

# Stress tests and capital requirement disclosures: do they impact banks' lending and risk-taking decisions?

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# Introduction

## Motivation and Research Question

⇒ Research on the effect of stress test results and their respective disclosure on lending and risk-taking for Euro Area banks is scarce.

Assess banks' reaction to higher capital requirements as a result of stress tests and respective information effects (from publication) using the 2016 and 2018 stress tests in a difference-in-differences setting .

How do banks respond to changes in capital requirements and their disclosure as a result of the stress tests, in terms of lending, risk-taking and profitability?

- Is there an effect of additional capital requirements resulting from stress tests on banks' balance sheets?
- Is there a dynamic effect of the publication of stress test results around the quarter of publication?
- Does the voluntary disclosure of Pillar 2 Requirements (P2R) matter?

## Related Literature

- Literature related to the effects of stress tests in the European context is scarce (mostly US focused). The consensus of these studies is that banks participating in stress tests tend to decrease their **credit supply and/or risk-taking**.

→ Acharya et al. (2018), Connolly (2018), Covas (2018), Cappelletti et al. (2019a), Calem et al. (2020), Cortés et al. (2020), Pierret and Steri (2020) and Kok et al. (2021)

- Strand of literature focusing on the **stress test disclosures** and respective information effects, mainly in the market behaviour.

→ Durrani et al. (2022), Cappelletti et al. (2019a), Georgescu et al. (2017), Breckenfelder and Schwaab (2018), Alves et al. (2015), Flannery et al. (2017), Barucci et al. (2018), Dogra and Rhee (2020), Fernandes et al. (2020), and Sahin et al. (2020)

- The causal identification of the effect of stress tests on lending and banks' risk-taking can be related to the debate on **how banks adjust their balance-sheets in response to higher capital requirements**.

→ Gersbach and Rochet (2017), Cappelletti et al. (2019b), Gropp et al. (2019) and Kok et al. (2021)

## Contribution to the literature

- 1 Expand literature on the impact of **higher capital requirements**, focusing on the prudential policy effectiveness via stress test exercises in the Euro Area.
- 2 Explore relevant **outcome variables**, assessing banks' **lending, risk-taking and profitability**, including **banks' heterogeneity**.
- 3 From a financial stability perspective: study whether publication and voluntary P2R disclosure helps to better understand the **mechanisms** underlying the pass-through of higher capital requirements on banks' behaviour → whether **disclosure** of prudential policy is effective in enhancing banks' **resilience** and improving financial stability.

## Preview of Results

Banks subject to stress tests:

- **(derisking)** Reallocate credit away from riskier borrowers to safer ones in the household sector, with negative effects for banks' profitability.
- **(deleverage)** Reduce lending towards households and non-financial corporations (a lagged significant effect). Results suggest no anticipatory effects for all variables being studied.
- Specifically the case for the set of **banks part of the SREP sample with undisclosed stress test results**, which were also not disclosing their P2R voluntarily.

# Set Up



## Institutional Setting

- The EU-wide stress tests assesses banks' capital position every two years **ensuring a banking system resilient to adverse macro-financial shocks.**
- Led by the EBA in cooperation with the ECB and national authorities.
- The ECB, in parallel, conducts the 'SREP' stress test for an additional set of banks under direct supervision → equivalent methodology.  
→ Before 2021 only stress test results of banks that form part of the European Banking Authority (EBA) sample were published, while results of smaller banks that are part of the Supervisory Review and Evaluation Process (SREP) sample were not published.
- **No "failing" or "passing"**: results influence the Pillar 2 capital required. Stress tests may translate into higher capital requirements.
- Stress test exercises launched in beginning of the year and results are published in the third (2016) or fourth (2018) quarter.

# Data

## Two unique data sets:

### ① Internal dataset on stress tests:

- Includes 93 (2016) and 87 (2018) participating banks, of which 37 (2016) and 33 (2018) are part of the EBA euro area sample with publicly available results, while 56 (2016) and 54 (2018) banks are part of the ECB/SREP sample with undisclosed results.

In few cases banks are excluded because of mergers immediately before or after an exercise.

### ② Granular supervisory data:

- Quarterly reports for euro area banks, including outcome variables defined as log changes of exposure at default (lending), changes in risk-weights (risk-taking) and changes in return on equity (profitability)! (among others like risk-weighted assets, assets, impairments, expected losses, as well as capital indicators like CET1 ratio, ... ).
- Almost 1,000 banks from Euro Area countries.
- Data spanning from 2015 Q1 and 2019 Q4.

⇒ Breakdown towards households and non-financial corporations!

## Data - Participating Banks

	EBA banks	SREP banks (Total)	of which, SREP banks (P2R disclosed)	of which, SREP banks (P2R undisclosed)
<b>2016</b>				
Assets (bn Euros)	523.929 (518.902)	44.405 (25.501)	48.562 (23.683)	41.537 (26.708)
CET1 ratio	0.144 (0.056)	0.175 (0.124)	0.162 (0.102)	0.185 (0.139)
Exposures (bn Euros)	441.565 (386.663)	42.221 (23.528)	46.964 (21.210)	38.949 (24.830)
Return-on-equity ratio	0.013 (0.009)	0.013 (0.021)	0.011 (0.017)	0.013 (0.023)
Stress tested banks	35	46	21	25
Disclosure	29.07.2016	No	Voluntary	No
<b>2018</b>				
Assets (bn Euros)	533.145 (503.578)	44.164 (26.373)	46.915 (25.658)	40.455 (27.439)
CET1 ratio	0.156 (0.063)	0.203 (0.115)	0.194 (0.116)	0.215 (0.116)
Exposures (bn Euros)	479.289 (406.856)	43.195 (24.861)	45.865 (23.863)	39.597 (26.246)
Return-on-equity ratio	0.017 (0.008)	0.02 (0.019)	0.023 (0.022)	0.017 (0.013)
Stress tested banks	32	52	30	22
Disclosure	02.11.2018	No	Voluntary	No

# Identification

## Baseline specification

- Use a classic staggered difference-in-differences for the initial investigation of effects.
- Rely on the common trend assumption before and after the stress testing outcomes of participating and non-participating banks.
- Overlap based on banks (risk-weighted) asset size → comparable sample of banks takes into account size, risk-profile and (implicitly) business model.

## Dynamic specification

- Extend to a dynamic differences-in-differences controlling for anticipatory or lagging effects → accommodates some of the recent critique and pins down publication date!

## Difference-In-Differences

⇒ Estimate average treatment effect (ATE), entities can be 'treated' twice:

$$Y_{i,t} = \alpha + \beta_1 D_{i,t} + \beta_2 X'_{i,t} + \tau_t + \mu_i + \varepsilon_{i,t}, \quad (1)$$

- $D_{i,t} = S_{i,t} * T_i$  with  $S_{i,t} = 1$  if the bank was stress tested and 0 otherwise.
- $T_i = 1$  during the intervention period, i.e. since the publication of the stress test results until the implementation in the supervisory review, 0 otherwise.
- $\beta_1$  indicates the ATE.
- $X'_{i,t}$  is a vector of control variables, namely the country specific unemployment rate, banks' voluntary buffer (each lagged by 1 quarter).

Standard errors are clustered at bank level.  $\alpha$  is a constant,  $\mu_i$  are bank fixed-effects,  $\tau_t$  are quarterly time fixed-effects and  $\varepsilon_{i,t}$  the individual error term.

## Dynamic Difference-In-Differences

⇒ **Dynamic difference-in-differences** modifies the baseline approach by focusing exclusively on the quarter of publication but **adding leads/lags** to trace out the dynamic propagation.

$$Y_{i,t} = \alpha + \sum_{j=q}^p \beta_j D_{i,t+j} + \gamma X'_{i,t} + \tau_t + \mu_i + \varepsilon_{i,t} \quad (2)$$

- $T_i = 1$  only in publication quarter.
- $D_{i,t+j}$  has  $q = 2$  leads and  $p = 4$  lags.
- Other variables remain the same.

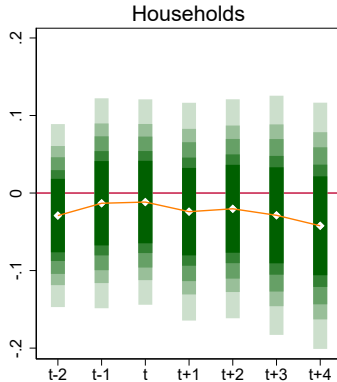
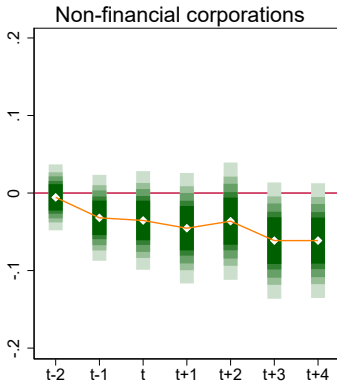
# Results

## Baseline DiD Results

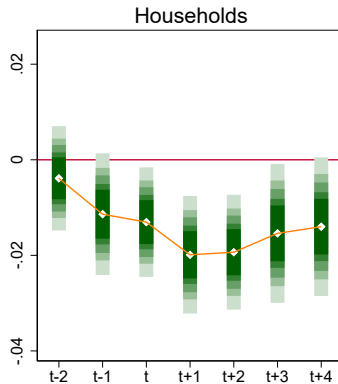
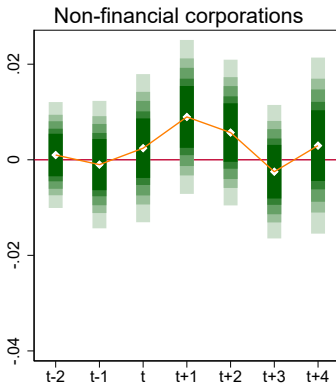
	Full sample	RWA	Assets	Full sample	RWA	Assets
<b>Exposures</b>	<b>Non-financial corporations</b>			<b>Households</b>		
$D_{it}$	-0.004	0.005	0.004	-0.016	-0.031	-0.021
(SE)	(0.014)	(0.015)	(0.015)	(0.017)	(0.020)	(0.022)
Observations	13034	7385	9249	12336	6987	8747
Groups	1010	475	963	962	447	920
<b>Risk-weights</b>	<b>Non-financial corporations</b>			<b>Households</b>		
$D_{it}$	0	-0.002	0	-0.007*	-0.008*	-0.009**
(SE)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
Observations	13030	7309	9205	12375	7017	8793
Groups	1012	473	964	963	450	925
<b>Return-on-equity</b>	<b>Total</b>					
$D_{it}$	-0.019**	-0.018*	-0.021**			
(SE)	(0.007)	(0.008)	(0.008)			
Observations	6778	4298	6571			
Groups	485	290	481			



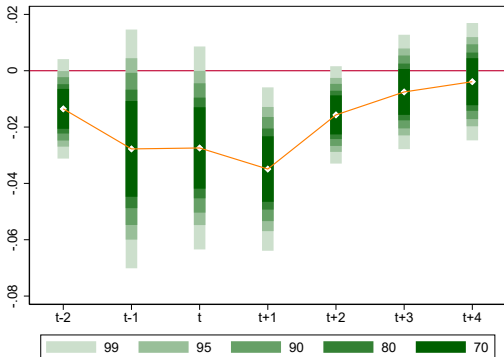
## Dynamic Results - Lending



## Dynamic Results - Risk-Taking



## Dynamic Results - Profits



## Validation - Common Trends

We use Cerulli and Ventura, 2019 following Angrist and Pischke, 2008, as below:

$$Y_{i,t} = \alpha + \beta_1 t + \beta_2 (D_{i,t} \times t) + \beta_3 D_{i,t} + \mu_i + \varepsilon_{i,t}, \quad (3)$$

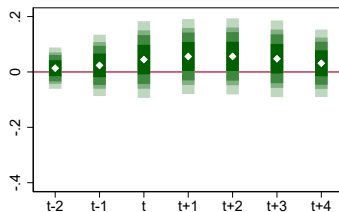
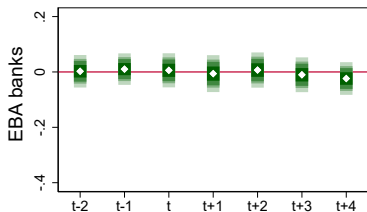
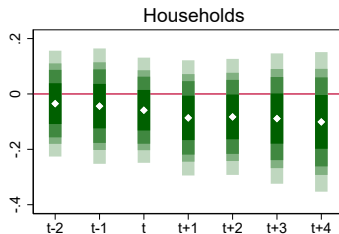
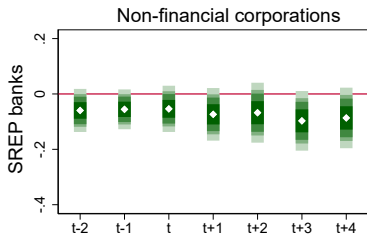
	Full Sample	RWA	Assets
<b>Δ Log Credit</b>			
Non-financial corporations	0.099	0.207	0.364
Households	0.907	0.881	0.801
<b>Δ Avg. Risk-weights</b>			
Non-financial corporations	0.522	0.435	0.409
Households	0.261	0.435	0.977
<b>Δ Avg. Return-on-equity</b>			
Total	0.931	0.957	0.844

## The Effect of Disclosures

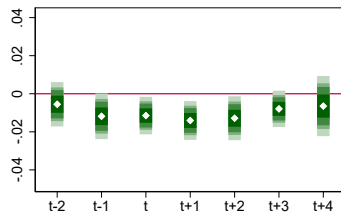
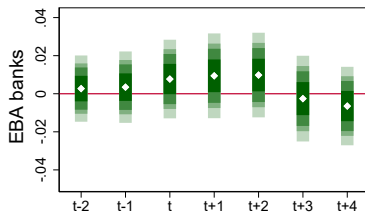
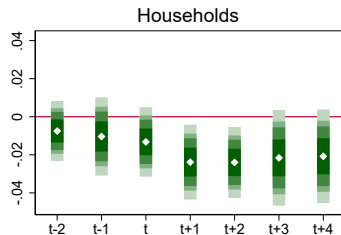
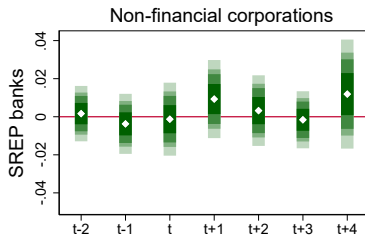
## EBA and SREP - Overview Baseline

	Full sample	RWA	Assets	Full sample	RWA	Assets
<b>Exposures</b>	<b>Non-financial corporations</b>			<b>Households</b>		
$D_{i,t} \times SREP$ (SE)	-0.005 (0.022)	0.004 (0.021)	0.004 (0.021)	-0.039 (0.024)	-0.053* (0.025)	-0.045 (0.026)
$D_{i,t} \times EBA$ (SE)	-0.003 (0.011)	0.009 (0.012)	0.008 (0.013)	0.015 (0.020)	0.011 (0.028)	0.019 (0.030)
Observations	13034	7385	9249	12336	6987	8747
Groups	1023	477	973	983	456	936
<b>Risk-weights</b>	<b>Non-financial corporations</b>			<b>Households</b>		
$D_{i,t} \times SREP$ (SE)	-0.002 (0.006)	-0.003 (0.006)	-0.002 (0.006)	-0.009* (0.005)	-0.009 (0.005)	-0.010* (0.005)
$D_{i,t} \times EBA$ (SE)	0.003 (0.003)	0.002 (0.004)	0.004 (0.004)	-0.005* (0.002)	-0.006 (0.003)	-0.008* (0.003)
Observations	13030	7309	9205	12375	7017	8793
Groups	1025	477	977	984	457	940

## EBA and SREP - Lending

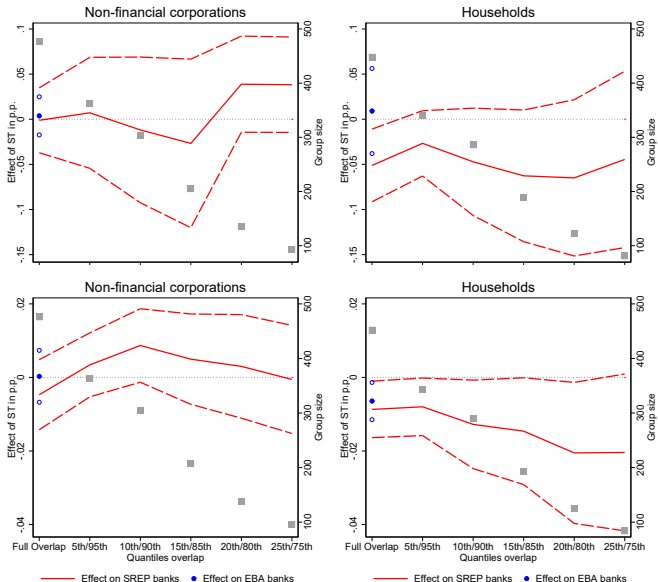


# EBA and SREP - Risk Taking





# EBA and SREP - Lending - Risk Taking - Size Overlap



Stress tests and capital requirement disclosures: do they impact banks' lending and risk-taking decisions?

## SREP P2R Voluntary Disclosure - Lending

	Full	RWA	Total Assets	Full	RWA	Total Assets
<b>Exposures</b>	<b>Non-financial corporations</b>			<b>Households</b>		
<i>D x SREP x undisclosed</i> (SE)	-0.034 (0.040)	-0.024 (0.040)	-0.022 (0.040)	-0.068 (0.036)	-0.081* (0.036)	-0.074* (0.037)
<i>D x SREP x disclosed</i> (SE)	0.011 (0.028)	0.019 (0.028)	0.017 (0.027)	-0.015 (0.027)	-0.027 (0.027)	-0.020 (0.028)
<i>D x EBA</i> (SE)	-0.008 (0.011)	0.002 (0.012)	0.001 (0.013)	0.013 (0.020)	0.005 (0.026)	0.010 (0.026)
Observations	12334	7042	9110	11672	6656	8602
Groups	1010	475	963	962	447	920

## SREP P2R Voluntary Disclosure - Risk-Taking

	Full	RWA	Total Assets	Full	RWA	Total Assets
<b>Risk-weights</b>	<b>Non-financial corporations</b>			<b>Households</b>		
<i>D x SREP x undisclosed</i> (SE)	0.001 (0.004)	-0.001 (0.004)	0.001 (0.004)	-0.017** (0.006)	-0.016** (0.006)	-0.017** (0.006)
<i>D x SREP x disclosed</i> (SE)	-0.007 (0.010)	-0.009 (0.010)	-0.007 (0.010)	-0.002 (0.008)	-0.002 (0.008)	-0.003 (0.008)
<i>D x EBA</i> (SE)	0.002 (0.003)	0.001 (0.004)	0.003 (0.004)	-0.005* (0.002)	-0.006* (0.003)	-0.007* (0.003)
Observations	12318	6959	9062	11712	6690	8655
Groups	1012	473	964	963	450	925

## Conclusion

## Wrapping Up

(three key takeaways) Banks subject to stress tests:

- **(derisking)** Reallocate credit away from riskier borrowers to safer ones in the household sector, with negative effects for banks' profitability → results remain stable for different specifications.
- **(deleverage)** Reduce lending towards households and non-financial corporations (a late lagged significant effect). There are no anticipatory effects for all variables being studied → SREP banks alone show evidence of a reduction in lending.
- Especially the case for **banks part of the SREP with undisclosed stress test results**, which were also not disclosing their P2R voluntarily → heterogeneity among the EBA and SREP banks is driven by the portion of SREP banks that do not voluntarily disclose their requirements (e.g. P2R).

⇒ Disclosure of capital requirements → banks appear to be are less prone to balance-sheet adjustments since they are (in general) already more capitalised.

## Policy Implications

Results support the discussion on the benefits and short-run costs of higher capital requirements and role of transparency for financial stability:

- Banks tend to comply with higher requirements, as a result of the stress tests, by dampening down their risk-weighted assets → reduce banks' gambling incentives resulting in a **positive disciplining effect**.
- As also suggested by Hanson et al. (2011), Gropp et al. (2019) and Cappelletti et al. (2019b) to ensure the effectiveness of the prudential policy but mitigate potential optimisation of risk-weighted assets and reduce adverse impact on real economy: could target **absolute amount of new capital** to be raised instead.
- The mandatory **publication of capital requirements should be considered** as banks with published requirements tend to have more robust capital ratios, hence improving market discipline and financial stability.

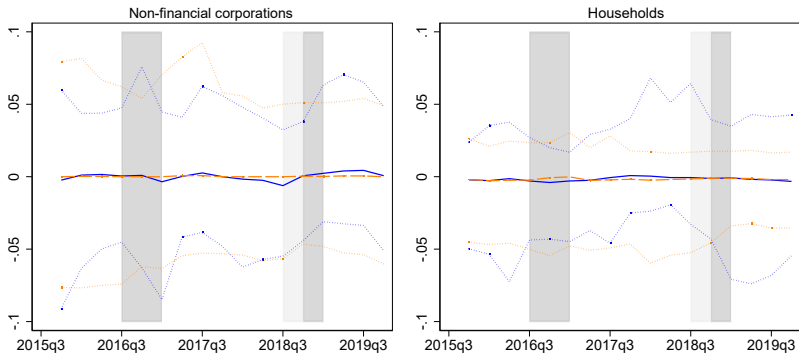
Thank you!  
Comments and questions welcome :)

# Lending

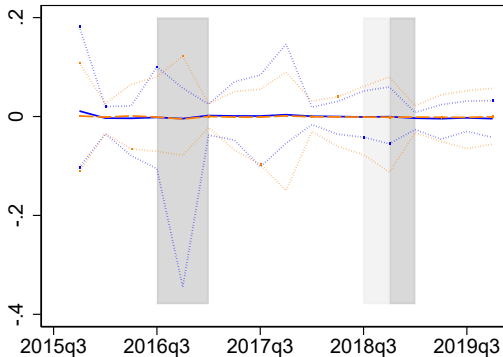




# Risk-taking



# Profitability



## Alternative Specifications

	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
<b>Exposures</b>	<b>Non-financial corporates</b>				<b>Households</b>			
$D_{i,t}$	-0.008	0.011	-0.005	0.006	-0.033**	-0.013	-0.015	-0.013
(SE)	(0.020)	(0.012)	(0.014)	(0.012)	(0.015)	(0.015)	(0.017)	(0.016)
Observations	12353	12337	13353	12343	11695	11675	12641	11685
Groups	1020	1020	1025	1020	978	978	984	978
<b>Risk-weights</b>	<b>Non-financial corporates</b>				<b>Households</b>			
$D_{i,t}$	-0.002	-0.002	0.001	-0.003	-0.001	-0.006**	-0.007**	-0.006**
(SE)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	12343	12327	13352	12331	11732	11711	12678	11722
Groups	1022	1022	1028	1022	979	979	986	979
<b>Retrun-on-equity</b>	<b>Total</b>							
$D_{i,t}$	-0.012**	-0.012*	-0.018**	-0.007				
(SE)	(0.005)	(0.006)	(0.007)	(0.005)				
Observations	6552	6063	6308	6548				
Groups	970	970	977	970				
<b>Controls</b>	Yes	Yes	No	Yes	Yes	Yes	No	Yes
<b>Fixed-effects</b>	No	Bank	Bank, Quarter	Bank, Country x Year	No	Bank	Bank, Quarter	Bank, Country x Year

## Placebo Years

	Full sample	RWA	Assets	Full sample	RWA	Assets
<b>Exposures</b>	<b>Non-financial corporations</b>			<b>Households</b>		
<i>Placebo dates</i> (SE)	-0.003 (0.013)	-0.009 (0.014)	-0.015 (0.014)	-0.007 (0.020)	-0.013 (0.023)	-0.014 (0.024)
<i>Actual stress-tests</i> (SE)	-0.012 (0.013)	-0.001 (0.014)	-0.005 (0.015)	-0.017 (0.017)	-0.033 (0.020)	-0.027 (0.021)
Observations	12018	6735	8726	11383	6377	8261
Groups	1023	477	973	982	455	935
<b>Risk-weights</b>	<b>Non-financial corporations</b>			<b>Households</b>		
<i>Placebo dates</i> (SE)	-0.004 (0.004)	-0.000 (0.004)	-0.002 (0.004)	0.001 (0.003)	0.001 (0.003)	0.002 (0.003)
<i>Actual stress-tests</i> (SE)	-0.001 (0.003)	-0.001 (0.004)	0.001 (0.004)	-0.007** (0.003)	-0.007** (0.003)	-0.008** (0.003)
Observations	12017	6668	8689	11418	6401	8302
Groups	1024	476	976	983	456	939

## Placebo Years

	Full sample	RWA	Assets	Full sample	RWA	Assets
<b>Return-on-equity</b>	<b>Total</b>					
<i>Placebo dates</i> (SE)	0.012 (0.007)	0.010 (0.008)	0.011 (0.008)			
<i>Actual stress-tests</i> (SE)	-0.011* (0.005)	-0.010 (0.005)	-0.012* (0.005)			
Observations	6355	3959	6174			
Groups	976	451	966			