

The disciplining effect of supervisory scrutiny in the EU-wide stress-test

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Does Stress Testing Affect Banks' Risk Taking?

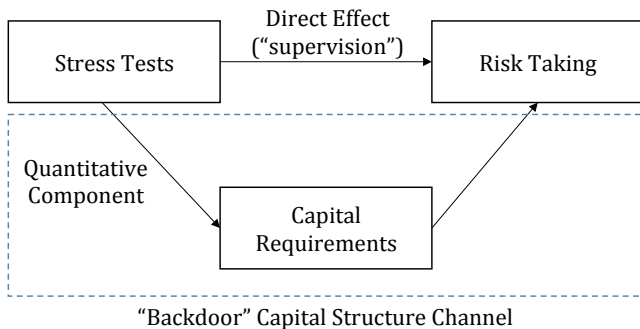
Current implementation of stress tests

- higher capital requirements (quantitative exercise) → measurable
- additional scrutiny (qualitative, opaque) → difficult to measure (“blackbox”)

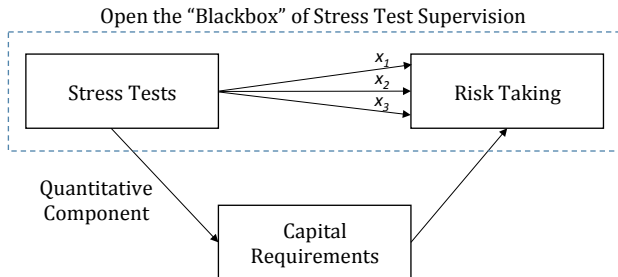
Stress tests reduce bank risk taking, but...

To identify the “**direct effect**” of stress test supervision (Pierret and Steri, 2019)

→ need to acknowledge the relevance of the capital structure channel for banks



This Paper Opens the “Blackbox” of Supervision



where x_1, x_2, x_3, \dots capture the "intensity of the scrutiny" applied in the qualitative component of the stress test

EU-wide stress tests:

- Quantitative component: stress test projections and bank-specific capital requirements
- Qualitative component: qualitative assurance (QA) process

Opening the “Supervision Blackbox” requires supervisory data on the QA process

Methodology: Diff-in-diff Around 2016 Stress Test

Dependent variable (risk taking) : $Risk_{bt} = \frac{RWA_{bt}}{Assets_{bt}}$, denoted in the paper “risk-weight density” (RWD)

$$Risk_{bt} = \alpha_b + \alpha_t + \alpha_{ct} + \beta_1 Post_t \times Tested_b + \gamma_2 Capreq_{bt} + \gamma_3 CET1R_{bt-1} + \beta_2' X_{b,t-1} + \varepsilon_{bt}$$

where

- $Post_t = 1$ if $t = 2017$, and $Post_t = 0$ if $t = 2015$ (year 2016 excluded)
- $Tested_b = 1$ if bank participated in the 2016 stress test
 - Treatment group: 63 SSM Significant Institutions (SIs)
 - Control group: 69 Less Significant Institutions (LSIs)
- $Capreq_{bt}$ includes bank-specific Pillar 1 and 2 capital requirements & macroprudential capital buffers
- $CET1R_{bt}$ bank's actual CET1 capital over RWA ratio (CET1 ratio)
- $\alpha_b, \alpha_t, \alpha_{ct}$ are bank, time and country \times time FE, $X_{b,t}$ includes bank size

Main Result: Diff-in-diff Around 2016 Stress Test

Treated banks reduced their average RWD by about **4.2 p.p.** relative to control banks.

Table 3: Effect of participating in the stress test on bank risk.

<i>Dependent:</i> RWD	(1)	(2)	(3)	(4)
<i>Treatment:</i> Participation	Without	Control	Full	With
	Controls	for size	Controls	Demand FE
Post ST16 x Treated	-0.027* (0.015)	-0.035** (0.015)	-0.040** (0.017)	-0.042** (0.019)
L.Log(Assets)		-0.119*** (0.036)	-0.133*** (0.029)	-0.145*** (0.039)
L.Regulatory Capital			-0.130 (0.214)	-0.150 (0.191)
L.Voluntary Capital			-0.241* (0.125)	-0.254* (0.144)
L.Retail			-0.016 (0.050)	0.013 (0.059)
L.Liquidity			-0.208** (0.085)	-0.175** (0.078)
L.LLP			0.066 (0.073)	0.039 (0.105)
L.CIR			0.001 (0.003)	0.001 (0.003)
L.RoE			0.218 (0.195)	0.166 (0.207)
L.Interest Income			-0.002 (0.004)	-0.001 (0.004)
Bank FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Country x Time FE	No	No	No	Yes
Observations	924	924	924	924
within R2	0.016	0.069	0.122	0.120

Methodology: Opening the “Blackbox”

Dependent variable (risk taking) : $Risk_{bf} = \frac{RWA_{bt}}{Assets_{bt}}$, denoted in the paper “risk-weight density” (RWD)

$$\begin{aligned} Risk_{bt} = & \alpha_b + \alpha_t + \alpha_{ct} + \beta_1 Post_t \times Tested_b \\ & + \beta_3 Post_t \times Tested_b \times QA_b^{dim} \\ & + \gamma_2 Capreq_{bt} + \gamma_3 CET1R_{bt-1} + \beta_2' X_{b,t-1} + \varepsilon_{bt} \end{aligned}$$

where

- QA_b^{dim} is a “measure of the intensity of the scrutiny applied in the QA process of the 2016 stress test”
- $dim = \{intensity, effectiveness, duration\}$
 - *intensity*: $\log(\text{number of credit risk flags triggered during the QA})$
 - *effectiveness*: sum of potential impacts on banks’ CET1 ratio depletion from credit risk flags
 - *duration*: number of cycles for which a bank was communicated risk flags

Main Result: Opening the “Blackbox”

QA Intensity matters most: **5.6 p.p.** RWD reduction for banks that receive more “risk flags” during the QA process.

Table 7: Effect of being stress tested on bank risk-taking through the Quality Assurance channel.

	(1)	(2)	(3)	(4)	(5)	(6)
	QA Intensity		QA Effectiveness		QA Duration	
Post ST16 x Treated	0.012 (0.026)	-0.014 (0.016)	-0.031* (0.016)	-0.031* (0.016)	0.011 (0.031)	-0.008 (0.024)
Post ST16 x Treated x QA	-0.027* (0.014)		-0.333 (0.268)		-0.025* (0.014)	
Post ST16 x Treated x High QA		-0.056*** (0.020)		-0.023 (0.024)		-0.041* (0.022)
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Country x Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	924	924	924	924	924	924
within R2	0.141	0.155	0.133	0.126	0.132	0.129

This paper opens the “blackbox” of stress test supervision

$$\begin{aligned} Risk_{bt} = & \alpha_b + \alpha_t + \alpha_{ct} + \beta_1 Post_t \times Tested_b \\ & + \beta_3 Post_t \times Tested_b \times QA_b^{dim} \\ & + \gamma_2 Capreq_{bt} + \gamma_3 CET1R_{bt-1} + \beta_2' X_{b,t-1} + \varepsilon_{bt} \end{aligned}$$

Comment 1: Measuring Risk Taking ($Risk_{bt}$)

Comment 2: Capital Requirements ($Capreq_{bt}$) vs. Supervision (QA_b^{dim})

Comment 1: Measuring Risk Taking

Outcome variable (risk taking): “risk-weight density” for credit risk exposures (RWD)

$$RWD_{bt} = \frac{\text{Risk - Weighted Exposure}_{bt}}{\text{Total Exposure}_{bt}}$$

1 Not a measure of Risk

- regulatory arbitrage (Acharya et al., 2013, Acharya and Steffen, 2015)
- risk weight manipulation by banks (Behn et al., 2016; Plosser and Santos, 2018; Mariathasan and Merrouche, 2014; Begley et al., 2017)
- negative correlation with market measures of risk (Acharya et al., 2014)

→ $Capreq_{bt} * RWD_{bt}$ is a measure of the capital requirement for the average exposure of the bank (cost of funding the average exposure)

2 Not a measure of Risk *Taking*

- confusion between ex-ante and ex-post risk

→ risk taking refers to *new* positions (new investments), and information available to the banker when she makes her investment decision (ex-ante measure of risk)

3 Instead: reduce RWA as mitigating action following stress test results

Comment 2a: Capital Requirements from Stress Tests

- Capital requirements: relevant channel explaining banks' risk-taking incentives (~~Modigliani~~ ~~Miller~~)
 - **More risk taking:** profit-maximizing banks could rationally respond to a higher cost of funding by increasing the expected profitability of their portfolios by investing in riskier assets (Koehn and Santomero, 1980; Kim and Santomero, 1988; Rochet, 1992; Baker and Wurgler, 2015; Gale, 2017)
 - **Less risk taking:** shareholders' skin in the game (Cooper and Ross, 2002; Admati, DeMarzo, Hellwig, and Pfleiderer, 2013)
 - **Non-monotonicity:** Bahaj and Malherbe (2018), Harris, Opp and Opp (2017)
- Literature is on the effective capital constraint banks face
- Stress tests increase the effective capital requirement of a bank

Comment 2a: Stress Tests Increase the *Effective* Capital Requirement

Comprehensive Capital Analysis and Review 2012
Table C.7: Federal Reserve Estimates in the Supervisory Stress Scenario
Citigroup Inc.

These projections represent hypothetical estimates that involve an economic outcome that is more adverse than expected. These estimates are not forecasts of expected losses, revenues, net income before taxes or capital ratios. The two minimum capital ratios presented below are for the period Q4 2011 through Q4 2013 and do not necessarily occur in the same quarter.

The Federal Reserve made changes to this table on March 16, 2012, to correct computation errors for some loss rates and levels. The corrections do not impact other figures, including capital ratios.

Projected Capital Ratios through Q4 2013
Under the Hypothetical Supervisory Stress Scenario

11.7% → 4.9% = 60% decline

5.0% requirement → 11.9% effective

16.9% → 9.9% = 59% decline

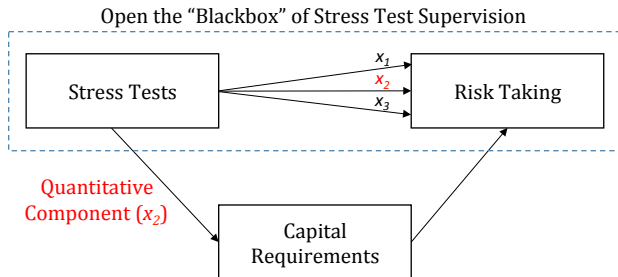
8% requirement → 13.7% effective

	Actual Q3 2011	Stressed ratios with all proposed capital actions through Q4 2013	Stressed ratios assuming no capital actions after Q1 2012 (1)
		Q4 2013 Minimum	Minimum
Tier 1 Common Capital Ratio (%)	11.7	4.9	4.9
Tier 1 Capital Ratio (%)	13.4	6.0	6.0
Total Risk-Based Capital Ratio (%)	16.9	9.9	9.9
Tier 1 Leverage Ratio (%)	7.0	2.9	2.9

Source: Discussion of "Stressed Banks" by Daniel Green, 2018 Federal Reserve Stress Testing Research Conference

Comment 2b: Capital Requirements vs. Supervision

Capital Requirements ($Capreq_{bt}$) vs. Supervision ($QA_b^{dim} = \{x_1, x_2, x_3\}$)



where x_1, x_2, x_3, \dots capture the "intensity of the scrutiny" applied in the qualitative component of the stress test

but x_2 (effectiveness): "sum of potential impacts on banks' CET1 ratio depletion from credit risk flags"

→ Increase the effective capital requirement

"Pillar 2 capital guidance ... determines an adequate level of capital to be maintained ... to withstand stressed situations that supervision expects banks to comply with (ECB, 2016)."

Additional Comments

- Need for the $Post_t \times Tested_b$ interaction in $Post_t \times Tested_b \times QA_b^{dim}$?
 - what is QA_b^{dim} for the control group, for the pre-treatment period?
 - do we expect treated banks to react differently to QA_b^{dim} ?
- Anticipation effect: stress test announced in July 2015, in the pre-treatment period
- Bad control problem for capital requirement?
 - If capital requirement affected by the “shock” (stress test), then need to interact with $Post_t \times Tested_b$, $Post_t$, and $Tested_b$
 - banks respond differently to increases in their capital requirements if they are tested or not (“different capital requirement regime”).

Summary

This paper opens the “blackbox” of stress test supervision

Comment 1: Measuring Risk *Taking*

Comment 2: Capital Requirements vs. Supervision

- stress tests increase banks' *effective* capital requirement
- important channel determining risk-taking incentives (~~Modigliani~~ ~~Miller~~)
- controlling for the capital structure channel: allows to identify a “direct effect” of supervision (not affecting the level of the effective capital requirement, but affecting risk taking)