



Evaluating Regulatory Reform: Banks' Cost of Capital and Lending

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INTRODUCTION

Bank regulations have changed dramatically over the past twenty years, from deregulation in the late 1990s to the Dodd-Frank Act (DFA) which intensified regulation following the financial crisis. We examine the effects of regulatory changes on banks' cost of capital and lending.

- Since the passage of the Dodd-Frank Act, the **value-weighted CAPM cost of capital for banks has averaged 10.5% and declined by more than 4% relative to non-banks on a within-firm basis.**
- This **decrease was much greater for larger banks** subject to new regulation than for smaller banks.
- Over a longer twenty-year horizon, we find that changes in the systematic risk of bank equity have real economic consequences: **increases in banks' cost of capital are associated with tightening in credit supply and loan rates.**

Builds on literature measuring the impact of regulatory change on market variables and on credit supply and loan rates with implications for broader macroeconomic conditions (Calomiris and Nissim (2014), Gandhi and Lustig (2015), Sarin and Summers (2016), Minton et. al (2017), Atkeson et. al (2018), Lown and Morgan (2006), Hirtle (2009), Philippon (2009), Gilchrist and Zakrajsek (2012), Frank and Shen (2016)).

BANKS' CAPM COST OF CAPITAL AND REGULATION

We estimate the CAPM cost of equity capital for banks and non-banks as

$$CAPM_{i,t} \equiv R_{f,t} + \beta_{i,t} \cdot \mu_m$$

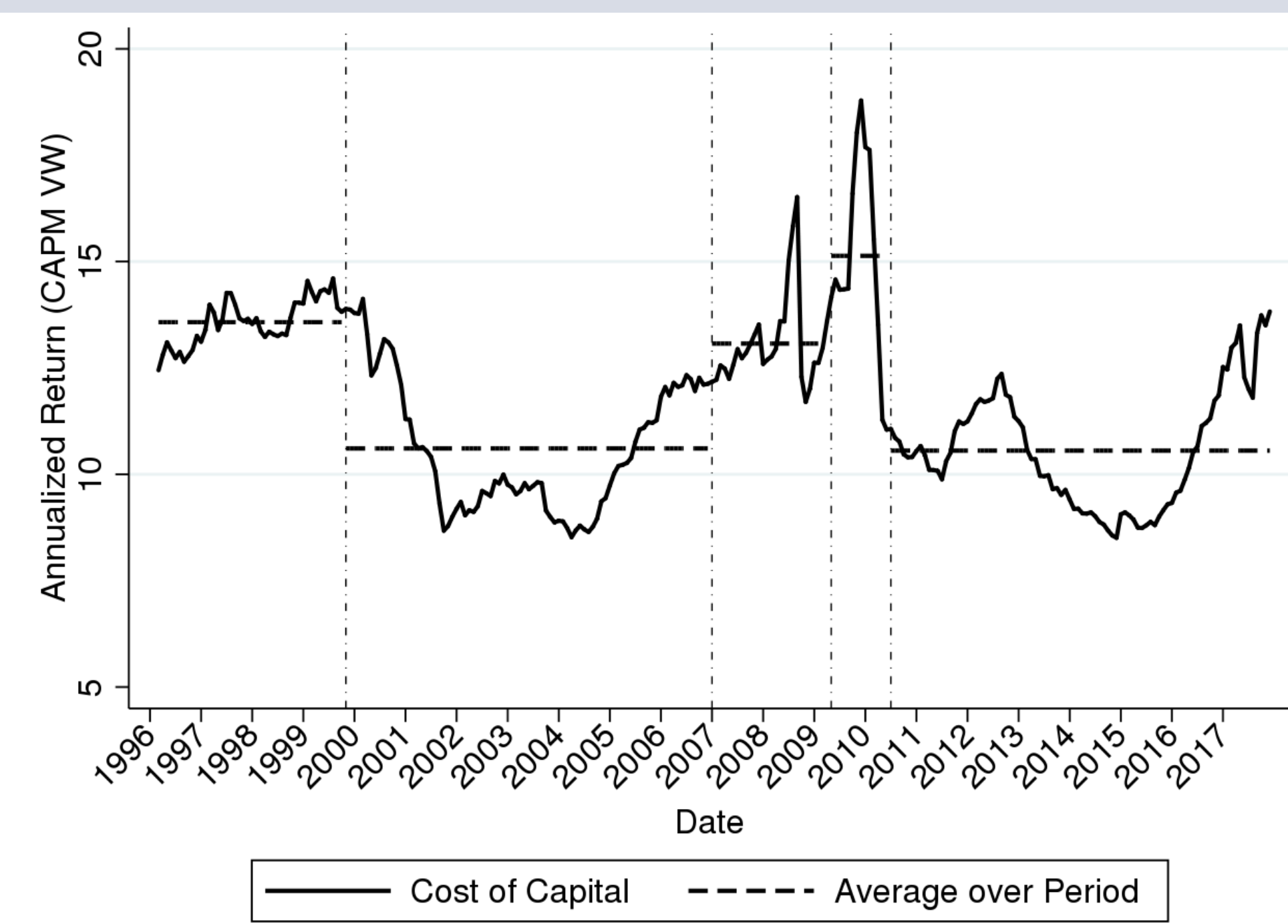
- CRSP-Compustat universe of firms
- March 1996 – December 2017 sample period

Regulatory time periods:

- Basel I: Pre-period (Mar. 1996 – Oct.1999)
- GLB: Gramm-Leach-Bliley Act (Nov. 1999 – Dec. 2006)
- Crisis: Financial Crisis (Jan. 2007 – Apr. 2009)
- SCAP: Supervisory Capital Assessment (May 2009 – Jun. 2010)
- Dodd-Frank: Dodd-Frank Act (Jul. 2010 – Dec. 2017)

CAPM cost of equity capital over time:

$$CAPM_{i,t} = \alpha + \beta_1 GLB_t + \beta_2 Crisis_t + \beta_3 SCAP_t + \beta_4 DFA_t + e_{i,t}$$



DIFFERENCES-IN-DIFFERENCES

We use differences-in-differences regressions to compare banks to non-banks and non-bank financial intermediaries over time:

$$CAPM_{i,t} - R_{f,t} = \alpha + \beta_1 GLB_t + \beta_2 Crisis_t + \beta_3 SCAP_t + \beta_4 DFA_t + \rho Bank_{i,t} + \delta_1 Bank_{i,t} GLB_t + \delta_2 Bank_{i,t} Crisis_t + \delta_3 Bank_{i,t} SCAP_t + \delta_4 Bank_{i,t} DFA_t + e_{i,t}$$

- Interaction coefficients δ reflect differential change over time for banks relative to non-banks and non-bank financial intermediaries
- Identification assumption: difference over time periods for banks is driven by regulation

	(1)	(2)	(3)	(4)
	CAPM	CAPM	CAPM	CAPM
GLB	-2.03*** (0.27)	-1.90*** (0.29)	-2.54*** (0.27)	-3.55*** (0.52)
Crisis	-2.55*** (0.41)	-2.74*** (0.44)	-3.23*** (0.44)	-1.57*** (0.44)
SCAP	-4.38*** (0.30)	-5.02*** (0.25)	-5.44*** (0.30)	-2.28*** (0.74)
Dodd-Frank	-4.75*** (0.21)	-4.91*** (0.22)	-5.54*** (0.26)	-4.51*** (0.47)
Bank		0.66* (0.37)	-3.26*** (0.47)	-3.31*** (0.53)
Bank x GLB		-1.25*** (0.45)	-0.78* (0.41)	0.23 (0.60)
Bank x Crisis		2.14*** (0.60)	2.50*** (0.65)	0.84 (0.59)
Bank x SCAP		6.55*** (0.88)	6.87*** (0.96)	3.69*** (1.05)
Bank x Dodd-Frank		1.90*** (0.46)	2.46*** (0.55)	1.42** (0.65)
Observations	1111127	1111127	1111062	223432
Adjusted R ²	0.170	0.199	0.598	0.566
Fixed Effects	No	No	Yes	Yes
Sample	All Firms	All Firms	All Firms	Banks+NBF

- Triple difference specification focuses on change for largest banks most impacted by post-crisis regulation
- Focuses on top 20 firms by industry (~\$50B for banks after 2010)
- Identification assumption: change in cost of capital for top vs. non-top banks versus top vs. non-top nonbanks driven by regulation:

$$\begin{aligned} & (top\ bank - nontop\ bank)_{Post} - (top\ bank - nontop\ bank)_{Pre} \\ & \text{versus} \\ & (top\ nonbank - nontop\ nonbank)_{Post} - (top\ nonbank - nontop\ nonbank)_{Pre} \end{aligned}$$

	(1)	(2)	(3)	(4)
	CAPM - Rf	CAPM - Rf	CAPM - Rf	CAPM - Rf
Bank x Top	3.41*** (0.40)	3.17*** (0.53)	0.13 (0.60)	0.25 (0.73)
Bank x SCAP		3.02*** (0.65)	4.42*** (0.64)	2.94*** (0.75)
Bank x Dodd-Frank		1.69*** (0.46)	3.25*** (0.39)	3.02*** (0.44)
Top x SCAP		-2.34*** (0.42)	-1.90*** (0.44)	2.07 (1.36)
Top x Dodd-Frank		-2.28*** (0.36)	-1.94*** (0.37)	-0.84 (0.76)
Bank x Top x SCAP		3.81*** (1.01)	2.78*** (1.07)	-1.27 (1.64)
Bank x Top x Dodd-Frank		-0.23 (0.66)	-1.24* (0.63)	-2.45** (0.95)
Observations	1111127	1111127	1111062	223432
Adjusted R ²	0.055	0.092	0.551	0.599
Fixed Effects	No	No	Yes	Yes
Sample	All Firms	All Firms	All Firms	Banks+NBF

SUMMARY OF RESULTS

Bank cost of capital increased differentially relative to other industries during the financial crisis, and decreased differentially after the DFA.

δ coefficients in differences-in-differences regressions indicate:

- Significant increase for banks during and after the financial crisis
- After DFA, differential decline of 4.5% vs. non-banks (2.3% vs. NBF)
- Relative to pre-GLB, differential increase of 1-2%
- 2000s are differentially lowest cost of capital for banks

Post DFA decline in cost of capital is driven by the largest banks, consistent with the hypothesis that regulatory changes have lowered the cost of capital

- Differential decline of 3-4% for top 20 banks by assets post-DFA, both within and across firms
- Compared to pre-GLB, within firm decline of 2% for top firms and additional 1% decline for the top banks, contrasting the increase seen above
- Largest stress tested banks exhibit 3% differential declines in cost of capital post CCAR

Results are robust to controls for bank characteristics. Relationship between RWA and cost of capital changes with regulation

- Top banks exhibit a 3-4% differential decline in cost of capital after controlling for characteristics
- Changes in RWA coefficients explains some of the decline in value-weighted regressions

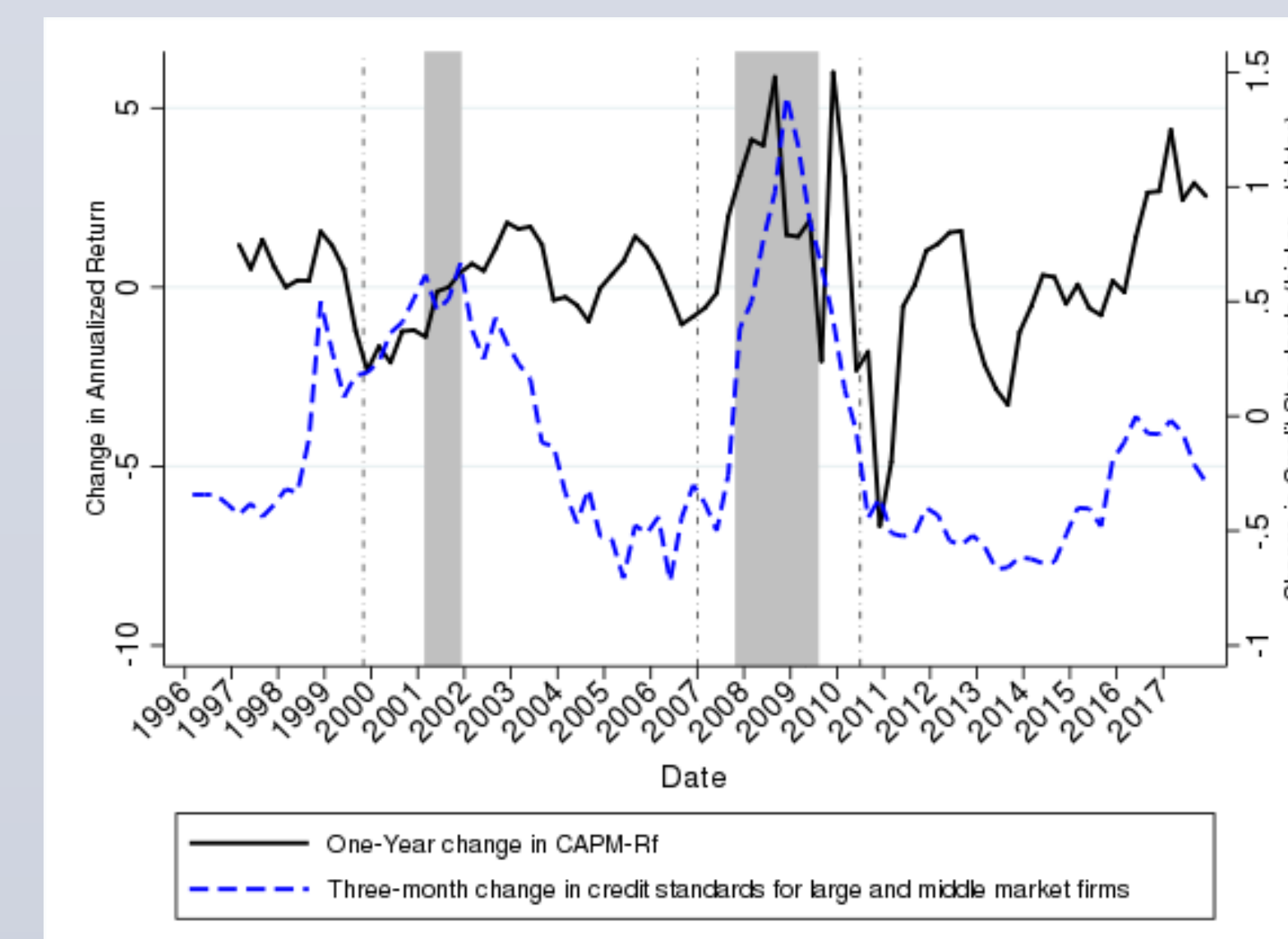
EFFECTS ON CREDIT SUPPLY

- **Do changes in the cost of capital effect the real economy?**
- Senior Loan Officer Opinion Survey (SLOOS) data on bank lending
- Five categorical responses for whether conditions eased or tightened
- Sample period of 1996 - 2017

$$SLOOS_{i,t} = \alpha + \beta \Delta(CAPM_{i,t} - R_{f,t}) + e_{i,t}$$

Cost of capital matters for bank lending decisions: increases lead to tightening of credit standards.

- A CAPM beta increase from 1 to 2 translates to a 0.19 point/0.5 σ increase in survey response for credit standards offered to large and middle market firms
- Result is robust to controlling for bank stock returns, risk-free rates, quarterly fixed effects



CONCLUSIONS

Cost of capital is the rate managers must earn on investor capital.

- Important for investment and financing decisions
- Hard to estimate the level precisely

Estimate cost of capital with time-varying betas and identify changes with differences-in-differences.

- Focus on what can be estimated precisely, systematic risk
- Reference period and comparison group matter for differences-in-differences approach

Cost of equity capital has declined for the largest banks since Dodd-Frank.

- Differential decrease post-Dodd-Frank, relative to pre-GLB era by some measures
- Consistent with regulatory reform reducing cost of capital for largest banks

REFERENCES

- Atkeson, A. G., A. d'Avernas, A. L. Eisfeldt, and P.-O. Weill (2018). Government guarantees and the valuation of american banks. NBER Macroeconomics Annual.
- Calomiris, C. W. and D. Nissim (2014). Crisis-related shifts in the market valuation of banking activities. Journal of Financial Intermediation 23, 400-435.
- Frank, M. Z. and T. Shen (2016). Investment and the weighted average cost of capital. Journal of Financial Economics 119(2), 300-315.
- Gandhi, P. and H. Lustig (2015). Size anomalies in u.s. bank stock returns. The Journal of Finance 70(2), 733-768.
- Gilchrist, S., J. W. Sim, and E. Zakrajsek (2013). Misallocation and financial market frictions: Some direct evidence from the dispersion in borrowing costs. Review of Economic Dynamics 16(1), 159-176.
- Hirtle, B. (2009). Credit derivatives and bank credit supply. Journal of Financial Intermediation 18(2), 125-150.
- Lown, C. and D. P. Morgan (2006). The credit cycle and the business cycle: New findings using the loan officer opinion survey. Journal of Money, Credit and Banking 38(6), 1575-1597.
- Minton, B. A., R. M. Stulz, and A. G. Taboada (2017). Are larger banks valued more highly? SSRN.
- Philippon, T. (2009). The bond market's q. The Quarterly Journal of Economics 124(3), 1011-1056.
- Sarin, N. and L. H. Summers (2016). Understanding bank risk through market measures. Brookings Papers on Economic Activity, 57-127.

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