Rules and Discretion(s) in Prudential Regulation and Supervision: Evidence from EU Banks in the Run-Up to the Crisis

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Introduction

- Policy and academic debate on the **role of prudential regulation** in the **prevention of banking crises**, in the aftermath of the global financial crisis
- Focus on the **EU framework for prudential regulation**: key principles defined at the EU level, but implemented at national level
- **National options and discretions** provided – particularly before the crisis - relevant source of variation in prudential regulation across EU countries for the determination of capital requirements
- We exploit the **pre-crisis heterogeneous implementation of national options and discretions** in EU countries to analyse the crisis resilience of banks subject to different national regimes

Research Questions and Preview of Results

1) Investigate whether **banks in countries with less stringent prudential regulation** had **higher probability of being in distress** during the financial crisis

   - Less stringent regulation → **Higher probability of crisis public support**

2) Investigate **potential balance sheet channels** through which laxer prudential framework could have led to higher financial vulnerability of banks

   - **Prudential regulation** contributes to the **incentives for banks' balance sheet management**
   - **Banks' financial conditions**, predicted by regulation, **explain part of** variation in **the prob. of crisis distress**

3) Analyse whether **banks in different existing financial conditions** responded differently to a less stringent prudential regulation

   - In general, **larger increase in the prob. of crisis bail-out** for **banks in ex-ante more vulnerable conditions**.

Overview

- Prudential Regulation in the EU
- Novel Indicators for Prudential Regulation
- Empirical Analysis
  - Baseline Specification
  - Banks' Balance Sheet Channel
  - Bank Heterogeneity
- Conclusions

Prudential Regulation in the EU

- Long path towards the establishment of a level-playing field, consistently with the principle of proportionality, started before the Banking Union

- **Basel II/CRD** [Dir. 48/2006 & Dir. 49/2006]
- General principles established at the EU-level through directives, but implemented through national legislation.

→ **Large differences for banks headquartered in distinct countries**

- **Developments in the EU banking system**

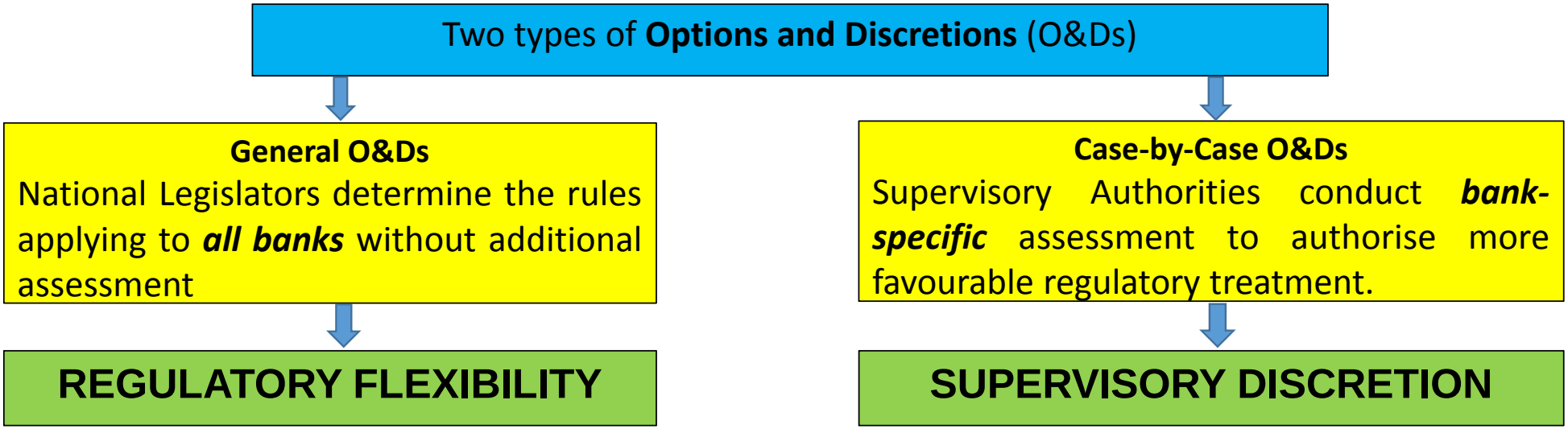
1. Consolidation of banking groups on a cross-border basis
2. Differences in the crisis risk-taking of banks in distinct countries

- **Basel III/CRD4 & CRR** [Dir. 36/2013 & Reg. 575/2013]

- Single Rulebook, but still some national options and discretions

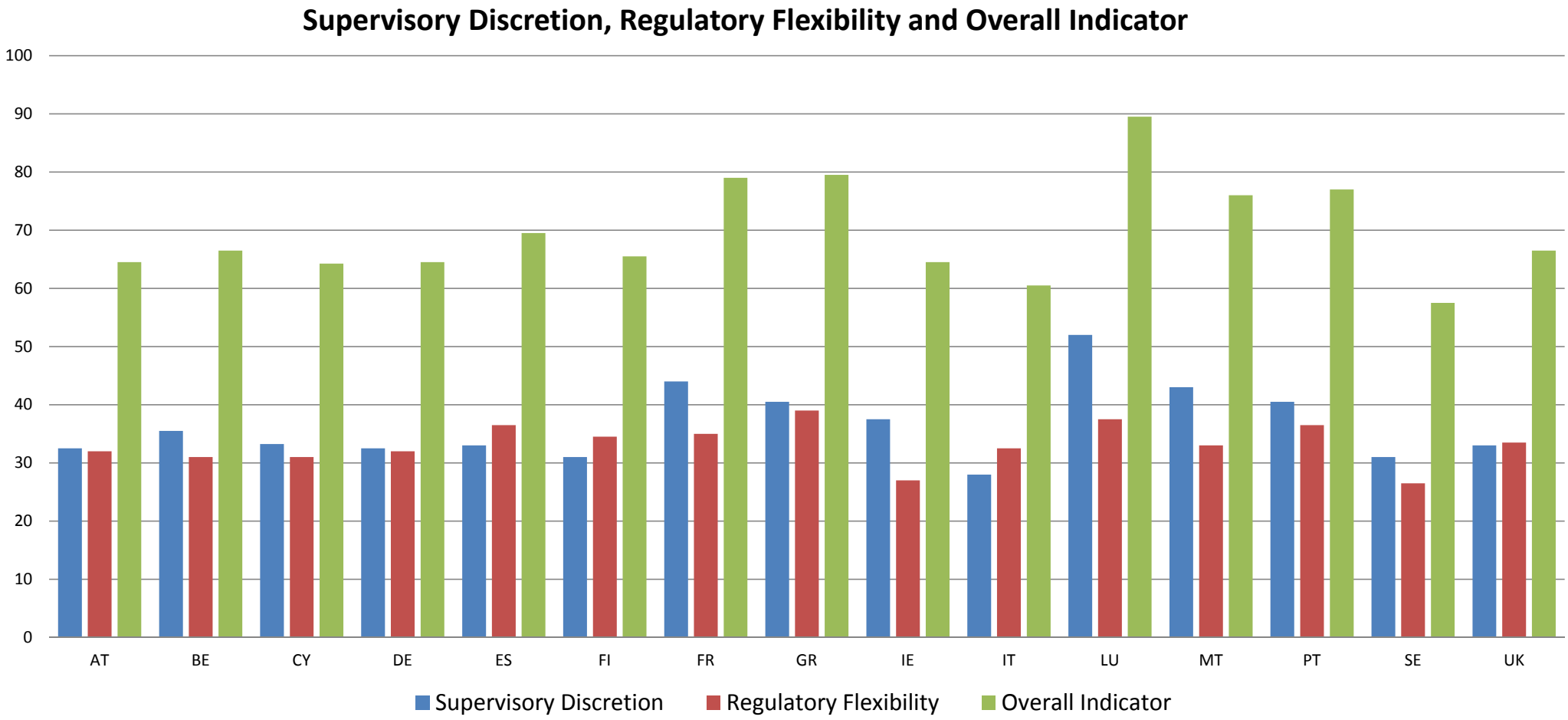
Prudential Regulation in the EU

- Focus on the **implementation of the Capital Requirements Directives** (CRD) by EU countries
- The CRD presents 152 **national options and discretions** (as reported by the EBA)



- We construct **quantitative indicators** based on the CRD implementation by national authorities
- **Higher value** of the indicator **= more permissive treatment** for all banks (Regulatory Flexibility) or some of them (Supervisory Discretion)

Novel Indicators for Prudential Regulation



Data

- Consider 696 banks in 17 EU countries (EU15, MT, CY) with at least 5bn € of total assets in the period 2005-2008

1. Bank balance sheet variables (Bankscope)
2. Bank-level measures of crisis support: Recapitalisations, Liabilities Guarantees, Liquidity Facilities (EU Commission, State Aid Archive)
3. Country-level indicators of prudential regulation (Authors' elaboration)
4. Country-level macro variables (ECB and Eurostat)

Baseline Specification

- **Strategy.** Exploit the **pre-crisis differences in the prudential framework** across EU countries and study the **crisis resilience of banks subject to different national regimes**
- **Hypothesis.** Did banks based in countries with a **less stringent pre-crisis prudential framework** show **higher need for public support measures during the crisis**?
- **Estimation.** Probit model for the probability of a government bail-out

$$P\left(Support_{i,j,Crisis}\right) = \Phi(\boldsymbol{x}'\boldsymbol{\beta})$$

$$where\ (\boldsymbol{x}'\boldsymbol{\beta}) = \alpha + \beta\ Regul_j + \gamma\ \ BankControls_{ijt} + \delta\ \ MacroControls_{jt} + \ \varepsilon_{ijt}$$

where *i* denotes the bank, *j* identifies the country, *Crisis* refers to the period bet. Feb 2008 and April 2011 and *t* indicates the years from 2005 to 2008. Bank-clustered standard errors

- **Rules vs. Discretion.** Investigate the implications of different approaches to micro-prudential regulation (regulatory flexibility and supervisory discretion).

Results of Baseline Specification

Probit Estimation: Average Marginal Effect of a 1-point increase in the Prudential Indicators on the Probability of Crisis Support

	(1)	(2)	(3)	(4)
VARIABLES	**SUPP**	**RECAP**	**GUAR**	**LIQSUPP**
Panel A				
Overall Indicator	0.0117***	0.00992***	0.00588***	0.00519***
Panel B				
Supervisory Discretion	0.0168***	0.0130***	0.00852***	0.00592***
Panel C				
Regulatory Flexibility	0.00887	0.0130*	0.00592	0.0204***
BANK CONTROLS	YES	YES	YES	YES
MACRO CONTROLS	YES	YES	YES	YES

Robust (bank-cluster) standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Overall Indicator

- A 1-point increase in the Overall Indicator (→ less stringent prudential framework) is associated with a 1.17% increase in the prob. of some crisis bailout between 2008 and Apr. 2011
- Analogous positive effect for the prob. of specific forms of crisis support

More **Supervisory Discretion** → Higher probability of crisis bail-out

More **Regulatory Flexibility** → Higher prob. of requiring liquidity support

SUPP: Any crisis support
RECAP: Recapitalisations
GUAR: Liabilities Guarantees
LIQSUPP: Liquidity facilities

Prudential Framework and Banks' Balance Sheets: Some Evidence (2005-2008)

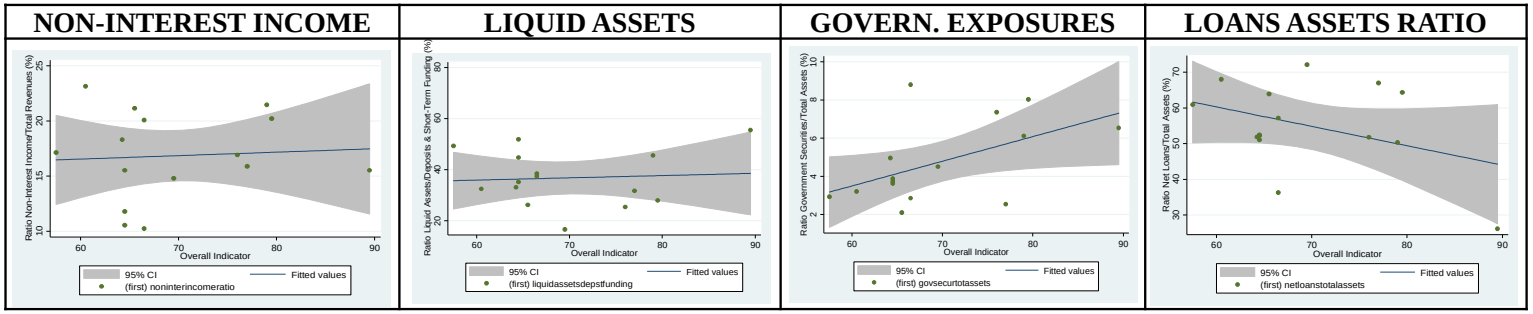
↑ Supervisory Discretion

↑Liquid Assets Ratio
↑ Government Securities Ratio
↓ Loans Assets Ratio

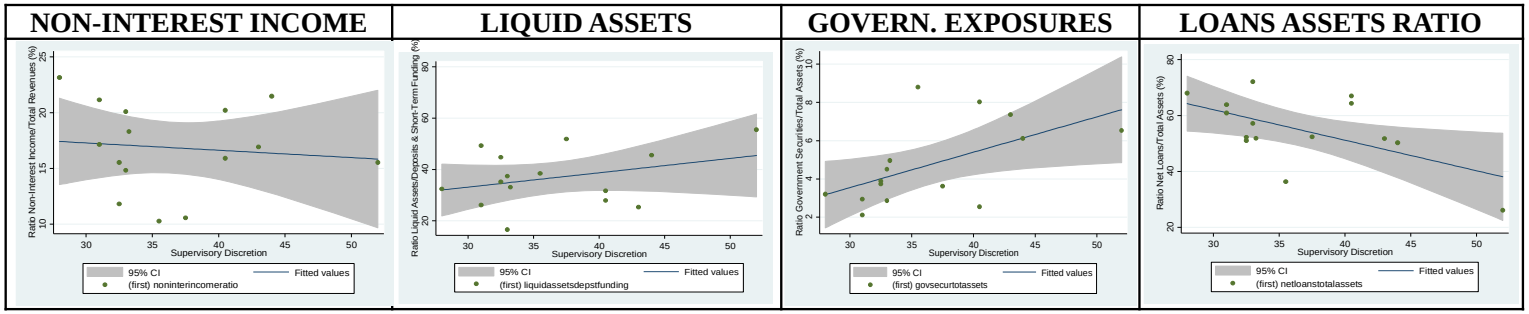
↑ Regulatory Flexibility

↑ Non Interest Income Ratio
↓ Liquid Assets Ratio
↑ Loans Assets Ratio

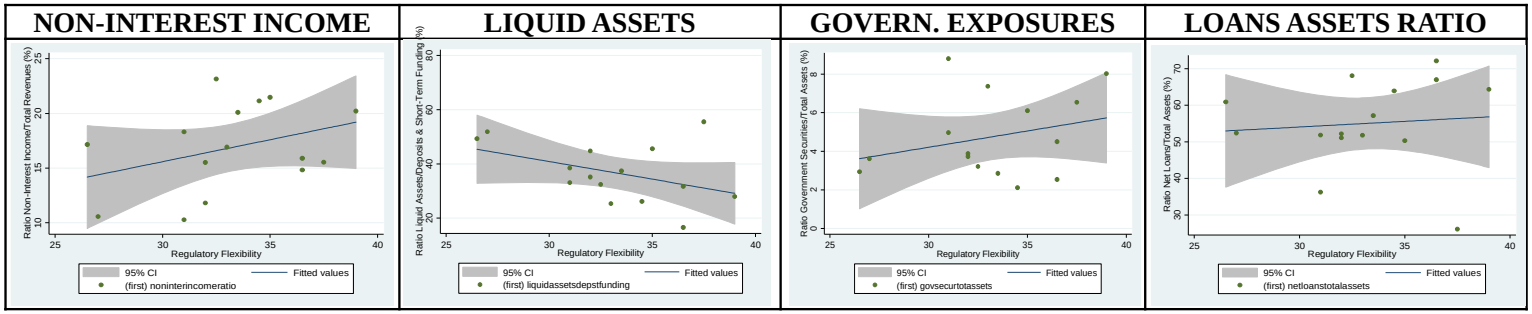
Panel A. Overall Indicator



Panel B. Supervisory Discretion



Panel C. Regulatory Flexibility



Balance Sheet Channel

The Role of Prudential Framework Incentives: Specification

- **Strategy.** Investigate the **link between prudential regulation and banks' balance sheet management** to identify the potential balance sheet channel of regulatory incentives
- **Hypothesis.** Do **regulatory flexibility and supervisory discretion** influence the balance sheet management of banks in distinct countries?
- **Estimation:** Reduced-form equation for bank balance sheet variables (bank-clustered stand. errors)

$$BalanceSheet_{i,j,t} = \alpha + \beta\ Regul_j + \gamma\ Bank\ Controls_{i,j,t} + \delta MacroControls_{j,t} + u_{i,j,t}$$

where $BalanceSheet_{i,j,t}$ is one of the following 4 bank balance sheet variables:

1. Non-interest income/Total revenues
2. Liquid assets/Deposits and short-term borrowing
3. Loans/Total assets
4. Exposures to government bonds/Total assets

Balance Sheet Channel

The Role of Prudential Framework Incentives: Results

VARIABLES	(1) NonIntInc	(2) NonIntInc	(3) NonIntInc	(4) LiqAssets	(5) LiqAssets	(6) LiqAssets	(7) Loans	(8) Loans	(9) Loans	(10) GovSec	(11) GovSec	(12) GovSec
Over_Indic	0.380			-0.348			-0.0663			**0.166*** **		
	(0.359)			(0.367)			(0.183)			(0.0623)		
Super_Discr		0.400			**0.857***			**-0.752*** **			**0.237*** **	
		(0.520)			(0.517)			(0.244)			(0.0884)	
Regul_Flexib			**0.741****			**-4.252*** **			**1.829*** **			0.168
			(0.360)			(1.518)			(0.404)			(0.143)
BANK CONT.	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
MACRO CONT.	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust (bank-cluster) standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

↑ **Regulatory flexibility**

- ↑ Non-Interest Income
- ↓ Liquid Assets Ratio
- ↑ Loans Assets Ratio

↑ **Supervisory discretion**

- ↑ Liquid Assets Ratio
- ↑ Government Bonds Ratio
- ↓ Loans Assets Ratio

Balance Sheet Channel

IVProbit: Specification

- **Strategy.** We focus on the **balance sheet component explained by prudential framework** and estimate the prob. of crisis support by IVProbit to model nonlinearity and endogeneity
- **Hypothesis.** Do **banks' financial conditions** - as predicted by the prudential framework incentives - **explain differences in the probability of bank distress** during the crisis?
- **Estimation.**
  - Two possible methods: **maximum likelihood** and **two-step** sequential estimates
  - **Focus on two-step estimates**: use the balance sheet variables predicted by prudential incentives

1st stage equation

$$BalanceSheet_{i,j,t} = \alpha_1 + \beta_1\, Regul_j + \gamma_1 Bank\ Controls_{i,j,t} + \delta_1\ MacroControls_{j,t} + u_{i,j,t}$$

2nd stage equation $\quad P\left(Support_{i,j,Crisis}\right) = \Phi(\boldsymbol{x'\beta})$

$$where\ (\boldsymbol{x'\beta}) = \alpha_2 + \beta_2\, BalanceSheet_{ijt} + \gamma_2\, BankControls_{ijt} + \delta_2\ MacroControls_{jt} + \varepsilon_{ijt}$$

Balance Sheet Channel

Two-Step IVProbit : Probit Coefficients

↑ ***Non-Interest Income Ratio*** (Regulatory Flexibility)

↑ **Prob. of Bail-out** (Recap, Liq Supp)

↑ ***Liquid Assets Ratio*** (Regulatory Flexibility)

↓ **Prob. of Bail-out** (Recap, Liq Supp)

↑ ***Loans Assets Ratio*** (Supervisory Discretion)

↓ **Prob. of Bail-out** (Recap, Guar, Liq Supp)

↑ ***Loans Assets Ratio*** (Regulatory Flexibility)

↑ **Prob. of Bail-out** (Recap, Liq Supp)

↑ ***Govern. Bonds Ratio*** (Supervisory Discretion):

↑ **Prob. of Bail-out** (Recap, Guar, Liq Supp)

VARIABLES	(1) SUPP	(2) RECAP	(3) GUAR	(4) LIQSUPP
NonInterInc_Overall	0.0566***	0.0553***	0.0273	0.171***
NonInterInc_Superv	0.0761***	0.0617***	0.0576**	0.171***
NonInterInc_Regul	0.0121	0.0303*	-0.0235	0.308***
LiquidAssets_Overall	-0.0733**	-0.0678**	-0.135***	-0.259**
LiquidAssets_Superv	0.0333***	0.0287**	0.0255*	0.0656**
LiquidAssets_Regul	-0.0105**	-0.0209***	-0.000868	-0.159***
LoansAssets_Overall	-0.0962***	-0.104***	-0.0566*	-0.262***
LoansAssets_Superv	-0.0703***	-0.0652***	-0.0526***	-0.126***
LoansAssets_Regul	0.0487**	0.0767***	0.00182	0.665***
GovSecur_Overall	0.421***	0.389***	0.399***	0.922***
GovSecur_Superv	0.387***	0.333***	0.354***	0.602***
GovSecur_Regul	0.528**	0.432*	1.025**	1.202
BANK CONTROLS	YES	YES	YES	YES
MACRO CONTROLS	YES	YES	YES	YES

Bank Heterogeneity: Specification

- **Strategy.** Explore **variation across banks** in their ex-ante financial conditions
- **Hypothesis.** Did banks in different existing financial conditions respond differently to less stringent prudential regulation? **Banks in weaker vs. stronger ex-ante conditions**?
- **Estimation.** Study the **interaction** between the **country-level prudential regulation** and the **existing bank-level balance sheet conditions** (predicted residuals)

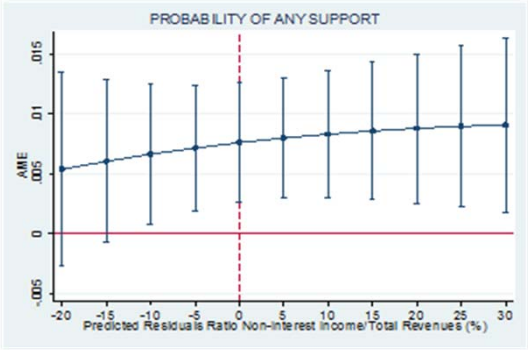
$$P\left(Support_{i,j,Crisis}\right) = \Phi(\boldsymbol{x}'\boldsymbol{\beta})$$

$$(\boldsymbol{x}'\boldsymbol{\beta}) = \alpha + \beta\ Regul_j + \gamma\ Regul_j * Resid\_BalanceSheet_{ijt} + \delta\ Resid\_BalanceSheet_{ijt} + \zeta\ BankContr_{ijt} + \eta\ MacroContr_{jt} + \varepsilon_{ijt}$$

- **Rationale.** Focus on the **bank-specific balance sheet component not explained by regulation** by using the residuals of the first-stage regressions for balance sheet variables.

Bank Heterogeneity: Interaction Plots

Non-Interest Income Ratio

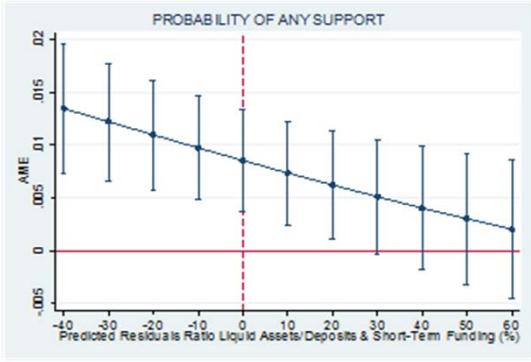


OVERALL INDICATOR

↑ Non Inter Income

↑ Marginal increase in the support probability due to laxer prudential framework

Liquid Assets Ratio

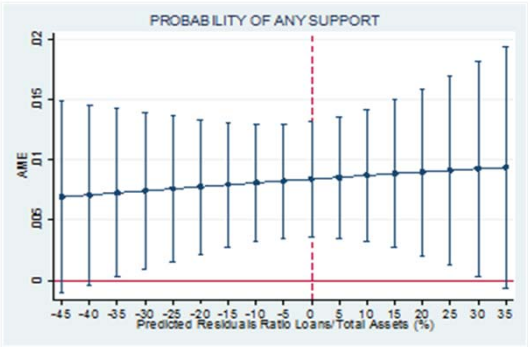


OVERALL INDICATOR

↓ Liquidity Buffers

↑ Marginal increase in the bailout prob., in part. for credit guarantees or liquidity facilities

Loans Assets Ratio

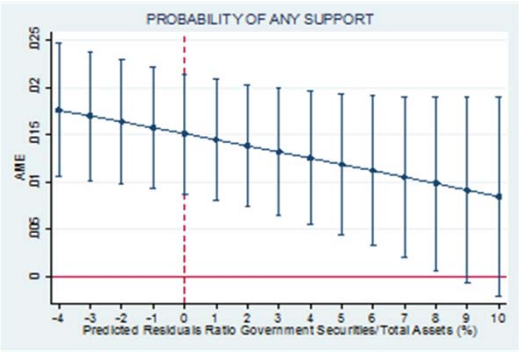


OVERALL INDICATOR

↑ Loans Assets Ratio

↑ Marginal increase in the support probability due to laxer prudential framework

Government Exposures Ratio



SUPERVISORY DISCRETION

↑ Sovereign Exposures

↓ Marginal increase in the bail-out probability, in part. for recapitalisations

The plots display the average marginal effect (AME) of the Prudential Regulation Indicator on the probability of support for different values of (the predicted residuals of) the balance sheet variables (using 95% Conf. Int.).

Main Results and Conclusions

1. **Less stringent prudential regulation → Higher probability of crisis public support**
2. **Prudential regulation** contributes to the incentives for **banks' balance sheet management**
   - **Regulatory flexibility:** more reliance on non-interest income, larger credit provision, smaller liquidity buffers
   - **Supervisory discretion:** larger liquidity buffers, wider sovereign exposures, more selective credit provision
3. **Banks' financial conditions,** as predicted by **prudential framework incentives** in distinct countries, **explain part of** the cross-bank variation in **the probability of crisis distress**
4. In most cases, observe a **larger increase in the probability of crisis bail-out** – under less stringent regulation – **when banks were ex-ante in more vulnerable financial conditions.**
5. On the other hand, **supervisory authorities** with large discretionary power may potentially **undermine the need for recapitalisations of banks with wider sovereign debt exposures**.

Contributions

1. Measure the **regulatory flexibility and supervisory discretion** of national prudential frameworks, based on EU directive implementation.

2. Analyse the relation between the **flexibility/discretion of pre-crisis national prudential frameworks** and the **probability of crisis support to banks** in distinct countries.

3. Investigate the potential **balance sheet channel of regulatory incentives** for risk-taking

4. Examine how **banks in ex-ante different financial conditions** responded to a less stringent prudential regime allowed by national options and discretions

5. Explore the role of **sovereign bond exposures** in the **approach of supervisory authorities** for recapitalisations and other crisis support measures for banks

APPENDIX

Balance Sheet Channel

Results of MLE IVProbit : Marginal Effects

↑ ***Liquid Assets Ratio*** (Regulatory Flexibility)
↓ **Prob. of Bail-out** (Recap, Liq Supp)

↑ ***Loans Assets Ratio*** (Supervisory Discretion)
↓ **Prob. of Bail-out** (Recap, Guar, Liq Supp)

↑ ***Loans Assets Ratio*** (Regulatory Flexibility)
↑ **Prob. of Bail-out** (Recap, Liq Supp)

↑ ***Govern. Bonds Ratio*** (Supervisory Discretion):
↑ **Prob. of Bail-out** (Recap, Guar, Liq Supp)

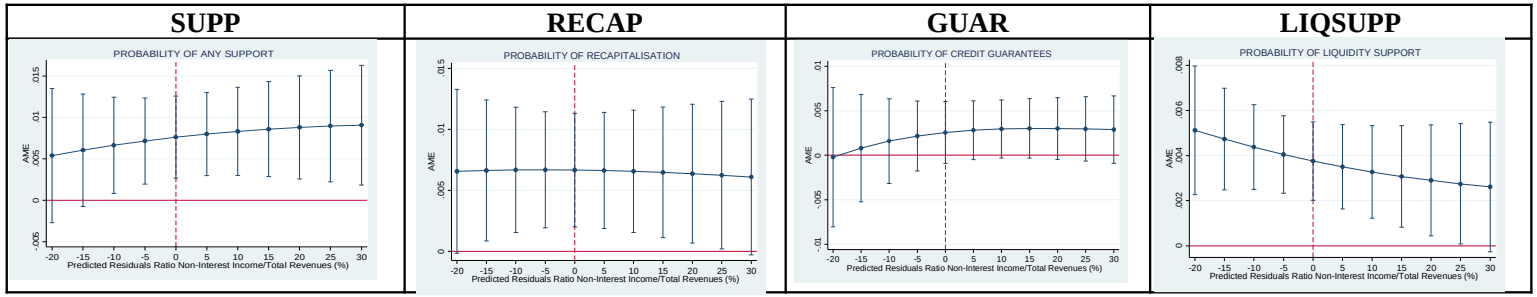
VARIABLES	(1) SUPP	(2) RECAP	(3) GUAR	(4) LIQSUPP
LiquidAssets_Overall	-0.00555***	-0.00583***	-0.00554***	-0.00595***
LiquidAssets_Superv	-	-	-	0.00428
LiquidAssets_Regul	-0.00267	-0.00399*	-0.000479	-0.00600***
LoansAssets_Overall	-	-0.0112***	-0.00748	-0.0117***
LoansAssets_Superv	-0.00969***	-0.00876***	-0.00701*	-0.00901***
LoansAssets_Regul	0.0123	0.0124***	0.00245	0.0140***
GovSecur_Overall	0.0388***	0.0366***	0.0398***	0.0398***
GovSecur_Superv	0.0379***	0.0346***	0.0367***	0.0359***
GovSecur_Regul	0.0412***	0.0402***	0.0435***	0.0452***
BANK CONTROLS	YES	YES	YES	YES
MACRO CONTROLS	YES	YES	YES	YES

Bank Heterogeneity: Reliance on Non-Lending Income Sources

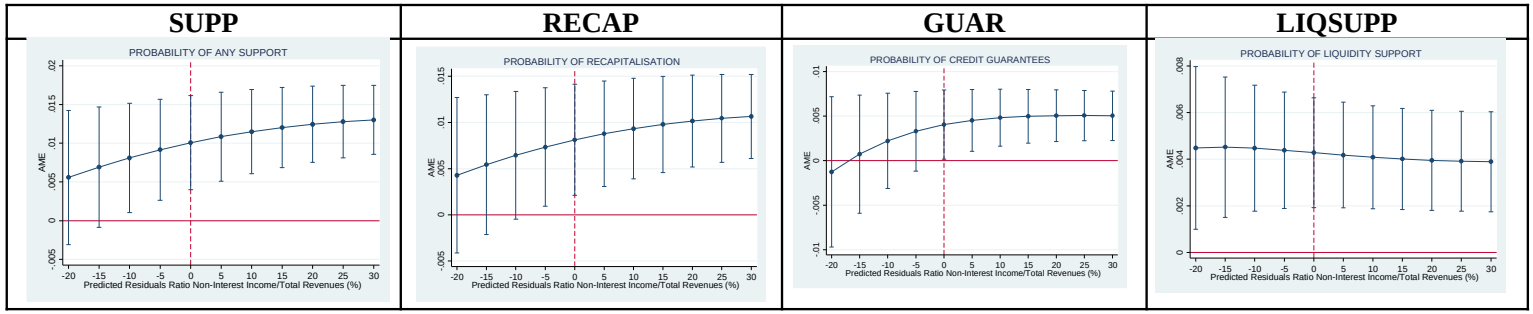
↑ Non Interest Income
↑ Marginal increase in the support probability due to laxer prudential framework

This effect was mostly driven by larger **supervisory discretion**

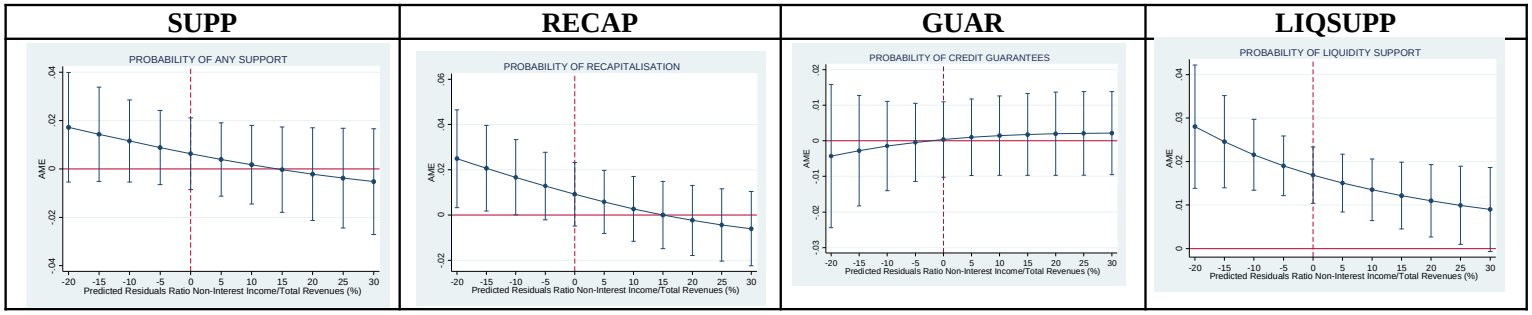
Panel A. Overall Indicator



Panel B. Supervisory Discretion



Panel C. Regulatory Flexibility



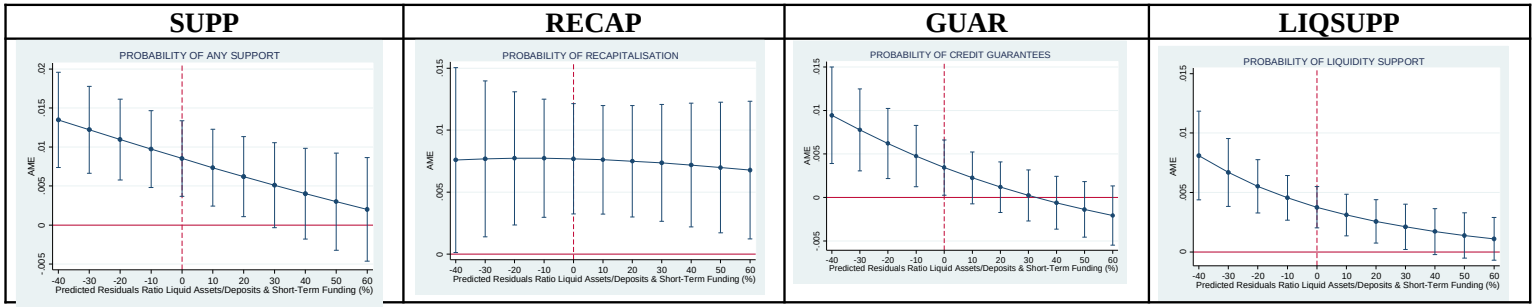
Bank Heterogeneity: Bank Liquidity

↓Liquidity Buffers:

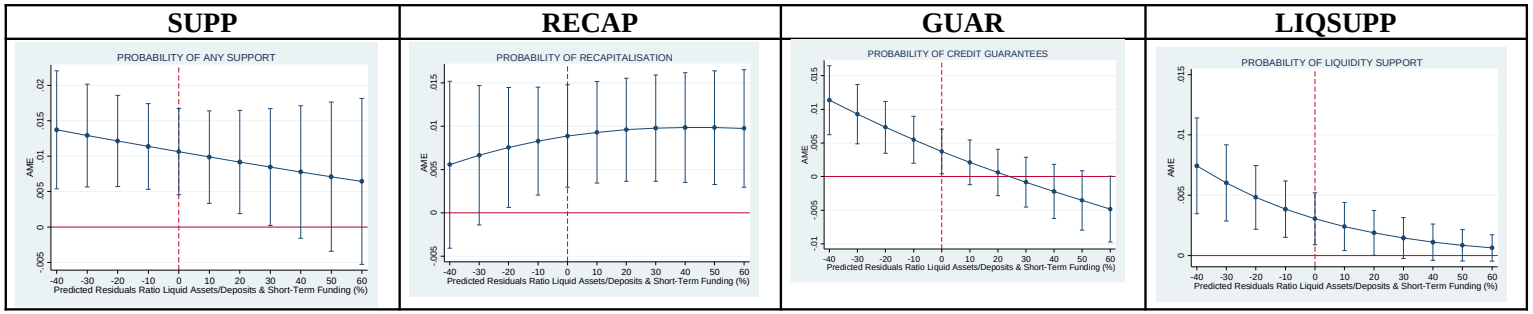
↓Marginal increase in the prob. of **recapitalisations**

↑ Marginal increase in the prob. of **credit guarantees** or **liquidity facilities**

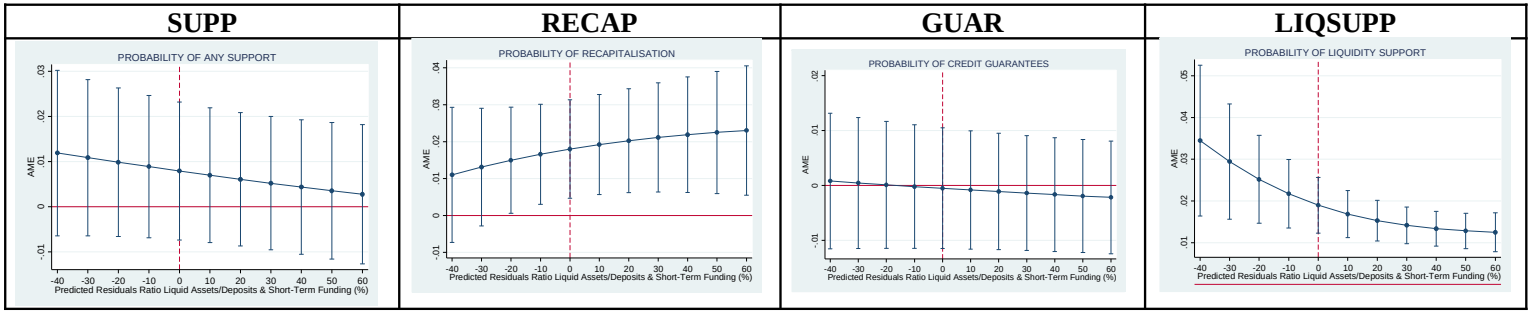
Panel A. Overall Indicator



Panel B. Supervisory Discretion



Panel C. Regulatory Flexibility

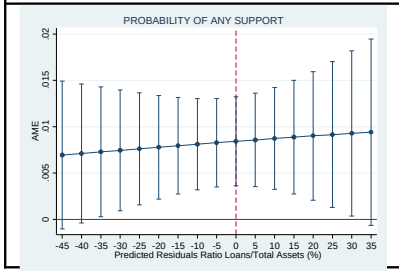
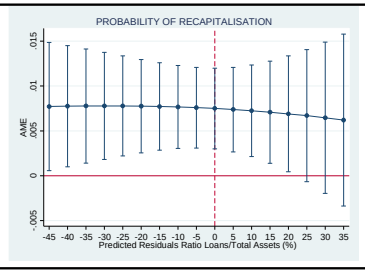
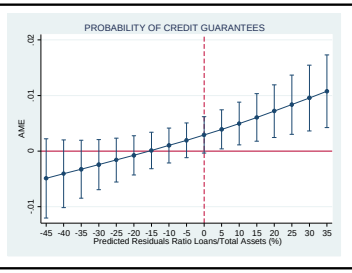
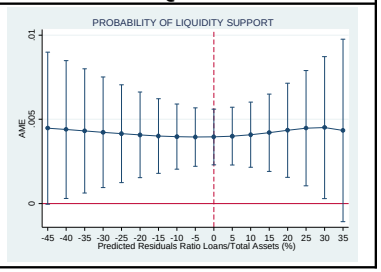


Bank Heterogeneity: Loans Assets Ratio

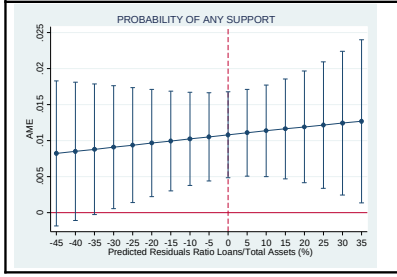
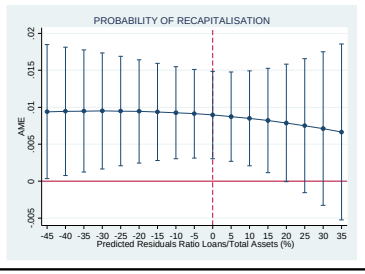
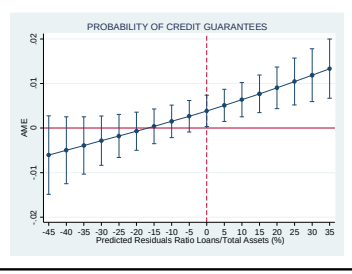
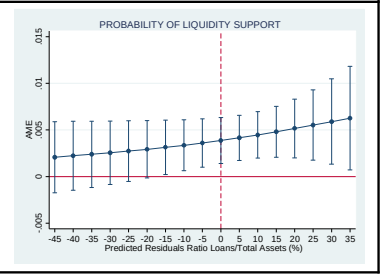
SUPERVISORY DISCRETION
↑ Loans Assets Ratio
↑ Marginal increase in the bail-out probability

REGULATORY FLEXIBILITY
↑ Loans Assets Ratio
↓ Marginal increase in the bail-out probability

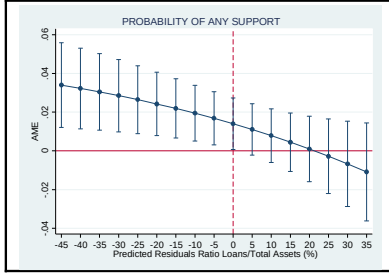
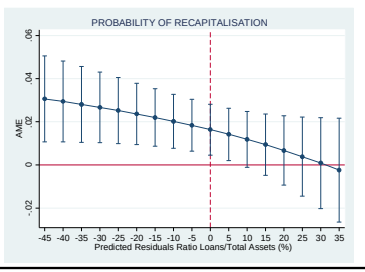
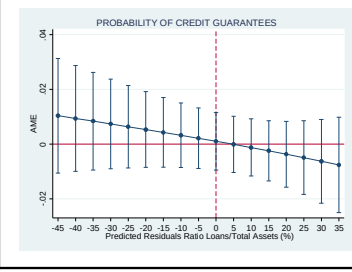
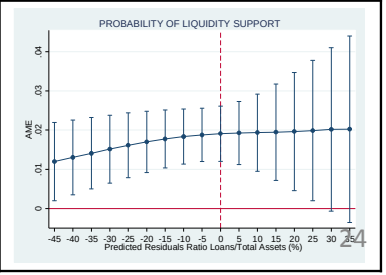
Panel A. Overall Indicator

SUPP	RECAP	GUAR	LIQSUPP
			

Panel B. Supervisory Discretion

SUPP	RECAP	GUAR	LIQSUPP
			

Panel C. Regulatory Flexibility

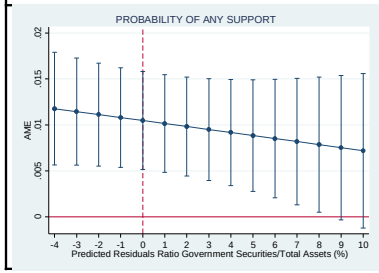
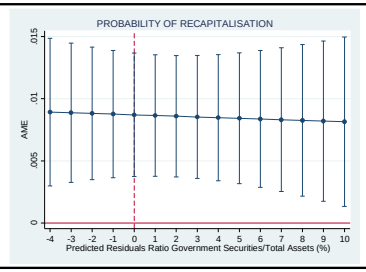
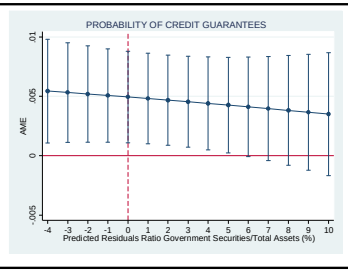
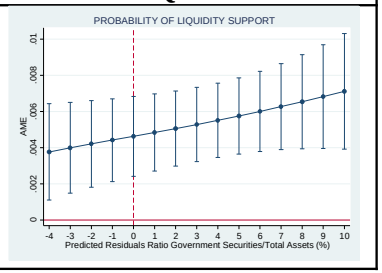
SUPP	RECAP	GUAR	LIQSUPP
			

Bank Heterogeneity: Exposures to Government Bonds

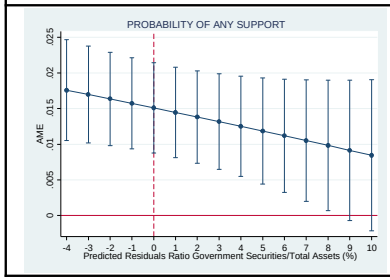
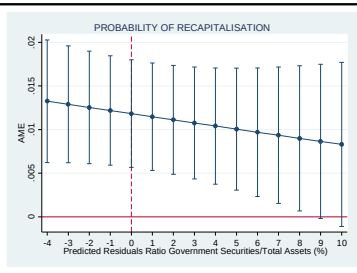
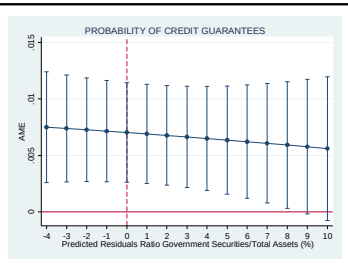
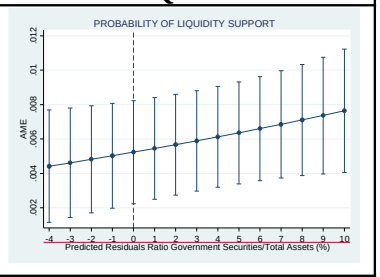
SUPERVISORY DISCRETION
↑ Sovereign Exposures
↓ Marginal increase in the bail-out probability

REGULATORY FLEXIBILITY
↑ Sovereign Exposures
↑ Marginal increase in the bail-out probability

Panel A. Overall Indicator

SUPP	RECAP	GUAR	LIQSUPP
			

Panel B. Supervisory Discretion

SUPP	RECAP	GUAR	LIQSUPP
			

Panel C. Regulatory Flexibility

SUPP	RECAP	GUAR	LIQSUPP