HOUSE OF FINANCE
Goethe-Universität Frankfurt

Wishful Thinking or Effective Threat?

Tightening Bank Resolution Regimes and Bank Risk-Taking

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Contents

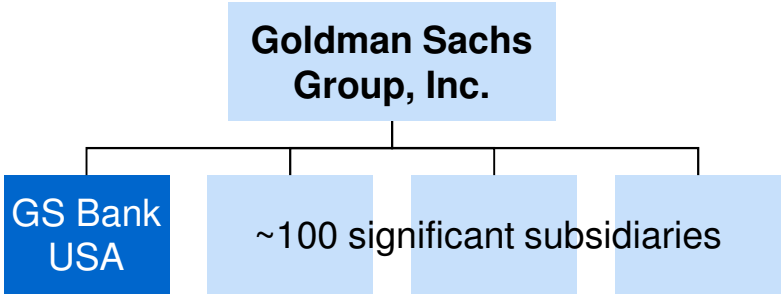
- **Motivation, theoretical model and key hypotheses**
- Identification strategy and model
- Results and policy implications

Motivation – Goldman Sachs and the two types of resolution law

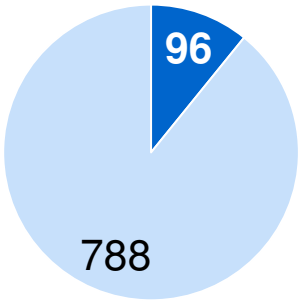
Two types of resolution law in the US that are applicable to financial institutions

(Default) Corporate insolvency regime	US Federal Bankruptcy Code, judicial insolvency (ex post, long process, freeze of funds, autom. stay)	**De facto not applicable** without major disruptions
(Special) Bank insolvency regime	FDIA, administrative insolvency (accounts for banks' specificities, timely intervention, liquidity/continuity)	**Appropriate** for banks, frequently applied

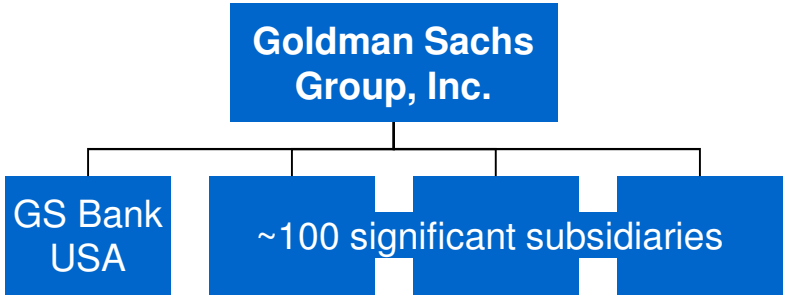
Applicable resolution regimes on 30.06.2010



Total assets of holding and applicable insolvency law
USD bn



Applicable resolution regimes on 30.09.2010



Total assets of holding and applicable insolvency law
USD bn

Does this influence bank risk-taking? We think: It does! ?!

A theory of bank closure – DeYoung/Kowalik/Reidhill (2013)[1] offer a model that predicts improving resolution technology to change bank risk-taking

Model

- Closing or bailing out a bank can be modeled as a **trade-off between liquidity and discipline**
  - Option 1: **Resolution**

    (discipline ↑, liquidity ↓)
  - Option 2: **Bailout**

    (discipline ↓, liquidity →)
- **Time discount rate** of regulator important for optimal solution, since
  - **Liquidity** effects are **short**-run
  - **Discipline** effects are **long**-run

→ **Improvements in resolution technology change level of trade-off**

(Testable) predictions

- **Improvements in resolution technologies change banks' behavior towards more discipline**
  - Less **complex** business strategies
  - Less **excessive risk-taking**
- Increasing **political will** (i.e. decreasing time discount rate) makes application of the resolution authority **more credible** and hence **increases its effect** on bank behavior

If both conditions are given, a tightening in bank resolution regimes should decrease risk-taking of affected banks

1 Journal of Financial Stability, forthcoming

We exploit the following hypotheses to test the effect of a change in bank resolution regimes

		Results of empirical tests
Main hypothesis	**Affected banks** alter their behavior towards **less risk-taking and safer business models** after a change in bank resolution regimes becomes effective.	
Extended hypothesis	If the application of the new resolution regime is **not credible due to bank-specific characteristics** (e.g., size), we expect to find a **lower or even no effect on the respective banks' risk-taking** after the change in bank resolution regimes.	

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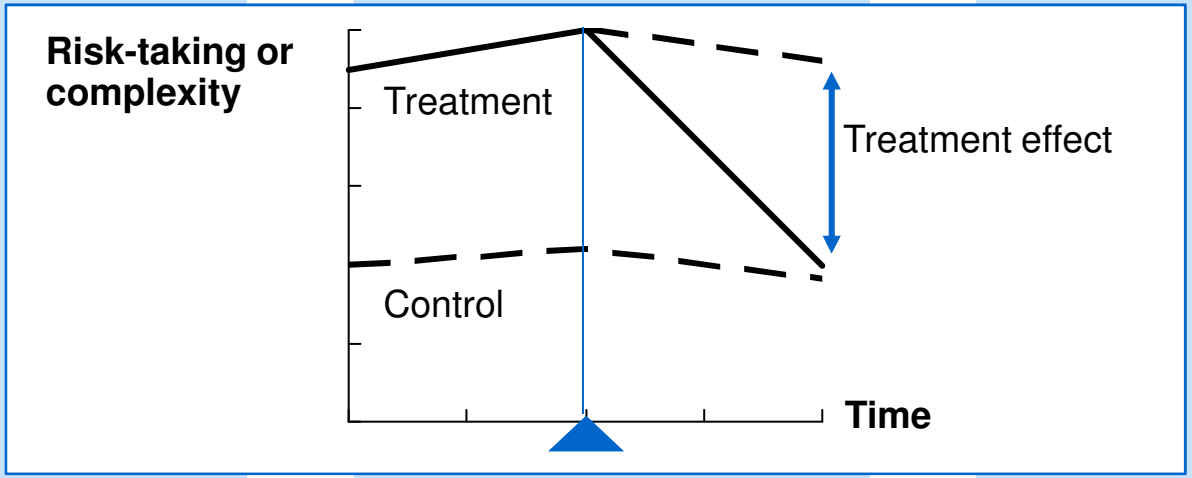
Our identification strategy applies the theory of bank resolution to changes in the US resolution regime – The Orderly Liquidation Authority (OLA)

Identification strategy:
Use quasi-natural experiment setup
in a difference-in-difference methodology

Requirement 1: Treatment

Requirement 2: Treatment and control group

Requirement 3: Timing of treatment



Our identification strategy applies the theory of bank resolution to changes in the US resolution regime – The Orderly Liquidation Authority (OLA)

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Requirement 1: Treatment	Requirement 2: Treatment and control group	Requirement 3: Timing of treatment
Is the OLA an improvement in resolution technology? ▪ OLA extends special resolution regime to financial institutions previously uncovered by bank-specific resolution law (legal improvement) ▪ Set up of new Orderly Liquidation Fund (financial improvement)		

An application to changes in the U.S. bank resolution regime – The Orderly Liquidation Authority (OLA) as the treatment

	BEFORE Orderly Liquidation Authority	AFTER OLA
Issue 1: Appropriate insolvency regimes	**No unified resolution regime for financial institutions**[1] ▪ FDIA with **bank-specific administrative resolution** procedure for all **insured depository institutions** (Literature: most appropriate, frequently utilized) ▪ All **other financial institutions** (e.g. bank or financial holding companies) only covered by **default corporate insolvency law** (Literature: Less appropriate) → **No appropriate resolution technology for bank/financial holding companies (BHCs), making bailout the only choice**	**Orderly Liquidation Authority** (DFA, title II) ▪ Extends special resolution regime to financial institutions **previously uncovered by bank-specific resolution law** ▪ OLA resolution technically similar to FDIA-procedure, **effectively covering any financial firm** → **Legal empowerment to resolve BHCs**
Issue 2: Sufficient resolution funds	**Limited resources of Deposit Insurance Fund** (record high of USD 52 bn in 2008, ~1/10 of Bank of America's deposits) → **Financial limit to resolve large institutions**	Set up of new Orderly Liquidation Fund with ex post risk-based assessments → **Financial empowerment**

The Orderly Liquidation Authority is a significant legal and financial empowerment of the regulator and hence a technological improvement to the U.S. resolution regime

1 See Bliss/Kaufman (2006) and Marin/Vlahu (2011) for detailed descriptions and comparison of the different regimes

Our identification strategy applies the theory of bank resolution to changes in the US resolution regime – The Orderly Liquidation Authority (OLA)

Identification strategy:
Use quasi-natural experiment setup
in a difference-in-difference methodology

Requirement 1: Treatment	Requirement 2: Treatment and control group	Requirement 3: Timing of treatment
Is the OLA an improvement in resolution technology? ▪ OLA extends special resolution regime to financial institutions previously uncovered by bank-specific resolution law (legal improvement) ▪ Set up of new Orderly Liquidation Fund (financial improvement)	**Were financial institutions differentially affected?** ▪ Affected banks: BHCs (and their banks) with high share of (previously) non-FDIA-regulated assets are most affected by the change in resolution regime (treatment group) ▪ Non-affected banks as control group	

Treatment and control group defined based on share of total non-FDIA-regulated BHC assets

FDIA-regulated/resolvable before OLA

	Treatment group	Control group
Definition	BHCs (and their banks) with **high share of non-FDIA-regulated assets** are particularly affected	BHCs (and their banks) with **low share of non-FDIA-regulated assets** are less affected (FDIA regime was effective before)
Identification	**Treatment-dummy: More than X% (here: 30%) of total BHC assets** were **not regulated by FDIA** before OLA	**Control-dummy: Less than Y% (here: 10%) of total BHC assets** were **not regulated by FDIA** before OLA
	Alternative: continuous 'treatment intensity' (non-FDIA-regulated asset share)	
Obs. level		
BHC level	BHC (treat)	BHC (control)
Bank level	Bank (treat), Other, Other, Other	Bank (cont.), Bank (cont.), Bank (cont.), Other

We test our hypotheses for different levels of aggregation (BHC and bank level) and use both a treatment/control dummy and a continuous treatment intensity for identification

Our identification strategy applies the theory of bank resolution to changes in the US resolution regime – The Orderly Liquidation Authority (OLA)

Identification strategy:
Use quasi-natural experiment setup
in a difference-in-difference methodology

Requirement 1: Treatment

Is the OLA an improvement in resolution technology?

- OLA extends special resolution regime to financial institutions previously uncovered by bank-specific resolution law (legal improvement)
- Set up of new Orderly Liquidation Fund (financial improvement)

Requirement 2: Treatment and control group

Were financial institutions differentially affected?

- Affected banks: BHCs (and their banks) with high share of (previously) non-FDIA-regulated assets are most affected by the change in resolution regime (treatment group)
- Non-affected banks as control group

Requirement 3: Timing of treatment

Can clear pre- and post-treatment periods be distinguished?

- Part of reform package suggested by the Obama Administration in June 2009 → pre-treatment
- Effective through enactment of Dodd-Frank Act in July 2010 → post-treatment

Baseline regression model employs the dif-in-dif framework

$$\text{Risk taking}_{i,t} = \alpha + \beta_1 * \text{AFTER}_t + \beta_2 * \text{AFFECTED}_i + \beta_3 * (\text{AFTER}_t \text{x} \text{AFFECTED}_i) + \text{FE} + X_{i,t} + \varepsilon_{i,t}$$

BHC/bank-data model

- Bank z-score
- RoA volatility
- Asset risk (RWA/assets)
- Business model risk (e.g. risky securities ratio, trading assets ratio, NII/II ratio)

Market-data model

- Volatility of (weekly) stock returns

Loan-data model

- Loan-income-ratio
- Application approval indicator per risk range

Dummy variable

- 0 = before introduction of OLA
- 1 = after introduction of OLA

Dummy variable

- 0 = non-affected bank (or BHC), part of a BHC with less than 10% non-FDIA-regulated assets
- 1 = affected bank (or BHC), part of a BHC with more than 30% non-FDIA-regulated assets

Continuous variable: Non-FDIA regulated asset share

Interaction term (Dif-in-Dif identification)

Fixed effects (bank and time/ bank and regional)

Control variables

For **BHC/bank-level** models:

- (Time-varying) bank controls, i.e. size, capitalization, profitability, liquidity, state support (TARP)

For **loan-level** models:

- (Time-varying) bank controls
- Loan characteristics
- Demographic controls
- Economic conditions, esp. housing market

Does it really make a difference? Some indicative evidence

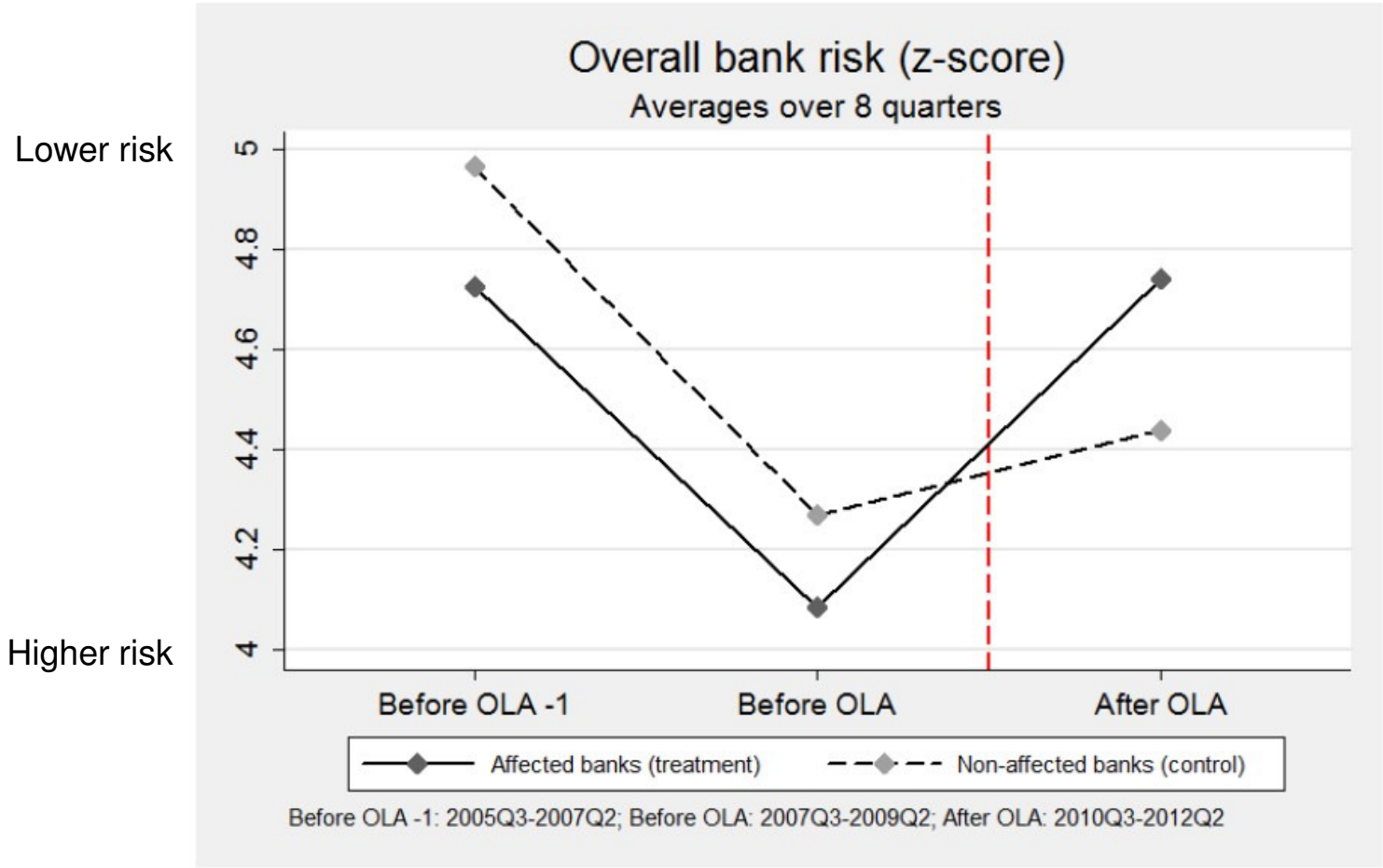

Figure 2: Bank risk-taking before and after OLA

Average bank risk for affected and non-affected bank exhibits a **parallel development in the absence of treatment**, but **affected banks decrease risk much stronger after treatment**

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Baseline – Bank/BHC risk measures (accounting and market data)

	(1)	(2)	(3)	(4)	(5)
Level	**Bank level**		**BHC level**		
Dep. variable	**Z-score**	**Asset risk**	**Z-score**	**Asset risk**	**σ Stock**
Affected bank	0.185*	0.0232**			
	(0.0978)	(0.0117)			
Affected BHC			0.195	0.00562	-0.0345*
			(0.192)	(0.0410)	(0.0195)
Affected bank x after OLA	0.530***	-0.0229***			
	(0.0931)	(0.00862)			
Affected BHC x after OLA			0.467**	-0.0178*	-0.0298***
			(0.229)	(0.0103)	(0.00712)
Constant	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES
Observations	52,128	52,346	4,881	5,034	1,263
R-squared	0.789	0.891	0.864	0.897	0.676

Highly significant decline in overall risk between pre- and post-treatment for affected banks as compared to non-affected banks at **both the level of individual banks** as well as on the **level of BHCs**

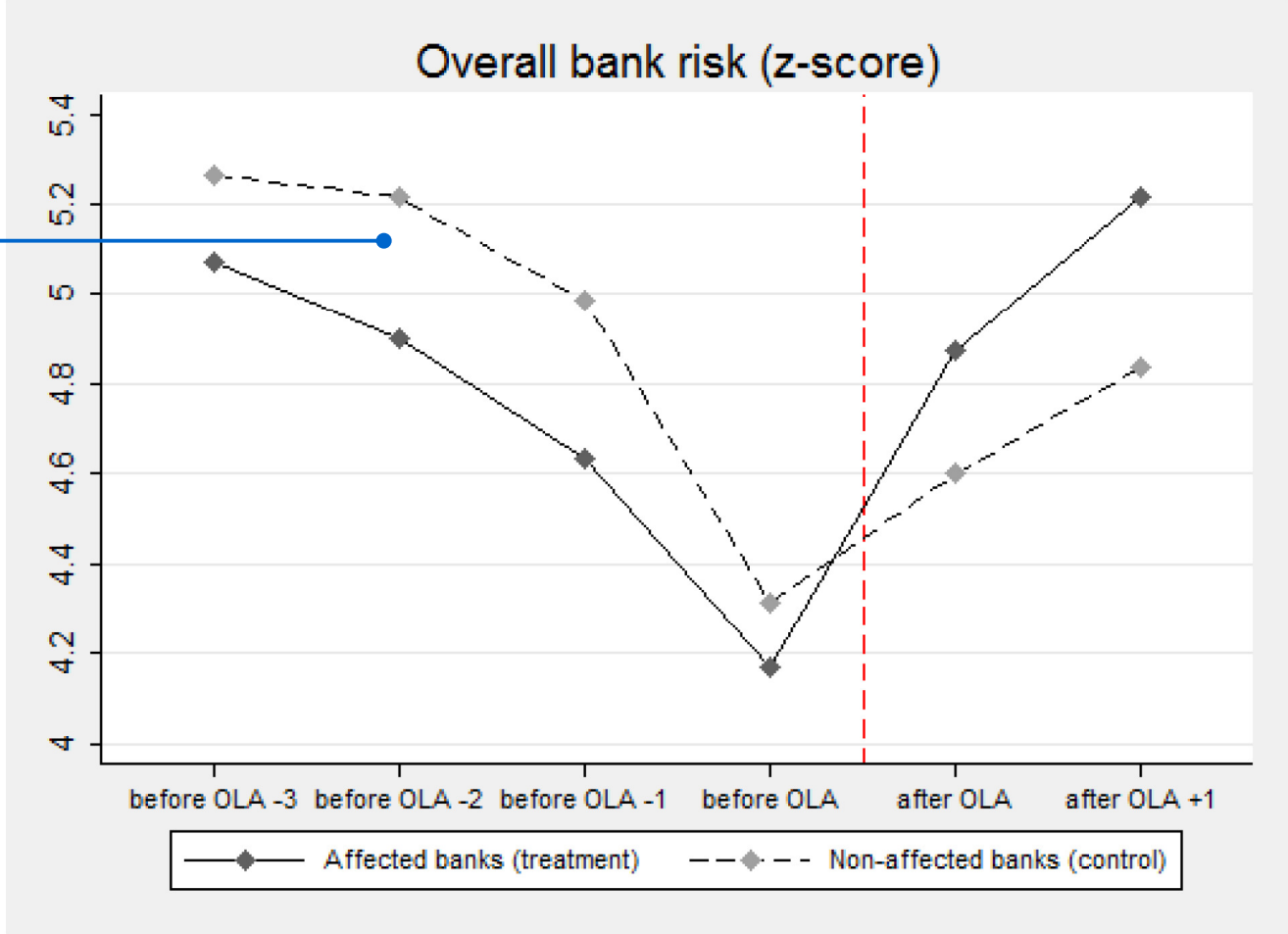
Robustness I – Using continuous treatment intensity

	(1)	(2)	(3)	(4)	(5)
Level	**Bank level**		**BHC level**		
Dep. variable	**Z-score**	**Asset risk**	**Z-score**	**Asset risk**	**σ Stock**
Unregulated share (parent BHC-level)	0.900***	0.0887***			
	(0.147)	(0.0145)			
Unregulated share (BHC-level)			3.159***	0.0305	0.0707*
			(0.916)	(0.0388)	(0.0379)
Unregulated share x after OLA	1.035***	-0.0727***			
	(0.127)	(0.0108)			
Unregulated share x after OLA			1.847***	-0.0438*	-0.0659***
			(0.556)	(0.0225)	(0.0166)
Constant	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES
Observations	82,788	83,061	13,013	13,192	4,626
R-squared	0.757	0.884	0.802	0.875	0.640

Robust results when **replacing the treatment dummy with the actual share of assets not subject to FDIA resolution** (continuous **treatment intensity** proxy)

Robustness II – Applying a placebo treatment (1/2)

Dif-in-dif identifying assumption:
In the absence of treatment, both treatment and control group develop equally **(parallel trend)**



Test the identifying assumption by **applying a placebo treatment**

Robustness II – Applying a placebo treatment (2/2)

	(1)	(2)	(3)	(4)	(5)
Level	**Bank level**		**BHC level**		
Dep. variable	**Z-score**	**Asset risk**	**Z-score**	**Asset risk**	**σ Stock**
Affected bank	0.222***	0.00568			
	(0.0837)	(0.00833)			
Affected BHC			0.0921	0.0610***	0.0775**
			(0.995)	(0.0187)	(0.0347)
Affected bank x after placebo	0.0133	0.00326			
	(0.0766)	(0.00438)			
Affected BHC x after placebo			-0.132	-0.00677	0.0125
			(0.201)	(0.00576)	(0.00866)
Constant	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES
Observations	59,296	59,577	7,261	7,321	1,957
R-squared	0.761	0.914	0.851	0.933	0.608

Treatment and control group **do not exhibit significantly different reactions to the placebo treatment**

Robustness III – Testing for alternative explanations (1/3)

Is the effect due to **sample attrition?**

	(1)	(2)	(3)	(4)
Level	**Bank level**			
Robustness test	**Sample attrition wo failed banks**		**Sample attrition wo exited banks**	
Dep. variable	**Z-score**	**Asset risk**	**Z-score**	**Asset risk**
Affected bank	0.183*	0.0237**	0.145	0.0278**
	(0.0999)	(0.0121)	(0.103)	(0.0117)
Affected bank x after OLA	0.508***	-0.0230***	0.578***	-0.0264***
	(0.0922)	(0.00862)	(0.0947)	(0.00915)
Trading assets ratio				
Trading assets ratio x after OLA				
Constant	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
Observations	51,059	51,251	49,866	50,012
R-squared	0.782	0.890	0.784	0.891

Results are **very consistent** with our baseline results in size and significance

Robustness III – Testing for alternative explanations (2/3)

Is there a non-linear response caused by the solvency constraint?

- Stronger response when the solvency constraint is more binding, leading to more aggressive decrease in risk
- Treatment group indeed enters treatment period with higher risk measures

→ Eliminate concerns by matching treatment and control group on pre-treatment risk measures

	(5)	(6)
Level		
Robustness test	**Solvency constraint**	
Dep. variable	**Z-score**	**Asset risk**
Affected bank	0.333***	0.0366**
	(0.108)	(0.0143)
Affected bank x after OLA	0.487***	-0.0277**
	(0.151)	(0.0116)
Trading assets ratio		
Trading assets ratio x after OLA		
Constant	YES	YES
Controls	YES	YES
Bank FE	YES	YES
Time FE	YES	YES
Observations	2,689	2,718
R-squared	0.817	0.910

Results of the matched sample are **very consistent** with our baseline results in size and significance

Robustness III – Testing for alternative explanations (3/3)

Could results be driven by other regulatory actions?[1]

- **Volcker Rule?** Later date, but anticipation? → Include affectedness by Volcker (trading asset ratio)
- **Fed stress tests (SCAP)?** → Exclude affected banks

	(7)	(8)	(9)	(10)
Level				
Robustness test	**Alternative explanation Volcker Rule**		**Alternative explanation Stress tests**	
Dep. variable	**Z-score**	**Asset risk**	**Z-score**	**Asset risk**
Affected bank	0.191*	0.0236**	0.226**	0.0270**
	(0.0977)	(0.0118)	(0.0975)	(0.0117)
Affected bank x after OLA	0.512***	-0.0238***	0.336***	-0.0351***
	(0.0953)	(0.00883)	(0.0955)	(0.00880)
Trading assets ratio	-0.177	0.0555		
	(0.721)	(0.0842)		
Trading assets ratio x after OLA	2.443**	0.123		
	(1.077)	(0.140)		
Constant	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
Observations	52,128	52,346	51,911	52,129
R-squared	0.789	0.891	0.790	0.891

Results are **very consistent** with our baseline results in size and significance. Effect of Volcker Rule (if correctly proxied) is not yet consistent…

1 Unlikely, as those have to be both (a) at the same time and (b) affecting banks differently in accordance with their non-FDIA-regulated share

How do bank business model and investment choices change?

Level	(1) Bank level	(2)	(3)	(4)	(5)	(6)
Dep. variable	**Trading assets ratio**	**Low risk securities ratio**	**High risk securities ratio**	**CRECD loan ratio**	**Deposit ratio**	**NII ratio**
Affected bank	0.00116	-0.00101	0.0439	-0.00503	-0.0169	-0.0246
	(0.00131)	(0.0380)	(0.0291)	(0.0132)	(0.0142)	(0.0608)
Affected bank x after OLA	-0.00413***	0.0563***	-0.0338**	-0.0109*	0.0343***	-0.0911**
	(0.00123)	(0.0207)	(0.0141)	(0.00559)	(0.0131)	(0.0438)
Constant	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Observations	52,346	50,467	41,380	52,346	52,346	49,936
R-squared	0.804	0.770	0.755	0.959	0.884	0.801

Decrease in risky activities and investment choices for the affected banks after the introduction of the OLA, using several indicators for bank business model and investment choices

Risk-taking in new business decisions (mortgage loan data)

	(1)	(2)	(3)
Level	**Loan level**		
Sample	**Full sample**	**Sub-samples**	
	All loans	**All unsold loans**	**All loans from non-sec. banks**
Dep. variable		**Loan-to-income ratio**	
Affected bank	-0.736***	-0.665***	-0.724***
	(0.207)	(0.251)	(0.221)
After OLA	0.00201	0.0547***	-0.0131
	(0.00822)	(0.0113)	(0.0104)
Affected bank x after OLA	-0.0608***	-0.0418*	-0.0378**
	(0.0141)	(0.0249)	(0.0148)
Constant	YES	YES	YES
Bank controls	YES	YES	YES
Loan controls	YES	YES	YES
Borrower controls	YES	YES	YES
Demographic controls	YES	YES	YES
Economic controls	YES	YES	YES
Bank FE	YES	YES	YES
Tract FE	YES	YES	YES
Observations	1,249,901	416,966	756,721
R-squared	0.309	0.349	0.334

Affected banks significantly decrease loan-to-income ratios of new mortgage loans after the introduction of OLA **overall**, as well as **controlling for unsold[1] loans and securitization share**

1 We define unsold loans as loans that have not been sold in same calendar year

Risk-taking in new business decisions – Controlling for demand

Panel A: Approval rate of loan applications

	(1)	(2)	(3)	(4)	(5)
Level	**Loan level**				
		Loan applications within loan-to-income ratio range			
Sample	**All appl.**	**0-1**	**1-2**	**2-3**	**>3**
Dep. variable	**Application approval indicator**				
Affected bank	-0.0186	-0.00154	0.00229	0.0654	0.00271
	(0.0247)	(0.0392)	(0.0370)	(0.0451)	(0.0942)
After OLA	-0.00787	-0.000292	-0.00486	-0.0120*	-0.0219***
	(0.00598)	(0.00655)	(0.00605)	(0.00618)	(0.00821)
Affected bank x after OLA	-0.0725***	-0.0525**	-0.0628***	-0.0673***	-0.0757***
	(0.0201)	(0.0252)	(0.0173)	(0.0151)	(0.0208)
Constant	YES	YES	YES	YES	YES
Bank controls	YES	YES	YES	YES	YES
Loan controls	YES	YES	YES	YES	YES
Borrower controls	YES	YES	YES	YES	YES
Demographic controls	YES	YES	YES	YES	YES
Economic controls	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES
Tract FE	YES	YES	YES	YES	YES
Observations	1,599,039	322,829	391,761	444,573	439,876
R-squared	0.121	0.263	0.159	0.133	0.139

Decrease in probability of loan approval by affected banks after the introduction of OLA for **grows from safe to risky risk ranges** – setup enables us to **control for demand effect**…

Risk-taking in new business decisions – Controlling for demand

Panel B: Total number of loan applications

	(1)	(2)	(3)	(4)	(5)
Level	**Loan level**				
		Loan applications within loan-to-income ratio range			
Sample	**All appl.**	**0-1**	**1-2**	**2-3**	**>3**
Dep. variable	**Log of total number of loan applications per bank, year, and range**				
Affected bank	-0.215	0.275	-0.264	-0.253	-0.833**
	(0.245)	(0.359)	(0.216)	(0.377)	(0.334)
After OLA	-0.186***	-0.161***	-0.159***	-0.198***	-0.291***
	(0.0202)	(0.0258)	(0.0240)	(0.0274)	(0.0314)
Affected bank x after OLA	-0.119	-0.158	-0.108	-0.0660	-0.0477
	(0.149)	(0.159)	(0.146)	(0.207)	(0.201)
Constant	YES	YES	YES	YES	YES
Bank controls	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES
Observations	16,633	4,304	4,239	4,085	4,005
R-squared	0.019	0.080	0.102	0.120	0.161

No systematic differences in loan demand across risk ranges between affected and non-affected banks after introduction of OLA

Extension – Is the OLA a credible threat for all banks?

	(1)	(2)
Level	**Bank level**	
Dep. variable	**Z-score**	**Asset risk**
Secular effects		
Affected bank	0.0718	0.0158
	(0.102)	(0.0119)
Total assets	-0.026***	-0.0014**
	(0.00859)	(0.00066)
2nd level interactions		
Affected bank x after OLA	0.499***	-0.0264***
	(0.0974)	(0.00911)
Total assets x after OLA	0.0375***	-0.0001
	(0.0109)	(0.000325)
Affected bank x total assets	0.028***	0.00135**
	(0.00844)	(0.000658)
Moderated Dif-in-Dif		
Affected bank x after OLA x total assets	-0.0374***	0.00006
	(0.0109)	(0.000325)
Constant	YES	YES
Controls	YES	YES
Bank FE	YES	YES
Time FE	YES	YES
Observations	52,128	52,346
R-squared	0.790	0.890

- **Bank size moderates credibility of the resolution threat: Coefficients on triple interaction term** (affected bank x after OLA x total assets) show that **risk measures might be increasing with total assets** for affected banks after the introduction of OLA
- Coefficient on difference-in-difference term (affected bank x after OLA) **supports robustness of earlier findings**

Extension – How do "too-big-to-not-rescue" banks react to the introduction on the OLA?

	(1)	(2)	(3)	(4)
Level	**Bank level**			
Sample	**Part of U.S.-GSIFI**		**Asset size USD 50+ billion**	
Dep. variable	**Z-score**	**Asset risk**	**Z-score**	**Asset risk**
Unregulated share (parent BHC-level)	1.890**	0.394***	1.969***	0.0548
	(0.900)	(0.150)	(0.755)	(0.0629)
Unregulated share x after OLA	-4.145***	0.330***	-1.501	0.0776*
	(1.253)	(0.103)	(0.981)	(0.0446)
Constant	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
Observations	363	365	399	401
R-squared	0.861	0.932	0.826	0.955

Resolution threat is not credible for TBTF-banks: **Affected, systemically important** banks do **not reduce their risk-taking** after the introduction of the OLA, but **might even increase it**

We find affected banks to significantly decrease risk-taking after OLA introduction; effect does not hold for systemically most important banks

		Results of empirical tests
Main hypothesis	**Affected banks** alter their behavior towards **less risk-taking and safer business models** after a change in bank resolution regimes becomes effective.	✓
Extended hypothesis	If the application of the new resolution regime is **not credible due to bank-specific characteristics** (e.g., size), we expect to find a **lower or even no effect on the respective banks' risk-taking** after the change in bank resolution regimes.	✓

We conduct a vast number of robustness checks

		Robust
Dependent variables	▪ **Alternative measures** for overall bank risk (accounting data as well as market data) and risk choices in business model/investment decisions, both on the bank level and on the micro-level of business decisions	✓
Definition of cutoffs	▪ **Alternative regulated asset share cutoffs** for treatment dummy variable and **share of non-FDIA-regulated assets** as explanatory continuous variable ▪ **Alternative quarterly computations** for the treatment period and the pre- and post-treatment periods	✓
Endogeneity concerns	▪ **Bank and time fixed effects** for regressions using **bank level dataset** ▪ **Bank and regional fixed effects** for regressions using **loan level dataset** as well as set of time-varying control variables ▪ Alternative specifications **including and excluding controls and fixed effects**	✓
Model speci-fications	▪ **Probit and logit models** as alternative specifications to test the application approval indicator (binary variable)	✓
Autocor-relation	▪ **Correct standard errors for possible autocorrelation at the bank level** (as suggested by Wooldridge (2010)) as panel dataset with repeated cross sections of banks and several periods of data before and after the treatment can be prone to autocorrelation problems (Bertrand et al. (2004))	✓
Sample selection	▪ **Correct for outliers** (winsorize the variables in bank level dataset at 1% highest and lowest percentile, loan-to-income ratio at the highest percentile) ▪ **Control for consistency of key explanatory variables** (exclude banks that change treatment status of within our observation period) ▪ **Test different levels of aggregation** (BHC and bank level)	✓

Some stretched policy recommendations – Effective bank resolution regime should take into account three fundamental features

1 A bank resolution regime tailored to the **special role of financial institutions** and **sufficiently financially endowed** is essential to avoid major interruptions in liquidity provision and (particularly) to create a **credible resolution threat** for financial institutions in order to discipline them ex ante

2 **Comprehensive coverage** of financial institutions as a whole - that extends beyond the scope of deposit-taking entities only - will **avoid incentives to shift risks** into non-resolvable entities

3 **Too-big-to-fail institutions might still be unimpressed** by improvements in the resolution regime; **additional measures increasing their resolvability** (and ultimately the resolution threat) **are required**

Thank you for your attention