

Cause or Effect: Supervisory Guidance and the Collapse of Commercial Real Estate

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- Commercial real estate sector was part of the boom and bust of the 2000s.
- Strict new supervisory policies on CRE loans took effect in 2006 just before the financial crisis emerged.
- These policies are an example of a targeted macroprudential approach.

Macroprudential Financial Policy

- Seeks to protect the stability of the U.S. financial system while promoting sustainable economic growth.
- Embodied in recent financial regulations such as the Dodd-Frank Act and Basel III.
- One approach: prevent excess concentrations in specific asset classes.

- Shocks in the banking system can propagate to the real economy.
 - Bernanke(1983)
- Increased supervisory stringency, particularly during economic downturns, restricts loan supply
 - Peek and Rosengren(1995), Curry, Fissel, and Ramirez(2008), Bassett, Lee, and Spiller (2012)
- Well-capitalized banks grow faster while requiring higher levels of capital generally reduces lending
 - Bernanke and Lown (1991), Hall(1993), Furfine(2000,2001)
- Banks over the thresholds originated fewer non-performing loans but faced greater potential credit and liquidity risk due to their concentrations of CRE holdings.
 - Lopez(2007), Pana(2010)

- Prior periods of banking distress, particularly during the late 1980s, have been linked to CRE concentrations.
- CRE is a volatile sector
- Regulators hoped to limit bank failures resulting from downturns in CRE prices.

Guidance took a two-pronged approach:

- Ensure adequate risk management for all CRE lending banks
- **Unprecedented** and **unexpected** use of numerical thresholds determine 'concentrated' banks.
 - Ratio of CRE to risk-based capital > 300%
 - 36 mo. CRE growth > 50%
 - Ratio of CLD to risk-based capital > 100%

Increased supervisory analysis at concentrated banks to achieve

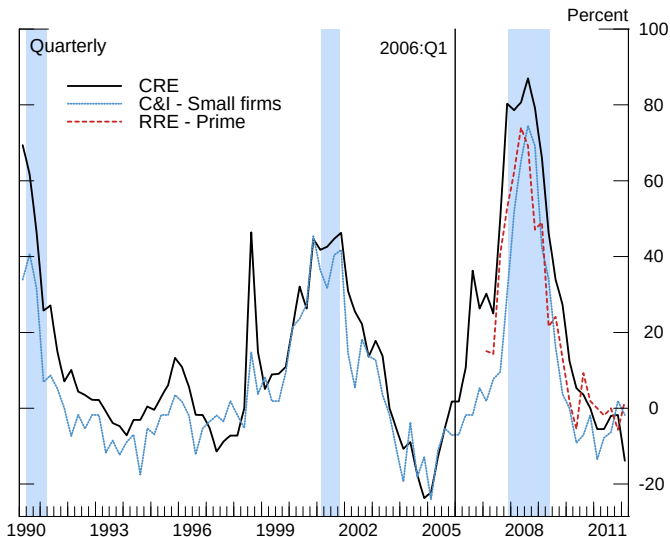
- Changes in underwriting standards
- Further diversification of the loan portfolio
- Reassessment of the risk management strategy
- Higher required capital levels

GAO - May 2011

- Guidance has been applied stringently and often incorrectly.
- Thresholds are often treated as strict caps
- Guidance may have contributed to the significant decline in CRE lending.

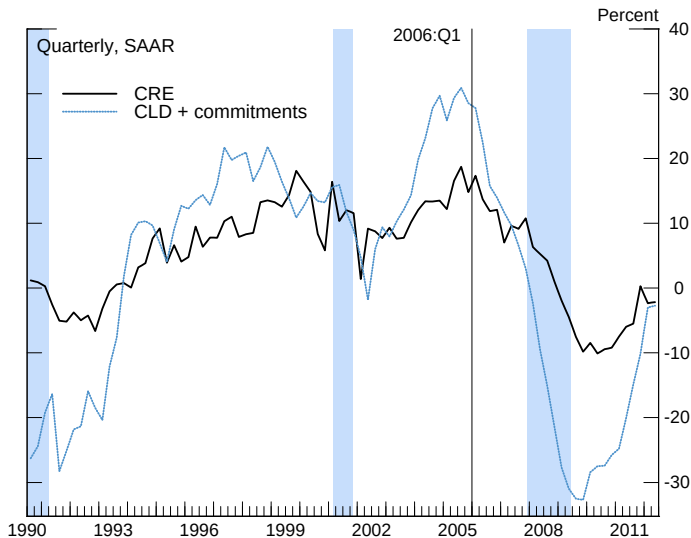
Thus, the CRE guidance is a 'natural experiment' providing empirical identification.

Net Percentage of Domestic Banks Tightening Standards



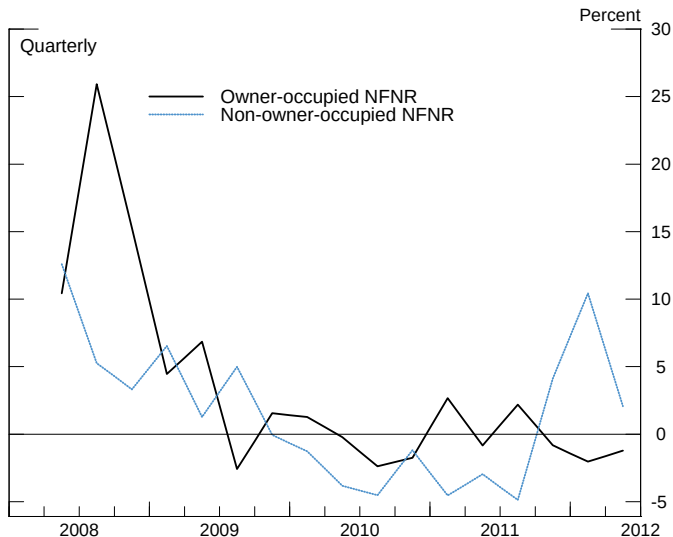
Source: Senior Loan Officer Opinion Survey

Growth of CRE Lending, by component



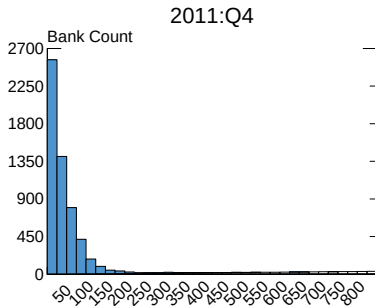
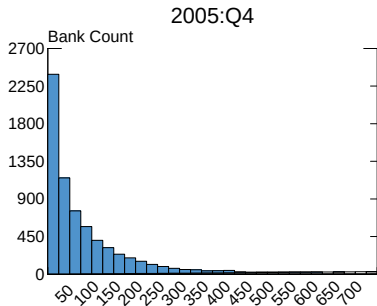
CRE includes loans for construction and land development, multifamily housing, and loans secured by nonfarm, nonresidential structures and off-balance sheet commitments.

Growth of CRE Loans for Existing Structures



Source: Call Reports

Distribution of Ratios of CLD to Risk-Based Capital



Note: A few banks with ratios greater than 850, negative risk-based capital, or without CLD holdings have been dropped from the graph.

Source: FFIEC Call Reports

- Call Report
 - Bank specific financial variables and growth rates
- Summary of Deposits
 - Annual FDIC data set on deposits held at each bank branch
 - Used to construct deposit-weighted state-level macroeconomic variables
 - Provide bank-specific economic indicators that control for demand conditions.
- Macroeconomic variables
 - various real and financial variables in the U.S. economy

Banks with the following characteristics are removed.

- Ratio of loans to total assets $< 2\%$
- Dependent variable growth rates outside the 2.5 and 97.5 percentiles
- Tier 1 capital ratios $< 0.5\%$
- banks with less than 30 time series observations

	CRE	CLD	C&I	RRE	Consumer
Clusters	3239	694	6342	7253	4802
Avg. Obs/Bank	59.50	47.62	52.98	55.26	52.37

Guidance and Threshold Variables

- Comment: dates between 2006:Q1 and 2006:Q4
- Final: dates after 2006:Q4
- Threshold: defined by guidance for CRE categories

Macro and State-level Control Variables

We include a number of variables to control for demand and economic conditions

-Deposit-weighted state-level variables

- Annualized quarterly percent change in CoreLogic Home Price Index
- One quarter difference in state unemployment rate
- Herfindahl-Hirschman Index of deposit concentration

-Macro-level variables

- Real GDP growth
- Quarter-end change in S&P 500 index
- Average quarterly level of 10-year corporate bond spread
- Need to try a few more

Fully Interacted Panel Regression with Bank Fixed Effects

$$\begin{aligned} y_{i,j,t} = & \beta_0 + \sum_{n=1}^4 \beta_n y_{i,j,t-n} + \beta_5 \frac{loans_{i,j,t-1}}{RBC_{i,t-1}} + \beta_6 threshold_{i,j,t-1} \\ & + \left(\beta_7 + \beta_8 threshold_{i,j,t-1} + \beta_9 threshold_{i,j,t-1} \times \frac{loans_{i,j,t-1}}{RBC_{i,t-1}} \right) \times comment_t \\ & + \left(\beta_{10} + \beta_{11} threshold_{i,j,t-1} + \beta_{12} threshold_{i,j,t-1} \times \frac{loans_{i,j,t-1}}{RBC_{i,t-1}} \right) \times final_t \\ & + \sum_{n=1}^2 \chi_{i,t-n} \beta_{12+n} + \sum_{n=1}^2 \Gamma_{i,t-n} \beta_{14+n} + \sum_{n=1}^2 \delta_{t-n} \beta_{16+n} \\ & + \sum_{n=1}^3 \beta_{18+n} Q_n + \beta_{22} \psi_i + \varepsilon_{i,j,t} \end{aligned}$$

CRE Models with Threshold Variables[†]

	(1) CRE	(2) CLD	(3) CLD+cmt
$comment_t$	0.00672 (0.07)	1.327 (1.55)	1.631 (1.80)
$final_t$	-1.116*** (-13.82)	-3.603*** (-8.50)	-3.508*** (-7.90)
$threshold_{i,j,t-1}$	-0.906*** (-9.98)	-2.994*** (-12.86)	-2.872*** (-11.56)
$threshold_{i,j,t-1} \times comment_t$	-0.619*** (-3.91)	-0.656 (-0.73)	-2.025* (-2.17)
$threshold_{i,j,t-1} \times final_t$	-1.009*** (-8.72)	1.497*** (3.89)	0.248 (0.61)
Clusters	3239	688	694
Avg. Obs/Bank	59.50	47.58	47.62
R-Squared	0.0749	0.122	0.114

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† - Regressions include all bank-specific and macrofinancial variables.

Non-CRE Models with Threshold Variables[†]

	(1) C&I	(2) RRE	(3) CONS
$comment_t$	-0.216* (-2.48)	-0.263*** (-6.65)	-0.244*** (-5.01)
$final_t$	-0.526*** (-7.54)	0.165*** (4.52)	-0.0156 (-0.33)
$threshold_{i,j,t-1}$	-0.172 (-1.36)	0.243** (2.84)	-0.155 (-0.94)
$threshold_{i,j,t-1} \times comment_t$	0.0870 (0.40)	-0.178 (-1.26)	0.702** (3.01)
$threshold_{i,j,t-1} \times final_t$	-0.665*** (-4.43)	0.316** (3.21)	0.162 (0.92)
Clusters	6342	7253	4802
Avg. Obs/Bank	52.98	55.26	52.37
R-Squared	0.0394	0.0808	0.145

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

[†] - Regressions include all bank-specific and macrofinancial variables.

Fully Interacted Model of Thresholds and Ratios[†]

	(1) CRE	(2) CLD	(3) C&I	(4) RRE	(5) Consumer
$comment_t$	0.549*** (5.37)	1.574 (1.72)	-0.174* (-1.98)	-0.298*** (-7.51)	-0.207*** (-4.20)
$final_t$	-0.533*** (-6.22)	-3.410*** (-7.54)	-0.489*** (-6.92)	0.130*** (3.54)	0.0192 (0.41)
$threshold_{i,j,t-1}$	1.358*** (10.64)	-1.565*** (-5.43)	0.0643 (0.45)	0.000914 (0.01)	0.103 (0.59)
$threshold_{i,j,t-1} \times comment_t$	-2.901*** (-5.03)	-0.699 (-0.61)	-0.335 (-0.37)	0.560 (0.96)	-1.522 (-1.35)
$threshold_{i,j,t-1} \times final_t$	-4.611*** (-13.31)	-0.737 (-1.21)	0.0108 (0.03)	0.811*** (3.75)	0.790 (1.86)
$\frac{loans_{i,j,t-1}}{RBC_{i,t-1}}$	-0.0156*** (-24.94)	-0.0214*** (-9.52)	-0.00177*** (-3.85)	0.00143*** (5.52)	-0.00169*** (-4.51)
$comment_t \times threshold_{i,j,t-1} \times \frac{loans_{i,j,t-1}}{RBC_{i,t-1}}$	0.00504*** (3.75)	-0.00138 (-0.50)	0.00104 (0.47)	-0.00181 (-1.26)	0.00598* (2.12)
$final_t \times threshold_{i,j,t-1} \times \frac{loans_{i,j,t-1}}{RBC_{i,t-1}}$	0.00859*** (10.78)	0.00787** (3.07)	-0.00163 (-1.77)	-0.00121* (-2.53)	-0.00159 (-1.65)
Clusters	3239	694	6342	7253	4802
Avg. Obs/Bank	59.50	47.62	52.98	55.26	52.37
R-Squared	0.0813	0.119	0.0395	0.0809	0.145

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† - Regressions include all bank-specific and macrofinancial variables.

$$\frac{\partial y_{i,j,t-1}}{\partial comment_t} = \beta_7 + \beta_8 threshold_{i,j,t-1} + \beta_9 threshold_{i,j,t-1} \times \frac{loans_{i,j,t-1}}{RBC_{i,t-1}}$$

$$\frac{\partial y_{i,j,t-1}}{\partial final_t} = \beta_{10} + \beta_{11} threshold_{i,j,t-1} + \beta_{12} threshold_{i,j,t-1} \times \frac{loans_{i,j,t-1}}{RBC_{i,t-1}}$$

Marginal Effects: Fully Interacted Models

	(1) CRE	(2) CLD	(3) C&I	(4) RRE	(5) Consumer
comment	-0.839*** (-4.07)	0.737 (1.43)	-0.197 (-0.67)	-0.281 (-1.48)	0.0655 (0.19)
final	-2.569*** (-16.59)	-3.361*** (-7.95)	-0.966*** (-5.36)	0.577*** (5.14)	0.334 (1.65)
comment_diff	-1.388*** (-6.26)	-0.837 (-0.82)	-0.0235 (-0.08)	0.0169 (0.09)	0.273 (0.79)
final_diff	-2.035*** (-13.50)	0.0499 (0.11)	-0.477** (-2.73)	0.447*** (4.07)	0.315 (1.57)

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Hypothetical Thresholds for Non-CRE Loan Categories

We define hypothetical thresholds for non-CRE loan categories approximately one standard deviation above their long-run mean.

	CRE	CLD	CI	RRE	CONS
mean	174.6	140.2	119.4	193.0	96.7
stddev	133.8	105.8	79.7	118.0	77.3
Threshold			200	300	200

Roughly equivalent to those issued in the guidance for CRE loans.

Regression with Hypothesized Thresholds

	(1) CRE	(2) CLD	(3) C&I	(4) RRE	(5) Consumer
$comment_t$	0.549*** (5.37)	1.574 (1.72)	-0.108 (-1.27)	-0.285*** (-6.89)	-0.359*** (-7.44)
$final_t$	-0.533*** (-6.22)	-3.410*** (-7.54)	-0.696*** (-9.81)	0.0814* (2.17)	-0.246*** (-5.16)
$threshold_{i,j,t-1}$	1.358*** (10.64)	-1.565*** (-5.43)	0.988*** (9.94)	0.428*** (9.13)	0.361*** (3.80)
$threshold_{i,j,t-1} \times comment_t$	-2.901*** (-5.03)	-0.699 (-0.61)	-3.930*** (-4.53)	-1.342*** (-4.31)	-2.115** (-2.86)
$threshold_{i,j,t-1} \times final_t$	-4.611*** (-13.31)	-0.737 (-1.21)	-3.226*** (-6.46)	-2.090*** (-7.83)	-1.150* (-2.35)
$\frac{loans_{i,j,t-1}}{RBC_{i,t-1}}$	-0.0156*** (-24.94)	-0.0214*** (-9.52)	-0.0204*** (-28.59)	-0.0101*** (-37.22)	-0.0117*** (-16.25)
$threshold_{i,j,t-1} \times comment_t \times \frac{loans_{i,j,t-1}}{RBC_{i,t-1}}$	0.00504*** (3.75)	-0.00138 (-0.50)	0.0109*** (3.43)	0.00304*** (3.99)	0.00549* (2.23)
$threshold_{i,j,t-1} \times final_t \times \frac{loans_{i,j,t-1}}{RBC_{i,t-1}}$	0.00859*** (10.78)	0.00787** (3.07)	0.00951*** (5.01)	0.00476*** (6.92)	0.00458** (2.82)
Clusters	3239	694	6420	7329	4919
Avg. Obs/Bank	59.50	47.62	54.65	57.30	55.21
R-Squared	0.0813	0.119	0.0455	0.0861	0.143

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Marginal Effects: Hypothesized Thresholds

	(1) CRE	(2) CLD	(3) C&I	(4) RRE	(5) Consumer
comment	-0.839*** (-4.07)	0.737 (1.43)	-1.853*** (-6.53)	-0.714*** (-6.77)	-1.376*** (-4.18)
final	-2.569*** (-16.59)	-3.361*** (-7.95)	-2.020*** (-10.83)	-0.582*** (-6.96)	-0.479* (-2.02)
comment_diff	-1.388*** (-6.26)	-0.837 (-0.82)	-1.745*** (-5.99)	-0.429*** (-3.92)	-1.017** (-3.07)
final_diff	-2.035*** (-13.50)	0.0499 (0.11)	-1.324*** (-7.44)	-0.663*** (-8.34)	-0.233 (-1.00)

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Targeted macroprudential policy that reduced concentrations and growth, but may have had unintended spillovers.

We may have identified three consequences of the CRE regulation:

- CRE lending at banks over the thresholds fell at statistically significant rates relative to others
- The same banks also reduced C&I lending, which is often partially collateralized by CRE property.
- Residential real estate increased at banks over the thresholds, despite the weakness in that market.

Caveats and Future Research

- How best to control for sample selection and other enforcement actions.
- The results are dependent on adequate controls for macroeconomic and financial conditions.
- Importantly, our analysis does not examine the riskiness of banks over the thresholds.
- Future research could examine the riskiness and performance of banks over the threshold during the crisis.

Estimated Coefficients on deposit-weighted state-level Control Variables

	(1) CRE	(2) CLD	(3) C&I	(4) RRE	(5) Consumer
ΔHPI_{t-1}	-0.0340* (-2.33)	0.0421 (0.76)	0.00122 (0.09)	0.0323*** (4.30)	0.0692*** (7.03)
ΔHPI_{t-2}	0.145*** (9.75)	0.169** (3.05)	0.0225 (1.61)	-0.0265*** (-3.54)	-0.0613*** (-6.19)
$\Delta Unemp_{t-1}$	3.119*** (13.62)	0.985 (1.14)	2.549*** (12.67)	1.988*** (21.26)	0.743*** (5.91)
$\Delta Unemp_{t-2}$	-2.533*** (-12.14)	-3.249*** (-4.08)	-2.393*** (-12.47)	-0.999*** (-11.51)	-0.978*** (-8.32)
HHI_{t-1}	4.582*** (4.67)	8.845* (2.20)	0.132 (0.22)	0.981* (2.22)	-0.956* (-2.15)
Clusters	3239	694	6342	7253	4802
Avg. Obs/Bank	59.50	47.62	52.98	55.26	52.37
R-Squared	0.0813	0.119	0.0395	0.0809	0.145

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

CRE Models with Loan-to-Capital Ratio Variables[†]

	(1) CRE	(2) CLD	(3) CLD+cmt
$comment_t$	0.573*** (3.54)	1.375* (2.15)	0.793 (1.19)
$final_t$	-0.602*** (-5.55)	-4.320*** (-9.58)	-4.401*** (-9.21)
$\frac{loans_{i,j,t-1}}{RBC_{i,t-1}}$	-0.0111*** (-21.03)	-0.0274*** (-13.31)	-0.0266*** (-12.12)
$\frac{loans_{i,j,t-1}}{RBC_{i,t-1}} \times comment_t$	-0.00135* (-2.43)	0.00120 (0.50)	-0.0000348 (-0.01)
$\frac{loans_{i,j,t-1}}{RBC_{i,t-1}} \times final_t$	-0.00127* (-2.97)	0.0141*** (6.48)	0.00972*** (4.25)
Clusters	3239	688	694
Avg. Obs/Bank	59.50	47.58	47.62
R-Squared	0.0802	0.126	0.117

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

† - Regressions include all bank-specific and macrofinancial variables.

Non-CRE Models with Loan-to-Capital Ratio Variables[†]

	(1) C&I	(2) RRE	(3) CONS
$comment_t$	-0.162 (-1.32)	-0.301*** (-5.55)	-0.387*** (-5.87)
$final_t$	-0.189* (-2.37)	0.0615 (1.48)	0.00812 (0.16)
$\frac{loans_{i,j,t-1}}{RBC_{i,t-1}}$	-0.000891* (-2.11)	0.00107*** (4.21)	-0.00166*** (-4.07)
$\frac{loans_{i,j,t-1}}{RBC_{i,t-1}} \times comment_t$	-0.000373 (-0.64)	0.0000105 (0.03)	0.00211*** (4.32)
$\frac{loans_{i,j,t-1}}{RBC_{i,t-1}} \times final_t$	-0.00296*** (-7.74)	0.000860*** (3.89)	0.000177 (0.52)
Clusters	6342	7253	4802
Avg. Obs/Bank	52.98	55.26	52.37
R-Squared	0.0397	0.0808	0.145

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

[†] - Regressions include all bank-specific and macrofinancial variables.