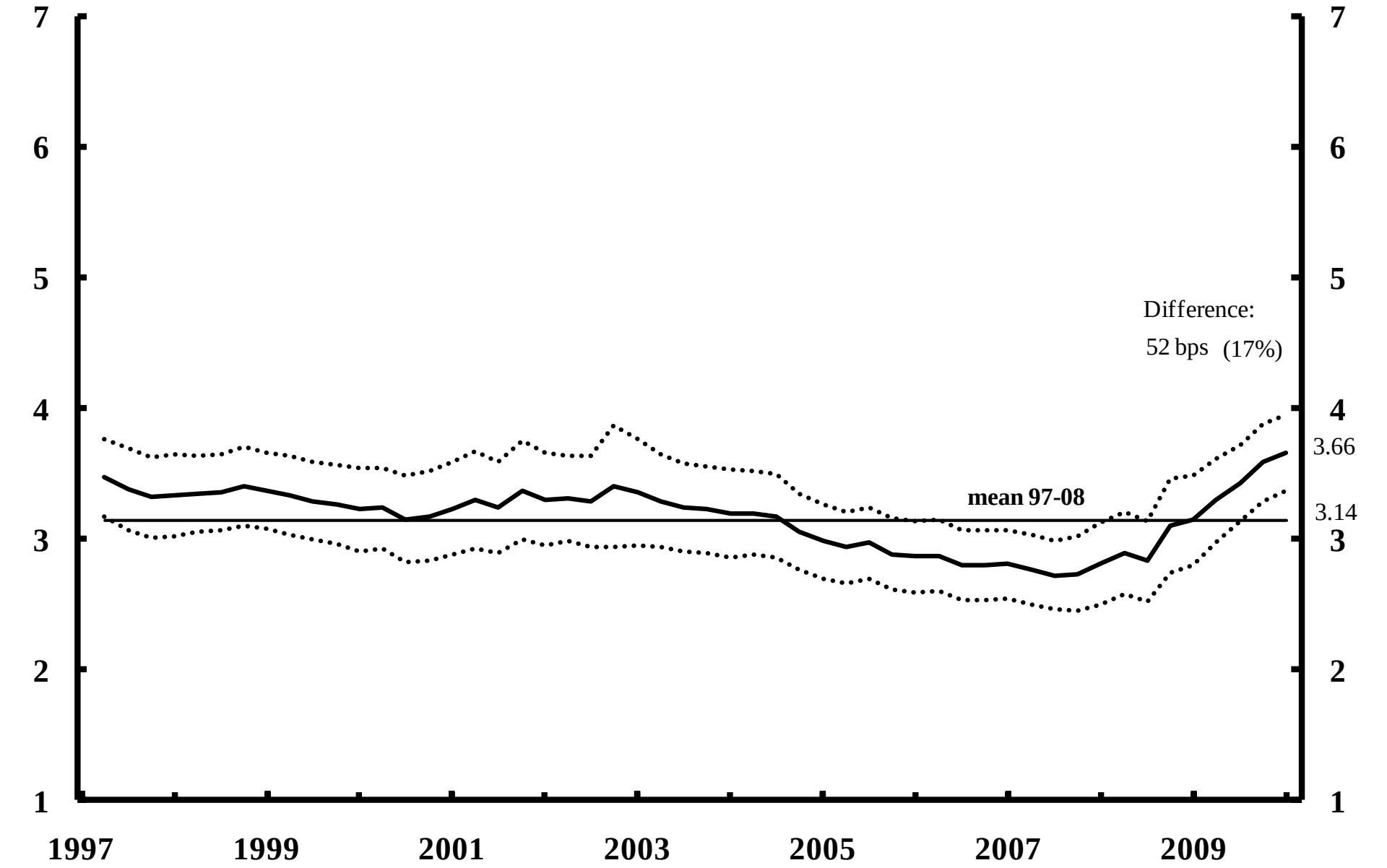


Figure 10: Spread of Coefficient of Time Effect Dummies over Fed Funds Rate

(95% confidence interval from robust standard errors)

All banks - small loans (< $50K)



Supply-side Effects on Loan Terms

At each quarter, run cross-section regression:

$$Y_{ijt} = \theta_t + \alpha_t X_{ijt} + \beta_t Z_{jt} + \upsilon_{it}$$

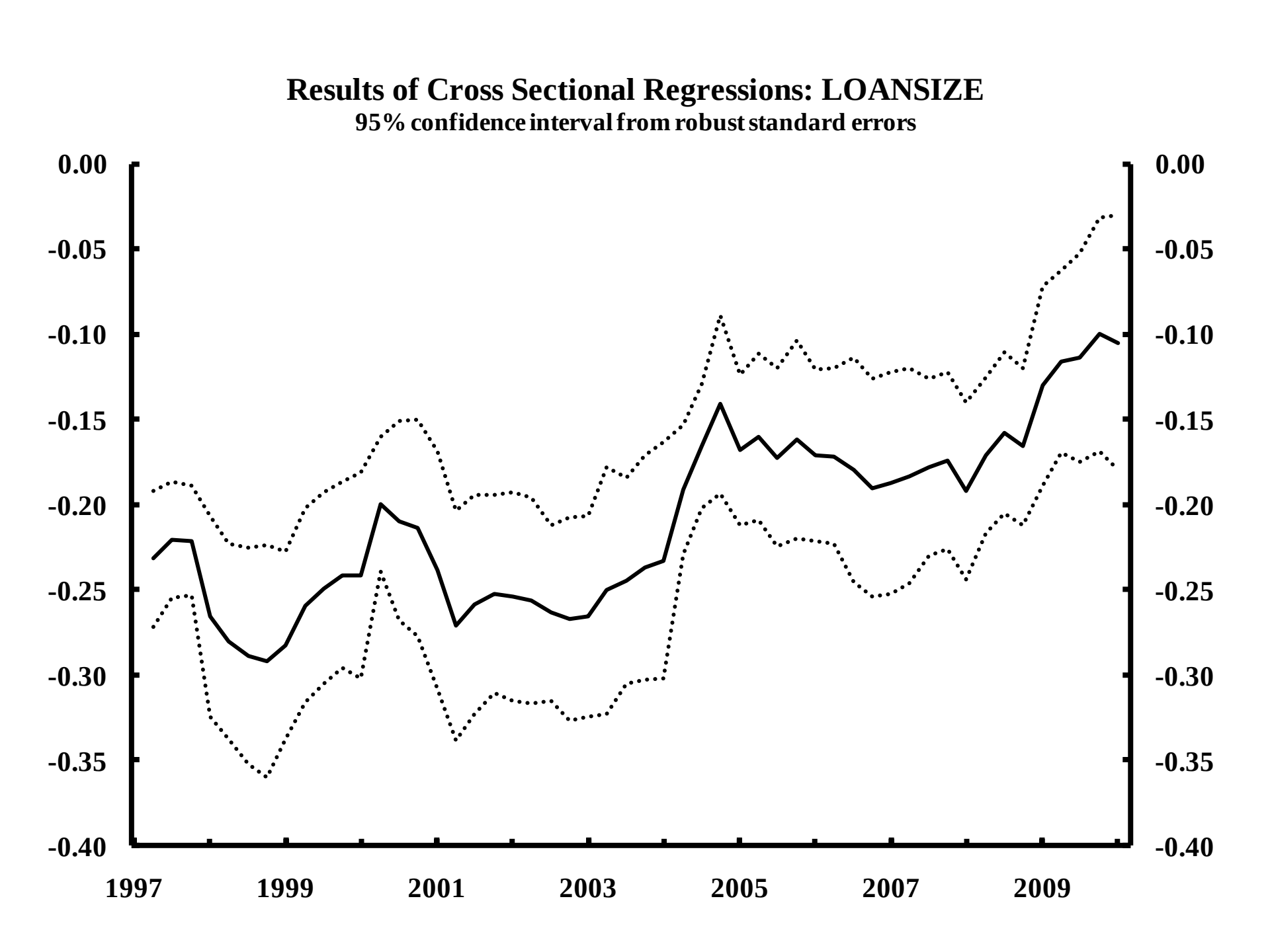
Z_{jt} is a vector of bank *j*'s characteristics at time *t*:

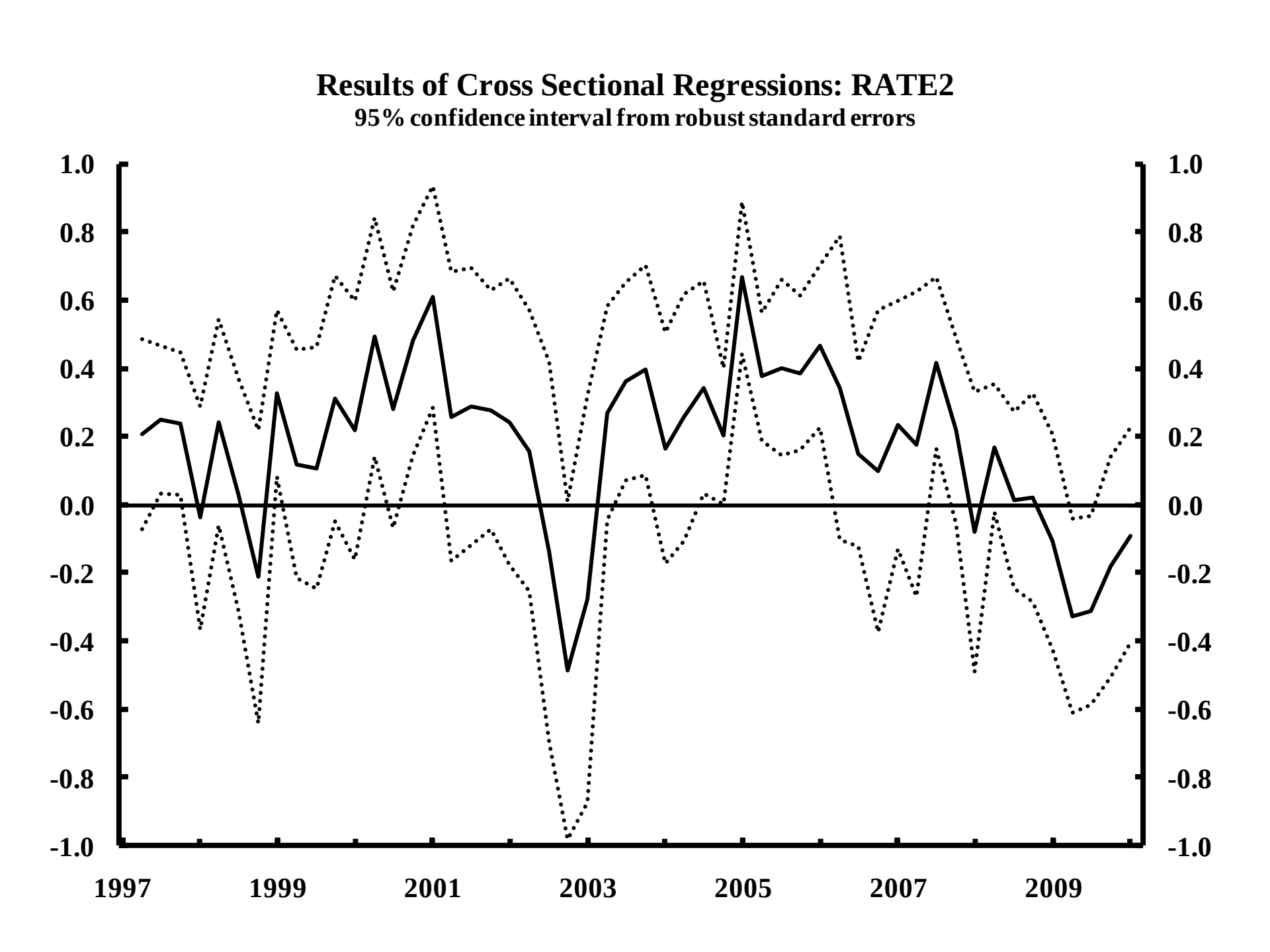
BADLOAN = ratio of past due and nonaccrual loans to loan loss reserve

CAPITAL = ratio of book capital to total assets

UNCOMMIT = Log(unused credit lines to total loans)

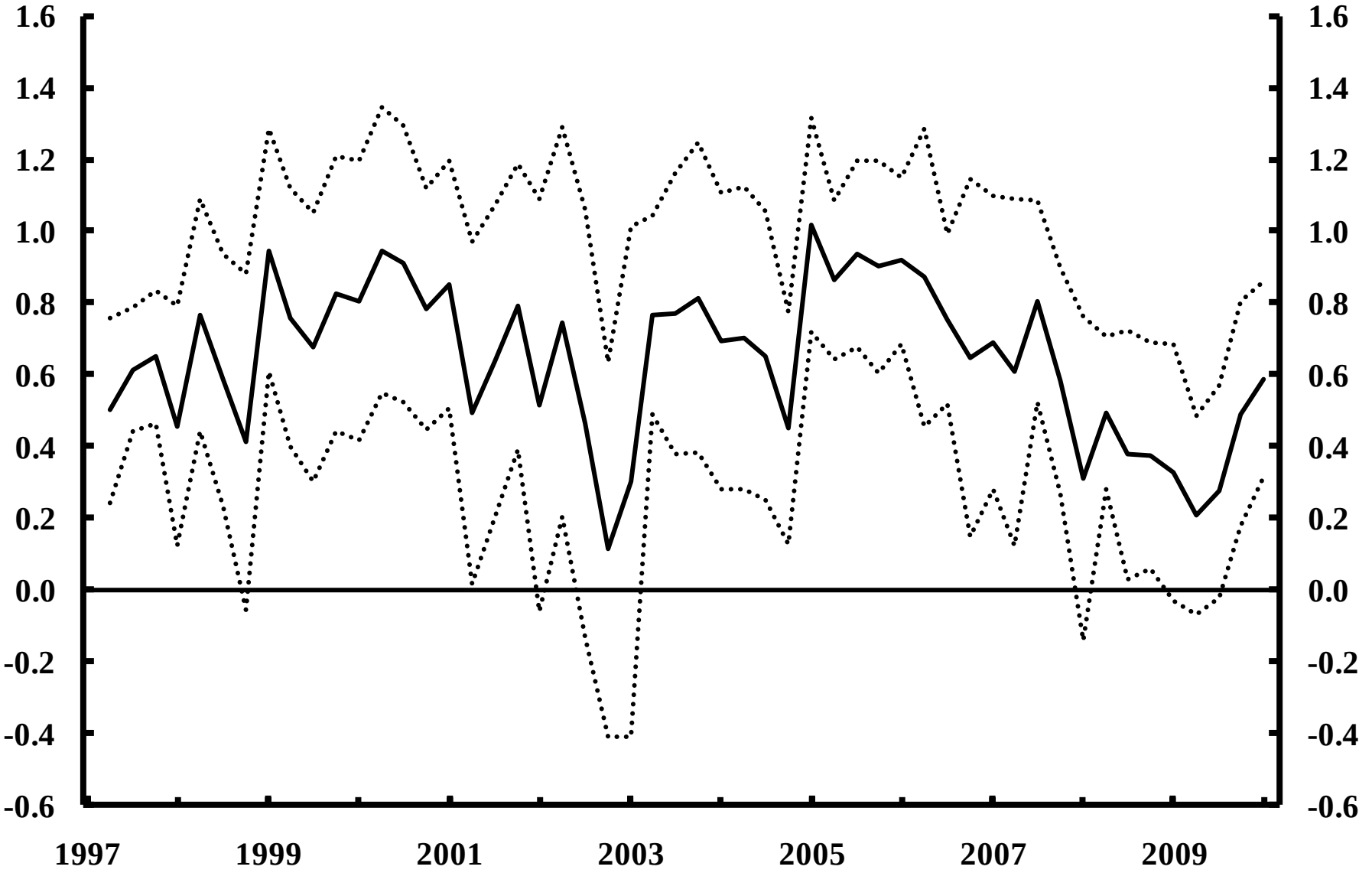
ROA = return on assets

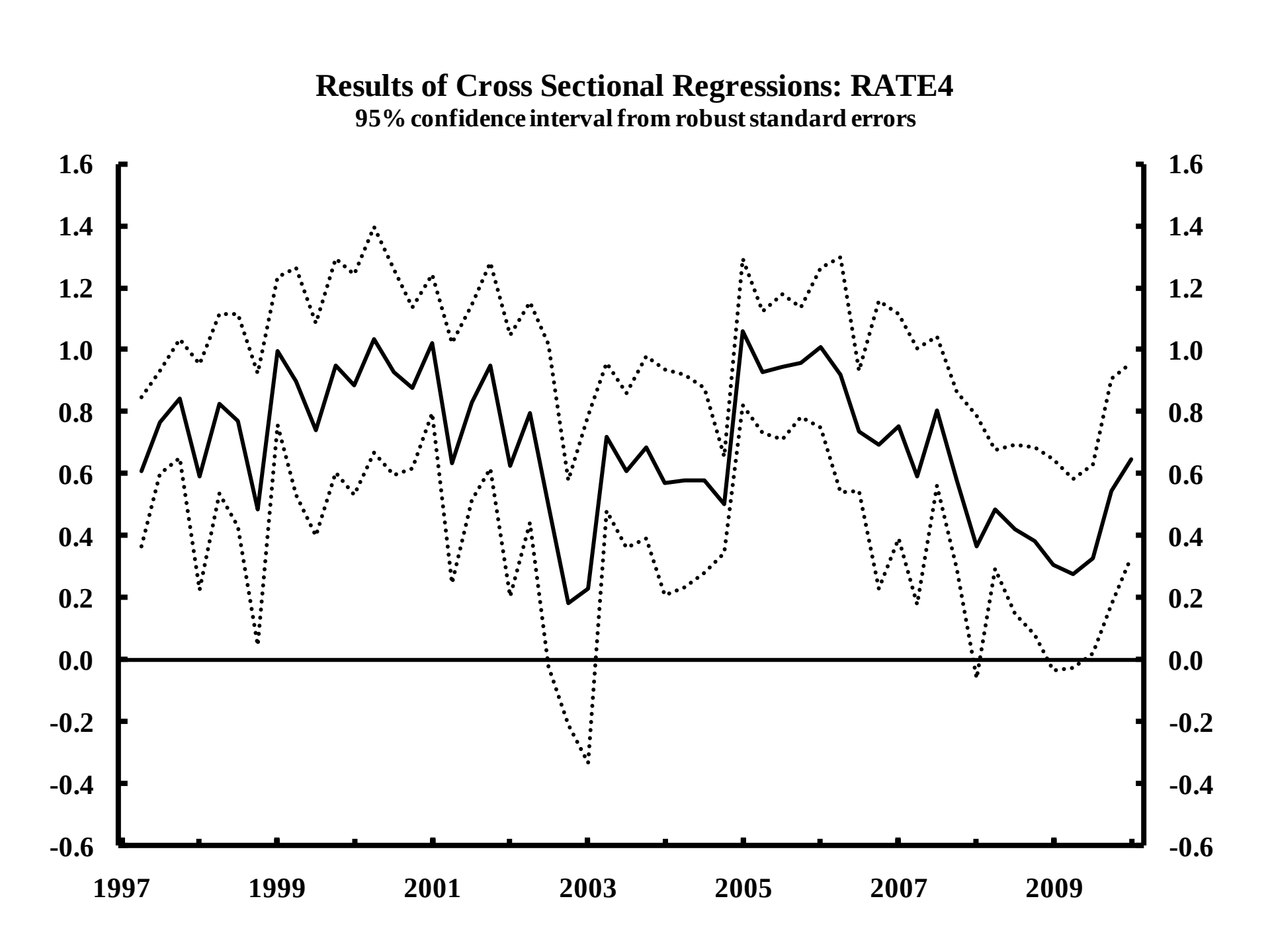

Results of Cross Sectional Regressions: LOANSIZE
95% confidence interval from robust standard errors
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
-0.30
-0.35
-0.40
1997
1999
2001
2003
2005
2007
2009

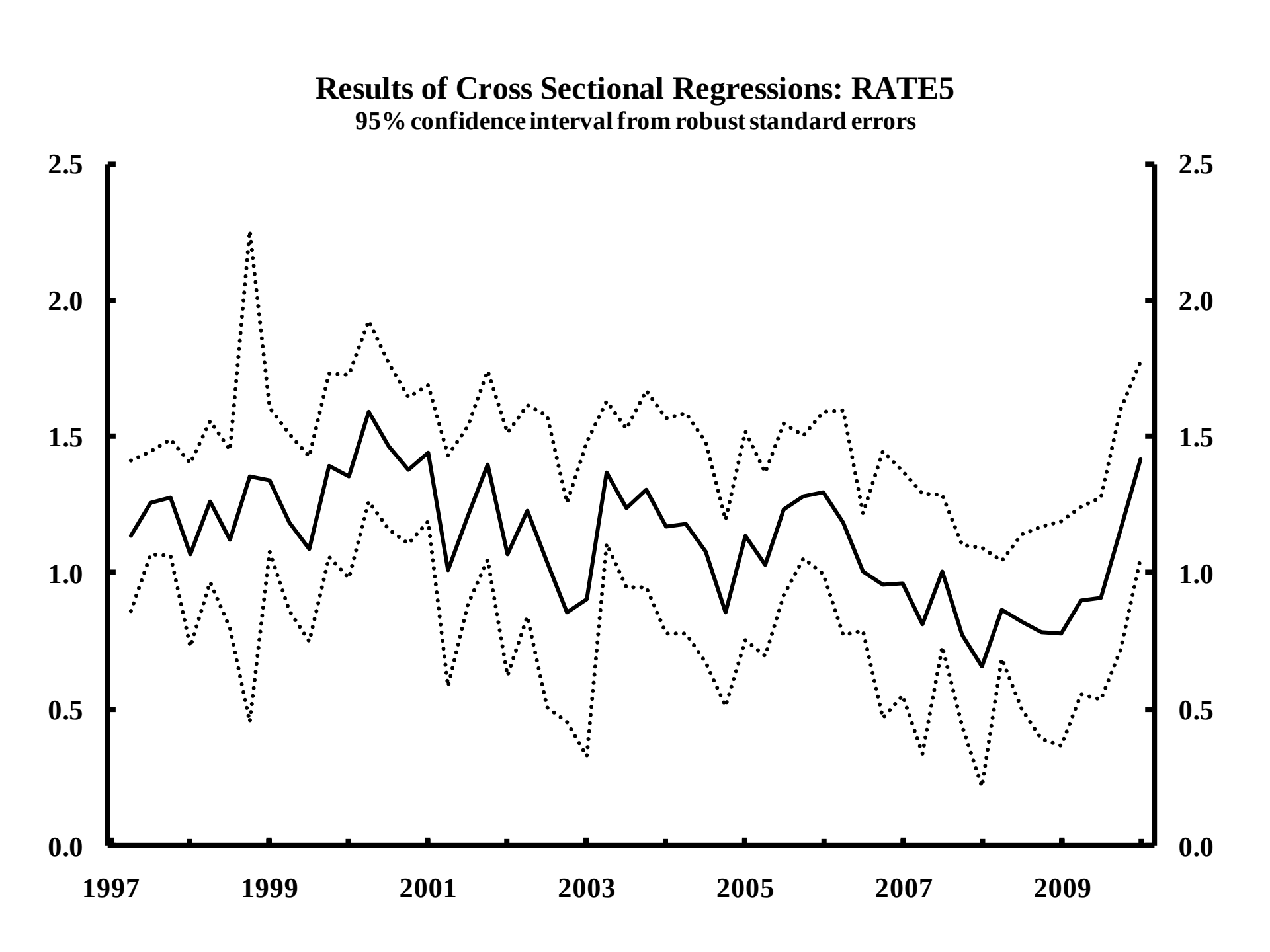

Results of Cross Sectional Regressions: RATE2
95% confidence interval from robust standard errors
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
1997
1999
2001
2003
2005
2007
2009

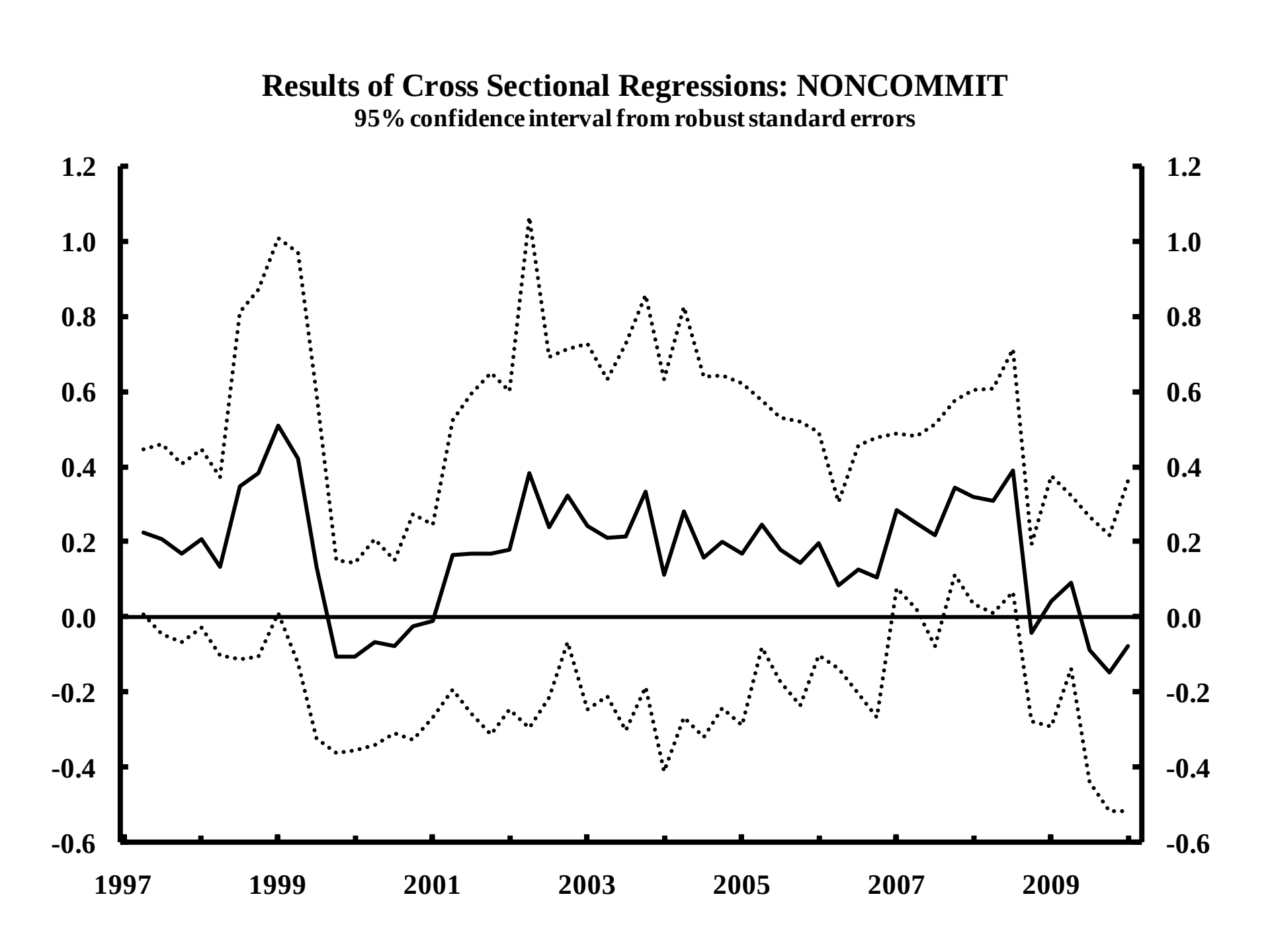
Results of Cross Sectional Regressions: RATE3

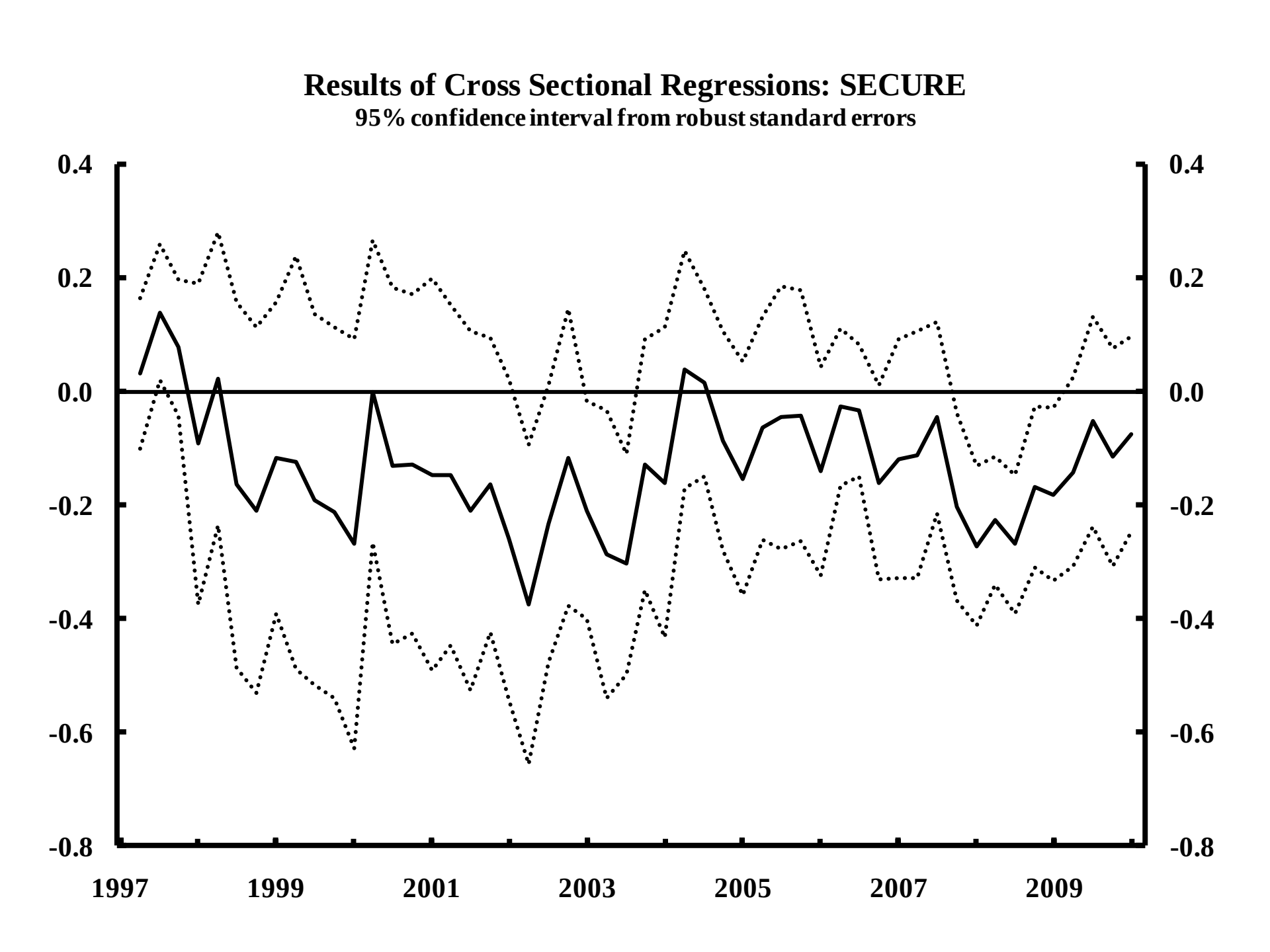
95% confidence interval from robust standard errors

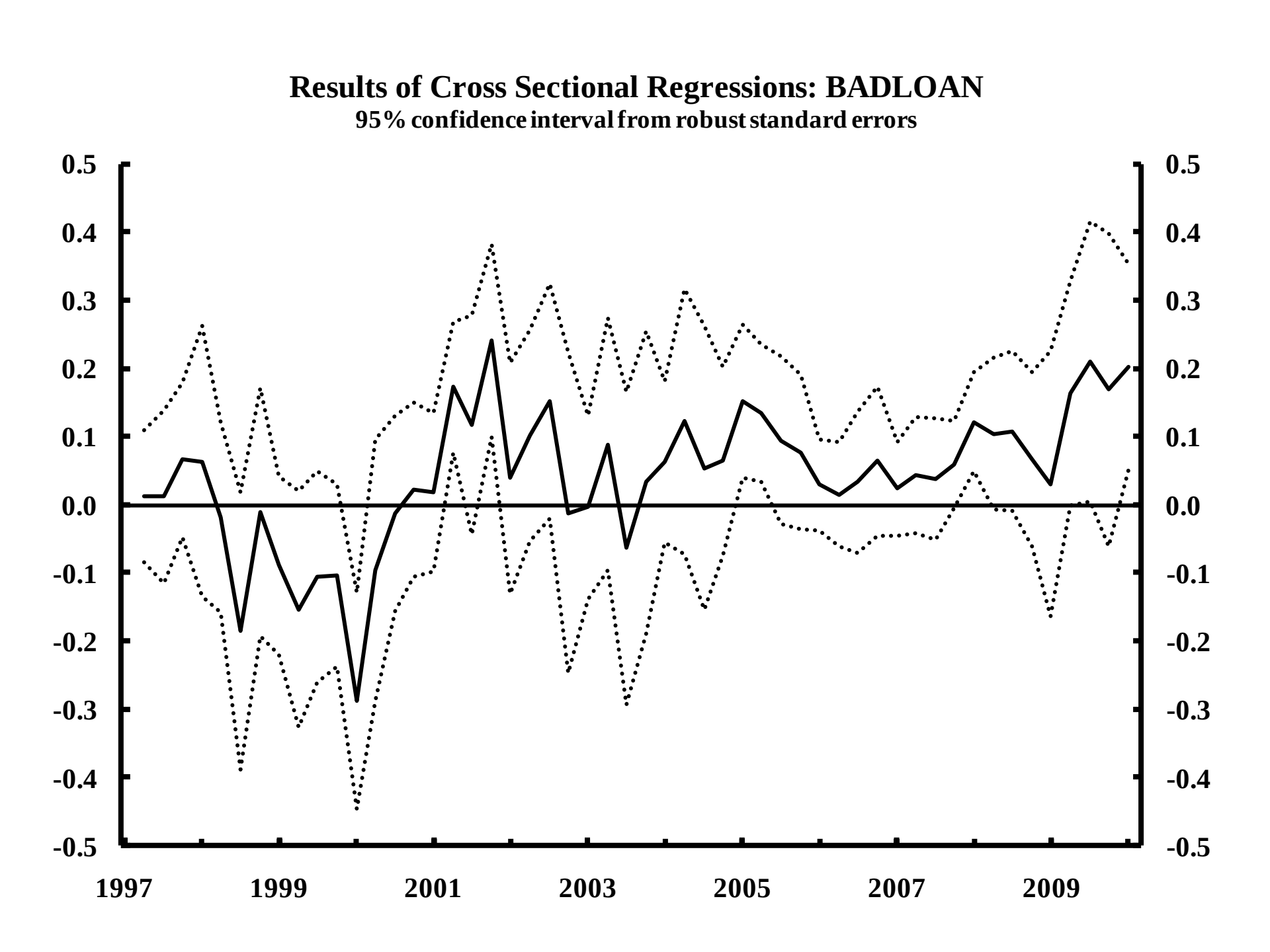


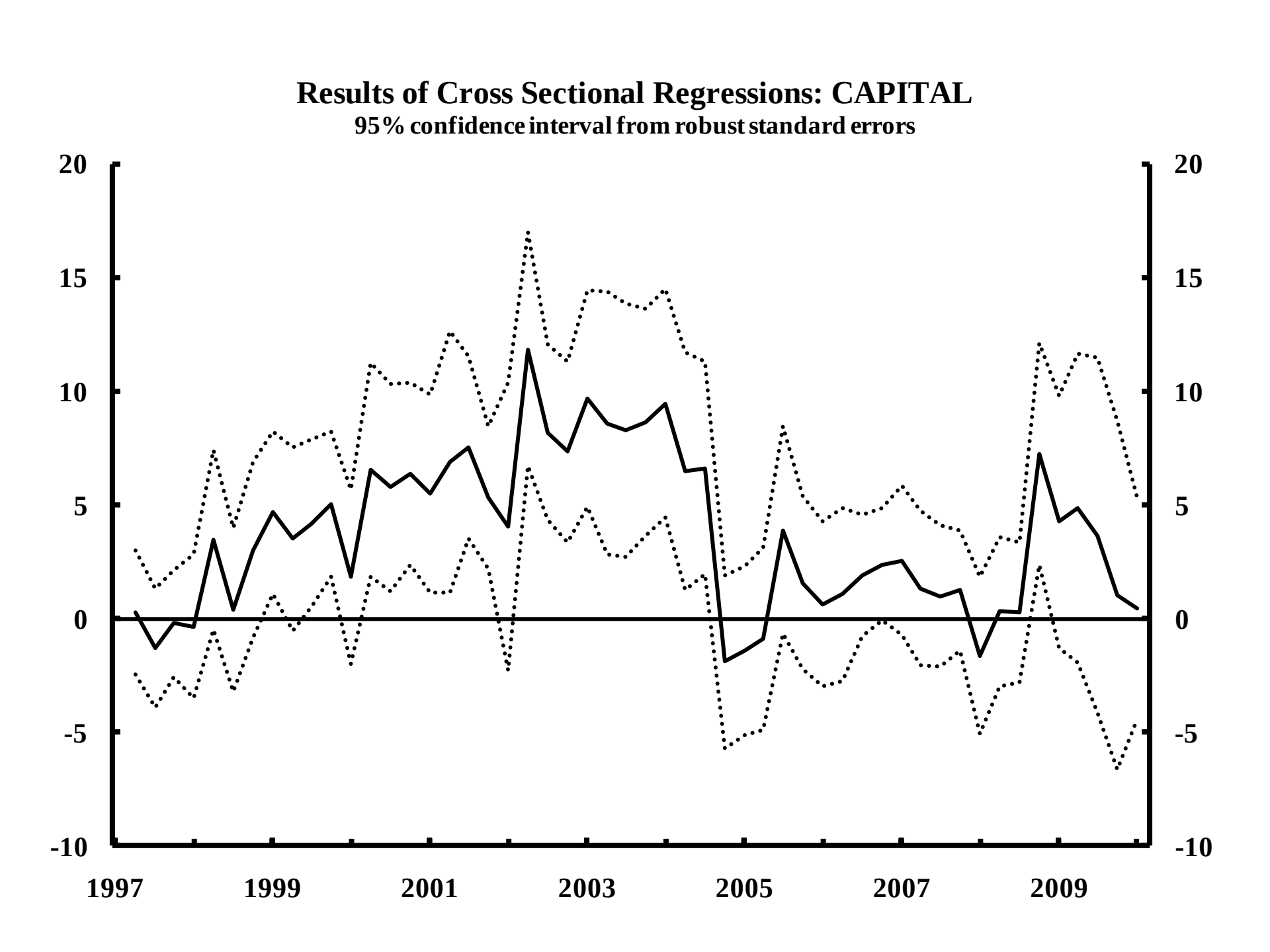

Results of Cross Sectional Regressions: RATE4
95% confidence interval from robust standard errors
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
1997
1999
2001
2003
2005
2007
2009

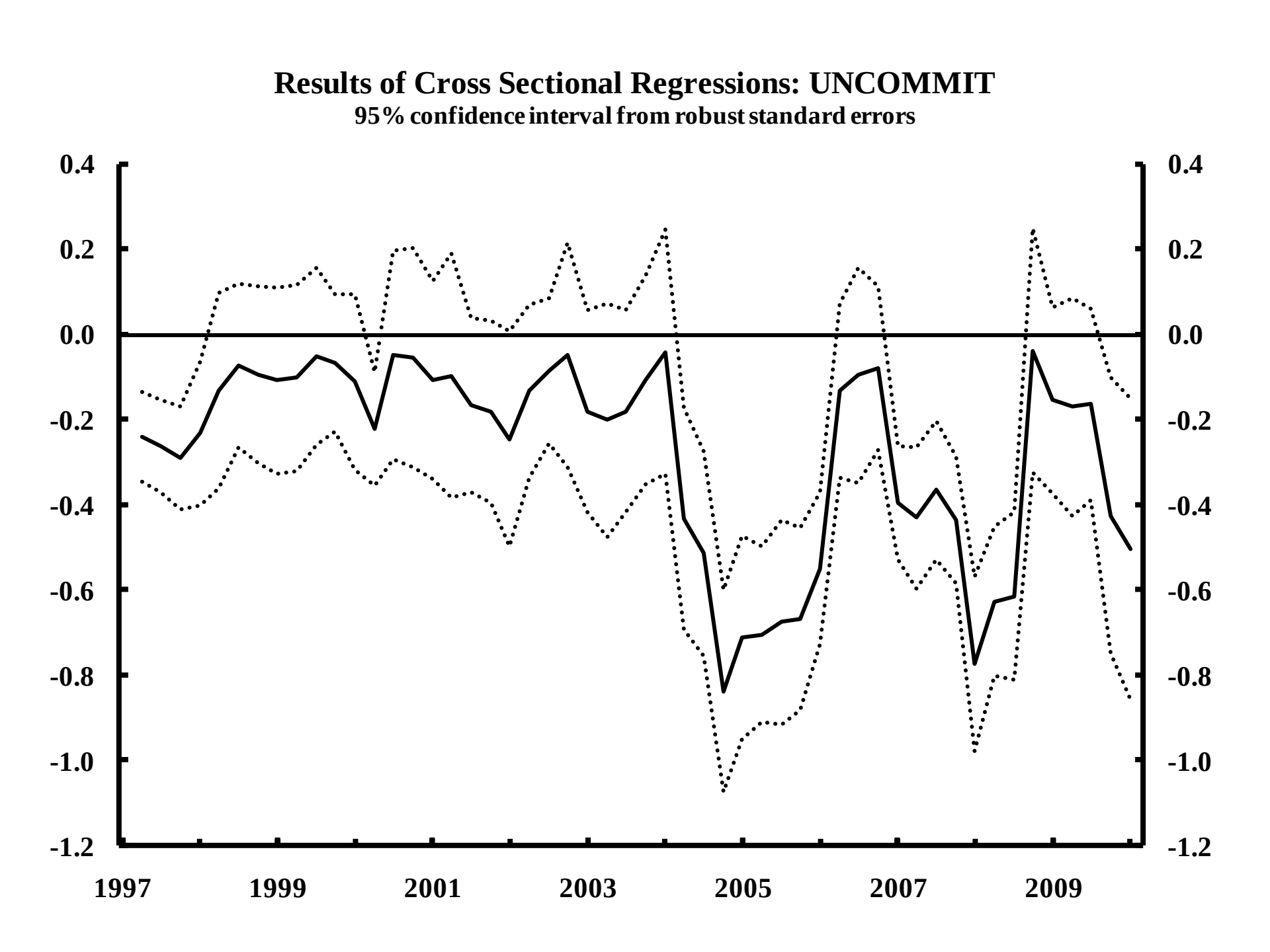

Results of Cross Sectional Regressions: RATE5
95% confidence interval from robust standard errors
2.5
2.0
1.5
1.0
0.5
0.0
1997
1999
2001
2003
2005
2007
2009


Results of Cross Sectional Regressions: NONCOMMIT
95% confidence interval from robust standard errors
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
1997
1999
2001
2003
2005
2007
2009


Results of Cross Sectional Regressions: SECURE
95% confidence interval from robust standard errors
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
1997
1999
2001
2003
2005
2007
2009


Results of Cross Sectional Regressions: BADLOAN
95% confidence interval from robust standard errors
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
1997
1999
2001
2003
2005
2007
2009


Results of Cross Sectional Regressions: CAPITAL
95% confidence interval from robust standard errors
20
15
10
5
0
-5
-10
1997
1999
2001
2003
2005
2007
2009


Results of Cross Sectional Regressions: UNCOMMIT
95% confidence interval from robust standard errors
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
1997
1999
2001
2003
2005
2007
2009

Conclusions

- As of 2010:Q1, C&I loan spread was 66 bps (23%) above normal, 1 percentage point from trough to peak.

- Small loans always have larger spreads than large loans, ***but*** were found tightened ***less***.

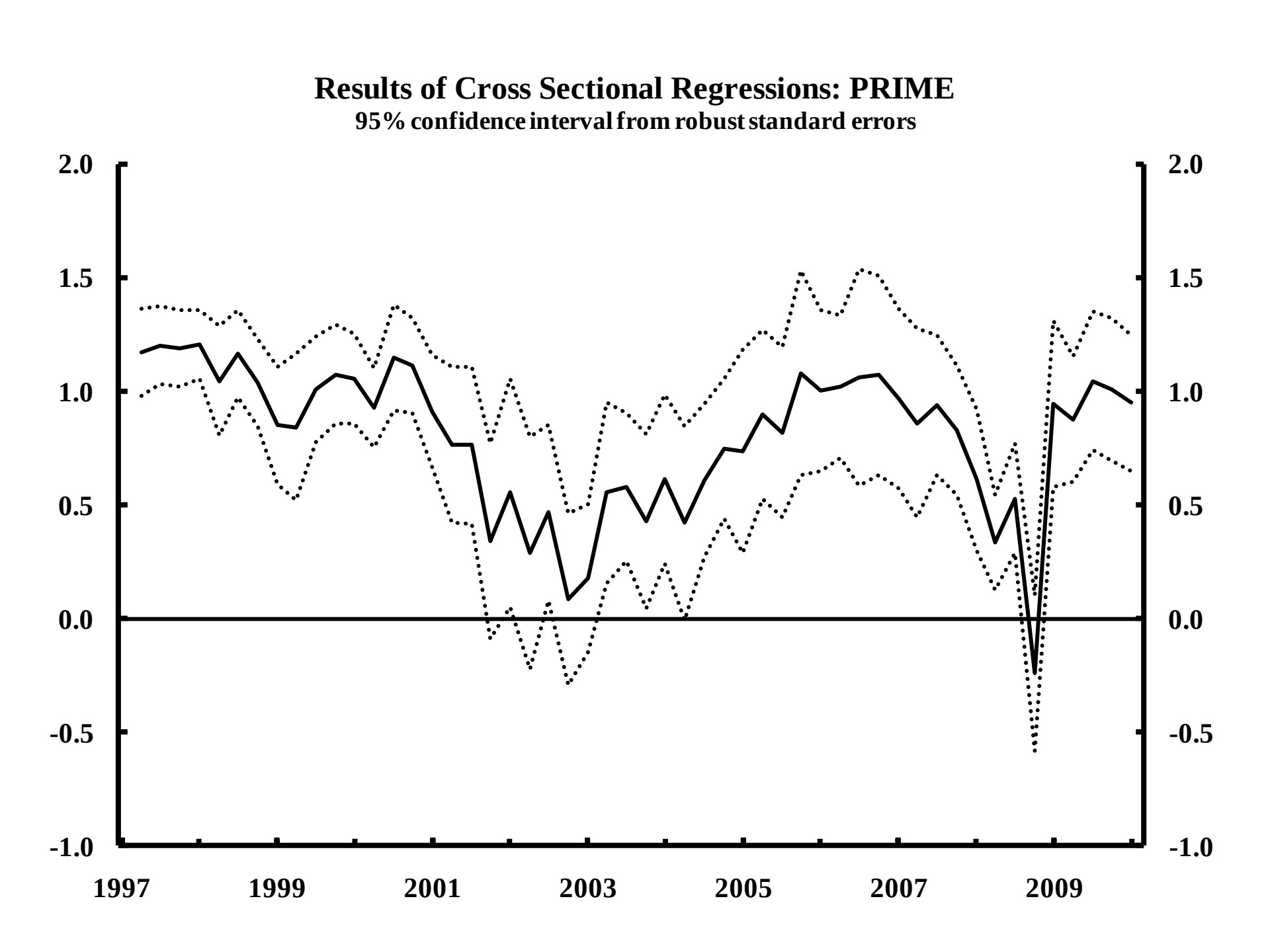
Conclusions on *how* banks tighten

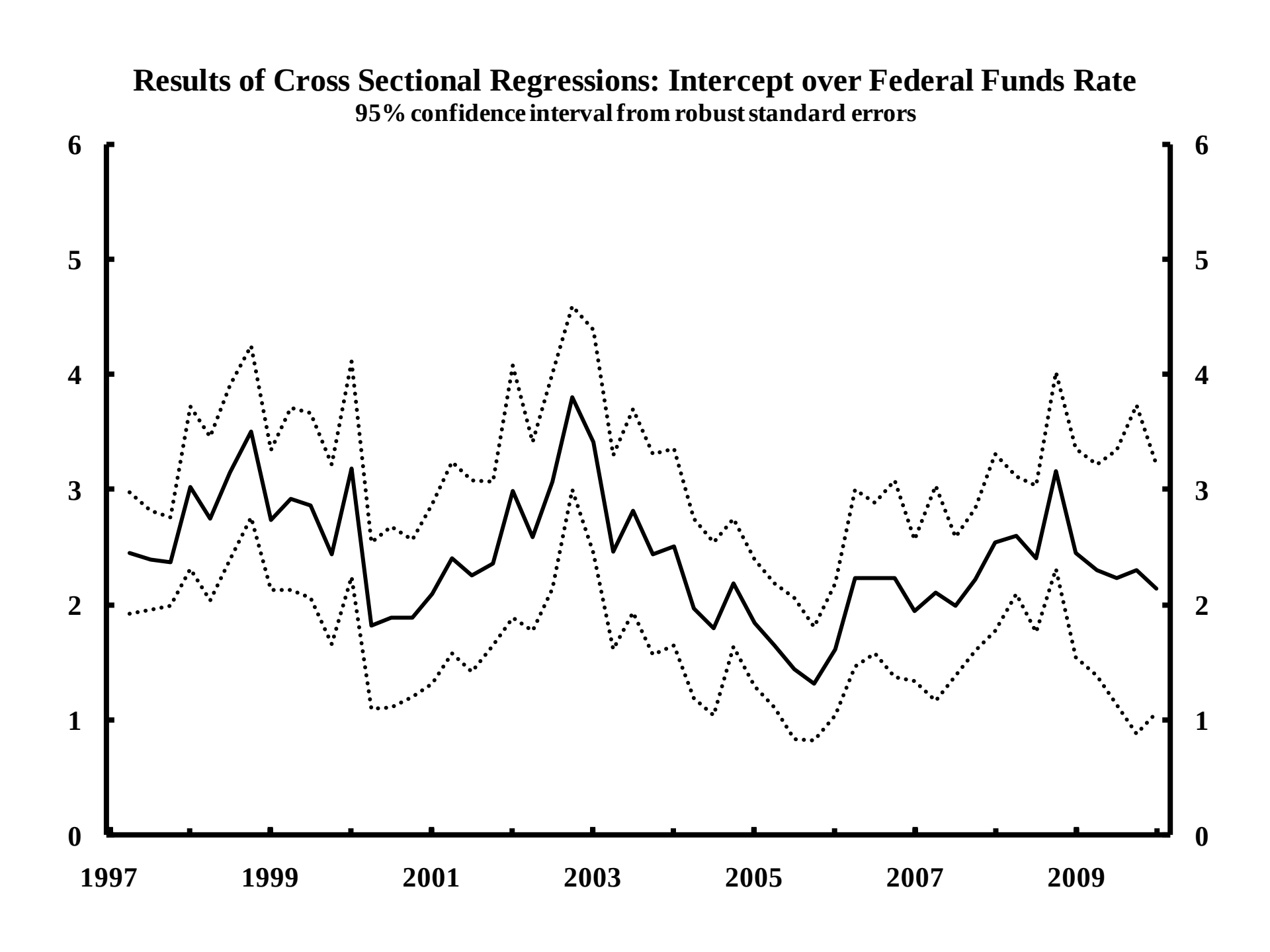
- Higher spread over policy rate.
- Reduce discount on loan size.
- Raise the risk premium.
- Raise premium on noncommitment loans from late 07 to early 08.

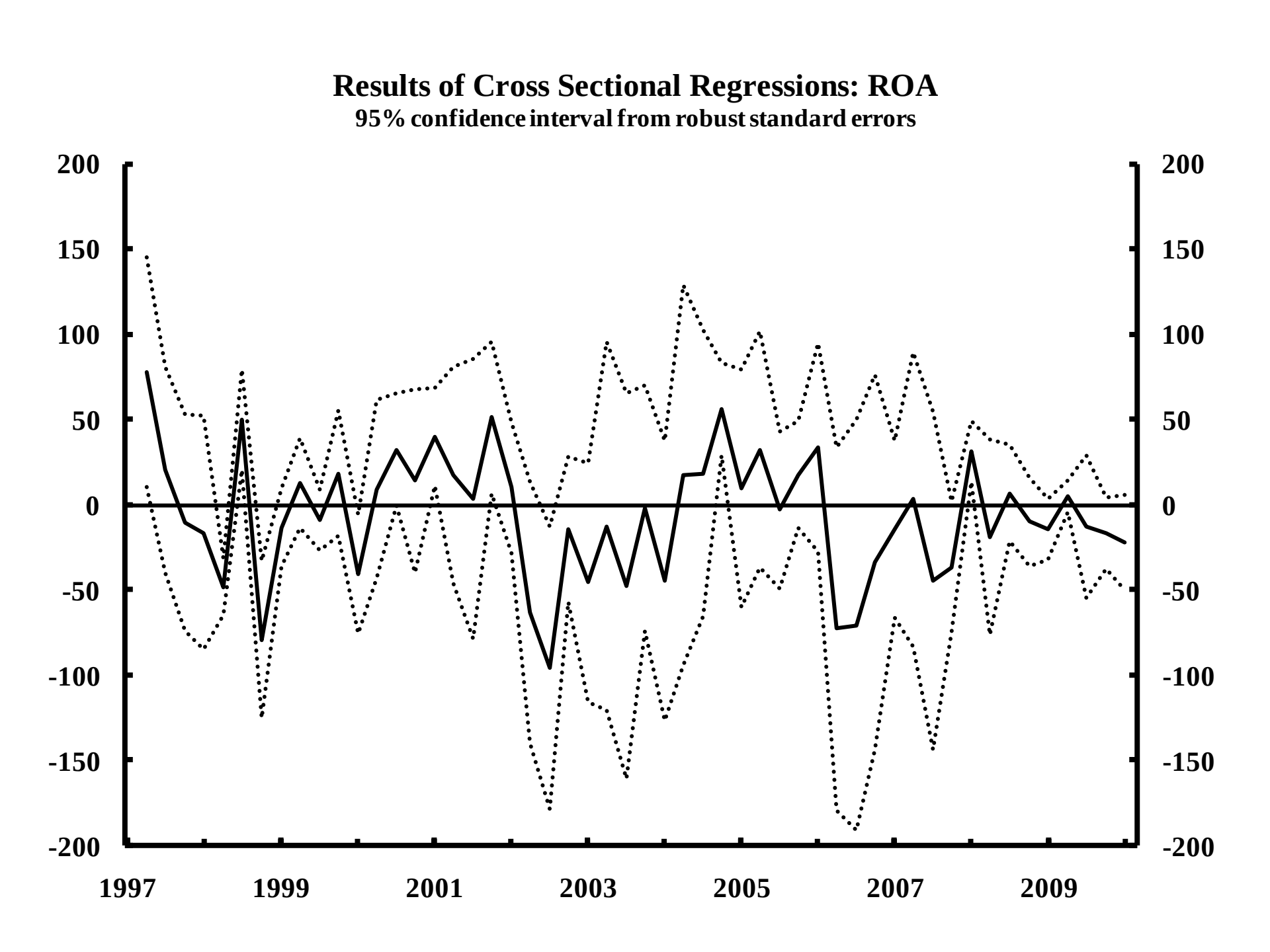
Conclusions on *why* banks tighten

- Banks with more bad loans charge higher rates.
- Banks with more capital charge higher rates.
- Banks with more unused loan commitments charge lower rates.

Thank You!


Results of Cross Sectional Regressions: PRIME
95% confidence interval from robust standard errors
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
1997
1999
2001
2003
2005
2007
2009


Results of Cross Sectional Regressions: Intercept over Federal Funds Rate
95% confidence interval from robust standard errors
6
5
4
3
2
1
0
1997
1999
2001
2003
2005
2007
2009


Results of Cross Sectional Regressions: ROA
95% confidence interval from robust standard errors
200
150
100
50
0
-50
-100
-150
-200
1997
1999
2001
2003
2005
2007
2009