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Deposit Insurance and Banks' Deposit Rates: Evidence from the 2009 EU Policy

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Deposit Insurance and Banks' Deposit Rates: Evidence from the 2009 EU Policy

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Abstract
In early 2009 the EU increased the minimum deposit insurance limit from €20,000 to €100,000 per bank account. Italy was the only country with a limit already set to €103,291 from 1994. To evaluate the impact of the new directive we run a diff-in-diff analysis and compare the bank-size weighted average deposit interest rates of the Eurozone countries with the Italian ones. We find that the increase of deposit insurance leads to a decrease of deposit rates in European countries relative to Italy between 0.3 and 0.7 percentage points. The drop in deposit rates is confirmed by a diff-in-diff analysis run at bank level after implementing a propensity score matching of Italian banks with European ones. We finally show that this effect mainly come from riskier banks confirming that deposit insurance negatively affects deposit rates by reducing the depositors' required risk-premium.

Keywords: Deposit Insurance, Bank Deposit Rates, Policy Evaluation

JEL Classification: G21, G28

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1 Introduction

In a attempt of preventing further escalation of the recent financial crisis, governments increased national deposit insurance limits in order to protect the stability of their national banking systems. In October 2008, the U.S. government temporally increased the deposit insurance coverage from $\$100,000$ to $\$250,000$, while in July 2010 the coverage was permanently extended to the new limit. Similarly, the European Union raised the deposit insurance limit from €$20,000$ to €$100,000$ in March 2009. The convergence to a common deposit insurance limit also represented a first step towards the creation of a common regulatory environment within the European Banking union.

The observed increases in deposit insurance limits are consistent with the theoretical foundation of an explicit deposit insurance as a limit to financial instability and, in particular, to avoid bank runs (Diamond and Dybvig, 1983). In fact, as deposits are demandable upon request, deposit insurance protects depositors, in part or in full, against banks' inability to pay them back. As banks are mainly financed by deposits - about 60% of total assets in Europe and the U.S. - and they play a vital role for the real economy, increasing deposits' safety was crucial to reduce liquidity risks in distressed financial markets.

In the aftermath of the financial crisis, as governments are facing the task of redesigning optimal deposit insurance policies, regulators urge the need of having a comprehensive understanding of the potential benefits and costs associated to a higher deposit insurance limit. The increase in the deposit insurance schemes may not only impact on the financial stability of a country, but it can also affect the supply and demand of deposits and, consequently, the equilibrium interest rate (Davila and Goldstein, 2015; Cooper and Ross, 2002). While there is a long-standing debate in the theoretical literature about the impact of deposit insurance on bank deposit rates, in absence of a valid experimental setting, the empirical literature has been mainly silent on this topic. This paper fills this gap in the literature.

In this paper we empirically evaluate the effect of the March 2009 European policy on banks' deposit rates. In particular we exploit a unique feature of the European policy: Italian banks were already subject to a national deposit insurance limit of €$103,291$ when the EU increased it to €$100,000$ in 2009; the Italian deposit insurance limit was established in 1994, well before the new European regime. Italian banks have been consequently unaffected by the new EU policy. For this reason we employ a difference-in-differences (diff-in-diff) strategy by comparing banks operating in the Eurozone with the Italian ones. We argue that the empirical results offer a meaningful estimate of the causal effect of the increase of deposit insurance on banks' deposit rates and deposit amounts.

We consider bank-level data provided by Bankscope (Bureau Van Dijk); banks are selected as follows. In the treatment group we consider banks operating in the European countries that jointly satisfy the following criteria: 1) they have been part of the Eurozone since the introduction of the euro as a single currency in January 2002; 2) they experienced an increase in deposit insurance limits between 30th, September 2008 and 30th, June 2009, and no other additional increase in the following years. The rationale for criterion 1) is that, given that we add time fixed effects in all our regressions, we choose to select all countries that are subject to the same monetary authority. The rationale for criterion 2) relates to our choice of considering only the two years successive to the policy (2009 and 2010) as post-treatment years because we want to reduce the risk of confounding policy changes or other exogenous events at country level in the post-treatment years. The control group is represented by the banks that operate in Italy. Italian banks represent a valid control group not only because they have been unaffected by the 2009/14/EC Directive, but also because, as documented in Laeven and Valencia (2010), Italian government did not put in place any specific policy response in the aftermath of the 2008 financial crisis; furthermore, up to the 2011 sovereign debt crisis,[1] the Italian government did not intervene with any kind of extraordinary actions to directly assist its banks through capital injections or asset guarantee.

We first estimate the impact of an increase in deposit insurance limit in a diff-in-diff, where observations are weighted by individual bank size - measured by the amount of total assets. We consider as dependent variable both the average interest rate expenses divided by total deposits, as well as the logarithm of the sum of total customers' deposits. By weighting each observation by each bank's total assets and including time and country fixed effects, we interpret our results

[1]To all practical concerns, the 2011 sovereign debt crisis was unexpected at the end of 2010 as the historical series of the Italian government bond yield clearly shows. To avoid the confounding effects of the sovereign debt crisis in our setting, we decided to stop our empirical investigation in 2010.

as the macroeconomic impact that the policy. We find an average decrease in banks' deposit interest rates between of about 0.3 percentage points in treated countries relative to Italy and a relative increase in the total amount of bank deposits.

To dig into our findings, we also estimate an unweighted diff-in-diff regression where the unit of observation is at the bank level. This strategy allows us to include bank fixed effects in the regression analysis, together with time fixed effects. Given that the sample of banks in treated and control groups is heterogenous along different dimensions, we look for a sample of banks operating in treated countries which is directly comparable to banks operating in Italy. To this purpose, we use a propensity score matching to identify banks, within the treated countries, that are comparable in terms of ex-ante observable characteristics to banks operating in Italy. The results from the diff-in-diff estimation performed on the matched sample confirms a negative and sizeable impact of the policy on banks' deposit rates of about 0.7 percentage points.

To further investigate the economic mechanism behind this finding, we exploit heterogeneities at the bank level. In particular, we find that the results on deposit rates are mostly driven by relatively riskier financial institutions. Our empirical results suggest that an increase in deposit insurance coverage negatively impacts on equilibrium prices (deposit interest rates) and does have either a positive or zero impact on equilibrium quantities (amount of deposits). Given that equilibrium movements are the results of changes in both demand and supply of deposits, we conclude that the dominating effect is an increase in the supply of deposits at riskier banks and a reduction in the demand of deposits by those banks. We rationalize this conclusion by referring to the predictions of the related theoretical literature.

On the supply side, following an increase in deposit insurance limit, depositors increase deposit supply as they are willing to accept a lower interest rate for a given amount of deposits; in the absence of a direct impact of deposit insurance on banks' risk-taking due to banks' moral-hazard incentives, the increase in deposit insurance limit should result in a lower deposit risk premium asked by depositors (Bartholdy *et al.*, 2003).

On the demand side, banks may either reduce or increase the deposit rate for a given level of deposit amounts, depending on the set of assumptions regarding their incentives to take risk.

We distinguish two sets of predictions in the literature. On one side, grounding their work on the seminal paper by Diamond and Dybvig (1983), Cooper and Ross (2002) study optimal deposit insurance limits in a setting where banks provide insurance to depositors by offering them deposit contracts. As liquidity shocks faced by depositors are private information, late depositors can mimic the early ones and trigger a bank run. Cooper and Ross (2002) find that, as deposit insurance limit increases, depositors' monitoring efforts on banks decrease. As a consequence, in presence of moral hazard, banks increase the riskiness of their investments and increase their demand of deposits. Moreover, Matutes and Vives (2000) develop a model of banking competition based on Diamond's delegated monitoring model (Diamond, 1984) and find that an increase in deposit insurance limits leads to an increase in the elasticity of depositors' supply, raising banks' competition on the deposit market and consequently leading banks to pay higher deposit rate for a given amount of deposits. On the other side, if ex-ante deposit insurance premia are taken into account, larger deposit insurance coverage decrease banks' returns as less funds can be profitably invested. Being the premia higher the higher the level of deposit insurance, banks can pass through these costs to depositors and offer lower deposit rates per unit of deposits.

As highlighted by Cooper and Ross (2002), the overall effect of the increase in deposit insurance limit on banks' demand for deposits crucially depends on how it affects banks' risk-taking. Using our selected matched sample, we study how bank's risk responds to the increase in deposit insurance limit in 2009. We find that treated banks did not show a significant difference in the Z-score relative to control banks, although we observe an increase in the ratio of Non-Performing Loans over Total Assets after 2009. At the same time we find an increase in bank equity capitalisation, although not significant. Taken together, these results suggest that there is not a substantial change in individual banks' risk in response to the increase of the deposit insurance limit. This result is consistent with the recent evidence provided by Anginer *et al.* (2014) who finds that the risk-taking effect of deposit insurance is dominated by its stabilisation effect in turbulent times.

While contributing to the debate about the impact of deposit insurance on bank's deposits demand and supply, our paper also complement recent empirical literature that focuses on the impact of deposit insurance on financial stability. Demirguc-Kunt and Detragiache (2002) show that countries with an explicit deposit insurance system are associated with greater likelihood of a financial crisis, the more so where banks' interest rates have been deregulated. Dewenter *et al.* (2018) instead show that, even in presence of relatively homogenous banks, in countries with weaker legal institutions, increases in deposit insurance limits have large effects on banks' risk. Our focus on the Eurozone naturally refers to a set of countries with relatively stronger institutions; as a consequence we expect the effect on risk to be smaller. More recently, within-country studies, find a positive impact of deposit insurance on banks' risk: Lambert *et al.* (2017) in the USA and Chernykh and Cole (2011) in Russia.

Finally, our paper contributes to the recent empirical evidence that depositors typically react to changes in deposit insurance limits (Iyer *et al.*, 2017) and to changes in deposit insurance credibility (Bonfim and Santos, 2018; Peia and Vranceanu, 2017).

The rest of the paper is organized as follows: section 2 provides a description of the empirical setting and of the data; section 3 reports the results from the cross-country level analysis; section 4 illustrates the results from our bank-level analysis. Section 5 concludes.

2 Institutional Setting and Data

2.1 The 2009/14/EC Directive

The European directive 94/19/EC signed on May 30th, 1994 addressed the need for a common set of rules for credit institutions by ensuring an harmonized minimum level of deposit insurance on deposits located within the EU. Article 7 required all member states to build a deposit guarantee scheme able to cover up to at least €$20,000$ per depositor in case an insured bank should not be able to cover its customer deposits. [2] The €$20,000$ limit introduced by the 94/19/EC directive represented a first step towards the integration of European financial regulation, leaving at the same time member countries with some level of discretion. The €$20,000$ limit constituted a floor above which countries could and did impose higher deposit insurance limits when financial market instability occurred.

[2] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31994L0019:EN:HTML.

As a response to the great instability triggered by the outburst of the financial crisis, this floor was then raised on March 11th, 2009 to €$100,000$ by the 2009/14/EC directive, which aimed at enhancing depositors' protection and at preventing liquidity issues from reinforcing banking instability. At the same time, the new directive encouraged the harmonization of the different levels of insurance limits across Europe in view of the creation of the upcoming European banking Union and of the related European deposit insurance scheme.

The actual convergence towards €$100,000$ started a couple of months before the implementation of the 2009/14/EC directive. Between the fourth quarter of 2008 and the first quarter of 2011 most European governments raised the limit of their deposit insurance coverage to €$100,000$ from the previous level of coverage. This increase in deposit insurance limit was not uniform across countries, but varied in intensity and timing, ranging from €0 for Italy, to €$100,000$ in case of Luxembourg.

The uniqueness of the European case lies in the heterogeneity of the increase in insurance limits among otherwise similar European countries. European countries belonging to the Eurozone benefited from a common currency and integrated markets for goods and services, but not from a common banking union. The European Banking Union has been, in fact, only recently introduced and will be completed by 2024, when all European banks will benefit from a common European Deposit Insurance System (EDIS).

As not all European countries experienced a contextual increase in deposit insurance limit, nor were all part of the Euro area, we restricted our sample to a subset of more homogeneous countries. We selected European countries that satisfied all the following two criteria: 1) they have been part of the Euro area since the introduction of the euro as a single currency in January 2002; 2) they experienced an increase in deposit insurance limits between 30th, September 2008 and 30th, June 2009, and no other additional increase in the following years. This selection strategy allow us to compare banks that operate in countries that are ex-ante very similar one to another before the increase in deposit insurance limit. Table 1 shows those countries that satisfy all of the two conditions and their different levels of deposit insurance limits in 2008.[3]

[3]In our sample, we do not have information on deposit interest rates for banks operating in Finland and Luxembourg; this is why, although these countries have been part of the Eurozone since the introduction of the euro as a single currency, banks operating in these countries are not part of the sample analysed in this paper.

Insert Table 1 here

Data on deposit insurance limits and their evolution through time have been collected from different sources. The main data reference on this point has been a database assembled by Demirguc-Kunt *et al.* (2014). Yet, the database did not provide the exact date of when a deposit insurance limit changed in time and we then verify the information by using data available from different national deposit insurers in order to obtain the exact date and amount of change.

2.2 Data Sources

We use data from Bankscope, a Bureau Van Dijk (BVD) dataset that contains yearly bank-level information with a global coverage. Bankscope collects balance sheet information from Fitch and provides summary reports, peer analysis and aggregated data reports. We focus on bank-level data for all banks that were active between 2006 and 2010 from the EU countries listed in Table 1. We downloaded annual data instead of quarterly data as the number of banks reporting quarterly data is significantly smaller and less representative of each national banking system than the number of those reporting annual data. We then restrict our sample by keeping banks with a consolidation code equal to C1, U1 or C2 and not including banks with consolidation code equal to U2. Codes C1 and C2 identify banks that report the statement of a mother bank integrating the statements of its controlled subsidiaries or branches with no unconsolidated companion or with an unconsolidated companion, respectively. Banks with classification code equal to U1 identify banks statement not integrating the statements of the possible controlled subsidiaries or branches of the concerned bank with no consolidated companion.

We further restrict our sample by considering only banks which, as core business, raise deposits and perform credit intermediation. We proceed in two steps. We first restrict our sample on banks that are labelled either as Bank holding companies, Commercial banks, cooperative banks or saving banks in peer group classification. We then screened manually the selected ones by looking at banks' primary business lines and we drop the financial institutions whose main focus is on different activities such as credit factoring and leasing.

We complement the bank-level information from Bankscope with some country-level data publicly available from the OECD database such as GDP growth, unemployment rate and public debt over GDP.

Finally, we also add information on the level of covered deposits as a fraction of those deposits that are eligible of deposit insurance. We refer to this ratio as the Covered-to-Eligible (CtE) ratio, defined as the amount of covered deposits within one country over the total amount of eligible deposits: $CtE = \frac{\text{Covered Deposits}}{\text{Eligible Deposits}}$. The greater is its value, the greater is the amount of deposits that are covered by deposit insurance. The CtE ratio provides information on how much a country's banking system is prone to a change in deposit insurance limit: a low CtE ratio means that the amount of uncovered deposits is high and that a small change in the deposit insurance limit could turn uncovered deposits into covered ones. In other words, the lower is the CtE ratio, the greater is the amount of deposits that becomes covered after the change. As European banks are not enforced to provide this information, we could only obtain estimates from a European Commission report by Uboldi and Cariboni (2008) on a country-level basis. These estimates are based on a survey forwarded by the European Commission to all European Member states in 2005.

Table 2 displays summary statistics on some key variables at country level, for the European countries that witnessed an increase in deposit insurance limit after the 2009/14/EC Directive (treatment) and Italy (control).

Insert Table 2 here

The statistics for the treatment group are computed as the mean over the ten countries in the pre-treatment years 2006-2008. The control group's statistics are instead based on the mean over the same three years for Italy. The average deposit rate is measured by the average interest expenses per unit of deposit of each bank weighted by bank's total assets within each country-year. The average deposit rate in Italy is significantly lower than the European countries possibly reflecting the difference in deposit insurance regime. The Growth rate of Total Deposit is measured as annual average growth rate in the total amount of bank deposits aggregated by country. While Italian average deposit rates are lower than other countries' before the policy is implemented, there is no difference in the growth rate of total deposits. Similarly there is no difference in the growth rate of GDP and in the average unemployment rate, suggesting that, in the pre-policy period, the countries in our sample were experiencing similar macroeconomic trends. Italian public debt over GDP is higher than the average European one. For this reason we restrict our analysis to the years 2006-2010, before the 2011 sovereign debt crisis affected some European countries such as Italy.

The CtE ratio is larger in Italy than in the other European countries, suggesting that the amount of deposits below the limit threshold in Italy is larger than the amount of covered deposits in the rest of Europe. This finding is consistent with a higher deposit insurance limit in Italy than in other countries, as more eligible deposits are indeed covered by insurance and suggests that the 2009/14/EC Directive actually increased the insurance coverage in Euro-area countries. Finally, the Italian banking sector is slightly more competitive than the rest of Euro-area countries under analysis: the average ratio of deposits held by top 25 depositary institutions (ranked by the average total assets in the years 2006-2008) is about 10 percentage points lower that others, suggesting a lower concentration in the deposits' market.

Insert Figure 1 here

Figure 1 shows the time variation in weighted deposit rate (top panel) and total deposits (bottom panel) for the two groups. The top panel in Figure 1 shows that Italian deposit rates (the scale is on the right x-axis) are significantly smaller than the European ones (left x-axis); while we observe a strong co-movement between the two series, between 2008 and 2009 we observe a larger drop of deposit rates of European countries relative to Italy. The bottom panel shows instead the evolution of total deposits for treated and control countries. While Italy represents a higher level of deposits (right x-axis), it also shows a more stable behavior in the years 2009 and 2010 relative to the other group of countries which show an increase.

In the next section, we will estimate the impact of the increase in deposit insurance on the weighted deposit interest rate and banks' deposits at the country level in a diff-in-diff analysis; the country fixed effects will allow to de-mean the dependent variables and to exploit the within-country variation over time. The time fixed effects will, instead, allow to clean the variables for the determinants of co-movement.

3 Country-Level Analysis

In this section we provide the preliminary cross-country evidence using bank-level data. As treatment occurs at the country level, we first run a cross country analysis, weighting bank-level data by bank's total assets within each country and imposing country's fixed effects. The assumption for the validity of our analysis is that Italian banks, being the only banks in the Eurozone that did not experience an increase in deposit insurance in 2009, provides a valid counterfactual for the trends of the other European banks' outcome variables absent the treatment. To study the causal impact of the EU directive in a diff-in-diff setting we estimate the following equation:

$$y_{ict} = \gamma_c + \lambda_t + \delta(T_c \cdot post_t) + \epsilon_{ict} \tag{1}$$

where y_{ict} is the outcome variable of interest for bank i at date t in country c. We consider both deposit rates and the log of total deposits as dependent variables; γ_c captures the country fixed effect and λ_t captures instead the time trends. T_c is a dummy variable that equals 0 if country c is Italy and 1 otherwise, while variable $post_t$ is a time dummy that equals 1 in the post-reform period, after 2008 and δ is the causal effect of interest. Notice that the estimates showed in this section result from weighted regressions where single observation's weight is determined by each bank total assets. This allows to interpret the empirical estimates as a country-level effect of the policy. The results are in fact equivalent to a regression of weighted average deposit rates and weighted log of deposits at the $\{c, t\}$ level. Results in Table 3 Column (1) show that the increase in deposit insurance limit is followed by a reduction in deposit rates by approximately .36 percentage points in treated countries relative to Italy (the effect is significant at 5.9%). Column (3) shows that the increase in deposit insurance limits is followed by a relative increase in total deposits by approximately 12.5%. The difference in the number of observations in the two columns reflect the fact that the deposit rate is not observable for many banks in our sample.[4]

Insert Table 3 here

[4] If we replicate the analysis by employing only banks for which the deposit rate is observable, the results are practically unchanged.

We also estimate the unweighted version of the regression in equation 1 for the deposit rates (Column 2) and log of deposit (Column 4). In the unweighted version, the reduction in deposit rates is stronger in magnitude and more precisely estimated; the impact on total deposits is, instead, negative but not statistically significant. The comparison of the estimation results of weighted and non-weighted regressions suggests that the drop in deposit rates is stronger in smaller banks; on the contrary, the increase in deposits is larger at bigger banks.

The reliability of a diff-in-diff analysis naturally hinges on the parallel trend assumption: the trend in deposit rates between treatment and control groups would have not changed if the EU policy change had not occurred. We provide an indirect test of this assumption by estimating the following equation:

$$y_{ict} = \gamma_c + \lambda_t + \sum_{\tau=2006}^{2007} \gamma_\tau T_c \mathbf{1}(t=\tau) + \sum_{\tau=2009}^{2010} \gamma_\tau T_c \mathbf{1}(t=\tau) + \epsilon_{ict} \tag{2}$$

where, differently from equation 1), γ_τ are time-varying coefficients for the relationship between the outcome and T_c normalized relative to 2008, the year immediately before the policy. Results are presented in graphical format in Figure 2. Estimates from equation 2 are from a weighted regression with standard errors clustered at the country level.

Insert Figure 2 here

Figure 2 shows two plots. Each one reports the estimate from the above regression by using two different outcome variables: the deposit rate (top panel) and the log of deposits (bottom panel). Each coefficient is normalized with respect to the estimated $\gamma_{\tau=0}$, where 0 is 2008; the reported confidence intervals are at 90% level. The plots show that there is not a statistical significant difference in trends in both deposit rates and amount in 2006 and 2007 (pre-period). Consistently with the results displayed in Table 3, the deposits interest rates significantly decline in treated countries relative to Italy after 2008, while the opposite occurs for total amount of deposits.

Taken together, the results on the equilibrium reaction of prices (deposit rates decrease) and quantities (deposit amounts increase) can be rationalized by a significant increase in supply of deposits that followed the increase in the deposit insurance limit. As risk is transferred away from depositors to the lender of last resort, deposits become more attractive than other investments, inducing depositors to increase their supply until the risk adjusted return equals the one of other asset classes (Sharpe, 1994).

We consider the country-level analysis as a preliminary evidence suggestive of the macroeconomic changes induced by the increase in deposit insurance. To dig deeper into the identification of the effects of the EU policy change and to rationalise the economic mechanisms behind the empirical findings, in the subsequent sections we will rely on a bank-level analysis.

4 Bank-Level analysis

In this section we focus on bank-level data that allows us to have a better understanding of what are the effects of an increase in deposit insurance limits on banks' deposit rates and deposit amounts. In particular, we present empirical results from the following empirical specification:

$$y_{ict} = \gamma_i + \lambda_t + \delta(T_c \cdot post_t) + \epsilon_{ict} \tag{3}$$

where, differently from equation (1), we include bank-level fixed effects to our specification to control for individual banks' business models. Furthermore, we cluster standard errors at bank level and, differently from the cross-country analysis, we give equal weight to each observation in the regression estimations. Empirical results from the estimation of equation 3 are in Table 4. Results in Column (1) and (2) are consistent with the estimation results from equation 1 in Table 3.

Insert Table 4 here

However these results must be interpreted with caution. Summary statistics reported in Table 5 at the bank level for the treated and the control group, averaged in the pre-period, suggests strong unbalancing with respect to important variables that measure size, bank business model, performance and risk: Total Assets, Total Deposit over Total Asset, Tier One Capital over Total Assets, Non-Performing Loans (NPLs) over Total Assets, Return on Asset (ROA) and Z-score.[5]

[5] In line with Laeven and Levine (2009) Z-score is calculated as the return on assets plus the capital-asset ratio divided by the standard deviation of asset returns and measures the distance from insolvency.

Insert Table 5 here

To overcome this problem, in the next section we build a sample of banks operating in European treated countries that is directly comparable with our sample of Italian banks by using a strategy based on propensity score matching.

4.1 Propensity Score Matching

In the previous paragraph we showed that banks in the control group differ from treated banks in key financial variables. In this case, running a diff-in-diff using Italian banks as a control group may potentially lead to biased results. Differences among covariates between treated and control banks before the deposit insurance policy was implemented could inficiate the results as control banks may not represent a valid counterfactual for treated banks absent the treatment.

In order to reduce this possible bias, we first run a propensity score matching that restricts our analysis to a sample of more homogenous treated and control banks; we then use this subset of banks in our empirical analysis.

We proceed with the matching strategy as follows. We first average banks' characteristics in the pre-treatment period (2006-2008) as we match treated with control banks in the years that preceded the policy change. We then restrict our control group on the most relevant balance sheet variables, by including them among the ones used to compute the propensity score. For every bank in the control group, we finally match them with a bank in the treatment group that has the closest score, that is the same probability of being treated.

We take into account these differences as we estimate the following probit regression at the bank i - country c level:

$$\begin{aligned} M_{ic} = &\alpha + \beta_1 Ta_{ic} + \beta_2 Tier1_{ic} \\ &+ \beta_3 NPLs_{ic} + \beta_4 Dep_{ic} + \epsilon_{ic} \end{aligned} \tag{4}$$

where M_{ic} is a dummy that equals 1 if bank i in country c is treated and 0 otherwise. Ta_{ic} is Total Assets, $Tier1_{ic}$ identifies Tier One Capital over total assets, $NPLs_{ic}$ is the ratio of Non-

Performing Loans over Total Assets and Dep_{ic} is the ratio of Total Deposits over Total Assets. Matching is then done using a nearest neighbour approach with a caliper equal to 0.005. The caliper sets boundaries of the distance between the score of banks in treated and control equal to 0.005, meaning that the propensity score of two banks in the treatment and control group cannot exceed this value.[6] Finally, the matching is done without replacement, so that there is a unique match between a bank in the treatment with a bank in the control group.

Table 6 shows the post-matching summary statistics of the treated and control group in the years 2006-2008. The two matched samples contain 48 banks each; the two groups do not show significant differences in size (measured by Total Assets), capitalization (measured by the ratio between Tier 1 Capital and Total Assets), business model (measured by Total Deposits over Total Assets) and risk (measured by the NPLs over Total Assets). Although not directly used as regressors in the probit regression in equation 4, the two samples do not show significant differences also in performance (measured by ROA) and distance from insolvency (measured by the log of the Z-score). This result ensures us about the comparability among the two groups in terms of ex-ante observables. We finally observe that deposit rates in the matched treated sample are greater on average the matched control group. This is consistent with a deposit insurance limit that is greater for control banks than for treated ones in the years 2006-2008.

Insert Table 6 here

Notice that we implemented the matching procedure without any restrictions on the initial sample of banks that could be potentially matched. The final matched treated and control samples show averages of the Total Assets that are significantly lower with respect to the Total Asset of the largest players of the European banking market. The benefit of having a sample with few largest banks is that our analysis is based on a sample of banks that have not been subject to direct government interventions in the aftermath of the global financial crisis; this enhances the internal validity of our strategy. As a further check, after the matching procedure is implemented, we compare our matched sample of banks with the list of banks provided by

[6] In the benchmark procedure, the caliper threshold has been chosen in order to minimize the dissimilarities between control and treatment group of banks and maximize the sample size. In the appendix we provide discussion about our choice and provide a robustness exercise with a more conservative caliper of 0.001; we show that our main results are confirmed in this case.

Laeven and Valencia (2010),[7] and we verify that among our matched sample, none of the banks has been object of nationalization, recapitalization or other purchase or guarantee program fostered by national government up to 2009.[8]

4.2 Empirical Results

We estimate equation (3) using our restricted matched groups. Table 7 shows the estimation results on both deposit rates and log of total banks' deposits. Consistently with the results on the unmatched sample, we find a decrease in deposit rates of approximately 78 basis points (Column 1). Instead, after correcting for unbalanced treated and control groups, the effect on total deposits is positive and no longer statistically significant (Column 2).

Insert Table 7 here

We also test for the absence of pre-trends in the matched sample in order to assess our parallel trend assumption. Figure 3 shows similar trends in the outcome variables before the policy change in 2008. The upper graph shows that the difference in deposit rates between treated and control groups before treatment with respect to 2008 is not significantly different from 0. Instead, consistently with the results presented in Table 7, this difference decreases significantly in the years after the policy was introduced.

Insert Figure 3 here

4.3 Impact on risk

To give a comprehensive interpretation of our results, we also estimate the impact of deposit insurance over banks' risk taking. The empirical literature has discussed the effects of higher deposit insurance limit on financial stability. While Lambert *et al.* (2017) provide evidence on the effects of deposit insurance being associated to greater risk-taking, Anginer *et al.* (2014)

[7] We refer to Tables A.1 and A.3.

[8] The only exception is Aegon Bank N.V. located in the Netherlands, that has been recapitalised. We decided to keep this bank in the sample and perform a robustness check (not showed here, but available upon request) where we exclude this bank from the analysed sample.

show that the higher risk induced by the moral hazard effect is dominated by the market stabilization effect in periods of greater financial distress. Given that the EU policy on deposit insurance limit occurred in EU countries in the aftermath of the global financial crisis, it is not ex-ante clear which effect would have dominated in our setting.

In the following analysis we show the effect of an increase in deposit insurance limit on banks' realised risk after 2008. We estimate the equation (3) using as dependant variables alternative measures of risk. In line with Celerier *et al.* (2018) we employ three measures of risk. Firstly, we use the Z-score; this measure is inversely related to the probability of default of a bank, so the greater is the Z-score, the safer the bank. Secondly, we use an alternative measure of banks' risk defined as the share of NPLs over total assets; it captures changes in the riskiness of the bank loan portfolio. Thirdly, we use the Tier 1 Capital over Total Assets to capture changes in the bank degree of capitalization. Estimation results are in Table 8.

Insert Table 8 here

We do not find a significant increase of Z-score for banks that operate in treated countries vs the others as a consequence of the increase in the deposit insurance limit. At the same time, we find a significant increase in NPLs, while a positive, but not significant effect in the level of capitalization. We interpret this result as evidence that banks in treated countries experienced an increase in the risk of their loan portfolios; however banks counter-reacted to the increase in this source of risk by increasing their capitalization. The statistically insignificant effect on Z-score suggests that the overall bank level risk did not change as a result of the increase of deposit insurance limit.

4.4 Interpretation of the Results

The empirical findings in the previous sections show that the 2009 increase in deposit insurance limit has been followed by a significant decrease in deposit rates and by a not significant change in total amount of deposits and risk. These findings can be rationalized by a joint shift in the supply and demand of deposits, as banks and depositors reacted to a change in the riskiness of the deposit contract.

Our argument is theoretically grounded as follows. For what concerns depositors, our results are consistent with an outward shift in the supply of deposits. An increase in deposit insurance limits moves risk away from depositors who now face lower risk in case of default. Since depositors allocate their funds comparing risk-adjusted returns in different asset classes (Sharpe, 1994), deposits become more attractive as their risk-adjusted return increases. Depositors will thus increase their deposit supply as long as deposits' risk-adjusted returns are higher than the one of other asset classes. An increase in deposit supply lowers the return on deposits, until the risk-adjusted returns on deposits is low enough compared to other asset classes. Moreover, an increase in deposit insurance limits makes depositors less risk-sensitive as they are more protected in case of bank default. As depositors are less risk-sensitive, they will incur in lower monitoring costs and they would be willing to increase their deposit supply (Cooper and Ross, 2002). In the light of these arguments, keeping demand constant, an outward shift of deposits' supply would result in lower deposit rates and in an increase in total amount of deposits.

On the banks' side, the reaction to a higher deposit insurance limit can be twofold. On one hand an increase in deposit insurance limits makes deposits a relatively more expensive source of funding. Banks are charged with a higher deposit insurance premium, which is needed to fund greater deposit insurance payouts in case of a bank default. As deposits become more expensive, banks will partially pass-through higher costs to depositors and decrease the demand for deposits. On the other hand, an increase in deposit insurance limits could also lead banks to an increase of deposit rates. As depositors are less risk-sensitive and exert lower monitoring efforts over banks, deposits become a less expensive source of funding for banks, which induces banks to increase demand for deposits (Cooper and Ross, 2002). Moreover, higher deposit insurance limits might also raise depositors' elasticity of supply, pushing banks to compete more for deposits by offering higher deposit rates (Matutes and Vives, 1996).

Our empirical results illustrated in the previous sections show a significant decrease in deposit rates and a contextual non-significant increase in total deposits. This is theoretically in line with an increase in supply by depositors' and a contemporaneous decrease in demand by banks. The increase in deposit insurance limit could have, in fact, increased banks' operating costs; this increase in costs, if not compensated by higher risk-taking and profitability, reduced the demand for deposits.

4.5 Heterogeneous Effects of the Policy

The bank-level analysis provided in the previous section shows that, upon comparing a similar group of treated and control banks, an increase in deposit insurance negatively affects the interest rate on bank deposits. Our economic interpretation is that depositors, which are more protected against bank risk by the deposit insurance, require a relatively lower return for a given amount of deposits. If true, we should observe a larger reduction of deposits' interest rate for riskier banks. In fact, risk-averse depositors allocate their money depending on the risk-adjusted return offered by banks (Sharpe, 1994) and require higher returns for riskier investments. As a result, riskier banks need to offer higher deposit rates to attract depositors and reward the greater risk they face (Acharya and Mora, 2015). An increase in deposit insurance limit decreases the risk associated to deposits and makes them more homogenous across different levels of risk. Consequently, the decrease in deposit rates after an increase in deposit insurance should be larger for riskier banks until the risk-adjusted returns equalise.

In this section, we dig deeper into banks' heterogeneity to understand whether the baseline effect on deposit rates and deposit amounts is stronger for riskier banks. In particular we consider an heterogeneity dimension which is likely to be considered by depositors as a proxy for risk as it measures the riskiness of bank loan portfolios: the ratio of Non-Performing Loans over Total Assets.[9]

We test this intuition in the following empirical exercise, where we rank our banks based on their percentage of NPLs on Total Assets; in particular, we split the sample in four quartiles the distribution of NPLs over total assets. We first estimate equation 3 by excluding from the sample the banks belonging the the first quartile of the distribution (the safest banks); we then exclude banks whose NPLs ratio is below the median value; finally we run a regression analysis by focusing on banks that belong to the fourth quartile of the distribution. We report the results in Table 9, where the dependent variable is the deposit interest rate. Column (1) reports the

[9] In the Appendix B we consider two alternative measure of perceived risk measured by the ratio of Tier One Capital over Total Assets and the log of the Z-score.

baseline results contained in Table 7 (column 1); columns (2) to (4) report the estimates for subsamples that feature progressively riskier banks - columns more to the right are the ones related to a progressively riskier subsample of banks.

Results show that banks with a higher share of Non-Performing Loans over Total Assets are the ones for which we observe a larger decrease in deposit rates. By comparing the magnitude of the coefficients over the different samples, we observe that, while in the baseline estimate the decline in deposit interest rates is about 78 basis points, in the group of riskiest banks (fourth quartile of the NPLs ratio distribution) the decline is about 147 basis points. This confirms that the drop in deposit rates is larger for riskier banks.

Insert Table 9 here

We replicate the analysis by pursuing the same strategy but using Total Deposit as outcome variable in the regressions. Results in Table 10 show that the total amount of deposits do not significantly differ among the subgroups in our analysis. As opposite to the baseline analysis we observe a negative growth rate of deposits for the riskiest although the estimate is not statistically significant.

Insert Table 10 here

Taken overall, the heterogeneity results presented in this section confirm that the reduction in deposit rates has been stronger at banks that are perceived riskier by depositors absent the deposit insurance coverage. As lower deposit rates are not associated with higher amount of deposits, our results provide evidence in favour of a greater reduction in banks demand for deposit for riskier banks. This reduction in demand may reflect higher financing costs for riskier banks after the increase in deposit insurance limit.

5 Conclusions

This paper studies what is the effect of an increase in deposit insurance limits on deposit rates. We exploit the regulatory change in the deposit insurance limits set by the 2009/14/EC Directive which increased deposit insurance limits in the European Union from €20.000 to €100.000.

We find that the deposit rates decreased substantially in banks that operate in countries where the deposit limit increased substantially relative to banks in the unaffected country (Italy). The drop in banks' deposit rates has been larger at riskier banks, confirming the theoretical prediction that deposit insurance negatively affects bank deposits' interest rate by reducing the return for the risk required by the depositors. We reach this conclusion by employing a combination of diff-in-diff and propensity score matching empirical strategy in order to provide a consistent estimate of the impact of the policy. Our findings contribute to the policy debate about the impact of a common regulatory framework for the banking sector of the Eurozone.

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A Propensity Score Matching

In section 4.1 we run a propensity score matching that restricts our sample and allows us to compare banks with similar characteristics in our diff-in-diff estimation. The benefit of reducing the sample size to group of more similar banks is to eliminate any potential bias that could be picked-up by heterogeneous banks' characteristics. At the same time, the cost of reducing the number of banks is to reduce the amount of information available and reduce the precision of our estimates.

In this appendix we propose an alternative and more conservative selection on the propensity score matching. We reduce the caliper, which is the maximum distance in the score between a treated bank and a control bank, to 0.001. This allows us to potentially compare a more homogeneous group of banks included, although it reduces the sample of treated and control banks. Table 11 provides the summary statistics for treated and control banks after the implementation of the propensity score matching with a caliper equal to 0.001. We do not observe a significant improvement in terms of balanced observable characteristics between treatment and control banks by employing a smaller caliper, while we instead observe a significant reduction in selected banks (the sample shrinks from 96 banks of the baseline analysis to 54). By using this selected sample, we then estimate our baseline diff-in-diff in equation 3 at the bank level.

Table 12 provides estimates in line with the baseline regression although the standard errors are higher, possibly due to the limited number of observations employed in the regression. This robustness shows that our choice of a caliper equal to 0.005 does not imply any costs in terms of obtaining balanced observable characteristics for treated and control banks and, at the same time, entails a benefit in terms of a larger sample size. On the contrary, we also employed larger calipers when implementing the propensity score matching (for example we employ calipers equal to 0.01 or 0.1). Although larger calipers enlarge the matched sample of banks, they imply a worse ex-post matching between control and treated banks in terms of observable characteristics (results are not showed in this appendix for brevity but available upon request).

Insert Table 11 and Table 12 here

B Heterogenous impact: alternative risk measures

In this section we replicate the heterogeneity analysis in Section 4.5 by considering two alternative measures of risk: we rank banks based on their Tier One Capital over Total Assets and their Log(Z-score). We proceed in similar ways: we split our sample in four quartiles based on the distribution of the risk variables and we then run regressions on subsamples which progressively exclude the less risky banks. Each table shows the results of the baseline regression in column (1) and the estimation results of different subsamples in the subsequent columns. We exclude an additional quartile of safer banks column by column - columns more to the right are the ones related to the riskier subsample of banks. Tables 13 and 14 show estimates relative to regressions whose dependant variables are respectively the bank deposit rates and total amount of deposits. The results confirm a larger negative impact of deposit insurance for the banks that belong to the fourth quartile of the distribution while we do not highlight any significant difference regarding the growth rate of deposits.

Insert Table 13 and Table 14 here

Along the same line, Tables 15 and 16 show results when banks are classified according to the distribution of their riskiness measured by the Log(Z-score). Regarding the effect on deposit rates we find a larger negative effect when excluding the first quartile of the distribution (column 2), but we do not find an increasingly larger negative effect using the subsamples of banks above the median of the Log(Z-score). In particular the not-significant effect on the interest rates for the subsample of banks that belong to the fourth quartile of the distribution can be rationalized by the significant increase in the total amount of deposits we observe in the column (4) of Table 16. This last evidence is theoretically compatible with an increase in the supply of deposits which is not matched by a sizeable decrease in demand of deposits by the banks that are closer to the default.

Insert Tables 15 and 16 here

C Tables

Table 1
Deposit insurance limit by Country in September 2008

Country	DI Limit (€)	Country	DI Limit (€)
Austria	20,000	Ireland	20,000
Belgium	20,000	Italy	103,291
France	70,000	Netherlands	20,000
Germany	20,000	Portugal	25,000
Greece	20,000	Spain	20,000

Note: The source of data is Demirguc-Kunt *et al.* (2014) and data available online from different national deposit insurers.

Table 2
Summary Statistics 2006-2008

	(1) Treatment	(2) Control
Weighted deposit interest rate	3.9456	2.7555
Growth rate Total deposits	0.0882	0.0927
Growth rate of real GDP	0.0214	0.0225
Unemployment rate	7.2540	6.5250
Public debt over GDP	63.4481	102.6700
Covered to eligible ratio	0.5554	0.7337
Ratio of deposits by top 25 institutions	0.9261	0.8396
Observations	27	3

Note: This table shows average values for the EU countries listed in Table 1 except for Italy (column 1) and Italy (column 2). Weighted deposit rate is the average interest expenses per unit of deposit of each bank weighted by bank's total assets for each year-country; the Growth rate of Total deposits is the yearly log change of the sum of each bank total deposits in each year-country; the Growth rate of real GDP (source: OECD) is the yearly log change of each country real GDP; the series of Unemployment rate and the Public debt over GDP are from the OECD; the Covered to eligible ratio is from Uboldi and Cariboni (2008); the Ratio of deposits by top 25 institutions is the ratio of the sum of Total deposits of the 25 largest banks - defined by total assets - in each country-year and the sum of Total deposits of all the banks in each country-year.

Table 3
Cross-Country Regression

	(1)	(2)	(3)	(4)
	Deposit Rates		Log of Deposits	
T·post	-0.3651*	-0.7388***	0.1250**	-0.0145
	(0.1764)	(0.1852)	(0.0496)	(0.0137)
Year Dummies	✓	✓	✓	✓
Country Fixed Effects	✓	✓	✓	✓
Weighted Regression	✓		✓	
Observations	3123	3123	8390	8390

Note: T is a dummy variable that equals 0 if the bank operates in Italy and 1 otherwise; *post* is a time dummy that equals to 1 in the post-reform (2009-2010) and 0 in the pre-reform years (2006-2008). Standard errors in parenthesis are clustered at country level. *, **, and *** denote significance at 10%, 5%, 1% respectively.

Table 4
Bank-Level Analysis

	(1)	(2)
	Deposit Rates	Log of Deposits
T·post	-0.6404***	-0.0479***
	(0.1132)	(0.0161)
Year Dummies	✓	✓
Bank Fixed Effects	✓	✓
Observations	3080	8312

Note: T is a dummy variable that equals 0 if the bank operates in Italy and 1 otherwise; *post* is a time dummy that equals to 1 in the post-reform (2009-2010) and 0 in the pre-reform years (2006-2008). Standard errors in parenthesis are clustered at bank level. *, **, and *** denote significance at 10%, 5%, 1% respectively.

Table 5
Summary Statistics - Bank level 2006-2008

	(1) Treatment	(2) Control	(3) Difference
Total Assets (in millions euro)	21.62	6.47	-15.15***
Average Deposits Rate	3.47	1.74	-1.73***
Total Deposit over Total Assets	0.63	0.52	-0.11***
Tier One capital over Total Assets	0.06	0.11	0.05***
Non-Performing Loans over Total Assets	0.02	0.04	0.02***
ROA	0.47	0.86	0.39***
Log(Z-score)	1.19	1.62	0.43***
Observations	3651	1370	

Note: This table shows average values for banks operating in the EU countries listed in Table 1 except for Italy (column 1) and banks operating in Italy (column 2); column (3) shows the mean-difference between column (1) and (2). Bank-level variables refer to key items from Bankscope. *, **, and *** denote significance at 10%, 5%, 1% respectively.

Table 6
Summary Statistics - Matched Sample 2006-2008

	(1) Treatment	(2) Control	(3) Difference
Total Assets (in millions euro)	35.49	44.59	9.11
Average Deposit Rate	4.31	1.95	-2.36***
Total Deposit over Total Assets	0.50	0.48	-0.02
Tier One capital over Total Assets	0.08	0.09	0.01
Non-Performing Loans over Total Assets	0.02	0.02	-0.00
ROA	0.81	0.80	-0.01
Log(Z-score)	1.23	1.38	0.16
Observations	137	133	

Note: This table shows average values for banks operating in the EU countries listed in Table 1 except for Italy (column 1) and banks operating in Italy (column 2); column (3) shows the mean-difference between column (1) and (2).The number of banks in the treatment and control group after implementing the propensity score marching procedure is equal to 48. Bank-level variables refer to key items from Bankscope.. *, **, and *** denote significance at 10%, 5%, 1% respectively.

Table 7
Bank-Level Analysis - Matched Sample

	(1) Deposit Rates	(2) Log of Deposits
T·post	-0.7814**	0.0406
	(0.3420)	(0.0993)
Year Dummies	✓	✓
Bank Fixed Effects	✓	✓
Observations	334	448

Note: The regression is based on a sample obtained after implementing the propensity score matching procedure. T is a dummy variable that equals 0 if the bank operates in Italy and 1 otherwise; $post$ is a time dummy that equals to 1 in the post-reform (2009-2010) and 0 in the pre-reform years (2006-2008). Standard errors in parenthesis are clustered at bank level. *, **, and *** denote significance at 10%, 5%, 1% respectively.

Table 8
Bank-Level Analysis: The Impact on Risk

	(1) log(Z-score)	(2) $\frac{NPLs}{TA}$	(3) $\frac{TierOne}{TA}$
T·post	-0.3146	0.0181*	0.0093
	(0.3400)	(0.0093)	(0.0079)
Year Dummies	✓	✓	✓
Bank Fixed Effects	✓	✓	✓
Observations	349	388	403

Note: The regressions replicate the baseline analysis using as dependant variable the log of Z-score (column 1), the ratio of Non-performing loans over Total assets (column 2) and the ratio of Tier One over Total Assets (column 3). The sample is obtained after implementing the propensity score matching procedure. T is a dummy variable that equals 0 if the bank operates in Italy and 1 otherwise; $post$ is a time dummy that equals to 1 in the post-reform (2009-2010) and 0 in the pre-reform years (2006-2008). Standard errors in parenthesis are clustered at bank level. *, **, and *** denote significance at 10%, 5%, 1% respectively.

Table 9
Heterogeneity on risk: Deposit Rates

	(1) Matched Sample	(2) >25	(3) >50	(4) >75
T·post	-0.7814**	-0.7534**	-0.9462***	-1.4734**
	(0.3420)	(0.3554)	(0.3457)	(0.5247)
Year Dummies	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓
Observations	334	249	165	81

Note: Column (1) reports estimates from regression analysis contained in Table 7 (column 1); column (2) reports estimates of a regression analysis on a subsample which excludes the banks whose $\frac{NPLs}{TA}$ is below the 25th percentile of the distribution; column (3) reports estimates of a regression analysis on a subsample which excludes the banks whose $\frac{NPLs}{TA}$ is below the median; column (4) reports estimates of a regression analysis on a subsample which excludes the banks whose $\frac{NPLs}{TA}$ is below the 75th percentile of the distribution. T is a dummy variable that equals 0 if the bank operates in Italy and 1 otherwise; $post$ is a time dummy that equals to 1 in the post-reform (2009-2010) and 0 in the pre-reform years (2006-2008). Standard errors in parenthesis are clustered at country level. *, **, and *** denote significance at 10%, 5%, 1% respectively.

Table 10
Heterogeneity on risk: Total Deposit

	(1) Matched Sample	(2) >25	(3) >50	(4) >75
T·post	0.0406	0.0278	0.0328	-0.0675
	(0.0993)	(0.0528)	(0.0742)	(0.1185)
Year Dummies	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓
Observations	448	332	220	110

Note: Column (1) reports estimates contained in Table 7 (column 1); column (2) reports estimates of a regression analysis on a subsample which excludes the banks whose $\frac{NPLs}{TA}$ is below the 25th percentile of the distribution; column (3) reports estimates of a regression analysis on a subsample which excludes the banks whose $\frac{NPLs}{TA}$ is below the median; column (4) reports estimates of a regression analysis on a subsample which excludes the banks whose $\frac{NPLs}{TA}$ is below the 75th percentile of the distribution. T is a dummy variable that equals 0 if the bank operates in Italy and 1 otherwise; $post$ is a time dummy that equals to 1 in the post-reform (2009-2010) and 0 in the pre-reform years (2006-2008). Standard errors in parenthesis are clustered at country level. *, **, and *** denote significance at 10%, 5%, 1% respectively.

Table 11
Summary Statistics - Matched Sample 2006-2008 - Robustness

	(1) Treatment	(2) Control	(3) Difference
Total Assets (in millions euro)	32.68	44.16	11.48
Average Deposit Rate	4.30	1.83	-2.47***
Total Deposit over Total Assets	0.49	0.50	0.01
Tier 1 capital over Total Assets	0.09	0.09	-0.00
Non-Performing Loans over Total Assets	0.03	0.03	0.00
ROA	0.80	0.83	0.03
Log(Z-score)	1.12	1.50	0.38**
Observations	76	76	

Note: This table shows average values for banks operating in the EU countries listed in Table 1 except for Italy (column 1) and banks operating in Italy (column 2); column (3) shows the mean-difference between column (1) and (2). The matched sample in the robustness check is obtained after implementing a propensity score matching procedure using a caliper equal to 0.001. The number of banks in this treatment and control group is equal to 27. Bank-level variables refer to key items from Bankscope. *, **, and *** denote significance at 10%, 5%, 1% respectively.

Table 12
Bank-Level Analysis: Matched Sample - Robustness

	(1) Deposit Rates	(2) Log of Deposits
T·post	-0.9107*	-0.1274
	(0.4766)	(0.1862)
Year Dummies	✓	✓
Bank Fixed Effects	✓	✓
Observations	334	448

Note: The matched sample in the robustness check is obtained after implementing a propensity score matching procedure using a caliper equal to 0.001. T is a dummy variable that equals 0 if the bank operates in Italy and 1 otherwise; *post* is a time dummy that equals to 1 in the post-reform (2009-2010) and 0 in the pre-reform years (2006-2008). Standard errors in parenthesis are clustered at bank level. *, **, and *** denote significance at 10%, 5%, 1% respectively.

Table 13
Heterogeneity on risk: Deposit Rates - Robustness

	(1) Matched Sample	(2) >25	(3) >50	(4) >75
T·post	-0.7814**	-0.8611**	-0.3076	-1.2302*
	(0.3420)	(0.3655)	(0.3220)	(0.6681)
Year Dummies	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓
Observations	334	249	165	81

Note: Column (1) reports estimates contained in Table 7 (column 1); column (2) reports estimates of a regression analysis on a subsample which excludes the banks whose $\frac{TierOne}{TA}$ is below the 25th percentile of the distribution; column (3) reports estimates of a regression analysis on a subsample which excludes the banks whose $\frac{TierOne}{TA}$ is below the median; column (4) reports estimates of a regression analysis on a subsample which excludes the banks whose $\frac{TierOne}{TA}$ is below the 75th percentile of the distribution. T is a dummy variable that equals 0 if the bank operates in Italy and 1 otherwise; $post$ is a time dummy that equals to 1 in the post-reform (2009-2010) and 0 in the pre-reform years (2006-2008). Standard errors in parenthesis are clustered at country level. *, **, and *** denote significance at 10%, 5%, 1% respectively.

Table 14
Heterogeneity on risk: Total Deposit - Robustness

	(1) Matched Sample	(2) >25	(3) >50	(4) >75
T·post	0.0406	0.0247	-0.0044	0.2811
	(0.0993)	(0.1230)	(0.1997)	(0.4738)
Year Dummies	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓
Observations	448	336	220	112

Note: Column (1) reports estimates contained in Table 7 (column 1); column (2) reports estimates of a regression analysis on a subsample which excludes the banks whose $\frac{TierOne}{TA}$ is below the 25th percentile of the distribution; column (3) reports estimates of a regression analysis on a subsample which excludes the banks whose $\frac{TierOne}{TA}$ is below the median; column (4) reports estimates of a regression analysis on a subsample which excludes the banks whose $\frac{TierOne}{TA}$ is below the 75th percentile of the distribution. T is a dummy variable that equals 0 if the bank operates in Italy and 1 otherwise; $post$ is a time dummy that equals to 1 in the post-reform (2009-2010) and 0 in the pre-reform years (2006-2008). Standard errors in parenthesis are clustered at country level. *, **, and *** denote significance at 10%, 5%, 1% respectively.

Table 15
Heterogeneity on risk: Deposit Rates - Robustness II

	(1) Matched Sample	(2) >25	(3) >50	(4) >75
T·post	-0.7814**	-0.9153**	-0.4744	-0.8431
	(0.3420)	(0.4441)	(0.4384)	(0.6861)
Year Dummies	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓
Observations	334	250	168	83

Note: Column (1) reports estimates contained in Table 7 (column 1); column (2) reports estimates of a regression analysis on a subsample which excludes the banks whose $Log(Z - score)$ is below the 25th percentile of the distribution; column (3) reports estimates of a regression analysis on a subsample which excludes the banks whose $Log(Z - score)$ is below the median; column (4) reports estimates of a regression analysis on a subsample which excludes the banks whose $Log(Z - score)$ is below the 75th percentile of the distribution. T is a dummy variable that equals 0 if the bank operates in Italy and 1 otherwise; $post$ is a time dummy that equals to 1 in the post-reform (2009-2010) and 0 in the pre-reform years (2006-2008). Standard errors in parenthesis are clustered at country level. *, **, and *** denote significance at 10%, 5%, 1% respectively.

Table 16
Heterogeneity on risk: Total Deposit - Robustness II

	(1) Matched Sample	(2) >25	(3) >50	(4) >75
T·post	0.0406	0.0858	0.1906	0.1413**
	(0.0993)	(0.1022)	(0.1255)	(0.0604)
Year Dummies	✓	✓	✓	✓
Bank Fixed Effects	✓	✓	✓	✓
Observations	448	334	221	110

Note: Column (1) reports estimates contained in Table 7 (column 1); column (2) reports estimates of a regression analysis on a subsample which excludes the banks whose $Log(Z - score)$ is below the 25th percentile of the distribution; column (3) reports estimates of a regression analysis on a subsample which excludes the banks whose $Log(Z - score)$ is below the median; column (4) reports estimates of a regression analysis on a subsample which excludes the banks whose $Log(Z - score)$ is below the 75th percentile of the distribution. T is a dummy variable that equals 0 if the bank operates in Italy and 1 otherwise; $post$ is a time dummy that equals to 1 in the post-reform (2009-2010) and 0 in the pre-reform years (2006-2008). Standard errors in parenthesis are clustered at country level. *, **, and *** denote significance at 10%, 5%, 1% respectively.

D Figures

Figure 1

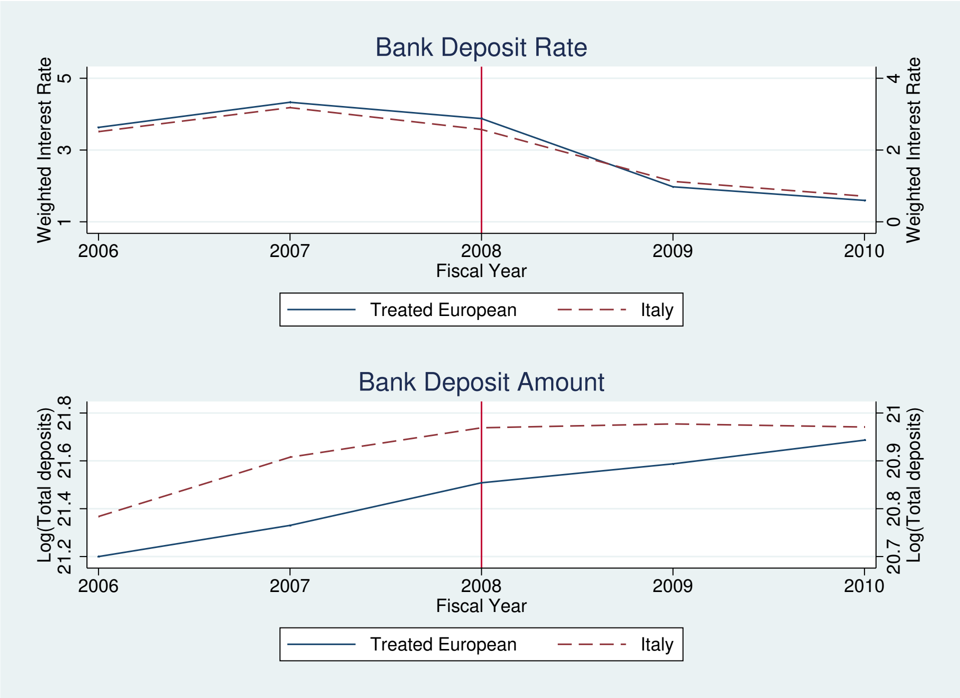

Figure 2

Figure 3


Event Study Analysis
Bank Deposit Rate
1
0
−1
2006
2007
2008
2009
2010
Year relative to 2008
γt
CI 90%
Bank Deposit Amount
.2
0
−.2
2006
2007
2008
2009
2010
Year relative to 2008
γt
CI 90%