

# TOWARDS A PAN EUROPEAN DEPOSIT GUARANTEE SCHEME. HOW BANK RISKINESS IS RELEVANT IN THE SCHEME?

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**JEL classification:** G18, G21, G28.

**Keywords:** European Union, Deposit insurance, Bank riskiness, Banking regulation

## **Introduction**

The Financial crisis highlighted clearly the need for better regulation and supervision of the financial sector. As far as deposits, citizens suddenly realized that different levels and forms of depositor protection co-existed in the EU and following the Northern Rock bank run in September 2007, it was clear that deposit protection systems in the EU did not function as they should.

Because of the possible spreading of bank runs all over the world, deposit insurance schemes became more common, and also countries where they did not exist, they began to set up them, like Australia and New Zealand. On the other side, in countries where the schemes were already adopted, an overhaul of the main characteristics of these schemes kicked off.

All this considered, this paper focuses on the recent evolution of regulation concerning deposit guarantee schemes (DGSs) taking into account that their main characteristics in Europe are changing – due to the approval of a new Directive – which set up the harmonization and mutualization of the individual schemes and, in the future, probably the birth of a supra-national one.

By considering that funding arrangements play a critical role in the success of any deposit guarantee scheme, this paper analyzes these arrangements in order to determine how much the different schemes are effective. In effect, the recent evolution in the funding arrangements worldwide seems to converge towards the evidence that a well-designed deposit insurance funding arrangement now includes a risk-based pricing system able to minimize the moral hazard issue that often accompanies even the most carefully designed insurance scheme. This is the risk that excessive risk taking can arise because creditors do not suffer the full consequences of a bank's failure and, therefore, are less likely to monitor its condition. In this research, differently from previous papers, we want to answer two main research questions. The first one considers the fact that the new European Directive requires that DGSs' funding arrangements are risk based pricing systems able to minimize the moral hazard risk. This is something new which tends to make banks evaluated/supervised by the DGSs similarly to the firms evaluated by the banks when the latter lend money to the former. Which is the impact of risk based insurance premiums on risk-taking attitude of banks?

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More importantly, the second research question aims to make a comparison between the main characteristics of the new “European DGS” and the main characteristics of the US Federal Deposit Insurance Corporation (FDIC) in order to analyze the similarities and the differences.

## **1. Literature review on how deposit insurance affect bank risk**

The literature concerning deposit insurance schemes can be considered starting with the paper of Diamond and Dybvig of 1983. According to this paper, banks have issued demand deposits throughout their history and economists have long had the intuition that demand deposits are a vehicle through which banks fulfill their role of turning illiquid assets into liquid assets. In this role banks can be viewed as providing insurance that allows agents to consume when they need to most. The paper shows that bank deposit contracts can provide allocations superior to those of exchange markets, offering an explanation of how banks subject to runs can attract deposits. Moreover bank runs in the model can cause real economic damage, rather than simply reflecting other problems.

Despite its stabilizing effect in the short run, deposit insurance has an adverse effect of raising systemic risk in the long run, because of the fact that banks are induced to moral hazard behaviours. The moral hazard problem associated with deposit insurance is well recognized as one of the major factors having contributed to the US savings and loan debacle in the 1980. Demigurc-Kunt and Detragiache in 2002, and many others, evidenced that deposit insurance exacerbated moral hazard problems in bank lending and was associated with higher likelihood of banking crisis. Furthermore, when deposits are insured, bank depositors lack incentives to monitor, that is they do not exercise market discipline, and banks are induced to take on excessive risk in their activities (Demigurc-Kunt and Kane, 2002; Barth et al. 2004 and Ioannidou and Penas, 2010).

By summarizing, there is a widespread agreement in the academic literature that deposit insurance stabilizes banking system but heavily affects bank risk-taking through two channels: increasing moral hazard by banks and reducing market discipline by depositors.

Of course, one may argue that the past failures of explicit deposit insurance schemes in stabilizing their banking systems are due to factors such as non-risk rated deposit insurance premiums and adequate coverage; and hence higher coverage could have prevented bank runs in many cases. Furthermore, the absence of bank runs may mean financial stability, but it may also mean that depositors have no incentives to monitor banks and so in the long period banks might be induced to take on excessive risk. Consequently, higher deposit insurance coverage tends to undermine market discipline and exacerbate the notorious moral hazard problem by inducing banks towards too risky activities. Moreover, the lack of market discipline allows bankers and regulators to disregard the issue of market stability. And, if so, it could be too late for the public to find out where there is a financial meltdown due to mismanagement and regulatory forbearance (Kam Hon Chu, 2011).

By considering this, in recent years it has emerged that banks, members of a DGS, should be charged a fee commensurate to their relative risk of failure, – i.e higher premium for higher insurance risk. With correct risk pricing, the benefits of increased risk taking can be taxed away which helps to restore an element of market discipline. While appropriately assigning bank risk is not straightforward, efforts should be made to adjust premiums for risk, for example, by assigning banks to risk buckets and charging different premiums for banks in each bucket. Even if some authors argued that risk-based deposit insurance premiums alone can not control moral hazard in deposit insurance (E.S. Prescott, 2002), in the United States and very recently in Europe the premiums are risk-based.

In particular, till 2014, most European DGSs did not adjust premiums for risk across banks and most levy premiums did not adequately reflect the average risk in the system (that is they were not fairly priced) and the burden therefore fell disproportionately on smaller and other deposit rich banks. The recast of the 1994 European deposit insurance Directive has altered this situation by introducing contributions that consist of both non-risk and risk-based elements (IMF, 2013) for every country’s DGSs.

The topic concerning bank risk and DGS has become relevant in Europe. Before this paper two relevant pieces of work can be mentioned: Laeven and Levin (2009) and Anginer et al. (2014).

Laeven and Levine goal is to provide the first empirical assessment of theoretical predictions concerning how a bank's ownership structure interact with national regulations in shaping bank risk taking. Synthetically, they examine whether ownership structure affects bank risk and whether the impact of national regulations on bank risk depends on the ownership structure of individual banks. Policy considerations motivate their research. The risk taking behavior of banks affects financial and economic fragility, so shaping the risk taking behaviour of individual banks is very relevant.

Differently, Anginer et al. analyse the impact of deposit insurance on bank risk and systemic stability during a period of global financial instability. They are interested in how regulation and supervision impact the relationship between deposit insurance and systemic stability. It is known that the adverse consequence of deposit insurance can potentially be mitigated through better bank regulation and supervision. To examine this relationship, they use a bank supervisory quality index, which measures whether the supervisory authorities have the power and the authority to take specific preventive and corrective actions such as replacing the management team. This variable comes from the banking surveys conducted by Barth et al. (2008). The surveys were conducted in the years 1999, 2002 and 2005. Because country level regulations change slowly over time they use the previously available survey data.

## **2. The evolution of the regulation of deposit guarantee schemes in Europe**

In Europe the Directive 94/19/EC has stated that DGSs have two main functions, precisely to protect savers and to enhance the stability of financial markets. The problem was that the level of harmonization was too low and a multiplicity of deposit insurance schemes was maintained with wide variations in coverage level, deposit/depositor eligibility, payout procedures and funding mechanisms. As everyone knows, the wide variety of deposit guarantee schemes (DGS) has not proven to be crisis-resilient and large government interventions were necessary to deal with failing banks in order to restore depositors' trusts and stop bank runs.

Following the crisis, on 15 October 2008 the European Commission proposed a revision to EU rules on deposit guarantee schemes and later, on 11 March 2009, the European Parliament and the Council publicized the Directive 2009/14/EC, amending Directive 94/19/EC on deposit-guarantee schemes as regards the coverage level and the payout delay.

The issue was not completely solved with the Directive and on 12 July 2010, the European Commission adopted a legislative proposal for a comprehensive revision of the Directive 94/19/EC. In particular, it stated that depositors should enjoy the same level of deposit protection in all member states, as the existing variety of DGS was considered unreliable in times of crisis. The main aim was to create a level playing field, with a focus on coverage limits and preference for ex- ante funding.

The legislative proposal did not represent yet a radical change as in some aspects it maintained the diversity in national DGS. Consequently, it was widely supposed not to represent a sufficient response to the problems raised by the crisis. Consequently, the legislative proposal remained stalled for several months due to lack of agreement between the Council and the European Parliament.

More recently these regulatory developments have been included in the discussions on the realization of the Banking Union, which was the key commitment of the EU Heads of State and Government on June 2012. Following these agreements, on 12 September 2012 the European Commission publicized the proposals for a Single Supervision Mechanism (SSM) that appears as the first step of the Banking Union. In this context, although a pan-European DGS was originally proposed as one of the Banking Union elements, at present the SSM and the establishment of the

pan-EU bank resolution fund are given a clear priority, with DGS harmonization considered as an objective to be pursued at a later stage.

Very relevantly, on 11 December 2013 the European Parliament and the Member States reached an agreement on bank recovery and resolution (BRRD) and just a few days after, on 17 December, they reached a provisional agreement on an important text for the protection of deposits. The new rules, which should enter into force on 1<sup>st</sup> January 2015, provide authorities with the means to intervene decisively both before problems occur and early on in the process.

More precisely, lately in January 2014 it was communicated by the European Commission that at the moment it was not envisaged to equip the Banking Union with a single supranational deposit guarantee scheme.

Finally, the Council of the European Union adopted the proposed Directive on Deposit Guarantee Schemes at first reading on 3 March 2014 while the Parliament adopted the text of the Directive at second reading on 15 April. Besides the latter text, the European Parliament adopted two other texts in order to complete the legislative framework underpinning the Banking Union: the Single Resolution Mechanism (SRM) and the Bank Recovery and Resolution Directive (BRRD). The three texts are interconnected. In particular, the use of DGS funds for bank resolution should be allowed, because it is cheaper than paying out depositors. To a large extent deposit guarantee scheme and resolution frameworks share the same function: protecting depositors against the unavailability of their deposits, which may happen as a result of a single bank's failure or a systemic crisis. In fact, DGS and resolution frameworks are mutually beneficial. On the one hand, resolution maintains the systemic functions of banks, avoids contagion and therefore additional payouts. On the other hand, DGS dissuades bank run and therefore avoid vicious circle which lead to bank crises. As a result, the combined introduction of deposit guarantee schemes and resolution frameworks produces synergies. Moreover, according to the Directive, DGS could be used for early intervention (recapitalization, liquidity assistance, guarantees, etc) provided that some conditions are met.

All that considered, in April 2014 it was also restated that a pan-European Deposit Guarantee Scheme was not foreseen at that stage. However, the Directive opens the way to a voluntary mechanism of mutual borrowing between the DGSs from different EU countries. At the moment the pan-European scheme appears to be a potential option in the future once the current banking reforms (the three texts mentioned above) have been implemented and the other elements of the banking union are in place<sup>2</sup>.

It appears clear that deposit insurance and resolution fund are intended as separate functions but they could be combined in a single fund allowing for swift decision making. So a prospective European deposit insurance and resolution fund could be the best solution in order to stabilize the retail deposit base and resolve troubled cross-border banks<sup>3</sup>.

As suggested by Allen et al<sup>4</sup> the latter two functions can be combined within some kind of European equivalent of the FDIC. The EU would then get a European Deposit Insurance Fund with resolution powers. The fund would be fed through regular risk based deposit insurance premiums with a fiscal backstop of national governments based on a pre-committed burden sharing key.

<sup>2</sup> In fact, the new legislation stipulates that 5 years after its entry into force, the Commission will submit a report, and if appropriate, could put forward a new legislative proposal.

<sup>3</sup> Schoenmaker D., Gros D., A European Deposit Insurance and Resolution Fund, CEPS Working Document, n.386, May 2012.

<sup>4</sup> F. Allen, T. Beck, E. Carletti, P. Lane, D. Schoenmaker and W. Wagner, "Cross-Border Banking in Europe: Implications for Financial Stability and Macroeconomic Policies, CEPR Report, London 2011.

## 2.1 The main characteristics of the Directive 2014/49/EU

It is possible to analyze the main innovations introduced by the Directive 2014/49/EU by considering three main aspects:

- the degree of protection of deposits in the perspective of depositors;
- the financing requirements of the DGS in order to get the optimal fund size;
- the deposit insurance pricing for the banks.

As far as the protection of deposits, the Directive ensures that depositors will continue to benefit from a guaranteed coverage of 100.000 euro in case of bankruptcy backed by funds to be collected in advance from the banking sector.

In addition, access to the guaranteed amount will be easier and faster. Repayment deadlines will be gradually reduced from the current 20 working days to 7 working days in 2024. This reduction will be made in three phases :

- 15 working days as from 1<sup>st</sup> January 2019
- 10 working days as from 1<sup>st</sup> January 2021
- and eventually 7 working days as from 1<sup>st</sup> January 2024

While the DGS will remain responsible for all banks authorized in its jurisdiction, it will also act as a single point of contact and manage, on behalf of the home DGS, the claims of depositors of local branches of banks opened in other EU Member States.

Moreover the DGS will be in close contact with the supervisory authorities. DGS will be informed at an early stage by supervisory authorities if a bank failure becomes likely. The DGS will have a prompt access to information on deposits at any time: Banks will be required to tag eligible deposits, provide single customer views and maintain their records up to date. The verification of claims is to be simplified by abandoning time-consuming set-off procedures. If a bank fails, no application from depositors will be needed: the scheme will pay on its own initiative.

As far as the financing requirements, first of all, the DGS should have enough funds in place to ensure the safety of depositors' money. There were shortcomings in certain countries in the past. Even though it would economically not be feasible to provide DGS with an amount of money equivalent to all deposits, a new improvement ensures that banks will have to pay into the schemes on a regular basis (ex-ante) and not only during a bank failure (ex-post).

More importantly, for the first time since the introduction of DGSs in 1994, new financing requirements for DGS are stated in the Directive 2014/49/EU, which can be summarized in six main points:

1. In principle, the target funding level for ex-ante funds of DGS is 0.8% of covered deposits (i.e. about 55 billion euro) to be collected from banks over a 10-year period. This is a minimum level required by EU law and Member states can set a higher target level for their DGSs. Currently schemes in about half of the member states have already reached the above target level or are relatively close to it. In one third of member states, DGS funds are above 1% of covered deposits and in a few of them, they are even beyond 2% or 3%. On the other hand, the Directive stipulates that Member States, upon approval of the Commission may set a target level lower than the above one, but no lower than 0.5% of covered deposits. This is possible where, given the characteristics of the banking sector (e.g. concentration of most assets in a few banks) it is unlikely that banks will be liquidated (they would be rather resolved), which makes triggering the DGS less likely.

2. In addition to ex-ante contributions, if necessary, banks will have to pay additional (ex-post) contributions to a certain extent, which will be limited in order to avoid pro-cyclicality and worsening financial situation of healthy banks. If this is still insufficient, DGS will borrow from

each other up to a certain limit (on a voluntary basis) or – as a last resort – use additional funding sources, such as loans from public or private third parties (alternative funding arrangements).

3. The new financing requirements ensure the schemes have enough funds in place to deal with small and medium sized bank failures. Large banks will be subject to resolution according to the Bank Recovery and Resolution Directive (BRRD).

4. In principle, the available financial means of DGS should include, cash, deposits and low-risk assets, which can be liquidated within a short period of time. However, DGS funds may also consist of so called “payment commitments” of a bank towards a DGS which are fully collateralized providing that the collateral consists of low risk assets and the collateral is unencumbered by third party rights. The total share of payment commitments shall not exceed 30% of the total amount of available financial means of the DGS. In order to ensure consistent application of the Directive in Member States, the European Banking Authority (EBA) will issue guidelines on the irrevocable payments commitments.

5. In order to fulfill their obligations to reach the required targeting funding level, Member States may regard bank levies as equivalent to ex-ante funds. The term “bank levies” refers to e.g. the mandatory contributions paid by banks to the State budget for the purpose of covering the costs related to systemic risk, failure and resolution of institutions. However, “double counting” should be avoided, i.e. levies used for one purpose (BRRD) should not be counted for other purposes (e.g. to reach the target funding level required by the DGS Directive).

6. The available financial means of DGS must be invested in a low risky assets and in a sufficiently diversified manner.

Finally, as far as the pricing for the banks, it is relevant to consider the degree of risk incurred by the banks, members of a DGS.

In fact, very relevantly, the Directive stipulates that the contribution to DGS will be based, besides on the amount of covered deposits, also on the degree of risk incurred by the respective member. Without such risk adjusting, banks with the same amount of covered deposits would pay the same amount of contribution to DGS. If risk-adjusting is applied, those banks may pay different contributions (potentially to a larger extent), depending on whether their activity – measured by a set of specific indicators - is deemed more prudent or more risky. Theoretically, riskier banks imply a higher likelihood of failure and, in turn, the need to trigger DGS. Therefore, such banks should pay more contributions to DGS.

In order to ensure consistent application of the Directive in Member States, the European Banking Authority (EBA) will issue guidelines to specify methods for calculating the contribution to DGS. In particular, it will include a calculation formula, specific indicators, risk classes for members, thresholds for risk weights assigned to specific risk classes, and other necessary elements.

At the same time, DGS may use their own risk-based methods for determining and calculating the risk based contributions by their members. However, each method shall be approved by the competent authority in a given Member state, and the EBA must be informed about the methods approved. This sounds like a sort of Basel requirements properly adapted to DGSs.

As stipulated by the Directive, three years after its entry to force, and at least every 5 year afterwards, the EBA shall conduct a review of the guidelines on risk-based or alternative own-risk methods applied by DGS.

It is possible to easily notice that the Directive still leave some room to the discretion of individual DGS and, in particular, the theme of the bank risk measure becomes relevant considering that most EU DGS did not adjust premiums for risk across banks. Exceptions included Finland, France, Greece, Hungary, Italy, Portugal, Romania and Sweden.<sup>5</sup>

### **3. The Federal Deposit Insurance Corporation (FDIC) in the USA.**

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<sup>5</sup> IMF, Technical Note on Deposit Insurance, IMF Country Report N° 13/66, March 2013, p. 9.

The FDIC is a relevant example of a deposit insurer that carries out tasks well beyond the mere insurance function. Its mission is not only to protect deposits, but also to examine and supervise financial institutions for safety and soundness and consumer protection and manage receiverships. The FDIC therefore performs an active role in financial supervision and even bank resolution (Beck and Laeven, 2006).

It started its insurance activity in 1934 as an independent agency in response to the thousands of bank failures that occurred in the 1920s and early 1930s.

It is funded by premiums that banks and thrift institutions pay for deposit insurance coverage and from earnings on investments in U.S. Treasury securities.

After the financial crisis the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 has indeed given the FDIC more responsibility in bank examination and resolution processes, for instance by transferring receivership authority over failing institutions to the FDIC.

The FDIC directly examines and supervises more than 4,500 banks and savings banks for operational safety and soundness, more than half of the institutions in the US banking system. Banks can be chartered by the States or by the Federal Government. Banks chartered by States also have the choice of whether to join the Federal Reserve System. The FDIC is the primary federal regulator of banks that are chartered by the States that do not join the Federal Reserve System. In addition, the FDIC is the back-up supervisor for the remaining insured banks and thrift institutions.

Banks apply for insurance and FDIC agrees to insure those that present an acceptable level of risk. Insurance is provided according to well defined rules. The FDIC charges premium based upon the risk that the insured bank poses, and it inspects, or examine, banks to further manage that risk.

In its 80 year history FDCI has evolved from a relatively simple set of rules to a more sophisticated system where risk is explicitly taken into account in determining the appropriate size of the insurance fund and what premium banks pay.

In order to make a comparison between the main characteristics introduced by the European Directive and the operation of FDCI we focus the exam on the degree of protection of deposits in the perspective of depositors, on the financing requirements of the DGS and on the pricing for the banks.

As far as the degree of protection, the standard insurance amount is \$250,000 per depositor, per insured bank, for each account ownership category.

As far as the financing requirements, the fund is financed ex-ante by the banks. It must be said that the FDIC has always had an explicit ex-ante fund paid for by the banking industry to satisfy claims as they arise. It is given for sure that alternative arrangements, such as pay-as-you-go or ex-post assessments, increase the risk of costly delays and can undermine confidence in the banking system more generally.

In the US there has been a huge debate about the optimal fund size and the current fund management strategy remains underpinned to the set of a long-term reserve ratio goal (DRR = designated reserve ratio) of 2%, which was set in 2011. In moving toward this goal, the law requires the reserve ratio to reach the minimum requirement of 1.35 percent by 2020. Thereafter, the FDCI's plan is to systematically increase the fund toward the 2 percent target. At the end of 2013 the reserve ratio was only 0.63 percent<sup>6</sup>.

An important point to note about the 2 percent target is that it is viewed as a soft, rather than a hard target. There is an explicit plan to reduce rates to produce the long-term average rate when the reserve ratio reaches 1.15 percent. Once the reserve ratio reaches 2 percent, the plan provides for rates to be reduced gradually, but not to zero as the reserve ratio grows.

Finally, a related topic of that of optimal fund size is the deposit insurance pricing, i.e. - who should pay what to achieve the target fund size?

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<sup>6</sup> Ellis D., Deposit Insurance Funding: Assuring confidence, Federal Deposit Insurance Corporation Staff Paper, November 2013

On this issue, it is remarkable that from its foundation to 1991, Congress set premium rates and all banks paid the same rate. The result was that better run banks subsidized those banks with a much higher risk profile. However, as with the law governing insurance fund adequacy, the rules governing pricing also were modified in response to the banking crisis of the late 1980s to resemble those of private insurers more closely and to reduce this subsidy. In 1991, Congress required the FDIC to adopt a risk-based premium system which the FDIC did beginning in 1993.

The FDIC initial risk-based pricing system was simple and relied on two factors: supervisory ratings and capital ratios. In 2006 restrictions on the FDIC ability to assess premium when the fund exceeded a certain level were eliminated. With greater flexibility to price, separate methodologies were adopted for large and small banks and further metrics were incorporated into the system to provide for more granular directions in risk.

The procedure is different for small and large banks.

For smaller banks, the FDIC relied upon a rich data set of supervisory rating changes and statistical methods to identify financial ratios that are good predictors of supervisory rating downgrades. Shortly thereafter, a sixth financial ratio was added and, with other minor modifications, this remains the basis of the small bank-risk based pricing system today.

<b>Risk measure used to determine risk-based premium rates for banks with assets less than \$10 billion.</b>
Tier 1 leverage ratio
Loan pst due 30-89 days/gross assets
Nonperforming assets /gross assets
No loan charge-offs/gross assets
Net income before taxes/ risk weighted assets
Rapid asset growth funded by brokered deposits
Weighted average examination component ratings

Source: FDIC

The FDIC did not have the same rich data on supervisory rating changes for large banks. As a result, it initially adopted a system based upon capital levels, supervisory ratings and debt issuer ratings to reflect these views of relative risk. On the onset of the most recent crisis, this approach proved unsatisfactory as neither supervisory ratings nor debt issuer ratings adequately reflected the increasing differences in risk profiles among these banks.

Eventually, an entirely new scorecard approach was introduced to assess premiums for the largest banks. This approach more closely resembles those that large financial institutions use to evaluate the risk of their counterparties and is conceptually designed around the concepts of probability of failure and loss given failure. It contains about a dozen financial ratios that proved pre-crisis, to be useful predictor of a relative risk ranking post-crisis. The scorecard uses supervisory ratings and these financial ratios to determine a bank's ability to withstand asset and funding-related stress, and it combines these with a measure of the bank's loss severity in the event it does fail. The goal is to identify forward looking indicators that differentiate risk and suggest how large institutions will fare during periods of economic stress.

<b>Risk measure used to determine risk-based premium rates for banks with assets greater than \$10 billion.</b>
Tier 1 leverage ratio
Higher risk assets /Tier 1 capital and reserves
Level of, and growth in, risk concentrations
Core earnings /average assets
Past due assets / Tier 1 capital and reserves



Critized and classified assets/Tier 1 capital and reserves
Core deposits /total liabilities
Highly liquid assets /potential cash outflows
Projected loss given default/domestic deposits
Weighted average examination component ratings
<b>Additional risk measures for highly complex institutions</b>
Largest Counterparty Exposure /Tier 1 Capital & Reserves
Top 20 Counterparty Exposure /Tier 1 Capital & Reserves
Trading Revenue Volatility /Tier 1 Capital
Market risk Capital /Tier 1 Capital
Level 3 Trading Assets /Tier 1 Capital
Short Term Borrowing /Average Assets
<b>Additional adjustments for all large banks</b>
High reliance on brokered deposits (only applies to higher risk large institutions)
Reliance on long term unsecured debt

Source: FDIC

#### 4. Data and Methods

We build a new database to first examine whether the risk-based premiums in the deposit guarantee schemes affect the attitude of banks towards risk and whether the impact of bank size and bank stability are relevant in determining the main characteristics of a financial system and consequently the design of a deposit guarantee scheme. Moreover we examine whether the impact of deposit insurance on bank risk varies during pre-crisis (2006), crisis (2009) and post crisis years (2012). In fact, as it is mentioned above, deposit insurance may lead to moral hazard resulting in excessive bank risk taking, however it should also prevent bank runs and thus ensure investor confidence and systemic stability during crises.

To pursue our goals, we choose some balance sheets items of 5,198 European banks and 9,902 US banks in three years: 2006, 2009 and 2012. Data were taken from the Bankscope<sup>7</sup> database.

We look for some stability ratios used by the FDIC – with the constraint of data availability - and we choose the following indexes to investigate the stability of the banks in the three period mentioned:

- Impaired Loans / Equity %;
- Loan Loss Reserves / Impaired Loans %;
- Return On Average Equity (ROAE) %;
- Net Interest Margin %;
- Unreserved Impaired Loans / Equity %;
- Net Loans / Total Depositor Borrowings %;
- Equity / Customer and Short Term Funding %;
- Capital Funds / Total Assets %;
- Subordinated Debt / Capital Funds %;
- Tier 1 Ratio %.

To test the relationship between the bank risk, its stability and the use of risk-adjusted insurance premiums in the relative deposit guarantee scheme we use ordinary least squares (OLS) to estimate the following regression specification:

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<sup>7</sup> Bankscope is the Bureau Van Dijk database that combines widely-sourced data with flexible software for searching and analysing banks. Bankscope contains comprehensive information on banks across the globe.

(1)

where:

*RISK* = dummy variable that explain that the bank is located in a country characterized by risk-adjusted insurance premium mechanisms<sup>8</sup> (1 risk-adjusted insurance premiums, 0 flat insurance premiums);

*SUPERVISION* = supervision quality index, from 0 (low quality of supervision) to 5 (high quality of supervision)<sup>9</sup>;

*LISTED* = dummy variable that explain that the bank is listed (1 listed, 0 unlisted or delisted);

*EU* = dummy variable that explain that the bank is located in Europe (1 Europe, 0 US).

*BIG* = dummy variable that explain that the bank is characterized by total assets > 10 billion Euros (1 higher, 0 less);

*IL/E* = Impaired Loans / Equity %;

*LLR/IL* = Loan Loss Reserves / Impaired Loans %;

*ROAE* = Return On Average Equity (ROAE) %;

*NIM* = Net Interest Margin %;

*UIL/E* = Unreserved Impaired Loans / Equity %;

*NL/TDB* = Net Loans / Total Depositor Borrowings %;

*E/CST* = Equity / Customer and Short Term Funding %;

*CF/TA* = Capital Funds / Total Assets %;

*SD/CF* = Subordinated Debt / Capital Funds %;

*TIER1* = Tier 1 Ratio %.

The dependent variable is a measure of risk for bank *i* in period *t*. Specifically, it is given by the multiplication of the return on average assets (ROAA) and the ratio defined by equity / total assets (leverage). We consider the dependent variable is able to assess the riskiness of the bank because leverage impacts directly on bank performance (ROE). If the leverage increases, we have higher ROE but also more variability in the ROE itself. Consequently a greater variability of ROE means more business risk. The higher the leverage, the higher the business risk. The higher the leverage, the greater, for the same ROA, the bank's ability to increase the volume of assets, and the latter could be riskier.

On the contrary as regards the regressors, we use a dummy variable concerning the location of the bank in a country in which a risk adjusted insurance premium is adopted; 10 variables, which are the above mentioned stability ratios; the supervision quality index; while the last variables are the location in a European State, the quotation of shares in a financial market, the dimension of the bank.

Table 3 and Table 4 report the descriptive statistics of the variables analyzed respectively for European banks and US banks.

The correlation matrix for the variables analyzed is in Table 5. As we can see, data have no

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<sup>8</sup> There are seven countries in Europe that are characterized by the presence of risk-adjusted premiums in their deposit guarantee scheme. These countries are: Bulgaria; Finland; Hungary; Italy; Portugal; Romania; and Sweden. Also US are characterized by risk-adjusted premium mechanism. EU countries that do not use a risk-adjusted premium mechanism – and use a flat premium mechanism – are: Austria; Belgium; Croatia; Cyprus; Czech republic; Denmark; France; Germany; Netherlands; Greece; Estonia; Ireland; Latvia; Lithuania; Luxemburg; Malta; Poland; Slovak; Slovenia; Spain; and United Kingdom. Our database includes 10,917 banks in the US and in EU countries with risk-adjusted premiums, and 4,183 banks located in non-risk-adjusted premiums European countries.

<sup>9</sup> Definition and calculation methods for the supervision quality index are in appendix.

correlation problem.

**Table 3: Descriptive statistics for European banks.**

	<i>Media</i>	<i>Median</i>	<i>Max</i>	<i>Min</i>	<i>First quartile</i>	<i>Third quartile</i>	<i>No obs</i>
<i>Y</i>	13,87	6,03	8.363,87	-3.609,86	0,00	11,83	29.706
<i>RISK</i>	1,00	1,00	1,00	1,00	1,00	1,00	29.706
<i>SUPERVISION</i>	2,00	2,00	2,00	2,00	2,00	2,00	29.706
<i>LISTED</i>	0,08	0,00	1,00	0,00	0,00	0,00	29.706
<i>BIG</i>	0,02	0,00	1,00	0,00	0,00	0,00	29.706
<i>IL/E</i>	18,76	6,35	979,55	0,00	1,14	18,42	23.937
<i>LLR/IL</i>	158,49	82,37	998,84	0,00	43,40	188,89	18.957
<i>ROAE</i>	5,69	7,40	528,71	-840,16	2,95	12,01	24.337
<i>NIM</i>	3,89	3,89	226,53	-486,86	3,35	4,44	24.290
<i>UIL/E</i>	24,80	9,46	966,30	0,00	3,26	22,86	11.106
<i>NL/TDB</i>	71,48	73,68	908,41	0,00	61,04	83,82	23.979
<i>E/CST</i>	15,85	11,72	988,51	-42,06	9,85	14,61	24.103
<i>CF/TA</i>	12,28	10,23	100,00	-68,43	8,78	12,49	23.918
<i>SD/CF</i>	1,27	0,00	380,52	-470,24	0,00	0,00	23.746
<i>TIER1</i>	20,00	14,02	770,42	-17,11	11,40	18,66	23.704

*Source: our elaborations on Bankscope data.*

**Table 4: Descriptive statistics for US banks.**

	<i>Media</i>	<i>Median</i>	<i>Max</i>	<i>Min</i>	<i>First quartile</i>	<i>Third quartile</i>	<i>No obs</i>
<i>Y</i>	21,28	1,67	39686,82	-33015,96	0,00	5,65	15.594
<i>RISK</i>	0,19	0,00	1,00	0,00	0,00	0,00	15.594
<i>SUPERVISION</i>	2,09	2,00	3,00	1,00	2,00	2,00	15.594
<i>LISTED</i>	0,06	0,00	1,00	0,00	0,00	0,00	15.594
<i>BIG</i>	0,10	0,00	1,00	0,00	0,00	0,00	15.594
<i>IL/E</i>	52,46	33,85	888,76	0,00	14,71	62,66	4.761
<i>LLR/IL</i>	59,35	46,35	998,70	0,00	33,33	64,47	4.646
<i>ROAE</i>	5,85	4,64	924,56	-832,90	2,19	8,80	12.846
<i>NIM</i>	2,60	2,43	812,50	-780,00	1,61	2,90	12.684
<i>UIL/E</i>	31,78	18,42	992,76	0,00	7,56	38,35	4.337
<i>NL/TDB</i>	67,68	68,57	992,20	0,00	53,57	81,78	10.450
<i>E/CST</i>	24,07	9,46	997,09	-500,00	6,75	15,61	12.141
<i>CF/TA</i>	10,49	7,81	100,00	-23,54	6,25	10,20	8.129
<i>SD/CF</i>	13,20	8,68	238,38	-165,42	0,00	22,17	6.980
<i>TIER1</i>	15,54	12,70	490,00	-16,47	10,00	16,73	4.738

Source: our elaborations on Bankscope data.

**Table 5: Correlation matrix**

<i>Y</i>	<i>RISK</i>	<i>SUPERVISION</i>	<i>EU LISTED</i>	<i>BIG</i>	<i>IL/E</i>	<i>LLR/IL</i>	<i>ROAE</i>	<i>NIM</i>	<i>UIL/E</i>	<i>NL/TDB</i>	<i>E/CST</i>	<i>CF/TA</i>	<i>S D / C F</i>	<i>TIER1</i>	
1	-0,0070	0,0148	0,0102	0,0200	-0,0030	0,0490	0,0954	0,1599	0,0501	-0,0530	0,0162	0,0593	0,3323	0,2745	<i>Y</i>
	1	-0,1872	-0,8540	0,0424	-0,152	0,1450	0,1520	0,0000	0,0559	-0,0110	0,0953	-0,0590	0,0725	0,0478	<i>RISK</i>
		1	0,1655	0,0053	0,0883	0,0778	-0,023	0,0094	-0,0220	0,0172	0,0099	0,0404	0,0123	-0,0030	<i>SUPERVISION</i>
			1	-0,0502	0,1665	0,2335	-0,226	0,0031	-0,0580	0,0559	-0,0617	0,0727	-0,0740	-0,0520	<i>EU</i>
				1	0,1188	0,0514	-0,028	-0,0240	-0,0030	0,0261	0,0332	0,0345	0,0095	-0,0410	<i>LISTED</i>

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1	0,068	-0,053	0,0418	-0,0390	0,0109	-0,0351	0,0125	-0,0540	3	-0,0440	BIG
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1	-0,265	-0,5030	-0,0460	0,9559	0,0607		-0,0570	-0,1490	5	-0,1050	IL/E
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1	0,6763	0	0,6299
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		0	
		1	0,8231
		0	<i>CF/TA</i>
		9	
		5	
		1	-0,0680
			<i>SD/CF</i>
			1
			<i>TIER1</i>

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*Source: our elaboration on Bankscope data.*

## 5. Results

We build a database to examine whether the risk-based premiums in the deposit guarantee schemes affect the attitude of banks towards risk and whether the impact of bank size and bank stability are relevant in determining the main characteristics of a financial system and consequently the design of a deposit guarantee scheme, during pre-crisis (2006), crisis (2009) and post crisis years (2012). We choose some balance sheets items of 5,198 European banks and 9,902 US banks.

We adopt a Student's T test and we use an OLS regression model to estimate the relationship between the bank risk (the multiplication of the ROAA and the leverage) and the presence of risk-adjusted insurance premium mechanisms, the supervision quality index, the bank is or not listed in a financial market, the location in Europe, the dimension of the bank and ten stability ratios.

Table 6 includes the Students' T test for equality in mean for European and US banks. Results indicate that the difference of European and US banks are statistically significant for nearly all regressors, with a p-value less than 0,00001.

**Table 6: Student's T test between European and US banks.**

<i>Variable</i>	<i>P-value</i>
<i>Y</i>	<0,00001***
<i>RISK</i>	<0,00001***
<i>SUPERVISION</i>	<0,00001***
<i>EU</i>	<0,00001***
<i>LISTED</i>	0,0001***
<i>BIG</i>	n.a.
<i>IL/E</i>	<0,00001***
<i>LLR/IL</i>	<0,00001***
<i>ROAE</i>	<0,00001***
<i>NIM</i>	<0,00001***
<i>UIL/E</i>	<0,00001***
<i>NL/TDB</i>	0,5794
<i>E/CST</i>	<0,00001***
<i>CF/TA</i>	<0,00001***
<i>SD/CF</i>	<0,00001***
<i>TIER1</i>	<0,00001***

*Source: our elaborations on Bankscope data.*

\* *Significant at the 10% confidence level.*

\*\* *Significant at the 5% confidence level.*

\*\*\* *Significant at the 1% confidence level.*

Table 7 reports the results from OLS model (1). The results of the regressions are shown in Table 4. From the regression analysis it is possible to see that some coefficients show negative values: *RISK* (-4.80736, p-value <0,00001\*\*\*), *SUPERVISION* (-1,84774, p-value 0,05770\*), *EU* (-4,73869, p-value <0,00001\*\*\*), *LISTED* (-1,10381, p-value 0,04626\*\*), *UIL/E* (-0,07178, p-value <0,00001\*\*\*) and *NL/TDB* (-0,02467, p-value <0,00001\*\*\*). Firstly, this means that banks located in countries adopting a risk-adjusted mechanism are characterized by less bank risk. Moreover, bank risk decreases with an increase in the country's supervision quality index. European banks are riskier than US banks, while listed banks have less bank risk than unlisted and delisted banks. Analyzing the Unreserved Impaired Loans on Equity ratio and the Net Loans on Total Depositor Borrowings ratio, results say that when this stability ratios increase, the stability of the bank increases and generalizing the stability of the financial system increases as well.

On the contrary, the coefficients shows a positive sign for the following ratios: *IL/E* (0,12023, p-value <0,00001\*\*\*), *LLR/IL* (0,04832, p-value <0,00001\*\*\*), *E/CST* (0,12060, p-value 0,04365\*\*), *ROAE* (0,59721, p-value <0,00001\*\*\*) and *NIM* (1,53160, p-value <0,00001\*\*\*).

The impact of the first three ratios on the business risk of the bank is different: when these ratios



increase, the stability of the bank increase as well but also the business risk of the bank increases. If the bank needs to maintain, for example for regulatory purposes, these ratios above certain thresholds, the stability of the bank is maintained but the bank riskiness increases. From the other side, the positive coefficients exhibited by *ROAE* and *NIM* means that the bank risk increase with the enhancement of the profitability.

The following regressors do not present significant values: *CF/TA*, *SD/CF*, *TIER1* and *BIG*.

**Table 7: OLS regression model.**

	<i>Coefficient</i>	<i>p-value</i>
<i>RISK</i>	-4,80736	<0,00001***
<i>SUPERVISION</i>	-1,84774	0,05770*
<i>EU</i>	-4,73869	<0,00001***
<i>LISTED</i>	-1,10381	0,04626**
<i>BIG</i>	0,92786	0,20327
<i>IL/E</i>	0,12023	<0,00001***
<i>LLR/IL</i>	0,04832	<0,00001***
<i>ROAE</i>	0,59721	<0,00001***
<i>NIM</i>	1,53160	<0,00001***
<i>UIL/E</i>	-0,07178	0,04756**
<i>NL/TDB</i>	-0,02467	0,05318*
<i>E/CST</i>	0,12060	0,04365**
<i>CF/TA</i>	0,29668	0,12832
<i>SD/CF</i>	0,04113	0,24343
<i>TIER1</i>	0,14235	0,20940
<i>Constant</i>	-4,49089	0,10609

*Source: our elaboration on Bankscope data.*

\* *Significant at the 10% confidence level.*

\*\* *Significant at the 5% confidence level.*

\*\*\* *Significant at the 1% confidence level.*

## Conclusions

The new European Directive concerning the deposit guarantee schemes has stated two relevant characteristics: the pre-funding of the schemes and the risk-adjusted insurance premiums charged to banks. The ex-ante funding is considered reassuring to depositors and taxpayers, thereby promoting confidence and enhancing financial stability. Also prefunding for future losses is a fairer method to cover depositor losses when they occur. With a pay-as-you-go or ex-post system, survivors pays the costs generated by those that fall, which does not restrain moral hazard, but promotes it. It also allows the deposit insurer to smooth the cost of deposit insurance over time. In general banks prefer steady, predictable premiums rather than rates that fluctuate and increase sharply in times of economic stress when banks can least afford it.

As regards risk-adjusted insurance premiums, the issue concerns the impact of deposit guarantee funds on bank risk and stability. In fact, while deposit guarantee schemes are aimed at ensuring depositor confidence and to prevent bank runs, it comes with an unintended consequence of encouraging banks to take on excessive risks.

By looking at the US experience, we can learn that also the FDIC wished to manage a fund that is sufficient at all times to pay depositors claims. In particular, the FDIC worked to charge steady premiums and avoid raising rates in bad times, when banks most need resources to lend and promote economic growth. Moreover, as a general matter, the DGS usually should not want to hold funds that are not needed and that could be better used by banks for lending.

Finally, in order to test the relationship between the bank risk, bank stability and the use of risk-adjusted insurance premiums in the relative deposit guarantee scheme, we use an OLS model. The banks located in countries where risk-adjusted insurance premiums are charged show smaller level of bank risk. Moreover, bank risk decreases with an increase in the country's supervision quality index. European banks are riskier than US banks, while listed banks have less bank risk than unlisted and delisted banks. Analyzing stability ratios, we found different results. For some measures of stability, we found that when the ratios increase, the stability of the bank increases and generalizing the stability of the financial system increases as well, while for other ones, when these ratios increase, the stability of the bank increase as well but also the risk of the bank increases. If the bank needs to maintain, for example for regulatory purposes, these ratios above certain thresholds, the stability of the bank is maintained but the bank riskiness increases.

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## Appendix

The supervision quality index has been made by analyzing data from the Bank regulation and Supervision database of the World Bank (2007). We selected 48 questions for the quality of the supervision. For each country analyzed, we create an index from 0 (no quality of supervision) to 5 (maximum quality of supervision) from the ratio between the number of positive answers to the number of total answers.

**Table A: Questions for the calculation of the supervision quality index.**

<i>Question</i>	“Yes”	“No”
Are banks allowed to hold reserves in foreign denominated currencies or other foreign denominated instruments?	14	15
Are banks limited in their lending to single or related borrowers?	29	0
Are banks limited in their sectoral concentration?	4	25
Are banks prohibited from making loans abroad?	1	28
Are banks required to hold either liquidity reserves or any deposits at the Central Bank?	28	0
Are banks required to hold reserves in foreign denominated currencies or other foreign denominated instruments?	3	26
Are banks required to meet geographical diversification requirements (by region within the country, or some minimum international diversification)?	1	28
Are interbank deposits covered?	0	27
Are premia collected regularly (ex ante)?	22	6
Are there explicit, verifiable, and quantifiable guidelines regarding asset diversification?	12	17
Are there mandatory actions that the supervisor must take in these cases?	18	10
Can individual supervisory staff be held personally liable for damages to a bank caused by their actions or omissions committed in the good faith exercise of their duties?	4	25
Can the deposit insurance agency/fund take legal action for violations against laws, regulations, and bylaws against bank directors or other bank officials?	11	15
Can the head of the supervisory agency can be removed	6	23
Can the supervisory agency be held liable for damages to a bank caused by its actions?	20	8
Do deposit insurance fees charged to banks vary based on some assessment of risk?	7	21
Do these reserves earn any interest?	24	2
Does the deposit insurance authority by itself have the legal power to cancel or revoke deposit insurance for any participating bank?	6	22
Does the deposit insurance authority make the decision to intervene a bank?	5	23
Does the deposit insurance scheme also cover foreign currency deposits?	26	2
Does the head of the supervisory agency (and other directors) have a fixed term?	26	3
Does the minimum ratio vary as a function of an individual bank's credit risk?	9	20
Does the minimum ratio vary as a function of market risk?	9	19
Does the minimum ratio vary as a function of operational risk?	2	24
Has the deposit insurance agency/fund ever taken legal action for violations against laws, regulations, and bylaws (of the deposit insurance agency) against bank directors or other bank officials?	5	22
How is the head of the supervisory agency (and other directors) appointed?	11	17
How many exceptions were granted last year?	0	12

If a customer has multiple loans and one loan is classified as non-performing, are the other loans automatically classified as non-performing?	13	15
If an infraction of any prudential regulation is found in the course of supervision, must it be reported?	26	0
If yes, which variant are you planning on adopting:	28	0
Is participation in the deposit insurance system compulsory for all banks?	28	0
Is subordinated debt allowable as part of regulatory capital?	29	0
Is subordinated debt required as part of regulatory capital?	2	27
Is there a formal definition of a "nonperforming loan" ?	19	10
Is there a limit per person?	27	1
Is there a simple leverage ratio that is required?	2	23
Is there a single financial supervisory agency for all of the activities in which commercial banks are allowed to do business?	20	9
Is there a single financial supervisory agency for all of the main financial institutions?	12	17
Is there an explicit deposit insurance protection system?	29	0
Is there formal coinsurance, that is, are depositors explicitly insured for less than 100% of their deposits?	11	17
Is this ratio risk weighted in line with the 1988 Basle guidelines?	29	0
Is your country planning on adopting Basel II	29	0
The primary system for loan classification is based on the number of days a loan is in arrears?	13	15
To whom are the supervisory bodies responsible or accountable?	3	26
Unrealized foreign exchange losses?	15	14
Unrealized losses in securities portfolios?	20	9
Were any deposits not explicitly covered by deposit insurance at the time of the failure compensated when the bank failed (excluding funds later paid out in liquidation procedures)?	5	18
Were insured depositors wholly compensated (to the extent of legal protection) the last time a bank failed?	18	6
<b>TOTAL</b>	<b>681</b>	<b>647</b>

*Source: Bank regulation and Supervision, World Bank, 2007.*