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

**Angela Maddaloni and Alessandro Scopelliti**[1]

July 2016
Preliminary Draft

**Abstract**

Ahead of the financial crisis, prudential regulation in the EU was implemented non-uniformly across countries. National options and discretions promoted more flexible regulation and a larger degree of discretion for the supervisors. We find that banks established in countries with a less stringent prudential regulation were more likely to require government support during the crisis. Banks operating in a laxer micro-prudential framework showed higher propensity to risk-taking: they were more reliant on non-interest income sources, had larger portfolio of government securities and smaller liquidity buffers. We show that, in countries with a less stringent prudential framework institutions with larger holdings of government securities and less reliant on non-lending sources of income increased relatively less their probability to require crisis support.

Keywords: Prudential Regulation and Supervision; European Banking; Cross-country Heterogeneities; Rules versus Discretion; Banking Union
JEL Classification: G01; G21; G28

[1] Angela Maddaloni (European Central Bank): angela.maddaloni@ecb.europa.eu and Alessandro Scopelliti (University of Warwick): a.d.scopelliti@warwick.ac.uk. We thank the comments and suggestions by Thorsten Beck, Francesco Cannata, Steven Ongena and the participants at the SUERF conference "The SSM at 1." The views presented in this paper are those of the authors and should not be attributed to the European Central Bank or the Eurosystem.

## 1. Introduction: The Banking Union and the Single Rule-Book

The establishment of the Banking Union in the EU was driven by the need of ensuring a consistent and uniform application of EU banking rules in the aftermath of the financial crisis and the sovereign debt crisis. In such perspective, the two pillars of the Single Supervision and Resolution have been designed on the foundation of the Single Rule-Book, which defines the common framework for prudential regulation for all EU countries.

The idea of a Single Rule-Book for the prudential regulation of EU banks was firstly developed, even before the creation of the Banking Union, during the implementation process of Basel III. Indeed, the crisis experience raised the concern that heterogeneities at national level in prudential regulation across EU countries could have spurred differences in the risk-taking of credit institutions before the crisis and consequently induced problems in the financial stability of their banking systems afterwards. This resulted also in negative spill-overs on public finances as national governments intervened in support of distressed financial institutions.

This work contributes to the empirical literature on how banking regulation and supervision affect various aspects of banking system performance, such as stability, efficiency and loan provision. Previous studies have examined the effect of prudential regulation on bank risk-taking, both in the domestic and in foreign markets, by finding mixed results on the effectiveness of capital regulation in promoting the stability of national banking systems (see for example Barth, Caprio and Levine, 2004; Apanard, 2009; Altunbas, Manganelli and Marques-Ibanez, 2011; Beltratti and Stulz, 2012; Ongena, Popov and Udell, 2013). However, they generally use indicators of capital regulation which are developed for global comparisons. When these indicators are used to compare countries with a good level of harmonisation in the regulatory environment, due for example to the adoption of the Basel agreements in the EU, not enough heterogeneity may be present.

We investigate the role that prudential regulation and supervision play in the prevention of banking crises, by looking at the stability of credit institutions subject to different national regimes – before the crisis - within the context of the European Union. The analysis is based on a novel indicator of flexibility and discretion in prudential regulation, which we construct by aggregating information on how EU directives were implemented at the national level. We exploit information on the implementation of the Capital Requirements Directive in national systems and construct two sub-indicators based on the degree of regulatory flexibility and of supervisory discretion. The construction of such indicators presents various elements of complexity, given the number of countries as well as the technicality of the regulatory and supervisory issues involved in this work. We then investigate how these indicators are related to the probability that a bank has been in distress as a consequence of the financial crisis.

The study provides new evidence on the importance of setting high regulatory standards when establishing a level-playing field for the prudential framework across EU countries. We find that credit institutions established in countries with less stringent prudential regulation had higher probability of being in distress during the recent financial crisis. This is quantified by looking at the measures of support to banks implemented by EU Governments.

Using the same framework, we also explore the potential trade-off between rules and discretion in the design of prudential regulation: general rules define the regulatory treatment for all banks in a given country, without requiring any previous supervisory assessment; while supervisory discretions assign to the supervisor the power to authorize specific banks to apply a more permissive treatment, on the basis of a case-by-case examination. Our results show that regulatory flexibility ahead of the crisis is associated with a larger increase in the probability of liquidity support than supervisory discretion. A 1-

point increase in the indicator of supervisory discretion is related to a 0.66% increase in the liquidity support probability, while a 1-point increase in regulatory flexibility is linked to a 1.97% increase in the probability of liquidity provision.

Country-level prudential regulation may shape the incentives for bank risk-taking, as observed from some bank balance sheet measures. In particular, we focus on three aspects, which have been highlighted in the aftermath of the crisis as potential sources of concern for the stability of financial intermediaries: the reliance on non-lending activities as source of income for banks, the exposure to government bonds and the inadequacy of liquidity buffers. In countries with more regulatory flexibility, banks present higher non-interest income ratios and lower liquid assets ratios. Also, in countries with more supervisory discretion, credit institutions present larger exposures to government bonds as well as wider buffers of liquid assets.

We investigate whether the prudential framework may influence the probability of bank distress differently in relation to their existing balance sheet characteristics, i.e. whether banks in different financial conditions responded differently to the risk-taking incentives of the prudential regime. For this purpose, we analyse the interaction between the prudential regulation indicators and the existing financial conditions of banks. We consider the three measures of balance sheet risk taking but, in order to ensure that the interacted variables do not reflect the role of prudential regulation, we compute the residuals of such measures from the regressions on the regulatory and supervisory indicators..

When we include the interaction between prudential regulation and existing financial conditions, we still observe that banks subject to a less stringent regime show higher probability of requiring crisis support. However, this increase in the probability of bank distress may be different across banks depending on their ex-ante balance sheet positions, on the design of prudential regulation and eventually on the type of support measure.

We show that in countries with a laxer prudential framework, banks less reliant on non-lending sources of income increased relatively less their probability to require public support during the crisis.

The exposure to government securities may imply different responses to a larger supervisory discretion or to a more flexible regulation. Under supervisory discretion, banks with larger government exposures showed a smaller increase in their probability of recapitalisations and credit guarantees, as supervisory authorities could undermine the need of support measures for banks widely exposed to sovereign bonds. On the other hand, under regulatory flexibility, banks with government exposures well above the average displayed a significant increase in their probability of recapitalisations.

The interaction with the existing liquidity position of banks displays different effects of a laxer prudential framework depending on the type of support measure. Banks with an ex-ante weaker liquidity position registered – during the crisis time – a larger increase in their probability of receiving liquidity measures or credit guarantees, but a smaller or not significant rise in their probability of being recapitalised.

The rest of the paper proceeds as follows. Section 2 illustrates the framework for bank regulation in the EU and section 3 presents the construction of the indicator for prudential regulation in the EU. Sections 4 and 5 describe respectively the methodological setup and the data. Section 6 discusses the results, and Section 7 presents the conclusions.

## 2. Bank regulation in the EU

The current discussion on the Single Supervisory Mechanism (SSM) within the Banking Union has focused, among various aspects, on the importance of having a level-playing field in banking regulation. This is crucial in order to make sure that the SSM can treat similar situations in a homogeneous way. On the contrary, if the legislations

applicable to banks in distinct countries are different, a single European Supervisor in charge of enforcing the application of prudential rules may have to judge similar cases in a different way[2], with potentially negative implications for the effectiveness of the Single Supervision.

But even before the most recent developments in the Banking Union and the institution of the SSM, the case for an effective harmonization in bank regulation across EU countries was promoted in order to ensure the full implementation of the Single Market for Financial Services. Since the late 1990s and early 2000s, the key economic rationale for a level-playing in bank regulation in the EU was to establish homogeneous competitive conditions for credit institutions established in different countries. Provided that differences in the regulatory burden across national legislations could have induced potential distortions to competition, in absence of a common regulatory framework, national legislators could have followed the incentive to relax prudential requirements for national banks to improve their competitive position among the credit institutions in the EU Single Market. For this reason, some degree of harmonization was needed in order to avoid a "race to the bottom", as a potentially inefficient outcome (in terms of social welfare) of this game among national legislators.

At the same time, given the still relevant differences across the banking systems of different countries, such harmonization was to be conducted in a way consistent with the principle of proportionality, in order to properly address the specificities of the banking sectors in all countries. In order to balance the two needs (level-playing field and proportionality), the legal instrument used for this purpose – as in other fields of the Single Market policies – was the EU directive, in order to establish some key principles at the EU

[2] This issue has been stressed, also in public speeches and engagements, by policy-makers and supervisors. See for instance Lautenschläger (2016)

level, but by leaving some discretionality to Member States for their implementation at the national level.

In 2000, the EU adopted a single Banking Directive (Dir. 12/2000) to replace and coordinate the existing directives and to improve the consistency of the regulatory framework for the activities of credit institutions in the EU. The Banking Directive was based on the principles of the Basel I agreement (established in 1988 and integrated in 1996 with the amendment for market risk).

Then, the adoption of the Basel II accord in 2004 prompted an implementation process in the EU through two directives: a recast of the Banking Directive (Dir. 48/2006) and the Capital Adequacy Directive (Dir. 49/2006). The national acts of implementation were adopted by Member States in the course of 2006, but in general – given the long process of negotiation for the new accord – banks had started to adjust their business models ahead of the formal implementation. Moreover, the national options and discretions provided in the Capital Requirements Directives (CRD) included also some transitory provisions based on the pre-existing differences across national legislations.

This approach to the design of prudential regulation, based on the national implementation of EU directives, was then put under discussion for some developments in the banking system both before and during the global financial crisis.

First, the process of financial integration across EU countries had induced a consolidation of credit intermediaries by banking groups both on a national basis and on a cross-border basis. Particularly in the latter case, the existing regulatory framework characterized by substantial national differences could then result as inadequate to

discipline the prudential conduct of banking groups with significant cross-border activities[3].

Second, the crisis experience had suggested that, in addition to the EU-wide implications of the US subprime crisis, there could have been some national differences in the risk-taking conducts of banks established in different countries. Given that credit institutions in distinct countries were subject to – at least partially - different regulatory frameworks for capital requirements, it was argued that national differences in prudential regulation could have played some role in the risk-taking of banks of different nationalities.

For these reasons, when the Basel Committee adopted the new Basel III accord in 2011, the European Commission proposed to implement the new prudential requirements in the EU through a Single Rulebook, in order to establish a uniform regulatory framework across EU countries. Then the new legislative package finally adopted by the EU includes a regulation, directly applicable in all countries (Reg. 575/2013) and a directive, still subject to national implementation (Dir. 36/2013). The CRD 4/CRR package is a key step for the Single Rulebook, in coordination with the Regulatory Technical Standards of the EBA. However, it still contains a relevant amount of national options and discretions[4].

## 3. A Novel Indicator for Prudential Regulation in the EU

In order to investigate the potential implications of regulatory differences across countries on bank risk-taking and on crisis resilience, we focus on the regulatory framework established through the Capital Requirements Directives and we construct indicators of flexibility and discretion in prudential regulation. The basic idea on which the indicators rely

[3] In some cases, for a few banking groups, the amount of cross-border assets could be also as large as the size of domestic assets

[4] The ECB has recently undertaken an initiative with regard to the ones available to the supervisory authorities, in its capacity as the competent authority for significant institutions in the context of the SSM. See the draft Regulation and the Guide of the ECB on the exercise of options and discretions in Union Law (2015)

is the fact that all countries in the EU adopted the guidelines of Basel I and then Basel II through the implementation of EU directives [in particular Dir. 48/2006 and Dir. 49/2006 for Basel II]. However, the directives allowed the existence of several options and national discretions which de facto created important cross-country differences on how the standards were implemented. The European Banking Authority (EBA) has provided accurate information on these issues, following up on a request of the EU Commission. The EBA reports[5] which countries adopted such discretions for the CRD framework and how they exerted them. We build the indicator by using this report from the EBA and integrate when necessary with information resulting from the directives.

Given the large number of options and discretions (152 as identified by the EBA), as well as the different impact of such options on capital requirements and regulatory burden, we construct a quantitative index that captures the degree of flexibility and discretion in prudential regulation for distinct countries. The possibility to exercise an option as defined in the Capital Requirements Directive (CRD) generally implies a more lenient regulatory treatment. We define the indicator such that the exercise of a regulatory option by a given country translates in higher values of the indicator. Then, a higher value of the indicator means a more permissive treatment for all credit institutions or for some of them (depending if the option is subject to supervisory approval).

The CRD contains two types of options and discretions (O&Ds), which can be classified along two different dimensions: Regulatory Flexibility and Supervisory Discretion. The general O&Ds – if exerted by the member country - allow for a more flexible banking regulation for all banks, as they relax the prudential requirements[6] or reduce some regulatory

[5] The "Technical advice to the European Commission on options and discretions" was adopted in 2008 by the Committee of European Banking Supervisors, which was actually succeeded by the European Banking Authority on 1 January 2011. See CEBS (2008)

[6] For instance through some discretion in the implementation of accounting rules for own funds or item deductions, as well as in the application of the standardized or of the internal rating approaches.

burden in terms of disclosure[7] (Regulatory Flexibility). At the same time, the case-by-case O&Ds attribute specific powers to the supervisory authorities, such that they are entitled to authorize the application of a more favorable regulatory regime for specific credit institutions (Supervisory Discretion).

The indicator addresses different aspects of the prudential framework in the Basel Accord, to assess their relative contributions to banking stability. We consider nine categories related to the implementation of the directive:

1. Definition of own funds
2. Scope of application
3. Counterparty risk
4. Standardised approach
5. IRB approach
6. Credit risk mitigation
7. Operational risk
8. Qualifying holdings
9. Trading book

For each of these categories we examined all the options that were allowed, inputting 1 for an option that indeed would increase regulatory flexibility or supervisory discretion and 0 otherwise. Moreover, acknowledging that not all the options had the same possible impact, we weight the input by 0.5 or 1, depending on the importance, as highlighted in the EBA report. For each category we calculate a weighted overall indicator of Prudential Regulation and two sub-indicators of Regulatory Flexibility and Supervisory Discretion.

[7] For example through some discretion in the disclosure framework for consolidated entities in banking groups

Figure 1 represents the values of the overall indicator and of the two sub-indicators for the EU countries in our sample[8].

## 4. Empirical specification

Given the current evolution in the prudential framework for the EU banking sector, it is important - for the current debate on the Banking Union - to understand the implications of national differences in prudential regulation on the stability of credit institutions based in different countries.

In particular, we exploit the pre-crisis differences in the prudential framework across EU countries and we study the crisis resilience of banks subject to different national regimes. . Based on the above described indicators of prudential regulation and supervision, and controlling for bank-specific characteristics and country-specific factors, we examine whether pre-existing cross-country heterogeneities in banking regulation may explain, in isolation or in combination with other factors, differences in the financial stability of credit institutions located in distinct countries during the crisis period.

The main hypothesis to be tested is whether banks established in countries with a less stringent prudential framework experienced on average higher financial distress and then showed higher need for public support measures during the crisis.

For this purpose, we estimate a logit model for the probability of receiving a government bail-out as in equation (1):

$$(1) \quad P\left(Support_{i,j,Crisis}\right) = \Lambda(\boldsymbol{x}'\boldsymbol{\beta})$$

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

[8] The details of the indicators are available upon request from the authors. Specific details about the exercise of options and discretions are not currently available for Netherlands and Denmark.

where *i* denotes the bank, *j* identifies the country, *Crisis* refers to the period between Feb 2008[9] and April 2011 and *t* indicates the years from 2005 to 2008, which is the relevant time period for the design and the implementation of the CRD framework.

In our baseline specification, we investigate whether banks established in countries with laxer prudential regulation had higher probability of receiving government support during the crisis, controlling for bank balance sheet variables and for macro variables. We consider, as dependent variables, either a general dummy for any type of public support, or specific dummies for peculiar measures of financial assistance (recapitalisations, guarantees on bank liabilities or access to liquidity facilities)[10].

### 4.1.Rules versus Discretion in Prudential Regulation

We use this framework to investigate two related research questions. First, we investigate the implications of different approaches to micro-prudential regulation, depending on whether they are based on general legal provisions or on ad hoc supervisory discretions.

For this purpose, we take advantage of the peculiar construction of our indicator, which includes the two sub-components of regulatory flexibility and supervisory discretion. Both sub-indicators measure the implementation of a more favourable regime to banks in terms of prudential requirements. However, this regime applies to potentially different subsets of entities (all banks vs. specific banks on a case-by-case basis).

Under regulatory flexibility, all banks can benefit from a more permissive treatment, without being subject to a supervisory decision: so credit institutions might not have an incentive to internalise possible consequences from excessive risk-taking, as they would not

[9] The first public banking intervention was the nationalisation of Northern Rock by the UK Government
[10] For an analysis of the causes of bank recapitalisations and nationalisations in the UK, see Rose and Wieladek (2012)

bear negative consequences from that – at least not in terms of prudential requirements. Under supervisory discretion, banks may take advantage of a less stringent regime only after an ad hoc supervisory decision: in such case, banks could have stronger incentives to undertake a more prudent conduct, in order to fulfil the conditions required by the supervisory authority for the approval of a more favourable regulatory treatment.

### 4.2 Prudential Regulation and Bank Risk-Taking

Second, we explore whether the relation between prudential regulation and bank distress probability varies across banks depending on their ex-ante financial conditions, looking at some balance sheet measures of bank risk-taking. In particular, we investigate whether banks in different existing financial conditions responded differently to a less stringent prudential regulation and whether this could explain some part of the cross-bank variation in bank distress probability during the crisis.

In this way, we intend to study whether the increase in bank distress probability, observed in relation to a more permissive prudential regime, affected more banks which were previously in a weaker or in a stronger balance sheet condition. This is important also to assess the stability implications of a prudential framework based on the provision of national options and discretions, i.e. whether it encouraged additional risk-taking from safer institutions able to afford it or whether it incentivised a gambling-for-resurrection strategy among riskier banks.

To this aim, we exploit the heterogeneity of financial intermediaries with respect to their balance sheet position and we study the interaction between the country-level prudential regulation and the bank-level balance sheet conditions. However, we acknowledge that financial conditions may be a result of the current prudential environment.

Therefore, we first investigate the link between the indicators of prudential regulation and the balance sheet variables related to bank risk taking: the ratio of liquid assets to deposits and short-term borrowing, the ratio of non-interest income to total revenues, the ratio of government exposures to total assets. We run pooled OLS panel regressions of the form:

$$(2)\ LiqAssetsRatio_{i,j,t} = \alpha + \beta\ Regul_j + \gamma\ Bank\ Variables_{i,j,t} + \delta\ MacroControls_{jt} + \varepsilon_{i,j,t}$$

$$GovSecurRatio_{i,j,t} = \alpha + \beta\ Regul_j + \gamma\ Bank\ Variables_{i,j,t} + \delta\ MacroControls_{jt} + \varepsilon_{i,j,t}$$

$$NonIntIncRatio_{i,j,t} = \alpha + \beta\ Regul_j + \gamma\ Bank\ Variables_{i,j,t} + \delta\ MacroControls_{jt} + \varepsilon_{i,j,t}$$

where *i* denotes the bank, *j* identifies the country, *t* refers to the years in the period between 2005-2008. $Regul_j$ indicates the prudential regulation indicator: either the overall indicator, or the sub-indicators of supervisory discretion and regulatory flexibility. Bank variable is the ratio of equity over assets, which is specific to each bank and also correlated with the regulatory environment.

From the results of these regressions, we take the residuals by bank and year[11]. Then we use these residuals in the logit regressions, instead of the actual values of the risk-taking measures, to estimate the determinants of crisis support probability. In this way, we focus on the balance sheet component which is not explained by the prudential regulation incentives and we study how a less stringent prudential regulation interplay with banks' ex-ante risk-taking (not related to regulatory and supervisory environment) in determining the probability of a financial institution to be in distress.

[11] Given the composition of the Prudential Regulation Indicator (the overall one and the two sub-indicators), for each specification in (2) we can have three predicted values, depending on which indicator component is used as explanatory variable.

The key feature of the prudential framework under our attention is the existence of national options and discretions. Regulatory flexibility and supervisory discretion were established to provide a more permissive treatment for all or some banks. The underlying rationale of these options was to allow in particular safer banks to benefit from a more lenient treatment by increasing their risk-taking.

For this purpose, it would be crucial to verify that this possibility was actually exploited only (or mainly) by those banks which could afford this additional risk-taking, on the basis of their ex-ante balance sheet conditions. If that happened, then we could argue that regulatory flexibility and/or supervisory discretion have successfully worked, i.e have fulfilled the purpose for which they have been introduced. Otherwise, if the increase in risk-taking had to be larger for banks in an ex-ante weaker position, this would mean that regulatory flexibility and/or supervisory discretion have indeed distorted (and worsened) banks' risk-taking incentives.

In formulating this hypothesis, we focus precisely on the marginal variation in risk-taking and distress probability: in relative terms, ex-ante safer banks could increase their risk-taking due to the regulatory framework relatively more than other banks (with regard to their respective ex-ante positions), but - in absolute terms - the ex-ante safer banks should still show a lower probability of crisis distress than other banks.

We run the following regressions:

$$(3) \quad P\left(Support_{i,j,Crisis}\right) = \Lambda(\boldsymbol{x'\beta})$$

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

where *t* refers to the years in the pre-crisis period and Residual_BankRisk denotes the residuals of the regressions of one of the three risk-taking measures on the micro-prudential indicators: the ratio of liquid assets over deposits and short-term borrowing, the ratio of

exposures to government securities over total assets, the ratio of non-interest income over total revenues. The BankControls variables include also the size of banks (log of total assets), as a key bank-specific determinant of bank support probability.

## 5. Data

In order to conduct our analysis, we combine four sources of information: a) bank-level measures of crisis support (based on EU Commission archive); b) bank balance sheet variables (from Bankscope); c) country-level indicators of prudential regulation (as presented in section 3); d) country-level macro variables.

Given the extensive policy response to the banking crisis through various forms of public support, we identify episodes of bank distress for individual institutions by considering the measures of financial assistance, as implemented by EU Governments for banks[12]: capital injections, guarantees on bank liabilities, asset protection schemes and liquidity facilities (Stolz and Wedow, 2010).

Although these measures were enacted by national governments, EU law required – in order to avoid potential distortions to competition in the Single Market - the approval of state aid measures by the EU Commission, to ensure homogeneity of criteria in the public support of the financial sector across EU countries. In this way, the conditions required to authorise the provision of financial assistance to credit institutions in distress were set in a consistent way across EU countries. This allows us to compare measures of public support implemented in different countries and to consider them jointly as episodes of bank distress.

For this reason, we collect the information on bank bail-out measures from the decisions of the European Commission (integrated with ad-hoc research) on the approval of state aid to the financial sector and we classify the various forms of support received by each

[12] See Laeven and Valencia (2012) for a cross-country analysis of banking crises in a global sample.

bank. We restrict our analysis to the measures of crisis support implemented by EU countries from the beginning of 2008 to April 2011, in order to concentrate on the episodes of bank distress which can reasonably be linked to risk-taking conducts adopted by banks in the pre-crisis period[13].

Table 1 presents some summary statistics of such measures for the banks included in our sample. We focus our analysis on banks established in 17 EU countries (EU15, Cyprus and Malta) with a minimum amount of assets of €5 bn, based on the balance sheet data for the period 2000-2008 as available from Bankscope[14], for a total number of 696 institutions.

The table shows that among the various forms of support, recapitalisations were the most common measures, immediately followed by credit guarantees: indeed, on average, 12.64% of the banks in our sample received capital injections, while 7.76% of the institutions benefited from credit guarantees. Asset relief schemes and liquidity facilities were relatively less common: the percentage of banks receiving such measures was equal to, respectively, 3.16% and 2.01% of the overall sample.

## 6. Results

### *6.1 Empirical Results: Baseline Specification*

Tables 2 to 4 report the coefficients and the marginal effects of the variables in the logit estimation for the baseline specification of model (2)[15]. We focus our attention on the

[13] We aim to exclude the episodes of bank distress which were determined more recently, as a consequence of the double dip recession affecting various EU countries, by the increase of non-performing loans for several credit institutions.

[14] To limit the restriction of the sample, we have considered banks reaching that minimum for at least one year in the considered period.

[15] The results discussed in this section are based on the estimation of the logit regression, by excluding Luxembourg, Netherlands and Denmark from the initial sample. Luxembourg is excluded for its peculiarities (a financial hub with a very favourable regulatory framework but with many subsidiaries of foreign institutions, which usually have received financial support from the Governments of their own countries of establishment).

results for the prudential regulation indicator: firstly, the overall indicator and, secondly, the two subcomponents of regulatory flexibility and supervisory discretion.

In general, as observed in Table 2, banks established in countries with a less stringent prudential framework display higher probability of being in distress during the crisis, as evidenced by the provision of some form of government support: in particular (col.2), a 1-point increase in the indicator (implying less capital stringency) is associated with a 1.16% increase in the probability of crisis support (while the average probability of support is equal to 16% for the estimation sample[16]). Then, if we consider the cross-country variation in the indicator, an increase in the value from the minimum to the maximum (22 points) would increase the probability of support by 25.52%.

This effect is also confirmed when we consider the distinct categories of support measures, like recapitalisations, credit guarantees and liquidity facilities. The marginal effect of a variation in the prudential regulation indicator on the probability of specific forms of support is smaller in terms of magnitude, since also the average probability of particular measures is actually lower (banks typically received only some types of financial assistance but not all). Indeed, a 1-point increase in the indicator is associated with a 0.96% rise in the probability of recapitalisation (average probability is 13.5%[16]), a 0.58% increase in the probability of credit guarantee (average probability is 6.3%[16]), a 0.54% rise in the probability of liquidity support (average probability is 2%[16]).

Next, we estimate the model using the indicator subcomponents of regulatory flexibility and supervisory discretion, in order to investigate the implications of different approaches to prudential regulation for the stability of financial intermediaries. Tables 3 and

---

Denmark and Netherlands are not included because of missing information for the prudential regulation indicator.

[16] In this case we report the average values of the probability of public support or of specific crisis measures for the estimation sample, by excluding Luxembourg, Netherlands and Denmark.

4 show the results for the supervisory discretion and regulatory flexibility indicators respectively. We find that the coefficient for the supervisory discretion indicator is always positive and significant, while the coefficient for the regulatory flexibility indicator is significant only when considering liquidity support. A 1-point increase in supervisory discretion is related to a 0.66% increase in the liquidity support probability, while a 1-point increase in regulatory flexibility is linked to a 1.97% increase in the probability of liquidity provision.

In general, a more favourable prudential treatment may potentially increase the risk-taking of credit institutions and then also the probability of being in distress: from the results of the baseline specification, this effect seems to be more significant when the source of a more lenient treatment is the supervisory discretion applied on a case-by-case basis to specific institutions. .

However, when we compare the results for the significant coefficients, we observe that, a larger recourse to supervisory discretion can be useful to reduce the potential negative implications of a less stringent prudential framework for financial stability, compared with regulatory flexibility. Indeed, provided that the supervisor is able to implement a consistent approach to all the supervised entities, it can better verify the suitability of individual banks to exploit a more favourable regulatory regime. This result would therefore provide a contribution to the debate on the choice of rules versus discretion in the design and the exercise of prudential policy.[17]

[17] The literature on rules and discretion in prudential policy is still relatively limited. For example, Walther and White, (2015), and Agur and Sharma (2013) analyse this topic in the perspective, respectively, of banking resolution and macro-prudential policy. These issues have been discussed also, using a qualitative approach, by some recent studies in the fields of political science and public policy

### *6.2 Empirical Results: Bank Heterogeneity*

In the baseline specification we have included some bank balance sheet variables as controls, in particular for liquidity, profitability, asset composition, income sources, to explore how balance sheet factors contribute to explain the variation in the probability of crisis support across banks.

The results of the baseline specification suggest that size is always an important factor in determining the probability of future bank distress. Profitability of banks, measured by the RoE, has a coefficient with the expected sign (negative), but generally not significant.

In the following we examine more in detail the interaction between country-level prudential regulation and some bank-specific balance sheet characteristics, which are related to bank risk-taking. We investigate whether the relation between laxness in prudential regulation and the probability of bank distress varies across banks depending on their ex-ante financial conditions and the risk that they had taken before. In particular, we focus on three aspects, which have been highlighted in the aftermath of the crisis as potential sources of concern for the stability of financial intermediaries: the reliance on non-lending activities as source of income for banks, the exposures to government bonds and the inadequacy of liquidity buffers.

First, to investigate how these three measures of risk-taking are related to the micro-prudential environment, we regress them on the overall indicators and the two sub-indicators. The results are shown in Table 5. All three measures are significantly related to at least one of the three indicators, supporting the argument that risk-taking through these channels was linked to the micro-prudential framework.

Then, we compute the residuals from the estimation of these regressions and we use the residuals of each of the three risk-taking measures in the interaction with the prudential regulation indicators.

### *6.2.1 Reliance on Non-Lending Income Sources*

First, we explore the role of the reliance on non-lending activities in the composition of bank income sources. In particular, we consider the ratio of non-interest income to total revenues: this ratio defines the percentage of total revenues from non-lending activities, like trading income or fees and commissions from investment banking activities.

On the one hand, banks with a more diversified income structure may be able to better respond to financial shocks, especially if these are focused on some specific types of assets, such as non-performing loans with high expected losses. On the other hand, if a large fraction of the bank income comes from riskier activities or if a bank expands excessively its trading book, higher non-interest income may lead to an increase in bank risk. These two counteracting effects may have different relevance depending on the level of the non-interest income ratio. Their compositional outcome could then display some potential non-linearity.

In Tables 2 to 4, we have introduced the non-interest income ratio as a control variable and we have observed that banks with higher income diversification have lower probability of being in distress during the crisis (see the related negative coefficient and marginal effect).

Table 5 shows that a more flexible regulatory environment (column 6) is significantly related to a higher non-interest income ratio. The coefficient is positive also for the overall indicator and the supervisory discretion indicator, but the coefficient is not significant.

Next, we insert the residuals of these estimates in the regressions. Results of the estimations are reported in Table 6. The coefficient for (the residuals of) the non-interest income ratio is negative and generally significant, supporting the argument that more

diversified banks are less likely to be in distress, even when considering the diversification that is not related to the micro-prudential framework. Then we include the interaction between the prudential regulation indicator with (the residuals of) the non-interest income ratio, to study whether and how the relation between laxness in prudential regulation and the probability of bank distress may vary for banks with different business models, depending on their income structure.

The plots in Figure 2 show the marginal effective contribution of an increase in the value of the prudential indicator for different levels of non-interest income ratio.

The plots of the overall marginal effect for different values of the non-interest income variable have some interesting insights. For a given value of the non-interest income ratio a higher value of the indicator increases the probability of being in distress, especially for the supervisory discretion indicator. This is consistent with the argument that a more lenient supervisory environment may induce banks to shift their activities towards riskier investment, overall increasing the probability of support.

When we consider specific forms of support, in particular recapitalisations, we notice some significant differences in the magnitude and in the cross-bank variation of the average marginal increase in the support probability. An increase in supervisory discretion is associated with a higher probability of recapitalisations, particularly for banks strongly reliant on non-lending income sources. An increase in the regulatory flexibility indicator is also linked with higher recourse to capital injections, but the marginal increase in the support probability results is significant only for banks with very low non-interest income ratios.

This may reflect two different approaches to recapitalisation policies. In principle, banks with a large fraction of non-lending income sources, being less involved in the traditional retail banking for the real economy, might be less likely to receive

recapitalisation support. However, in countries with large supervisory discretion, the supervisor authority may have more significant concern for ensuring the provision of adequate bail-out funds to complex banking groups - more reliant on trading or investment activities - if it assesses that a potential bank's default may have serious contagion effects on the overall financial system.

### *6.2.2 Exposures to Government Bonds*

Second, we consider the role of bank exposures to government securities. The European sovereign debt crisis has shown that sovereign exposures may result – in some cases – in risky investments for banks. Nevertheless, EU prudential requirements for capital adequacy assign a 0% risk weight – under the Standardised Approach - to the investments in government securities issued by EU member states, independently from the issuer credit ratings and from the bond credit risk, and this has likely incentivised the purchase of treasury bonds by banks.

Our empirical analysis is focused on the public support provided to banks until April 2011. Therefore, we can study the implications of the pre-crisis sovereign exposures on bank distress during the early stage of the financial crisis, before the periods of high level of stress in the sovereign debt markets of Italy and Spain in the summer of 2011.

In the baseline specification (Tables 2 to 4), we have introduced as control variable the ratio of government bond exposures to bank total assets. Results were generally not significant. However, because of the preferential treatment of sovereign exposure for capital requirement purpose, the investment in government securities is likely to be linked to the regulatory environment. Indeed the results of the regressions reported in columns 1 to 3 in Table 5 suggest that the sovereign exposure of a bank is positively linked with a less stringent prudential framework and in particular with a larger discretionary power of

supervisory authorities. In particular, the positive and significant coefficient for supervisory discretion is consistent with a narrative of moral suasion on the side of national supervisors, which may have encouraged domestic banks to invest in sovereign domestic bonds (see Ongena et al., 2016).

To assess how the micro-prudential framework affects the probability to be in distress in combination with sovereign exposure, we include in the baseline specification the residuals of the regressions of government securities ratio on the prudential regulation indicators: such residuals identify the component of banks' sovereign exposures that it is not explained by the incentives of prudential regulation. The results show that sovereign exposure is positively related with the probability of being in distress, in particular in the case of support by government guarantees and access to liquidity facilities.

We also include in the model the interaction between the government exposure ratio (residuals from the regression on the micro-prudential indicators) with the indicator of prudential regulation, to explore whether and how the differences across banks in the exposures to sovereign debt may have affected their probability of distress during the crisis.

The plots in Figure 3 display the marginal effects of the prudential regulation indicator for different values of the government exposure ratio. These plots suggest that the marginal increase of recapitalisation probability – for banks subject to a laxer prudential framework – shows a different cross-bank variation for regulatory flexibility and supervisory discretion. In countries with large supervisory discretion, the marginal increase in the recapitalisation probability due to a laxer prudential framework was indeed smaller for banks which were ex-ante more exposed to government securities. This result is consistent with the argument of potentially distorted incentives of national supervisors: they may be interested in delaying the recognition of bank balance sheet weaknesses, which could lead to

recapitalisations and other forms of support for domestic banks, especially when such credit institutions present high levels of domestic sovereign debt.[18]

This could be explained with regard to the approach of national supervisors with regard to banks' exposures to government debt, particularly domestic public debt. In fact, the evidence presented in some recent papers (Ongena, Popov and Van Horen, 2016; De Marco and Macchiavelli, 2015) suggest that national authorities in the EU (including potentially supervisory authorities) could have exerted some indirect or direct influence on domestic banks, to encourage the purchase and the holding of national sovereign bonds. Also, the theoretical findings in Crosignani (2015) support the argument that Governments might prefer undercapitalised domestic banks during crises, because they would act as buyers of last resort for home public debt.

Provided that recapitalisation measures are implemented by Governments, but the assessment to verify the potential undercapitalisation of banks is usually conducted by supervisory authorities, our evidence could suggest that supervisory authorities with a large discretionary power may potentially undermine the need for recapitalisation of banks with large exposures to government debt. This would provide additional support to the case for a Banking Union with a Single Supervision, in order to break the vicious loop between banks and sovereigns. Further research to validate this argument could be developed by looking at the composition – by country of issuer – of banks' exposures to government debt, such to distinguish domestic and foreign public debt.

When we focus our attention on the interaction between the sub-indicator of regulatory flexibility[19] and the exposures to government debt, we observe that banks in

[18] Our data do not allow to distinguish between domestic and foreign sovereign exposure. However, the evidence presented in related analysis generally show that the large majority of banks' sovereign exposure is domestic.

[19] We do observe some cross-country differences in regulatory flexibility, but they do not concern the regulatory treatment of sovereign exposures (0% risk weight for EU sovereign exposures in all EU countries).

countries with more flexible regulation showed higher need for recapitalisation and liquidity support and that this increase in the distress probability was actually larger for banks holding wider amounts of sovereign bonds. The plots of the average marginal effect for the sub-indicator of regulatory flexibility (Figure 3) confirm that a less stringent prudential framework increased the probability of needing financial assistance during the crisis (recapitalisations, liquidity provision) and that this effect was quantitatively more relevant for banks with ex-ante larger exposures to government debt.

The underlying intuition for this result would be that, under the 0% risk weight for prudential regulation, banks can increase their portfolio of government securities, without the need of raising additional capital for loss absorption. But, since treasury bonds still present some credit risk, a larger portfolio of sovereign exposures may imply an increase in the actual credit risk on the bank balance sheet, and then also in the overall bank risk. Provided that banks in countries with more regulatory flexibility showed higher need of public support during the crisis, a higher percentage of sovereign exposures would have further increased the overall degree of bank risk for individual institutions and so would have raised – ceteris paribus – also the probability of crisis support.

The interaction of the prudential framework with the banks' exposures to government debt implies some relevant differences in the magnitude of the average marginal effects and in the cross-bank variation for the two sub-indicators of regulatory flexibility and supervisory discretion. Such differences are particularly evident in the case of recapitalisations: a less stringent prudential framework was associated with an increase in the probability of receiving capital injections, particularly for banks with exposures to government debt above the average.

The plots for liquidity support show a somewhat different trend. Indeed, for all the indicators (the overall one and the two sub-indicators of supervisory discretion and

regulatory flexibility), the marginal increase in the probability of liquidity support due to a laxer prudential framework was larger for institutions with wider exposures to government securities. However, this result was driven by the fact that, within our sample, 50% of the cases of liquidity support refer to Greek banks at the beginning of the sovereign crisis in the euro area.

### *6.2.3 Bank Liquidity*

Finally, we explore the interaction between the existing liquidity position of banks and the provision of a more permissive prudential regime. We investigate whether banks in different funding liquidity conditions responded differently to a less stringent prudential framework. For this purpose, we consider the ratio of liquid assets to deposits and short-term liabilities. This variable indicates how large is the buffer of liquid assets of a bank with respect to its short-term liabilities: a higher value indicates a better liquidity position of the institution. From the results in the baseline specification (Tables 2 to 4), we notice that banks with a stronger liquidity position had a lower probability of distress during the crisis, as evidenced by the lower recourse to financial assistance measures, particularly for recapitalisations (negative coefficient and marginal effect in the estimation).

We first explore the potential endogeneity concerns related to this interaction term, i.e. the eventual role of capital regulation in bank liquidity. Although the prudential regulation under our attention was precisely focused on solvency requirements, some theoretical studies have highlighted that capital regulation may have some implications on bank liquidity, i.e. capital requirements may be a substitute for liquidity requirements (Rochet and Vives, 2004; Admati et al., 2013). Then we analyse whether the liquidity position of a bank could be to some extent influenced by the incentives of prudential regulation. The results reported in Table 5 suggest that the liquidity position of banks was

linked positively to the supervisory discretion indicator and negatively to the regulatory flexibility indicators. All in all this would suggest that indeed a more relaxed regulatory environment was associated with lower liquidity buffers for banks; however, when supervisors had discretionary power in approving the application of these flexible options to specific institutions, banks presented higher liquid assets ratios.

In order to investigate if the existing liquidity position was relevant for the banks' response to prudential regulation standards, with potential implications on their probability of crisis distress, we introduce the interaction with the residuals of the liquid assets ratio from the estimation reported in columns (7) to (9) of Table 5. We use the residuals of the estimation to exclude the components of liquidity potentially explained by prudential regulation.

Results are shown in Table 8 for the overall indicator and the two sub-indicators. The coefficient of the liquidity ratio is generally negative in all the estimations as is the marginal effect in the logit: when taking into account recapitalisation and liquidity support measures, the coefficient is also significant. Then, looking at the interaction of the prudential regulation indicator with the liquid assets ratio, we still observe that banks subject to laxer prudential regulation show higher probability of requiring public support during the crisis.

Figure 4 shows the plots of the marginal effect of an increase in the prudential indicators for different values of liquidity ratios. Generally, for a given value of the liquidity ratio, the marginal effect of an increase in the indicator is positive, i.e. a laxer prudential framework increased the probability of being in distress.

Then, from the plots for the overall indicator and for any type of support (Figure 4 Panel A), we notice that the average marginal increase in the probability of crisis support for banks subject to laxer regulation was indeed an inverse function of the banks' liquid assets ratio in the pre-crisis period. This means that the increase in the distress probability was

actually larger for banks having ex-ante a more fragile liquidity position, as denoted by a lower liquid assets ratio.

However, to fully disentangle the role of bank liquidity position in the interaction with prudential regulation, we have to examine the results separately for the two sub-indicators and for specific forms of crisis support.

First, when we use as main explanatory variables the two sub-indicators of regulatory flexibility and supervisory discretion (see Table 8, Panels B and C), we notice that the average marginal effects show substantial differences in the magnitude of the crisis probability increase for the two sub-indicators. From the plots in Figure 4, we observe that - when the effects are significant and for given values of the liquid assets ratio - a 1-point increase in regulatory flexibility is generally related to a considerably larger increase in the probability of bank distress, than an equivalent rise in supervisory discretion. This difference in the size of the effect is relevant in the case of both recapitalisations and liquidity measures.

Second, we observe – for distinct types of support measures – relevant differences in the direction of this cross-bank variation depending on the liquidity position.

When we consider credit guarantees and liquidity facilities, we observe that a laxer prudential framework was associated with a larger increase in the support probability for those banks having – in the pre-crisis period - a liquid assets ratio lower than the sample mean of the variable (notably, of the predicted residuals of the liquid assets ratio). At the same time, banks with existing larger liquidity buffers increased their probability of crisis distress relatively less than banks with smaller liquidity buffers. This would suggest that liquidity-weaker banks had responded to a less stringent prudential framework by increasing their risk-taking relatively more than liquidity-stronger banks. While the ideal rationale for a less stringent regulation would be to allow especially sounder banks to benefit from a more

favourable treatment, this result would show that in fact more fragile banks exploited a more flexible regime to take even more risk.

On the other hand, when we consider the probability of bank recapitalisations, we still find that a less stringent prudential framework was related to an increase in the support probability. However, the average marginal effect was not significant for banks with liquid assets ratios well below the sample mean, while it displayed an increasing trend for banks with larger liquidity buffers (i.e. ex-ante less risky banks exploited a more permissive regulatory framework to increase their risk-taking relatively more than other banks). It is worthy to note, however, that only the marginal effect of a less stringent framework was indeed larger for liquidity-stronger banks (and not the level of recapitalisation probability). This means that, in relative terms, banks with ex-ante larger liquidity buffers used the more lenient treatment defined in the legislation or authorised by the supervisor to increase their risk-taking more than other banks. This would be consistent with the underlying rationale of a regulatory waiver, i.e. allowing safer banks to take more risks as long as they can afford it.

To sum up these results, we can conclude that the regulatory flexibility and the supervisory discretion, embedded in the CRD implementation, were indeed increasing the probability of crisis distress, by increasing the solvency risk (and then the probability of requiring recapitalisations) for liquidity-stronger banks, and by raising the funding liquidity risk (and then the probability of credit guarantees and liquidity provision) for liquidity-weaker banks. However, supervisory discretion could limit the magnitude of these effects if compared with regulatory flexibility.

## 7. Conclusions

This paper analyses the implications of national differences in the pre-crisis prudential framework across EU countries on the stability of financial intermediaries during

the crisis period. We construct quantitative indicators of regulatory flexibility and supervisory discretion, based on the existence of national options and discretions in the implementation of the Capital Requirements Directive. Then we identify episodes of bank distress with regard to the measures of public support implemented by EU Governments during the period 2008-2011 and classify the various forms of financial assistance (recapitalisations, credit guarantees, and liquidity provision). The results of the empirical work reveal that:

1) Banks established in countries with less stringent prudential regulation displayed higher probability of requiring government support during the crisis.

2) Banks' non-interest income ratios, sovereign bond exposures and liquidity buffers are linked to the micro-prudential environment. Institutions operating in a laxer framework showed higher propensity to risk-taking: they were more reliant on non-interest income sources, had larger portfolio of government securities and smaller liquidity buffers

3) For a given value of the balance sheet risk-taking measures, a laxer framework increases the probability of being in distress. However, the existing financial conditions of banks explain the differences in their responses to a less stringent prudential framework.

3.1) A more lenient supervisory environment may induce those banks with larger diversification in their income sources to further shift their activities towards riskier investment, overall increasing the probability of support.

3.2) Similarly, we find evidence suggesting that supervisory authorities with a large discretionary power may potentially undermine the need for recapitalisation of banks with large exposures to government debt.

The results of the empirical analysis may suggest relevant policy implications for the design of prudential policies in the Banking Union, particularly on two aspects.

*a) The Importance of the Level-Playing Field Regulation for Financial Stability*

The introduction of the Single Rule-Book, designed to eliminate – or to minimize - the differences in prudential regulation across EU countries, contributes in reducing the heterogeneities in the risk-taking of credit institutions and then in the stability of national banking systems, by realigning the regulatory incentives on the basis of a common prudential framework.

*b) The Trade-Off between Rules and Discretion in the Design of Prudential Policies*

Prudential policies more reliant on (general) regulatory provisions can treat all institutions equally, but they may accentuate moral hazard problems for weak and risky banks. Also, prudential policies more based on (case by case) supervisory decisions imply the assignment of substantial discretionary power to the supervisor, but they may be more tailored for the specific position of an intermediary and then potentially more effective in affecting the structure of bank incentives. The implementation of prudential policy in the Banking Union would need to find an appropriate equilibrium along these options.

## References


- Agarwal S., D. Lucca, A. Seru, and F. Trebbi, 2014, "Inconsistent Regulators: Evidence from Banking," The Quarterly Journal of Economics, 129(2), pp. 889-938

- Agur I., and S. Sharma, 2013, "Rules, Discretion and Macro-prudential Policy," IMF Working Paper No. 13/65

- Altunbas Y., S. Manganelli, and D. Marqués-Ibáñez, 2011, "Bank Risk during the Financial Crisis: Do Business Models Matter?" Working Paper Series No. 1394, European Central Bank

- Apanard A. P., 2009, "Banking Regulation and the Output Cost of Banking Crises," Journal of International Financial Markets, Institutions and Money, 19(2), pp. 240-257

- Argimon I., G. Arqué Castells, and F. Rodriguez Tous, 2012, "Does the Intensity of Prudential Regulation Affect Banks? Evidence from the 2007-2009 Crises", Journal of Governance and Regulation, 1 (3), 14-26

- Argimon I., and J. Ruiz-Valenzuela, 2011, "The Effects of Regulatory Stringency and Risk Sensitivity on Banks", Journal of Banking Regulation, 12 (2), 144-166

- Barth J., G. Caprio, and R. Levine, 2004, "Bank Regulation and Supervision: What Works Best?" Journal of Financial Intermediation, 13, pp. 205–248

- Beltratti A., and R. M. Stulz, 2012, "The Credit Crisis Around the Globe: Why Did Some Banks Perform Better?" Journal of Financial Economics, 105, pp.1-17

- Committee of European Banking Supervisors, 2008, CEBS' Technical Advice to the European Commission on Options and National Discretions, https://www.eba.europa.eu/documents/10180/16106/2008-17-10-Final-Advice-on-options-and-national-discretions.pdf

- Crosignani M., 2015, "Why are Banks not Recapitalized during Crises?" Working Paper

- De Marco F., and M. Macchiavelli, 2015, "The Political Origin of Home Bias: the Case of Europe," Working Paper

- ECB, 2015a, Public Consultation on a Draft Regulation of the European Central Bank on the Exercise of Options and Discretions Available in Union Law, Banking Supervision

- ECB, 2015b, Public Consultation on a Draft ECB Guide on Options and Discretions Available in Union Law, Banking Supervision

- Laeven L., and F. Valencia, 2012, "Systemic Banking Crises Database: An Update", IMF Working Paper No.12/163

- Lautenschläger S., 2016, "Single Supervisory Mechanism, Single Supervisory Law", Speech at the Workshop of the European Banking Institute, Frankfurt am Main, 27 January 2016

- Maddaloni A., and J.-L. Peydro', 2011, "Bank Risk-taking, Securitization, Supervision, and Low Interest Rates: Evidence from the Euro-area and the U.S. Lending Standards", Review of Financial Studies, 24(6), pp.2121-2165

- Ongena S., A. Popov, and N. Van Horen, 2016, "The Invisible Hand of the Government: Moral Suasion during the European Sovereign Debt Crisis", Working Paper

- Ongena S., A. Popov, and G. F. Udell, 2013, **"**When the Cat's Away the Mice will Play. Does Regulation at Home Affect Bank Risk Taking Abroad?" Journal of Financial Economics, 108, pp.727-750

- Rose A. K., and T. Wieladek, 2012, "Too Big to Fail: Some Empirical Evidence on the Causes and Consequences of Public Banking Interventions in the United Kingdom," Journal of International Money and Finance, 31 (8), pp. 2038-2051

- Stolz S., and M. Wedow, 2010, "Extraordinary Measures in Extraordinary Times. Public Measures in Support of the Financial Sector in the EU and the United States," Occasional Paper No.117, European Central Bank

- Walther, A., and L. White, 2015, "Rules versus Discretion in Bank Resolution," working paper

**Figure 1. The Indicator of Prudential Regulation across EU Countries**

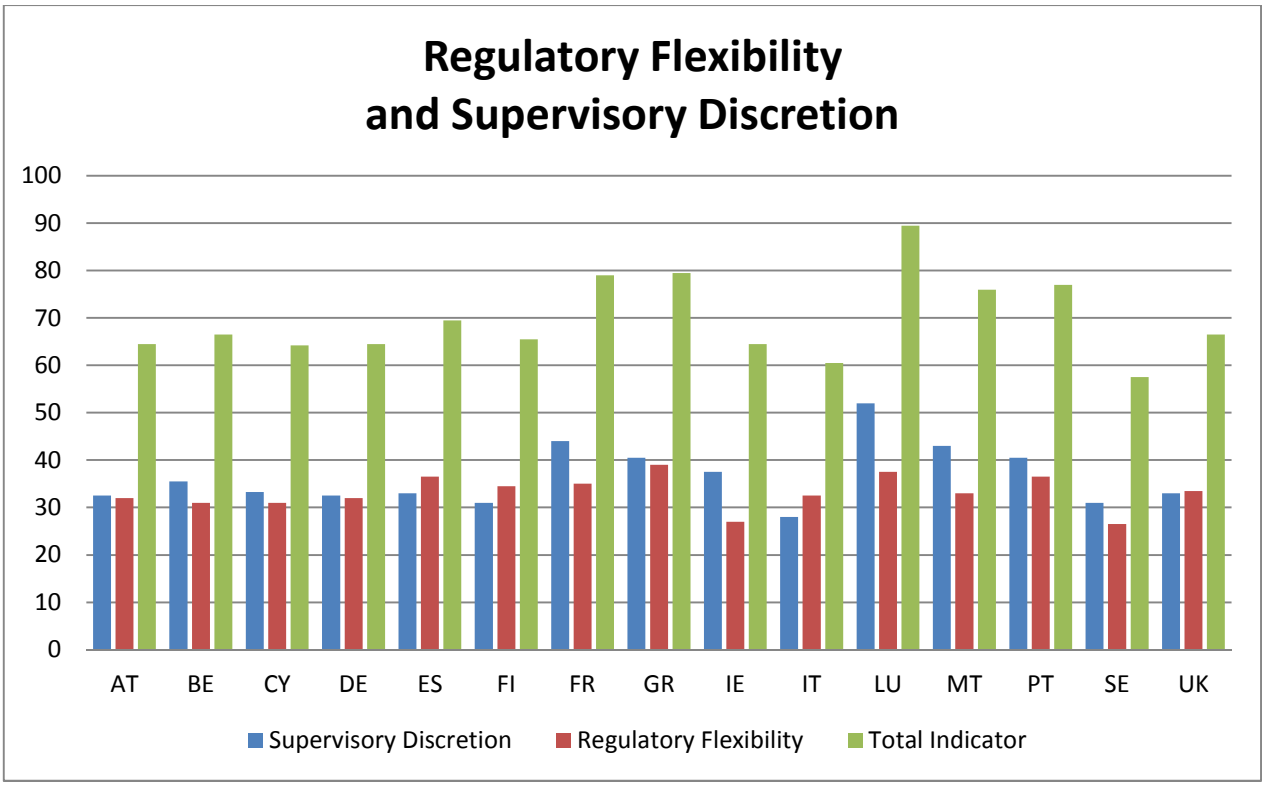
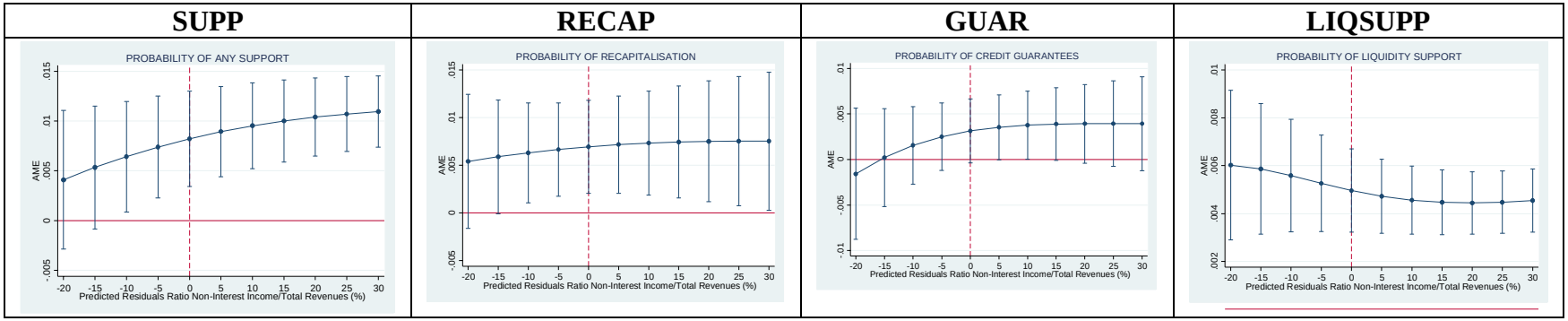


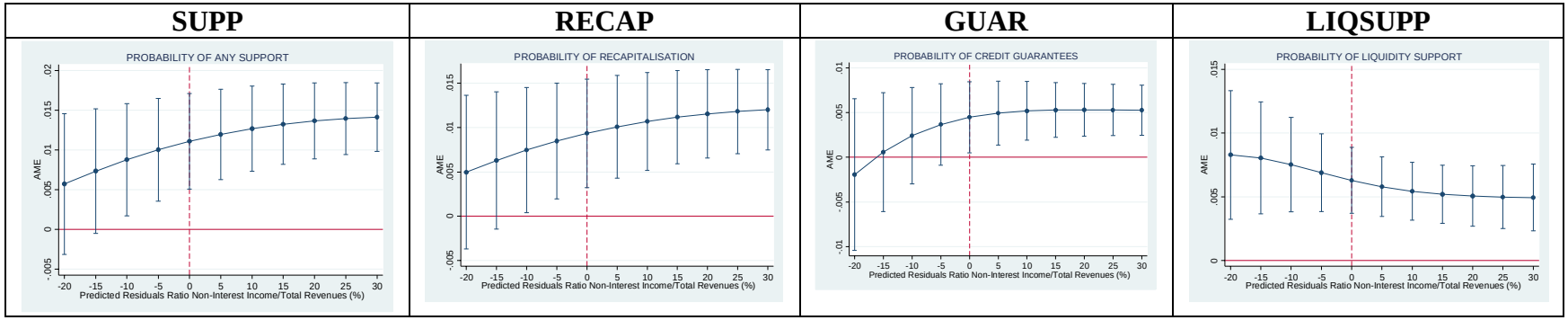

Figure 1. The above histogram displays the values of the overall indicator of Prudential Regulation, of the two sub-indicators of Supervisory Discretion and Regulatory Flexibility for 15 EU countries. The indicator is constructed on the basis of the exercise of national options and discretions in the implementation of the Capital Requirements Directive. A higher value of the indicator indicates a less stringent prudential framework in a given country.

## Figure 2. Interaction with the Predicted Residuals of the Non-Interest Income Ratio

### Panel A. Overall Indicator




### Panel B. Supervisory Discretion




### Panel C. Regulatory Flexibility

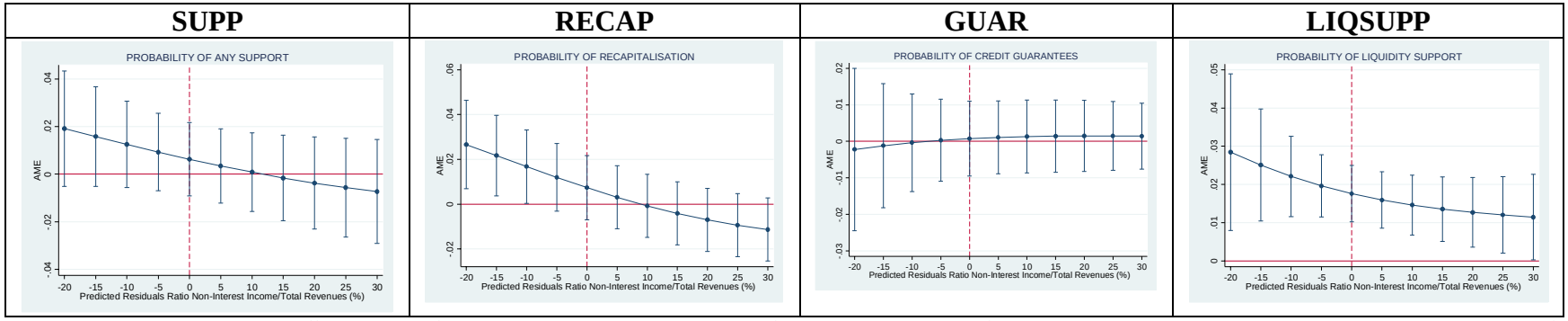
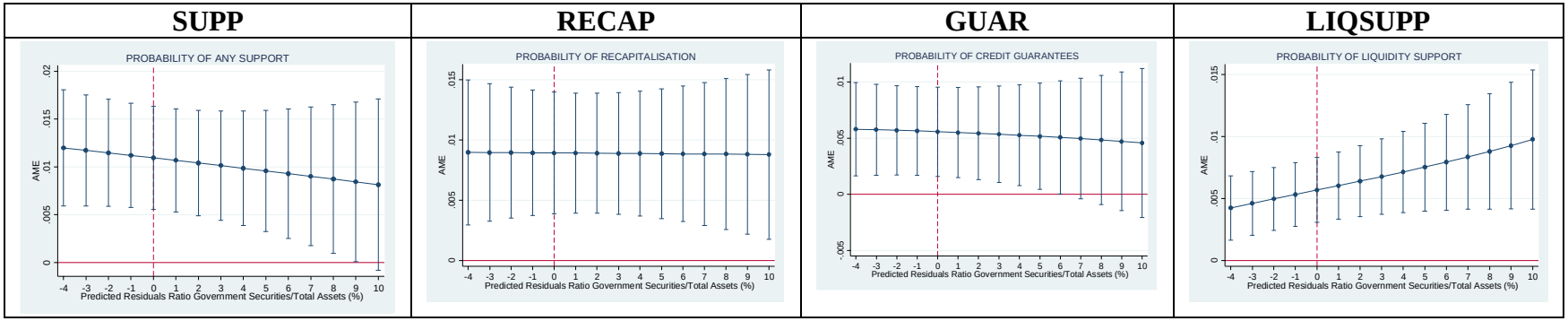


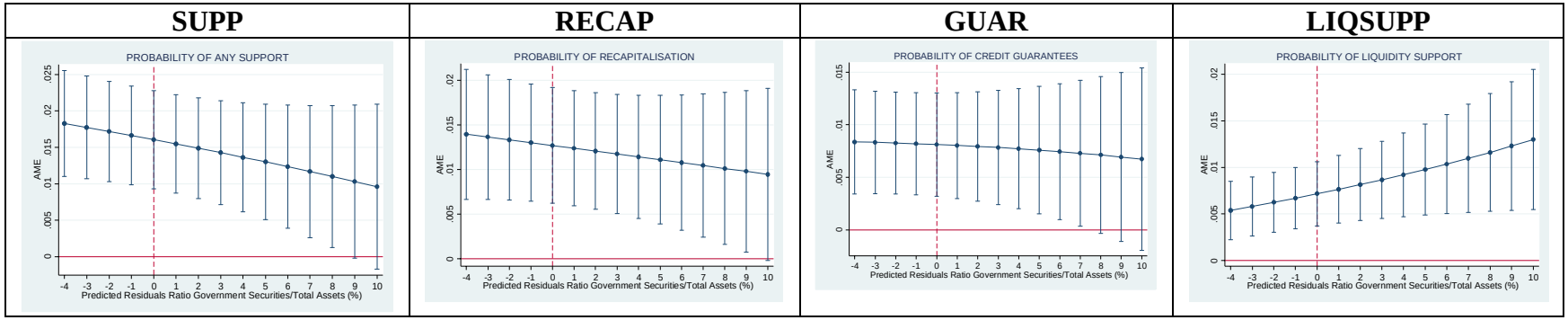

Figure 2. The above plots display the average marginal effects (AMEs) of the Prudential Regulation Indicator and of its two sub-components of Supervisory Discretion and Regulatory Flexibility on the probability of any form of support (SUPP) and of specific crisis interventions (RECAP, GUAR, LIQSUPP) for different values of (the predicted residuals of) the Non-Interest Income/Total Revenues Ratio. The dashed line indicates the mean value of the (predicted residuals of) the non-interest income ratio in the estimation sample. The AMEs are computed based on the estimation of a logit regression (with std. errors clustered by bank), including an interaction term between the prudential regulation indicator and the (predicted residuals of) the non-interest income ratio. Confidence intervals are drawn for the 5% level.

## Figure 3. Interaction with the Predicted Residuals of Bank Exposures to Government Bonds

### Panel A. Overall Indicator




### Panel B. Supervisory Discretion




### Panel C. Regulatory Flexibility

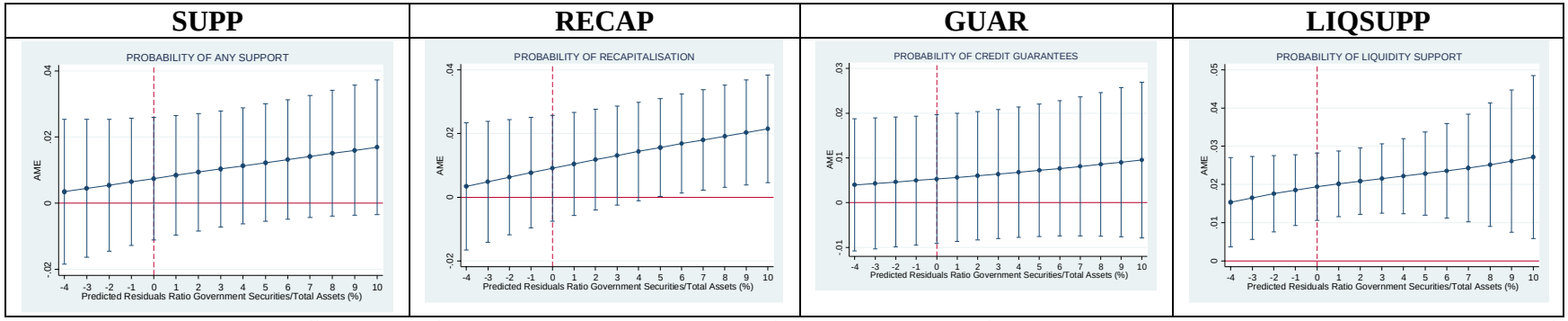
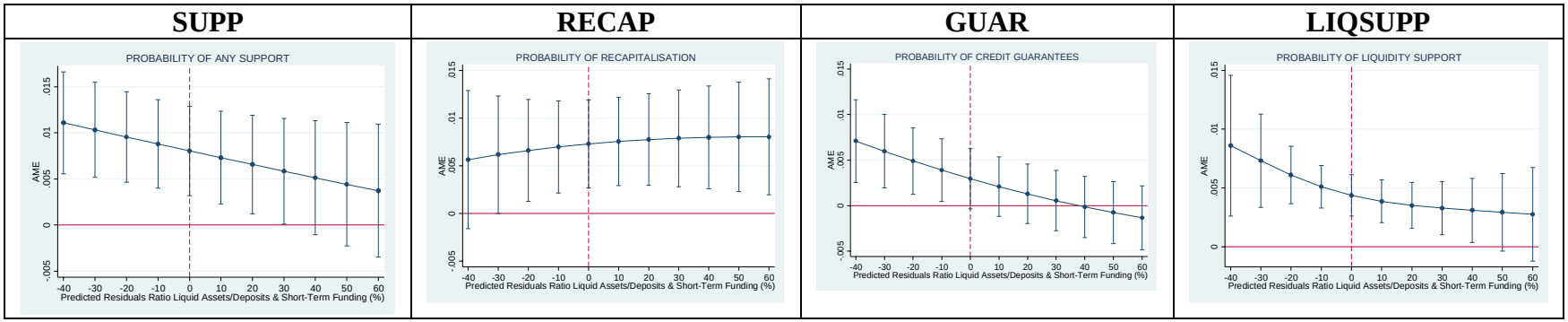


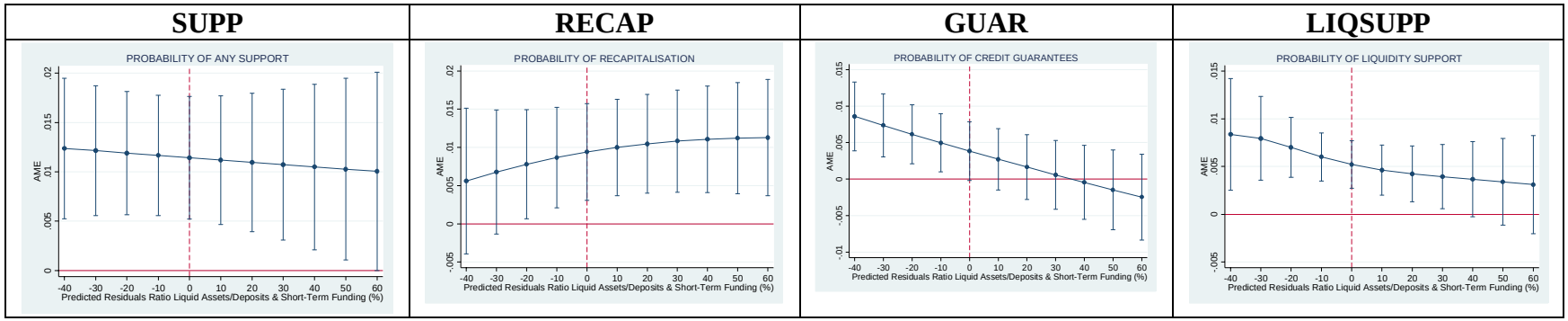

Figure 3. The above plots display the average marginal effects (AMEs) of the Prudential Regulation Indicator and of its two sub-components of Supervisory Discretion and Regulatory Flexibility on the probability of any form of support (SUPP) and of specific crisis interventions (RECAP, GUAR, LIQSUPP) for different values of (the predicted residuals of) the Exposures to Government Securities/Total Assets Ratio. The dashed line indicates the mean value of the (predicted residuals of) the government exposures ratio in the estimation sample. The AMEs are computed based on the estimation of a logit regression (with std. errors clustered by bank), including an interaction term between the prudential regulation indicator and the (predicted residuals) of the government exposures ratio. Confidence intervals are drawn for the 5% level.

## Figure 4. Interaction with the Predicted Residuals of the Liquid Assets Ratio

### Panel A. Overall Indicator




### Panel B. Supervisory Discretion




### Panel C. Regulatory Flexibility

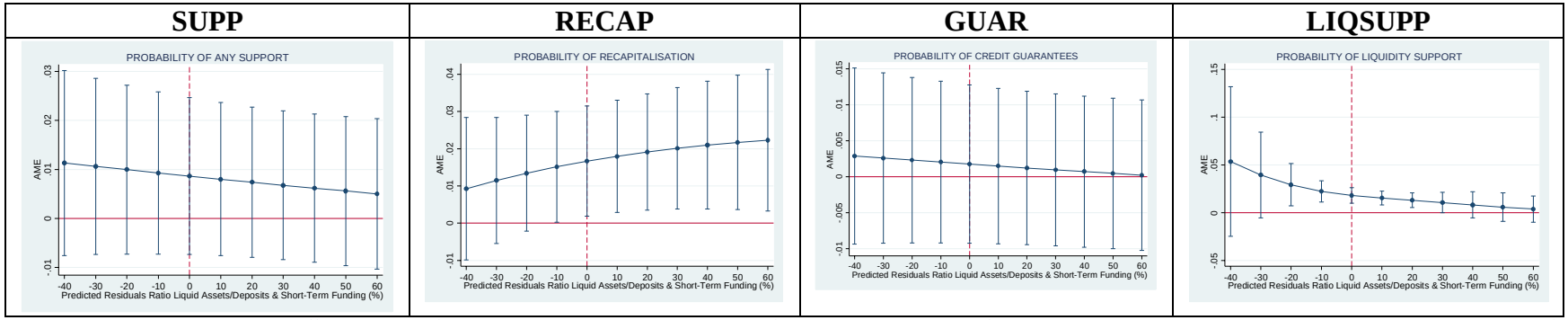



Figure 4. The above plots display the average marginal effects (AMEs) of the Prudential Regulation Indicator and of its two sub-components of Supervisory Discretion and Regulatory Flexibility on the probability of any form of support (SUPP) and of specific crisis interventions (RECAP, GUAR, LIQSUPP) for different values of (the predicted residuals of) the Liquid Assets/Deposits & Short-Term Borrowing Ratio. The dashed line indicates the mean value of the (predicted residuals of) the liquid assets ratio in the estimation sample. The AMEs are computed based on the estimation of a logit regression (with std. errors clustered by bank), including an interaction term between the prudential regulation indicator and the (predicted residuals) of the liquid assets ratio. Confidence intervals are drawn for the 5% level.

**Table 1. Measures of Public Support to Banks**

| | RECAPITALISATIONS | | | GUARANTEES | | | ASSET RELIEF | | | LIQUIDITY SUPP. | | | ANY SUPPORT | | | ALL BANKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COUNTRY | No. Inst. | Perc. Inst. | Perc. Assets | No. Inst. | Perc. Inst. | Perc. Assets | No. Inst. | Perc. Inst. | Perc. Assets | No. Inst. | Perc. Inst. | Perc. Assets | No. Inst. | Perc. Inst. | Perc. Assets | No. Inst. |
| **AUSTRIA** | 6 | 16.22% | 46.32% | 6 | 16.22% | 43.67% | 3 | 8.11% | 7.88% | 0 | 0.00% | 0.00% | 7 | 18.92% | 47.53% | 37 |
| **BELGIUM** | 3 | 18.75% | 83.65% | 2 | 12.50% | 65.00% | 3 | 18.75% | 83.65% | 0 | 0.00% | 0.00% | 3 | 18.75% | 83.65% | 16 |
| **CYPRUS** | 0 | 0.00% | 0.00% | 5 | 62.50% | 73.00% | 0 | 0.00% | 0.00% | 0 | 0.00% | 0.00% | 5 | 62.50% | 73.00% | 8 |
| **GERMANY** | 9 | 5.49% | 29.98% | 8 | 4.88% | 22.23% | 6 | 3.66% | 19.85% | 0 | 0.00% | 0.00% | 11 | 6.71% | 30.41% | 164 |
| **DENMARK** | 0 | 0.00% | 0.00% | 8 | 66.67% | 80.05% | 0 | 0.00% | 0.00% | 0 | 0.00% | 0.00% | 8 | 66.67% | 80.05% | 12 |
| **GREECE** | 8 | 72.73% | 86.26% | 6 | 54.55% | 81.20% | 0 | 0.00% | 0.00% | 7 | 63.64% | 84.79% | 8 | 72.73% | 86.26% | 11 |
| **SPAIN** | 29 | 30.53% | 20.34% | 0 | 0.00% | 0.00% | 2 | 2.11% | 1.16% | 2 | 2.11% | 1.16% | 29 | 30.53% | 20.34% | 95 |
| **FINLAND** | 0 | 0.00% | 0.00% | 0 | 0.00% | 0.00% | 0 | 0.00% | 0.00% | 0 | 0.00% | 0.00% | 0 | 0.00% | 0.00% | 6 |
| **FRANCE** | 11 | 20.37% | 83.57% | 1 | 1.85% | 4.93% | 1 | 1.85% | 4.93% | 0 | 0.00% | 0.00% | 11 | 20.37% | 83.57% | 54 |
| **IRELAND** | 5 | 23.81% | 50.77% | 1 | 4.76% | 9.95% | 5 | 23.81% | 50.77% | 0 | 0.00% | 0.00% | 5 | 23.81% | 50.77% | 21 |
| **ITALY** | 4 | 4.60% | 13.71% | 0 | 0.00% | 0.00% | 0 | 0.00% | 0.00% | 0 | 0.00% | 0.00% | 4 | 4.60% | 13.71% | 87 |
| **LUXEMBOURG** | 1 | 1.96% | 5.99% | 1 | 1.96% | 0.58% | 0 | 0.00% | 0.00% | 1 | 1.96% | 0.28% | 3 | 5.88% | 6.85% | 51 |
| **MALTA** | 0 | 0.00% | 0.00% | 0 | 0.00% | 0.00% | 0 | 0.00% | 0.00% | 0 | 0.00% | 0.00% | 0 | 0.00% | 0.00% | 2 |
| **NETHERLANDS** | 6 | 18.18% | 57.51% | 7 | 21.21% | 58.83% | 1 | 3.03% | 33.06% | 1 | 3.03% | 4.57% | 9 | 27.27% | 59.04% | 33 |
| **PORTUGAL** | 0 | 0.00% | 0.00% | 5 | 29.41% | 69.13% | 0 | 0.00% | 0.00% | 1 | 5.88% | 1.84% | 5 | 29.41% | 69.13% | 17 |
| **SWEDEN** | 1 | 9.09% | 40.87% | 2 | 18.18% | 16.38% | 0 | 0.00% | 0.00% | 0 | 0.00% | 0.00% | 3 | 27.27% | 57.24% | 11 |
| **UNITED KINGDOM** | 5 | 7.04% | 41.63% | 2 | 2.82% | 1.81% | 1 | 1.41% | 27.11% | 2 | 2.82% | 1.81% | 5 | 7.04% | 41.63% | 71 |
| **ALL SAMPLE** | 88 | 12.64% | 44.85% | 54 | 7.76% | 18.30% | 22 | 3.16% | 18.03% | 14 | 2.01% | 1.66% | 116 | 16.67% | 47.96% | 696 |

Source: European Commission and authors' calculations

**Table 2. Baseline Specification – Overall Indicator (2005-2008)**

| VARIABLES | (1) SUPP | (2) SUPP | (3) RECAP | (4) RECAP | (5) GUAR | (6) GUAR | (7) LIQSUPP | (8) LIQSUPP |
|---|---|---|---|---|---|---|---|---|
| *REGULATORY FRAMEWORK* | | | | | | | | |
| Overall Indicator | 0.103*** | 0.0116*** | 0.100*** | 0.00961*** | 0.0933*** | 0.00577*** | 0.324*** | 0.00545*** |
| | (0.0274) | (0.00294) | (0.0300) | (0.00278) | (0.0328) | (0.00207) | (0.0715) | (0.00105) |
| *RISK-TAKING MEASURES* | | | | | | | | |
| LiqAssets/DeposST | 0.000500 | 5.66e-05 | -0.0107* | -0.00102** | 0.00306 | 0.000190 | -0.0457 | -0.000768 |
| | (0.00396) | (0.000449) | (0.00552) | (0.000518) | (0.00303) | (0.000189) | (0.0485) | (0.000812) |
| GovSecur/TotAssets | -0.0111 | -0.00125 | -0.0275 | -0.00263 | 0.0178 | 0.00110 | 0.0434 | 0.000728 |
| | (0.0183) | (0.00205) | (0.0207) | (0.00196) | (0.0173) | (0.00109) | (0.0619) | (0.00102) |
| NonInterIncomeRatio | -0.0345*** | -0.00391*** | -0.0413*** | -0.00395*** | -0.0501*** | -0.00310*** | -0.0303 | -0.000508 |
| | (0.0125) | (0.00140) | (0.0142) | (0.00133) | (0.0165) | (0.00108) | (0.0565) | (0.000987) |
| *BANK CONTROLS* | | | | | | | | |
| Size | 0.759*** | 0.0858*** | 0.834*** | 0.0799*** | 0.562*** | 0.0348*** | 0.349 | 0.00586 |
| | (0.104) | (0.0110) | (0.118) | (0.0105) | (0.128) | (0.00880) | (0.254) | (0.00416) |
| Loans/TotAssets | 0.00976 | 0.00110 | -0.00629 | -0.000602 | 0.0245 | 0.00151 | 0.0161 | 0.000271 |
| | (0.0107) | (0.00122) | (0.00983) | (0.000928) | (0.0153) | (0.000955) | (0.0591) | (0.00100) |
| RoE | -0.0102 | -0.00116 | 0.00155 | 0.000148 | -0.00574 | -0.000356 | 0.0328 | 0.000551 |
| | (0.00752) | (0.000853) | (0.00738) | (0.000705) | (0.00878) | (0.000549) | (0.0215) | (0.000362) |
| MACRO CONTROLS | YES | YES | YES | YES | YES | YES | YES | YES |
| YEAR FIXED EFFECTS | YES | YES | YES | YES | YES | YES | YES | YES |
| Observations | 1,346 | 1,346 | 1,346 | 1,346 | 1,346 | 1,346 | 1,346 | 1,346 |

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

**Table 3. Baseline Specification – Supervisory Discretion (2005-2008)**

| VARIABLES | (1) SUPP | (2) SUPP | (3) RECAP | (4) RECAP | (5) GUAR | (6) GUAR | (7) LIQSUPP | (8) LIQSUPP |
|---|---|---|---|---|---|---|---|---|
| *REGULATORY FRAMEWORK* | | | | | | | | |
| Superv Discretion | 0.148*** | 0.0165*** | 0.139*** | 0.0132*** | 0.129*** | 0.00796*** | 0.358*** | 0.00663*** |
| | (0.0349) | (0.00363) | (0.0396) | (0.00358) | (0.0400) | (0.00259) | (0.0908) | (0.00133) |
| *RISK-TAKING MEASURES* | | | | | | | | |
| LiqAssets/DeposST | 0.000260 | 2.89e-05 | -0.0104* | -0.000986** | 0.00300 | 0.000185 | -0.0312 | -0.000577 |
| | (0.00385) | (0.000429) | (0.00538) | (0.000500) | (0.00290) | (0.000181) | (0.0398) | (0.000739) |
| GovSecur/TotAssets | -0.0111 | -0.00123 | -0.0275 | -0.00262 | 0.0188 | 0.00116 | 0.0570 | 0.00106 |
| | (0.0188) | (0.00208) | (0.0211) | (0.00198) | (0.0176) | (0.00110) | (0.0583) | (0.00106) |
| NonInterIncomeRatio | -0.0301** | -0.00335** | -0.0368*** | -0.00350*** | -0.0450*** | -0.00278*** | -0.0153 | -0.000284 |
| | (0.0125) | (0.00139) | (0.0140) | (0.00130) | (0.0165) | (0.00107) | (0.0520) | (0.000985) |
| *BANK CONTROLS* | | | | | | | | |
| Size | 0.752*** | 0.0837*** | 0.821*** | 0.0780*** | 0.549*** | 0.0338*** | 0.331 | 0.00612 |
| | (0.104) | (0.0107) | (0.116) | (0.0103) | (0.127) | (0.00866) | (0.244) | (0.00445) |
| Loans/TotAssets | 0.0117 | 0.00131 | -0.00486 | -0.000462 | 0.0264* | 0.00163* | 0.0314 | 0.000581 |
| | (0.0109) | (0.00123) | (0.00985) | (0.000926) | (0.0158) | (0.000983) | (0.0573) | (0.00108) |
| RoE | -0.0125 | -0.00139 | -0.000606 | -5.76e-05 | -0.00677 | -0.000417 | 0.0263 | 0.000486 |
| | (0.00814) | (0.000911) | (0.00641) | (0.000610) | (0.00822) | (0.000513) | (0.0205) | (0.000376) |
| MACRO CONTROLS | YES | YES | YES | YES | YES | YES | YES | YES |
| YEAR FIXED EFFECTS | YES | YES | YES | YES | YES | YES | YES | YES |
| Observations | 1,346 | 1,346 | 1,346 | 1,346 | 1,346 | 1,346 | 1,346 | 1,346 |

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

**Table 4. Baseline Specification – Regulatory Flexibility (2005-2008)**

| VARIABLES | (1) SUPP | (2) SUPP | (3) RECAP | (4) RECAP | (5) GUAR | (6) GUAR | (7) LIQSUPP | (8) LIQSUPP |
|---|---|---|---|---|---|---|---|---|
| *REGULATORY FRAMEWORK* | | | | | | | | |
| Regulatory Flexibility | 0.0899 | 0.0107 | 0.121 | 0.0121 | 0.137 | 0.00873 | 1.321*** | 0.0197*** |
| | (0.0820) | (0.00969) | (0.0895) | (0.00884) | (0.108) | (0.00690) | (0.241) | (0.00433) |
| *RISK-TAKING MEASURES* | | | | | | | | |
| LiqAssets/DeposST | -0.000170 | -2.03e-05 | -0.0106** | -0.00105** | 0.00250 | 0.000160 | -0.0713 | -0.00106 |
| | (0.00394) | (0.000468) | (0.00524) | (0.000511) | (0.00300) | (0.000194) | (0.0610) | (0.000872) |
| GovSecur/TotAssets | -0.00771 | -0.000917 | -0.0233 | -0.00232 | 0.0163 | 0.00104 | 0.0219 | 0.000326 |
| | (0.0166) | (0.00197) | (0.0191) | (0.00189) | (0.0168) | (0.00109) | (0.0638) | (0.000951) |
| NonInterIncomeRatio | -0.0334*** | -0.00397*** | -0.0416*** | -0.00414*** | -0.0527*** | -0.00337*** | -0.0499 | -0.000742 |
| | (0.0116) | (0.00136) | (0.0140) | (0.00134) | (0.0165) | (0.00109) | (0.0620) | (0.000952) |
| *BANK CONTROLS* | | | | | | | | |
| Size | 0.769*** | 0.0915*** | 0.847*** | 0.0843*** | 0.587*** | 0.0375*** | 0.284 | 0.00423 |
| | (0.105) | (0.0108) | (0.120) | (0.0104) | (0.122) | (0.00892) | (0.243) | (0.00346) |
| Loans/TotAssets | 0.00375 | 0.000446 | -0.0108 | -0.00107 | 0.0170 | 0.00109 | -0.0248 | -0.000370 |
| | (0.0103) | (0.00123) | (0.00957) | (0.000934) | (0.0137) | (0.000893) | (0.0564) | (0.000817) |
| RoE | -0.00746 | -0.000887 | 0.00500 | 0.000497 | -0.00432 | -0.000276 | 0.0403* | 0.000601* |
| | (0.00651) | (0.000781) | (0.00843) | (0.000830) | (0.00963) | (0.000619) | (0.0229) | (0.000347) |
| MACRO CONTROLS | YES | YES | YES | YES | YES | YES | YES | YES |
| YEAR FIXED EFFECTS | YES | YES | YES | YES | YES | YES | YES | YES |
| Observations | 1,346 | 1,346 | 1,346 | 1,346 | 1,346 | 1,346 | 1,346 | 1,346 |

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

**Table 5. Regulatory Framework and Risk-Taking Measures**

| VARIABLES | (1) GovSec | (2) GovSec | (3) GovSec | (4) NonIntInc | (5) NonIntInc | (6) NonIntInc | (7) LiqAssets | (8) LiqAssets | (9) LiqAssets |
|---|---|---|---|---|---|---|---|---|---|
| Overall Indicator | 0.146** | | | 0.474 | | | -0.00102 | | |
| | (0.0691) | | | (0.411) | | | (0.383) | | |
| Superv Discretion | | 0.225** | | | 0.450 | | | 0.890* | |
| | | (0.0895) | | | (0.511) | | | (0.515) | |
| Regulatory Flexibility | | | 0.0335 | | | 1.368* | | | -3.945* |
| | | | (0.217) | | | (0.711) | | | (2.356) |
| Equity/TotAssets | -0.142* | -0.136* | -0.154** | 0.280** | 0.281** | 0.282** | 0.553 | 0.542 | 0.631 |
| | (0.0760) | (0.0737) | (0.0783) | (0.133) | (0.134) | (0.131) | (0.691) | (0.683) | (0.701) |
| MACRO CONTROLS | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| YEAR FIXED EFF. | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Observations | 1,353 | 1,353 | 1,353 | 1,880 | 1,880 | 1,880 | 1,856 | 1,856 | 1,856 |
| R-squared | 0.036 | 0.041 | 0.025 | 0.020 | 0.018 | 0.021 | 0.017 | 0.020 | 0.031 |

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

## Table 6. Interaction with the Predicted Residuals of Non-Interest Income Ratio

**Panel A. Overall Indicator (2005-2008)**

| VARIABLES | (1) SUPP | (2) SUPP | (3) RECAP | (4) RECAP | (5) GUAR | (6) GUAR | (7) LIQSUPP | (8) LIQSUPP |
|---|---|---|---|---|---|---|---|---|
| | Coeff | AME | Coeff | AME | Coeff | AME | Coeff | AME |
| Overall Indicator | 0.0758*** | 0.00769*** | 0.0730*** | 0.00676*** | 0.0577* | 0.00222 | 0.372*** | 0.00484*** |
| | (0.0233) | (0.00254) | (0.0266) | (0.00247) | (0.0324) | (0.00182) | (0.0907) | (0.00103) |
| NonIntInc/TotRev | -0.178*** | -0.00277*** | -0.116 | -0.00249** | -0.296** | -0.00260*** | -0.620*** | -0.000609** |
| (res.) | (0.0647) | (0.000956) | (0.100) | (0.000990) | (0.124) | (0.000775) | (0.192) | (0.000300) |
| OverIndic*NonIntInc | 0.00225*** | | 0.00132 | | 0.00369** | | 0.00785*** | |
| (res.) | (0.000824) | | (0.00141) | | (0.00179) | | (0.00242) | |
| BANK CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| MACRO CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| YEAR FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Observations | 1,853 | 1,853 | 1,853 | 1,853 | 1,853 | 1,853 | 1,853 | 1,853 |

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

**Panel B. Supervisory Discretion (2005-2008)**

| VARIABLES | (1) SUPP | (2) SUPP | (3) RECAP | (4) RECAP | (5) GUAR | (6) GUAR | (7) LIQSUPP | (8) LIQSUPP |
|---|---|---|---|---|---|---|---|---|
| | Coeff | AME | Coeff | AME | Coeff | AME | Coeff | AME |
| Superv. Discretion | 0.103*** | 0.0105*** | 0.0989*** | 0.00887*** | 0.0830** | 0.00328 | 0.423*** | 0.00625*** |
| | (0.0294) | (0.00322) | (0.0335) | (0.00325) | (0.0367) | (0.00230) | (0.120) | (0.00144) |
| NonIntInc/TotRev | -0.132*** | -0.00313*** | -0.125** | -0.00260*** | -0.225*** | -0.00270*** | -0.390*** | -0.000952** |
| (res) | (0.0436) | (0.00102) | (0.0493) | (0.000983) | (0.0522) | (0.000707) | (0.139) | (0.000394) |
| SupDiscr*NonIntInc | 0.00300*** | | 0.00282** | | 0.00510*** | | 0.00891*** | |
| (res) | (0.000994) | | (0.00113) | | (0.00119) | | (0.00317) | |
| BANK CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| MACRO CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| YEAR FE | YES | YES | YES | YES | YES | YES | YES | YES |

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

**Panel C. Regulatory Flexibility (2005-2008)**

| VARIABLES | (1) SUPP | (2) SUPP | (3) RECAP | (4) RECAP | (5) GUAR | (6) GUAR | (7) LIQSUPP | (8) LIQSUPP |
|---|---|---|---|---|---|---|---|---|
| | Coeff | AME | Coeff | AME | Coeff | AME | Coeff | AME |
| Regul. Flexibility | 0.0560 | 0.00792 | 0.0763 | 0.00974 | 0.0137 | 0.000290 | 1.420*** | 0.0187*** |
| | (0.0699) | (0.00797) | (0.0761) | (0.00750) | (0.0934) | (0.00544) | (0.330) | (0.00443) |
| NonIntInc/TotRev | 0.137 | -0.00284** | 0.257** | -0.00331*** | -0.105 | -0.00261*** | -0.318 | -0.000602 |
| | (0.130) | (0.00112) | (0.110) | (0.00113) | (0.181) | (0.000811) | (0.278) | (0.000510) |
| RegulFlex*NonInterInc | -0.00480 | | -0.00855** | | 0.00186 | | 0.00749 | |
| | (0.00396) | | (0.00341) | | (0.00547) | | (0.00801) | |
| BANK CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| MACRO CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| YEAR FE | YES | YES | YES | YES | YES | YES | YES | YES |

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

## Table 7. Interaction with the Predicted Residuals of Bank Exposures to Government Bonds

**Panel A. Overall Indicator (2005-2008)**

| VARIABLES | (1) SUPP | (2) SUPP | (3) RECAP | (4) RECAP | (5) GUAR | (6) GUAR | (7) LIQSUPP | (8) LIQSUPP |
|---|---|---|---|---|---|---|---|---|
| | Coeff | AME | Coeff | AME | Coeff | AME | Coeff | AME |
| Overall Indicator | 0.0959*** | 0.0109*** | 0.0914*** | 0.00893*** | 0.0886*** | 0.00543*** | 0.323*** | 0.00517*** |
| | (0.0256) | (0.00274) | (0.0271) | (0.00259) | (0.0319) | (0.00204) | (0.0816) | (0.00129) |
| GovSec/TotAssets | 0.191 | 0.000264 | -0.0204 | -0.000770 | 0.247 | 0.00193* | -1.067** | 0.00163** |
| (res) | (0.231) | (0.00186) | (0.242) | (0.00217) | (0.213) | (0.00110) | (0.532) | (0.000716) |
| Over Ind * GovSec | -0.00276 | | 0.000181 | | -0.00313 | | 0.0157** | |
| (res) | (0.00339) | | (0.00348) | | (0.00317) | | (0.00717) | |
| BANK CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| MACRO CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| YEAR FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Obs. | 1,349 | 1,349 | 1,349 | 1,349 | 1,349 | 1,349 | 1,349 | 1,349 |

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

**Panel B. Supervisory Discretion (2005-2008)**

| VARIABLES | (1) SUPP | (2) SUPP | (3) RECAP | (4) RECAP | (5) GUAR | (6) GUAR | (7) LIQSUPP | (8) LIQSUPP |
|---|---|---|---|---|---|---|---|---|
| | Coeff | AME | Coeff | AME | Coeff | AME | Coeff | AME |
| Superv Discretion | 0.144*** | 0.0160*** | 0.132*** | 0.0127*** | 0.130*** | 0.00792*** | 0.368*** | 0.00675*** |
| | (0.0329) | (0.00339) | (0.0359) | (0.00331) | (0.0382) | (0.00256) | (0.0965) | (0.00159) |
| GovSec/TotAssets | 0.234 | 0.000968 | 0.125 | -0.000118 | 0.209 | 0.00222** | -0.293 | 0.00190*** |
| (res) | (0.152) | (0.00196) | (0.157) | (0.00207) | (0.149) | (0.00103) | (0.189) | (0.000737) |
| SupDiscr *GovSec | -0.00650 | | -0.00360 | | -0.00488 | | 0.0107* | |
| (res) | (0.00426) | | (0.00437) | | (0.00419) | | (0.00546) | |
| BANK CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| MACRO CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| YEAR FE | YES | YES | YES | YES | YES | YES | YES | YES |

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

**Panel C. Regulatory Flexibility (2005-2008)**

| VARIABLES | (1) SUPP | (2) SUPP | (3) RECAP | (4) RECAP | (5) GUAR | (6) GUAR | (7) LIQSUPP | (8) LIQSUPP |
|---|---|---|---|---|---|---|---|---|
| | Coeff | AME | Coeff | AME | Coeff | AME | Coeff | AME |
| Regul Flexibility | 0.0621 | 0.00749 | 0.0904 | 0.00903 | 0.0814 | 0.00556 | 1.225*** | 0.0166*** |
| | (0.0793) | (0.00942) | (0.0846) | (0.00846) | (0.113) | (0.00714) | (0.266) | (0.00472) |
| GovSec/TotAssets | -0.278 | 0.000215 | -0.503* | -0.000994 | -0.0769 | 0.00237* | -2.734** | 0.00102 |
| (res) | (0.262) | (0.00256) | (0.284) | (0.00248) | (0.229) | (0.00126) | (1.327) | (0.000688) |
| RegFlex * GovSec | 0.00830 | | 0.0145* | | 0.00336 | | 0.0763** | |
| (res) | (0.00772) | | (0.00826) | | (0.00714) | | (0.0360) | |
| BANK CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| MACRO CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| YEAR FE | YES | YES | YES | YES | YES | YES | YES | YES |

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

## Table 8. Interaction with the Predicted Residuals of the Liquid Assets Ratio

**Panel A. Overall Indicator (2005-2008)**

| VARIABLES | (1) SUPP | (2) SUPP | (3) RECAP | (4) RECAP | (5) GUAR | (6) GUAR | (7) LIQSUPP | (8) LIQSUPP |
|---|---|---|---|---|---|---|---|---|
| | Coeff | AME | Coeff | AME | Coeff | AME | Coeff | AME |
| Overall Indicator | 0.0717*** | 0.00834*** | 0.0768*** | 0.00708*** | 0.0496* | 0.00316* | 0.376*** | 0.00515*** |
| | (0.0226) | (0.00249) | (0.0253) | (0.00240) | (0.0284) | (0.00175) | (0.0862) | (0.00100) |
| LiqAssets/DeposST | 0.0374 | -0.000448 | -0.0604 | -0.00120** | 0.0824*** | -0.000460* | -0.280* | -0.000649 |
| (res) | (0.0246) | (0.000306) | (0.0488) | (0.000566) | (0.0262) | (0.000245) | (0.155) | (0.000398) |
| Indic * LiqAssets | -0.000605 | | 0.000701 | | -0.00131*** | | 0.00322* | |
| (res) | (0.000378) | | (0.000670) | | (0.000417) | | (0.00189) | |
| BANK CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| MACRO CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| YEAR FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Obs. | 1,840 | 1,840 | 1,840 | 1,840 | 1,840 | 1,840 | 1,840 | 1,840 |

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

**Panel B. Supervisory Discretion (2005-2008)**

| VARIABLES | (1) SUPP | (2) SUPP | (3) RECAP | (4) RECAP | (5) GUAR | (6) GUAR | (7) LIQSUPP | (8) LIQSUPP |
|---|---|---|---|---|---|---|---|---|
| | Coeff | AME | Coeff | AME | Coeff | AME | Coeff | AME |
| Superv. Discretion | 0.101*** | 0.0115*** | 0.0993*** | 0.00873*** | 0.0650* | 0.00396* | 0.430*** | 0.00594*** |
| | (0.0289) | (0.00313) | (0.0342) | (0.00322) | (0.0343) | (0.00221) | (0.110) | (0.00140) |
| LiqAssets/DeposST | 0.00308 | -0.000223 | -0.0590* | -0.00138** | 0.0604*** | -0.000228 | -0.253** | -0.000787* |
| (res) | (0.0241) | (0.000399) | (0.0330) | (0.000598) | (0.0188) | (0.000162) | (0.112) | (0.000434) |
| SupDiscr*LiqAssets | -0.000146 | | 0.00129 | | -0.00182*** | | 0.00553** | |
| (res) | (0.000633) | | (0.000837) | | (0.000582) | | (0.00243) | |
| BANK CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| MACRO CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| YEAR FE | YES | YES | YES | YES | YES | YES | YES | YES |

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

**Panel C. Regulatory Flexibility (2005-2008)**

| VARIABLES | (1) SUPP | (2) SUPP | (3) RECAP | (4) RECAP | (5) GUAR | (6) GUAR | (7) LIQSUPP | (8) LIQSUPP |
|---|---|---|---|---|---|---|---|---|
| | Coeff | AME | Coeff | AME | Coeff | AME | Coeff | AME |
| Regulatory Flexibility | 0.0749 | 0.00884 | 0.175** | 0.0163** | 0.0283 | 0.00170 | 1.687*** | 0.0239*** |
| | (0.0717) | (0.00829) | (0.0840) | (0.00784) | (0.0900) | (0.00561) | (0.350) | (0.00636) |
| LiqAssets/DeposST | 0.0125 | -0.000404 | -0.0917 | -0.00109** | 0.0124 | -8.33e-05 | 0.118 | -0.000686 |
| (res) | (0.0181) | (0.000403) | (0.0625) | (0.000475) | (0.0147) | (0.000211) | (0.270) | (0.000485) |
| RegulFlex * LiqAssets | -0.000473 | | 0.00238 | | -0.000411 | | -0.00458 | |
| (res) | (0.000594) | | (0.00178) | | (0.000514) | | (0.00793) | |
| BANK CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| MACRO CONTR. | YES | YES | YES | YES | YES | YES | YES | YES |
| YEAR FE | YES | YES | YES | YES | YES | YES | YES | YES |

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