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On the relationship between bank market concentration and stability of financial institutions: Evidence from the Italian banking sector

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Abstract

This paper explores the relationship between bank market concentration and financial stability of financial institutions relying on highly territorially disaggregated data taken at municipality level in Italy between 2001 and 2012. Firstly, we test the existence of a U-shaped relationship between market concentration and financial stability. Secondly, we estimate the impact of the level of concentration of the banking system and other explanatory variables, such as size, level of capitalization and credit insolvency of financial institutions, on a proxy of risk taking behavior such as the banking ''stability inefficiency'' derived simultaneously from the estimation of a stability stochastic frontier. The paper concludes that the inefficiency of financial stability is U-shaped relationship with respect to the measure of market concentration. Boosting market power increases bank failure in very concentrated markets while leads to higher financial stability in already competitive markets. Bank size is an essential factor in explaining this relationship as the effect of size on the inefficiency of stability is an inverse U-shaped as a function of the market share indicator; results also suggest that high, low and average concentration levels do not change the positive effects that the level of capitalization has on the stability inefficiency.

Keywords: Management; local banks; market structure; financial stability

JEL Codes: G21; G28; C14; D21

I. *INTRODUCTION, MOTIVATION AND CONTRIBUTION*

The different level of banking market structure is an important topic in the literature given its effects on financial stability (Beck et al. 2006; Schaeck et al. 2009; Wagner, 2010). However, this relationship is not clear yet and theory and empirical evidence seem to be inconclusive (Mirzaei et al., 2013), with conflicting and ambiguous findings (Canoy et al. 2001; Carletti and Hartmann, 2003; Allen and Gale, 2004; Anginer et al. 2014). Higher competition might compromise the solvency of some institutions, thus hampering the stability of the banking system at aggregate level. Banks, consequently and in order to keep their profits unaltered, could take riskier policies increasing the likelihood of failure. This negative relationship between the number of banks in the market and the average banks' credit quality is explained by the fact that when banks compete for deposits, interest rates fall and, due to the contraction of banks' franchise values, banks have less to lose and therefore undertake more risk taking strategies (Marcus, 1984). On the other hand, in parallel with deposit market, banks also compete in the loan market; loan rate as a consequence might decline, raising borrowers' profits and making bankruptcy less likely. In other words, competition in the loan market lowers bank risk by reducing the risk-taking incentives of borrowers (Boyd and De Nicolò, 2005).

More specifically, in the last years, two are the main lines of research trying to illustrate the role of the market power on the risk of financial institution's failure and on the banking system stability. Part of the literature supports the "concentration-stability" view, according to which banks may have higher profits in collusive market. Indeed, in a more competitive market, banks may be incentivized to take more risky behaviors due to the fact that higher competition reduces the gains of both financial institutions and stakeholders (Keeley, 1990). Banks are induced to take riskier behaviors also because in more competitive markets they are more exposed to contagion as, in case of bank bankruptcy, also other banks exposed or close in business with the failed institution might also go bankrupt. In other words, banks are price-takers under perfect competition and there aren't incentives to provide liquidity to the troubled bank, helping the contagion to spread (Allen and Gale, 2004). The presence of a high number of banks in the market also increases the chance that a poor quality borrower applies for a loan; as a consequence, the quality of the loan portfolio of the whole banking market decreases. In more concentrated system banks tend to be larger, (consequently) better diversified and therefore less fragile than in banking system with many small banks (i.e., more competitive systems) (see Beck et al. 2006; Allen and Gale, 2000; 2004). Fewer banks means also an easier monitoring procedure and a more effective supervision which in turn will make the risk of contagion and systematic crisis less pronounced in concentrated banking systems. This view has been challenged by the "concentration-fragility" view according to which, instead, a more collusive banking market increases financial fragility. Indeed, bank market power in the deposit market induces banks to increase the cost of borrowing for entrepreneurs; their default risk will increase as a consequence of the fact that entrepreneurs are hindered to undertake more risky projects. The higher default risk of entrepreneurs shifts on the financial institutions and weakens bank financial security (Boyd and De Nicolò, 2005). In other words, in more concentrated markets, banks will charge higher interest rates, boosting the risk-taking behaviour of borrowers, leading therefore to an increase in the probability of default. This is what Boyd and De Nicolò (2005) called "shifting effect" being a monotonic declining relationship between competition and bank risk (i.e. as the number of banks and competition increase, the level of bank risk would decline). More competition leads to lower loan rates and to lower firm default probabilities, finally improving bank risk measures. More concentrated markets are associated with higher capital ratios, higher income volatility and higher insolvency of banks, supporting the idea that even though banks detain more capital in less competitive markets, their level of capitalization is not high enough to counterbalance the impact of default risk of higher risk taking institutions (Soedarmono et al. 2013). Exploring the relationship between bank market concentration and stability of financial institutions could help academics and regulators to formulate effective policies to contrast financial instability; at the same time, it could also be helpful for understanding which market conditions may make managers more efficient (reducing risk-taking), guaranteeing stability of the financial sector and preventing the proliferation of negative events that increase the probability of defaults.

The paper addresses the following research questions: Is there a linear relationship between market concentration and risk-taking behavior of banks? Does the Italian banking sector support the “concentration-stability” or the “concentration-fragility” theory? What effects does the institutional environment have on the market concentration-financial stability relationship? More specifically, this paper contributes to the recent literature as follows: (i) it uses the technique suggested by Lind and Mehlum (2010) and tests the existence of a U-shaped relationship between bank concentration and financial stability in order to validate the use of both the market share index and the square of market share index. Do not take this into account might lead to misleading results and policy implications. In order to measure the level of concentration of the market, we rely on the “structure-conduct-performance” (SCP) paradigm assuming that banks operating in concentrated markets have higher profits due to monopoly rents (see Section II for more details). We rely upon a highly territorially disaggregated market share index calculated on bank specific loans, deposits and assets taken at municipality level (at SLL, Sistema Locale del Lavoro, level), being enable to better capture the differences across geographical areas. Financial stability is calculated through the z-score being a widespread accounting measure used to capture bank stability in the banking system (Boyd and Graham, 1986, 1988; Boyd and Runkle, 1993; Maechler et al., 2005; Laeven and Levine, 2009; Uhde and Heimeshoff, 2009; Fink et al., 2009; Demirguc-Kunt and Huizinga, 2010; Houston et al., 2010; Beck et al. 2012; Fiordelisi and Mare, 2014); (ii) it examines the relationship between bank concentration and financial stability and determines whether the “concentration-stability” or “concentration-fragility” theory holds for a rich sample of cooperative, commercial and popular banks in Italy over the 2001-2012 period, by regressing a bank’s risk-taking proxy against the market share indicator. We use as risk-taking measure the “stability inefficiency” (see Fang et al. 2011; Tabak et al. 2012) whose estimation approach is the stochastic frontier analysis (SFA); (iii) as only few studies, to the best of our knowledge, examine cooperative banking and investigate the concentration-stability link among these credit institutions (among the few exceptions see Hesse and Cihák, 2007; Liu et al. 2012; Fiordelisi and Mare, 2014), this study considers both cooperative and non-cooperative banks. Specific attention has been paid on cooperative banks because of their mission in favour of the local community. Indeed, Italian cooperative banks are characterized by small size and a very local attitude. Their activity is mainly based in favour of members and aim at supporting the moral, cultural and economic development of the local community; moreover, they have an important role in financing households, artisans and small businesses. We believe that due to this particularly local community focused mission, it is important to examine whether the link between market concentration and financial stability differs when cooperative banks are taken into account. The analysis is performed using a rich database of Italian banks counting on a very homogeneous political, cultural and monetary environment; (iv) finally, in order to assess and to shed some light on the differences of stability inefficiency across several bank-specific variables, the paper explores the role played by the level of capitalization (proxied by the ratio of equity to total assets), bank size (proxied by the log level of total assets) and credit insolvency (proxied by the ratio of non-performing loans to total loans); more specifically, as an additional check, we analyze whether the concentration-financial stability relationship changes as a results of other factors related to the institutional environment.

In order to anticipate our findings, the empirical evidence is in favour of an inverted U-shaped relationship between the market share index and financial stability suggesting the use of both the market share index and the square of market share index. When the “stability inefficiency” has been used as a risk-taking measure, the results show that the inefficiency of financial stability is U-shaped relationship with respect to the measure of market concentration, suggesting that the increase in concentration does not lead to a linear change in inefficiency of the financial stability. The empirical evidence seems to support both the "concentration-fragility" view, according to which a high market power is detrimental to the stability of the market system (Beck et al. 2006; Shaeck et al. 2009; Liu et al. 2012; Fiordelisi and De Mare, 2014) at already high level of concentration and the "concentration-stability" view, as at low values of market concentration new entry decrease the probability of failure (Keeley, 1990; Allen and Gale, 2000; 2004; Beck et al. 2006; Matsuoka, 2013). Results also show that bank size is the most influential variable on this relationship as we find that the effect of size on financial stability is an inverse U-shaped as a function of the market share indicator. Robustness check has been performed measuring the level of market power using the loans, deposits and assets activities and exploring whether the level of disaggregation at which we measure the market share index - community, province or regional level - may affect the results.

This paper is structured in the following way. Section II brefly review the literature on the measurement of market concentration; Section III describes the empirical approach adopted in order to test the presence of a U-shaped between bank market concentration and financial stability and the empirical approach used to calculate the impact of bank concentration on inefficiency of financial stability. Section IV describes the data and variables for the analysis. Section V shows the main findings while Section VI performs some robustness checks. Finally, Section VII concludes.

II. MEASURING MARKET CONCENTRATION

The literature on the measurement of market concentration considers both structural and non-structural approaches; while the former one – the Structure-Conduct-Paradigm (SCP) - aims at measuring the degree of concentration from the structure of the market, the latter one – New Empirical Industrial Organization (NEIO) - instead, directly assesses the conduct of firms. More specifically, the SCP paradigm, initially developed by Mason (1939) and Bain (1956), uses concentration measures as proxies for competition assuming that banks operating in concentrated markets have higher profits due to monopoly rents (Lloyd-Williams et al. 1994; Berger and Hannan, 1998). The SCP hypothesis argues that bank concentration and other impediments to competition create an environment that affects bank conduct and performance in unfavourable way from a social point of view and aims to explain aspects of the conduct and performance of banks in term of the structural characteristics of the market in which they operate. Three are the main used measures of concentration such as the number of firms (easy to perform but it does not take into account the distribution of firms), the concentration ratios (easy to be performed and limited data demanding) and the Herfindhal-Hirschman Index (requires information on the entire distribution and incorporated each firm individually). On the other hand, the NEIO method is the alternative approach based on the assumption that the conduct of firms in the market is directly observed. Among the main indicators concerning this approach are the Lerner index (it measures the market power by the divergence between the firm's price and its marginal cost), the Panzer-Rosse index (making use of the transmission of input prices on firms' revenues) and lastly the Boone indicator (based on the idea that efficient firms are more highly rewarded in more competitive markets). See Leon (2014) for an exaustive review of each index advantages and shortcomings. The feasible specification for the cost function necessary to the estimation of the indexes proposed by the NEIO approach will probably be different to that of the estimation of the cost efficiency. These market competition indicators are constructed using a Translog formulation and then there is a high probability that are correlated with bank performance. This will probably ease the inconvenience for not calculating the NEIO indicators. Indeed, although the market structure indicators are not necessarily the best proxies of the market power and there are both theoretical reasons and empirical evidence of the weak link between market structure and competition, we follow the SCP approach due to the fact that market concentration indicators calculated through NEIO would be highly correlated with stochastic approach applied in order to measure the impact of bank market concentration on inefficiency of financial stability.

As we are interested in studying the impact of non-linearity of bank market concentration upon inefficiency of financial stability, we build a bank specific market share based on loans (MS_L), which is the main activity of financial institutions (measured at local market - SLL - Sistemi Locali del Lavoro - being a sort of municipality context), as follows:

$$MS_L = \frac{Loans_i}{(Total\ Loans)_k} \tag{1}$$

where (*Total Loans*)$_k$ refers to total bank loans grouped at market level k (in our case local context associated to SLL) because it is reasonable that banks compete with other intermediaries operating in the surrounding areas as indeed might be the municipality. For robustness checks: (a) different financial activities, such as deposits ($MS_D = Deposits_i/(Total\ Deposits)_k$) and total assets ($MS_A = Assets_i/(Total\ Assets)_k$), are also taken into account in order to capture how different bank activities influence our analysis and (b) different relevant markets, such as regional and provincial levels, are taken into account in order to calculate the concentration indicator.

[Table 1 around here]

III. METHODOLOGY

Testing the U-shaped between market concentration and financial stability

By using the technique suggested by Lind and Mehlum (2010), we test the existence of the inverted U-shaped[1] between bank concentration and financial stability. More specifically, we present the test considering both the entire sample of banks and different sub-groups of financial institutions, such as cooperative (CB's) and non-cooperative banks (NO-CB's). Moreover, we check whether a shock, such as financial crisis, influences the shape of this function. The data validates the existence of the U-shaped between bank concentration and financial stability (i.e. we do not reject the H_0: Monotone or U shaped); this test underlines the importance and necessity to take into account the non-linear component when the concentration-stability nexus is investigated. As a consequence of the test, we use both the measure of bank concentration and its square to analyse the relationship between bank concentration and inefficiency of financial stability by employing a recent stochastic frontier technique suggested by Kumbhakar et al. (2014), including in the regression other determinants of financial stability, such as capitalization, bank size and credit insolvency.

Financial stability and bank market concentration: a stochastic frontier approach

We estimate the impact of bank concentration on inefficiency of financial stability using a parametric technique (see Tabak et al. 2012) by applying the recent model suggested by Kumbhakar et al. (2014) which splits the error term into four components: bank fixed effects, time-varying inefficiency, time-invariant inefficiency, and a stochastic component capturing random shocks. This model captures the fact that banks may eliminate certain sources

[1] Lind and Mehlum (2010) tests for the following hypotheses: H_1: Inverse U shape; H_0: Monotone or U shape.

of their short-run inefficiency over time, while other sources may have a more permanent nature. The model is represented by the following set of equations:

$$y_{it} = f_{it}(x_{it}, \beta_{it}) + \varepsilon_{it} \tag{2a}$$

$$\varepsilon_{it} = v_{it} - u_{it} + \alpha_i + E(u_{it}) + \alpha_0^* \tag{2b}$$

$$\alpha_i = \mu_i - \eta_i + E(\eta_i) \tag{2c}$$

$$\alpha_0^* = \alpha_0 - E(\eta_i) - E(u_{it}) \tag{2d}$$

$$v_{it} \sim i.i.d.N(0, \sigma_v^2) \tag{2e}$$

$$u_{it} \sim i.i.d.N^+(\mathrm{z_i}\delta, \sigma_u^2) \tag{2f}$$

$$\mu_i \sim i.i.d.N(0, \sigma_\mu^2) \tag{2g}$$

$$\eta_i \sim i.i.d.N^+(0, \sigma_\eta^2) \tag{2h}$$

where y denotes the output of the $\mathrm{i_{th}}$ bank (in this case the financial stability indicator, i.e. z-score), x_i represents 1xk vector of input, β is kx1 vector of unknown parameters to be estimate, η_i represents persistent inefficiency, u_{it} denotes the short-run inefficiency distributed by each unit as truncation at zero, where z is a (1 x m) vector of exogenous factors associated with technical inefficiency of production of units and δ is a (m x 1) vector of unknown coefficients, μ_i captures bank effects and v_{it} is a stochastic component.

This model is estimated in three steps. Firstly, equation (2a) is estimated using a standard fixed effects estimation. Secondly, time-varying inefficiency u_{it} is obtained. Lastly, persistent inefficiency η_i is estimated (Kumbhakar et al., 2014). More specifically, the translog specification is described as follows:

$$\frac{\widetilde{FS}}{\widetilde{w}_{1.}} = \sum_j \beta_j \tilde{y}_{j.} + \sum_k \gamma_k (\frac{\widetilde{w}_{k.}}{\widetilde{w}_{1.}}) + \tau_1 T + \frac{1}{2}\left[\sum_j \sum_m \beta_{jm} \tilde{y}_{j.} \tilde{y}_{m.} + \sum_k \sum_n \gamma_{kn} (\frac{\widetilde{w}_{k.}}{\widetilde{w}_{1.}}) * (\frac{\widetilde{w}_{n.}}{\widetilde{w}_{1.}}) + \tau_{11} T^2\right] + \sum_j \sum_k \delta_{jk} \tilde{y}_j (\frac{\widetilde{w}_{k.}}{\widetilde{w}_{1.}}) \tag{3}$$

where $\widetilde{FS}$ is the natural logarithm of financial stability calculated using the z-score[2], $\tilde{y}$ are (the natural logs of) output quantities, $\widetilde{w}$ are (the natural logs of) input prices, and T denotes a time trend that captures changes in technology over time. The linear homogeneity in factor prices is guaranteed dividing all input prices and total cost by one input price (in our case labor cost, i.e. $\widetilde{w}_1$). Moreover, the symmetry conditions are also imposed, i.e. $\beta_{jm} = \beta_{mj}$ and $\gamma_{kn} = \gamma_{nk}$.

Since they are mathematically equivalent, the choice of the normalizing variable is innocuous (Restrepo-Tobon and Kumbhakar, 2013, p. 16). The set of parameters in the translog function are estimated using maximum likelihood

[2] As suggested by Roy (1952), the indicator of financial stability corresponds to the inverse of the probability of default and it's considered in literature as one of the main indicators to quantify the financial stability in the banking sector. In other words, it measures the probability of default for a bank or a banking system. This indicator suffers from several limitations (Cihák et al., 2012). Its use is directly correlated to the probability of failure of a bank, occuring when the capital is less than debt. The formulation of z-score is: $z - score = \frac{ETA+ROA}{\sigma_{ROA}}$, where ETA is the level of capitalisation of the bank (i.e. Equity to Total Assets), ROA denotes the ratio between profit and total assets (i.e. Return on Assets) and finally σ_{ROA} is the standard deviation of the ROA in the period analysed. It combines banks' buffers (capital and profits) with the risks they face (measured by the standard deviation of returns). The z-score measures the number of standard deviations a return realization has to fall in order to deplete equity. A higher Z-score implies a lower probability of insolvency, providing a direct measure of stability that is superior to analyzing leverage. Because its skewness, we use a logit transformation of the z-score. Obviously, the standard deviation of ROA is calculated for both cooperative and non-cooperative banks changing over time. Moreover, following the bacon algorithm proposed by Billor et al. (2000), we reduce the influence of outliers, eliminating them in the 0.01 percentile (see also Weber, 2010; Anginer et al. 2014; and Chiaramonte et al. 2015 for an application).

estimator (MLE) that allows us to get a consistent and efficient estimator as suggested by Kumbhakar and Lovell (2000).

As suggested by the recent literature (see Tabak et al. 2012), we include some determinants both in the frontier and inefficiency component. More specifically, we include in the production function the following variables: 1) the value added divided by workers (VAC) in order to control for growth effect, 2) branches density measured as ratio between number of branches and square kilometer (BD) measured at SLL aggregate territorial level, in order to control for the geographical location of branches and as a measure of bank's branch network in a market, 3) population density measured as ratio between total population and square kilometre (PD) in order to control for the relationship between high-low population density environments and financial inclusion and for the possible association with higher deposit depth and lower credit depth (i.e. banks operating in a region with a high population density may have lower expenses) and finally 4) deposits density measured as ratio between number of deposits and square kilometre (DD) as a proxy for the use of banking services. In order to construct BD and DD, we consider SLL-level data for branches and deposits taken from the Bank of Italy dataset (*Bollettino Statistico*), while the information on the population and surface or territorial kilometres are taken from ISTAT dataset.

Furthermore, in the inefficiency component, we control for 1) a competition indicator (MS), 2) banking size measured by the natural logarithm of total assets (TA), 3) bank capitalization measured by the ratio between equity and total assets (ETA), 4) credit risk measured by the ratio between non performing loans and total loans (NPLL) taken in logit transformation (i.e. lNPLL=NPLL/(100-NPLL)), and 5) typology of banks such as cooperative and commercial banks while popular is used as benchmark group (CB, COM and PB). Finally, a time trend is also included. We reduce the heterogeneity in our estimation because our analysis is based on a single country, accounting on cultural, geographical, political and monetary homogeneity. Moreover, the highly detailed spatial stratification enables us to capture the differences between geographical areas, obtaining more accurate estimates.

IV. DATA AND VARIABLES

Data

Data have been collected from BilBank 2000 database distributed by ABI (Associazione Bancaria Italiana) because its large time extension and its rich set of information on bank balance sheets over the 2001-2012 period (see Table 2 for more details on the definition of the variables)[3]. We focus on the Italian context being a promising field of analysis, especially in the European landscape, due to the territorially highly disaggregated data availability, the financial reforms (privatization and Second Banking Directive) occurred after 1990 and the integration of markets.

The sample of banks consists on cooperative, commercial and popular banks[4], a less than other branches of banks located abroad. In particular, we use a sample of Italian banks classified by the Bank of Italy as: major (average funds intermediated more than 65 billion euro), large (average funds intermediated between 27 and 65 billion euro), medium (average funds intermediated between 9 and 27 billion euro), small (average funds intermediated between 1.3 and 9 billion euro) and minor (average funds intermediated less than 1.3 billion euro). In this way, we also take into consideration the different size of financial institutions.

[3] Unfortunately, we do not have information on some of the variables used in the analysis for years before 2001 and after 2012. For this reason, we base our analysis on the 2001-2012 time span. Furthermore, the ABI-dataset is compared with Bankscope-dataset. The debate is in favour of the first because it has some valuable information, such as number of branches and number of workers, necessary to evaluate the input prices for each bank.

[4] The "local" feature of Italian banking market is captured especially considering the cooperative banks (CB's) that operate purely at the local level than other financial institutions. This allows them to take advantage of the close relationship with customers (banking relationship), thus having more information on the degree of insolvency.

Table 3 describes the sample used in the analysis by geographical location, emphasizing the importance of the cooperative banks in the Italian banking scene; indeed, almost 66% of financial institution in our sample is made of cooperative banks, making them very important players and actors in the Italian financial environment.

[Tables 2 and 3 around here]

Variables

According to the calculation of the bank performance, our production set follows the asset model (Sealey and Lindley, 1997), where the output vector (**y**) is composed by: customer loans (y_1), services (administrative) or non – traditional activities (y_2), i.e. commission income and other operating income, and securities (y_3), i.e. bank loans, Treasury bills and similar securities, bonds and other debt less bonds and debt securities held by banks and other financial institutions. Since non-traditional activities play an important role in the banking output, we include a proxy to capture the effect of these activities, as the commission income and other operating income, on bank performance (e.g. Casu et al., 2004; Tortosa - Ausina et al., 2008). Instead, the inputs vector (**x**) consists of the following items: number of workers (x_1), number of branches (x_2) and fundraising (x_3), i.e. total liabilities to customers, amounts owed to banks and debt securities (bonds, certificates of deposit and other securities). The cost vector (**w**) incurred by the credit institutions is composed by: labour cost (w_1) obtained as the ratio of personnel expenses (wages and salaries, social charges, indemnities working, treatment pensions and similar) and number of employees; cost of physical capital (w_2), i.e. ratio of other administrative expenses, value adjustments to tangible and intangible assets and other operating expenses to number of branches and cost of financial capital (w_3), consisting of interest expenses and similar charges and commission expenses over total liabilities (see Table 4 for more details on descriptive statistics on input, input prices and output). On the output side, NO-CB's have a lower value of customer loans (y_1) as well as of the level of services (y_2) and of other loans (y_3). Considering the geographic location, banks located in the Northern regions have a high level of customer loans (y_1), of services (y_2) and of other loans (y_3). The cost of labour (w_1), of the physical (w_2) and financial (w_3) is higher for NO-CB's as well as for banks operating in the Northern regions. NO-CB's have a higher number of workers (x_1), branches (x_2) and a higher level of fundraising (x_3).

[Table 4 around here]

The inclusion of some environmental variables in one stage stochastic frontier is strongly approved in the recent literature (Lozano-Vivas et al., (2002) and Hasan et al., (2009)), especially considering the Italian context (Destefanis et al., (2014) and Barra et al. (2016)). Therefore, in order to explore the role played by the institutional environment associated to the financial characteristics of banks on financial stability, we control for banking size measured by the natural logarithm of total assets (TA), by the level of capitalization measured by equity to total assets (ETA), by a proxy of credit insolvency measured by non performing loans to total loans taken in logit transformation (lnNPLL) and by the typology of financial institutions (cooperative and commercial banks; popular used as benchmark group). Finally, a time trend is also included in order to account for inefficiency change. We rely on a highly disaggregated spatial stratification than enables us to capture the differences between geographical areas, obtaining more accurate estimates and avoiding part of distortion in the estimation. Specifically VAC, BD, PD and DD are not measured at the national or regional level as in previous studies, but at the local level (SLL). For comparison check, notice that there are nowadays in Italy 110 *province* (the NUTS3 category) while 686 SLLs have been identified by the

Italian Statistical Office (ISTAT, 2005) highlighting remarkable differences in economic performance across the Italian territory. SLL-level data for branches, deposits and loans are taken from the Bank of Italy dataset (*Bollettino Statistico*). The other variables useful for our analysis are drawn from BilBank 2000 database distributed by ABI (Associazione Bancaria Italiana). All monetary aggregates are in thousands of deflated 2005 euros. Our sample begins in 2001, because SLL-level data are not available before that year. The test and SFA regressions are carried out with STATA 13.1, respectively.

[Table 5 around here]

CB's are more stable (FS=27.5) and more capitalized (ETA=0.13) than the NO-CB's (FS=9.2, ETA=0.127). According to the competition indicator calculated at local level (i.e. SLL), Northern regions are less concentrated (NE: MS_L=0.355 and NW: MS_L=0.34) than Southern regions (Centre: MS_L=0.49 and South: MS_L=0.62). These differences persist when different levels of market structure are taken into account, even if the percentage of market share decreases because the border that characterized the market is bigger (see Table 1). More specifically, when the provincial level has been taken into account, the market concentration is: 0.156 (NE), 0.106 (NW), 0.17 (Centre) and 0.208 (South); when, instead, the regional level of market has been considered the market concentration is: 0.028 (NE), 0.025 (NW), 0.033 (Centre) and 0.042 (South). Summing up, the concentration indicator for different levels of market structures (i.e. municipality, province and region) and when loan is taken as main financial activity is: NE (0.35, 0.156, 0.028); NW (0.34, 0.106, 0.025); Centre (0.49, 0.17, 0.33); South (0.49, 0.208, 0.042).

With regard to the controls included both in the production frontier and inefficiency component (see Table 5 above), we notice that the Northern regions arise higher level of growth (VAC), higher density of deposits (DD) and lower percentage of credit risk (NPLL) with respect to Southern regions. Moreover, CB's are more capitalized (ETA), but holds less quantity of assets having a lower size (TA) with respect to NO-CB's. In order to have more information on the association between variables used into our analysis, their correlation coefficients are shown in Table 6 below. Boxplots of the financial stability indicator and of market concentration are, instead, shown in Figure 1.

[Table 6 and Figure 1 around here]

V. EMPIRICAL EVIDENCE

Testing the non-linearity between bank concentration and risk-taking

Firstly, by using the technique suggested by Lind and Mehlum (2010), we test the existence of the inverted U-shaped between bank concentration (i.e. $MS_{LOANS,SLL}$) and risk-taking (i.e. z-score), also including time dummies in order to control for the unobservable exogenous effects or any possible shocks presented in the period considered. Table 7a shows the results when the level of concentration associated to bank specific loans has been considered as benchmark; considering the whole sample (Table 7a, Column a), the empirical evidence is in favour of an inverted U-shaped relationship between the market share index and financial stability (we reject the H_0: Monotone or U shape), suggesting that the increase in concentration does not have a linear effect on financial stability. Indeed, the test shows a positive and statistically significant relationship between market share and financial stability while, instead, a negative and statistically significant relationship between the squared market share and financial stability has been found. In other words, at low values of concentration, having more maket power (i.e. increasing the level of concentration in the market) increases financial stability – i.e. banks are less fragile and the market is more stable; at some point, the effect becomes negative and the quadratic shape means that financial stability with respect to the measure of market share is decreasing as concentration increases – i.e. banks are more fragile and the market is less stable. In other words, at already high level of concentration, making the market even more concentrated has detrimental effects on financial stability. In order to take this relationship into account, we use both the market share and the square of market share.

[Table 7a around here]

In order to explore the possible effects of the crisis, we exclude from our initial sample (2001-2012) the financial recession period that took place in 2007 - i.e. taking out years from 2007 onwards (Table 7a, Column b); the financial crisis does not seem to affect the inverted U-shaped relationship between market concentration and financial stability. Moreover, because of the special regulations (i.e. devote at least 70% of annual net profit to legal reserve, pay a share of annual net profits to mutual funds for the promotion and development of cooperation in an amount equal to 3%, devote the remaining share of profits to purposes of charity or mutual aid) cooperative banks cannot maximize profits by choosing an optimal combination of outputs and for this reason they cannot be properly compared with other banks profit-efficiency wise; therefore, we also check whether the different features of financial institutions may influence the above described relationship – i.e. by considering CB's (Table 7a, Columns c and d) and NO-CB's (Table 7a, Columns e and f) separately. Interestingly, results show that the evidence of the inverted U-shaped relationship between market concentration and financial stability is confirmed only for CB's, showing a monotonic relationship, instead, when only NO-CB's are taken into account. In line with the findings provided by Barra and Zotti (2017), this result could be due to the fact that manager of CB's behaves better (in terms of risks) operating in competitive markets than NO-CB's for the following reasons: (i) hold high level of capital used as buffer to bear negative events; (ii) do not maximize the profit (no incentive to operate in concentrate markets); (iii) know the type of borrowers given that hold soft information being in strictly contact with the customers (territorial feature); (iv) do not subject to merger and acquisition processes over time with respect to NO CB's. Overall, CB's don't need to operate in concentrated market since the risks are lower than NO-CB's.

Finally, we also check whether the relationship between market concentration and financial stability changes when other financial activities are taken into account – i.e. measuring the market share index focusing the attention on the level of market power measured in the deposit (Table 7b) and asset (Table 7c) market, and when a different level of disaggregation at which we measure the market share index is considered – i.e. measuring the market share index both at province (Table 7d) and regional (Table 7e) level. The main results are confirmed.

[Tables 7b-7e around here]

Stability inefficiency: the role of market competition

Following equation (3), where the z-score is used as dependent variable in order to capture the role of financial stability, Tables 8a-8e show the results regarding the relationship between market concentration and the inefficiency of financial stability, taking also into account the role played by the size of banks, the level of capitalization and credit insolvency. A negative coefficient means that the corresponding variable is inversely proportional to financial fragility. In other words, a negative coefficient means that the related variable appears to increase stability. On the other hand, instead, a positive coefficient means that the related variable is directly proportional to fragility.

The main results show that the inefficiency of financial stability is U-shaped relationship with respect to the measure of market concentration, showing a negative and statistically significant relationship between inefficiency and market share while, instead, a positive and statistically significant relationship between inefficiency of financial stability and (squared) market share has been found. In other words, the increase in concentration does not lead to a linear change in inefficiency of the financial stability. Indeed, at low values of concentration, increasing the market power lowers the inefficiency of the financial stability – i.e. banks are less fragile and the market is more stable. In other words, concentration has positive effects on financial stability, due to the fact that banks can use profits in order to implement their monitoring and screening processes; as a consequence, banks reduce risks and increase the stability of the market. At some point, the effect becomes positive and the quadratic shape means that the inefficiency of financial stability with respect to the measure of market share is increasing as concentration increases – i.e. banks are more fragile and the market is less stable. In other words, at already high level of concentration, making the market even more concentrated has detrimental effects on financial stability and this result can be due to the fact that banks do not use their profits to implement monitoring and screening processes; then bank would attract all the types of borrowers, where the "bad type" is associated to a high insolvency, decreasing the survival probability. In other words, the bad borrowers will have more incentive to take more risks investing in riskier projects in order to repay the loan and the high interest rates imposed by banks operating in concentrated markets. Then concentration becomes risky, increasing the instability in the financial markets. The U-shaped relationship between market concentration and the inefficiency of financial stability also means that banks operating under low and high concentration levels are more fragile (i.e. higher inefficiency) than those operating under average concentration levels.

To sum up, the empirical evidence seems to support both the "concentration-fragility" view (according to which a high market power is detrimental to the stability of the market system (Beck et al. 2006; Shaeck et al. 2009; Liu et al. 2012; Fiordelisi et al. 2014) at already high level of concentration and the "concentration-stability" view, as at low values of market concentration new entry decrease the probability of failure (Keeley, 1990; Allen and Gale, 2000; 2004; Beck et al. 2006; Matsuoka, 2013).

[Table 8a around here]

Stability inefficiency: the role of bank size, capitalization and credit insolvency

Regarding the determinants associated to the institutional environment and to their effects on financial stability, the empirical evidence shows that the level of capitalization (ETA) is negatively and statistically significant, meaning that the higher is the level of capitalization of financial intermediares, the higher is the financial stability of the system. In other words, the level of capitalization produces a positive effect on stability, increasing survival probability of banks (Repullo, 2004). Indeed, the capital can be used as buffer in order to avoid the incidence of negative shocks, such as financial crises, on the survival probability of financial institutions. This suggests that the level of capitalization is an important tool in order to make financial intermediares less vulnerable to negative events. This finding is consistent with the argument that higher capitalization contributes to alleviate agency problems between managers and shareholders (Mester, 1996), reducing problem loans. Bank size (TA) is also negative and statistically significant meaning that larger banks are engaged in less risk-taking than smaller banks making increasing the efficiency of the financial system as a higher size allows financial institutions to have more resources allocated in order to cover the risks. The credit insolvency (NPLL) variable is, instead, positive and statistically significant meaning that the deterioration in asset quality is found to negatively affect the stability of the financial system. This result is consistent with the notion that after loans become non-performing after being in default, operating costs rise because of the difficulty in dealing with these loans, increasing financial fragility. Finally, the dummy variable for cooperative banks (CB's) is negative and highly statistically significant, meaning that cooperative banks contribute more to improve the efficiency of financial stability with respect to non-cooperative banks. In other words, the cooperative banks are more stable and resilience to negative events (for instance financial crisis) than non-cooperative banks.

We then interact bank size, credit insolvency and capitalization with the measure of market share. Results are presented in Table 8a, Columns B, C, D and E (again the level of concentration associated to bank specific loans has been considered as benchmark). The interaction between market share and the level of capitalization (Table 8a, Column B) is not statistically significant suggesting that high, low and average competition levels do not change the positive effects that the level of capitalization has on the stability inefficiency. Coefficients of the interaction between size and the market share variable as well as between size and the squared term of the market share variable show that the effect of size on financial stability is an inverse U-shaped as a function of the market share indicator (Table 8a, Column C). At low value of concentration, increasing bank size has a positive effect on the inefficiency of stability – i.e. banks are more fragile and the market is less stable. At some point, the effect becomes negative and the quadratic shape means that the inefficiency of financial stability with respect to the interaction between size of banks and market share is decreasing as concentration increases – i.e. banks are less fragile and the market is more stable. This result is in favour of the "concentration-stability" view according to which larger banks in more concentrated markets (i.e. more collusive markets) are more stable. Regarding the interaction between credit insolvency and market share (Table 8a, Column D), results show that the inefficiency of financial stability is U-shaped relationship with respect to the interaction of market share and credit insolvency, showing a negative and statistically significant relationship between inefficiency and the interaction term between market share and credit insolvency.

VI. SENSITIVITY ANALYSIS

The main results are obtained when the level of concentration is measured in the loan market at SLL level – i.e. the market share corresponds to the ratio of bank specific loans to total loans. The first robustness check consists in repeating the empirical analysis focusing the attention on the level of market power measured in the deposit and asset market. More specifically, Table 8b shows the results when the market share index corresponds to the ratio of bank specific deposit to total deposits at SLL level, while Table 8c shows the results when the market share index corresponds to the ratio of banks specific assets to total assets at SLL level. In both cases the main results are confirmed. The empirical evidence shows the U-shaped relationship between the inefficiency of financial stability and the measure of market concentration, confirming that the increase in concentration does not lead to a linear change in inefficiency of financial stability. The level of capitalization (ETA) is still negatively and statistically significant, having the level of capitalization positive effects on stability of the bank system. Bank size (TA) is also confirmed to be inversely proportional to financial fragility, therefore increasing stability. The deterioration in asset quality (NPLL) is again directly proportional to fragility (see Table 8b, Column A1; Table 8c, Column A2). When the interaction between bank size, credit insolvency and capitalization with the measure of market share is taken into account (Table 8b, Columns B1-E1; Table 8c, Columns B2-E2), results confirm that the effect of size on the inefficiency of stability is an inverse U-shaped as a function of the market share indicator; in other words, the interaction between bank size and market share is decreasing as concentration increases making banks less fragile and the market more stable.

As a further robustness check, we also explore whether the level of disaggregation at which we measure the market share index may affect the results. More specifically, in the main analysis, we measure the market share index as the ratio between bank specific loan (deposit or asset) to total bank loans (deposit or asset) grouped at SLL level (i.e. municipality level). In other words, the relevant market has SLL disaggregation. For robustness, we repeat the analysis measuring the market share index both at province (Table 8d, Columns A3-E3) and regional (Table 8e, Columns A4-E4) level. In other words, we assume that banks compete with other intermediaries operating in the same province (PROV) and region (REG)[5]. Table 8d shows the results when the market share index is measured as the ratio between bank specific loan to total bank loans grouped at province level, while Table 8e shows the results when the market share index is measured as the ration between banks loans to total bank loans grouped at regional level. Due to space constraints, we only show the results when the level of concentration is measured in the loan market (results when using the level of concentration in both deposit and asset marker are similar and available on request). In all cases the main results are generally confirmed.

[Tables 8b-8e around here]

VII. CONCLUSIONS AND POLICY IMPLICATIONS

The main aim of the paper is to explore the relationship between market concentration and financial stability of the banking system. We firstly test the existence of a U-shaped relationship between market concentration and financial stability; secondly, we regress the market share indicator on bank risk-taking to underline whether financial stability is affected by increasing or decreasing the market share of banks. Thirdly, we explore whether this relationship is affected by the size, level of capitalization and credit insolvency of banks.

The empirical evidence is in favour of an inverted U-shaped relationship between the market share index and financial stability only for cooperative banks, while a monotonic relationship, instead, has been found when non-cooperative banks have been considered. This result suggests that cooperative banks operating in less concentrated markets might have overall low risk measures; in other words, it seems that cooperative banks behave better (in term of risks) in less concentrated markets. Indeed, cooperative banks hold a high level of capitalization and, due to their mission, do not maximise profits; in other words, their managers have less incentive to operate in concentrated markets. This evidence could be very relevant in term of policy implications when considering the reform of the cooperative banks that took place in Italy from 2016 onwards, aiming at eliminating structural weaknesses in the cooperative banking system. Cooperative banks have been confirmed as important institutions serving local communities; however, it has been asked to each cooperative bank to either join a cooperative banking group or become a commercial bank. More specifically, each cooperative bank is required to join a cooperative banking group as a condition to being authorised by the Bank of Italy to carry out banking businesses; otherwise, for a cooperative bank in order to remain independent from a cooperative banking group, it must be transformed into a commercial bank or transfer its assets to one or more mutual funds for the promotion and development of cooperation. Any cooperative bank which does not either join a cooperative banking group or transform into a commercial bank must be liquidated or wound-up. In other words a call for a more concentrated banking system has been clearly made for the Italian credit system by the Italian government. The reform aimed to reduce the fragmentation of the banking sector, leading to transformations and

[5] In order to provide the reader with more information on the level of disaggregation used in the analysis, in Italy there are 110 province (the NUTS3 category) and 20 regions (the NUTS2 category) while 686 SLLs have been identified by the Italian Statistical Office (ISTAT, 2005).

merging operations that are not supported by our data which, instead, suggest less incentives for cooperative banks to concentrate in order to better perform in term of risks. For a discussion on the benefits and costs of competition and cooperation among cooperative banks see also Coccorese and Ferri (2017) who underline that competition might be helpful in order to expel the least efficient bank from the market even though cooperation might also work in order to improve network economies and relationships between banks.

The empirical evidence also shows that inefficiency of financial stability is U-shaped relationship with respect to the measure of market concentration. Indeed, at low values of market concentration, increasing market power decreases the inefficiency of stability (i.e. the system is more stable). However, as the concentration level of the market increases, then more concentration leads to less stability of the market. Results support the "concentration" fragility view according to which a more collusive banking market increases financial fragility, when market level concentration is already relatively high. Indeed, bank market power in the deposit market induces banks to increase the cost of borrowing for entrepreneurs; their default risk will increase as a consequence of the fact that entrepreneurs are hindered to undertake more risky projects. The higher default risk of entrepreneurs shifts on the financial institutions and weakens bank financial security (Boyd and De Nicolò, 2005). On the other hand, results support also the "concentration-stability" point of view according to which systemic banking crises are less likely to occur when the banking system is more concentrated (Beck et al. 2006) when, instead, the market level concentration is already relatively low. Confirming the evidence produced by Martinez-Miera and Repullo (2010), we find that the "margin" effect dominate in already competitive markets (i.e higher competition increases the fragility of the market) while in very concentrated markets is the "risk shifting" effect to dominate (i.e. higher competition reduces the fragility of the market). Finally, when taking into account the role of capitalisation, size and credit insolvency on the relationship between bank concentration and risk-taking, results show that bank size is the most influential variable on this relationship as we find that the effect of size on financial stability is an inverse U-shaped as a function of the market share indicator. At low value of concentration, increasing bank size has a positive effect on the inefficiency of stability – i.e. banks are more fragile and the market is less stable; at some point, the effect becomes negative meaning that the inefficiency of financial stability with respect to the interaction between size of banks and market share is decreasing as concentration increases – i.e. banks are less fragile and the market is more stable.

Our evidence can help policy makers and regulators taking decisions in order to reduce the instability of the financial market. Indeed, after a certain level of concentration, banks do not have incentive to get more market power as risk-taking and the inefficiency of financial stability will be higher (i.e. the bank will have to cover all the risks in highly concentrated markets). This leads policy makers and regulators to avoid the creation of concentrated market or monopoly that increase the instability. In particular, according to the theoretical prediction of Boyd and De Nicolò (2005), in concentrated markets financial institutions impose higher interest rates. This choice attracts borrowers more risky given that must invest in risky projects in order to repay the loan and the higher interest rates, increasing the instability of financial stability. In fact, banks have to bear a high share of risk that increases the probability of bankruptcy.

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TABLES AND FIGURES

Table 1: Market structure and financial stability

YEAR	$MS_{L,SLL}$	$MS_{L,PROV}$	$MS_{L,REG}$	FS
2001	0.4269	0.1433	0.0146	10.0639
2002	0.4298	0.1448	0.0132	11.5686
2003	0.4455	0.1580	0.0135	18.6420
2004	0.4279	0.1502	0.0127	20.9332
2005	0.4531	0.1586	0.0125	20.9718
2006	0.4453	0.1585	0.0137	24.1359
2007	0.4419	0.1468	0.0140	19.9695
2008	0.4417	0.1524	0.0144	27.0190
2009	0.4395	0.1485	0.0187	30.0540
2010	0.4540	0.1599	0.0217	32.5623
2011	0.4600	0.1583	0.0264	22.2012
2012	0.4627	0.1732	0.0330	18.3441
GEO				
South	0.6237	0.2087	0.0425	23.4498
	[0.3998]	[0.2988]	[0.1178]	[14.4576]
Centre	0.4911	0.1698	0.0332	18.6142
	[0.4167]	[0.2678]	[0.1010]	[12.2785]
N-W	0.3444	0.1061	0.0249	24.1766
	[0.3475]	[0.2166]	[0.0872]	[14.2422]
N-E	0.3556	0.1564	0.0283	16.3582
	[0.3896]	[0.2621]	[0.1064]	[12.9590]
Italy	0.4433	0.1538	0.0316	21.2668
	[0.4003]	[0.2608]	[0.1023]	[14.0351]
CB's	0.4285	0.0829	0.0077	27.4552
	[0.3959]	[0.1776]	[0.0426]	[12.0217]
NO CB's	0.4721	0.2921	0.0781	9.2000
	[0.4072]	[0.3320]	[0.1552]	[8.8888]

Notes: our elaboration. Standard deviation in brackets.

Table 2: Description of the variables

Variables	Symbol	Description
Concentration and Financial Stability		
Market share index (SLL)	$MS_{L,SLL}$	Market share index based on bank specific loans to total loans at SLL level. [a]
Market share index (PROV)	$MS_{L,PROV}$	Market share index based on bank specific loans to total loans at provincial level. [a]
Market share index (REG)	$MS_{L,,REG}$	Market share index based on bank specific loans to total loans at regional level. [a]
Financial Stability	FS	Capitalisation plus return on assets over standard deviation of return on assets.[a]
Determinants of inefficiency		
Size of banks	TA	Log of total assets.[a]
Capitalisation	ETA	Equity to total assets.[a]
Credit risk	NPLL	Non performing loans to total loans.[a]
Type of banks	TYPE	Cooperative and commercial banks dummies; popular used as benchmark group
Controls in the frontier		
Branch density	BD	Number of branches per square kilometre. [b,d]
Population density	PD	Number of inhabitant per square kilometre. [b,d]
Deposit density	DD	Number of deposits per square kilometre. [b,d]
National income	VAC	Value added per workers. [c,d]

Notes: our elaboration.
Source: (a) own calculations upon BilBank 2000 database from ABI; (b) ISTAT (2005); (c) ISTAT (2005) and own calculations from Bureau Van Dijck's AIDA; (d) Bank of Italy (*Bollettino Statistico*).

Table 3: Description of Sample used in the Analysis (2001-2012 period)

	South	Centre	N-W	N-E	Total
CB's	1316	939	2048	732	5035
NO-CB's	489	615	642	851	2597
ITALY	1805	1554	2690	1583	7632

Notes: own elaboration

Table 4. Descriptive Statistics for the inputs, inputs prices and outputs used in the Production Function

	(y_1)	(y_2)	(y_3)	(x_1)	(x_2)	(x_3)	(w_1)	(w_2)	(w_3)
South									
	1000752	565399.4	22933.77	36.70	349	1367943	628	60.33	0.0195
	[9714297]	[5851982]	[188299.2]	[210.75]	[2.585]	[1.21e+07]	[3.171]	[15.77]	[0.0193]
Centre									
	2645613	1032045	67815.09	641.47	790	3301393	2028.12	60.71	0.0239
	[1.18e+07]	[4773043]	[296051.6]	[262.04]	[3.488]	[1.44e+07]	[14920.71]	[17.08]	[0.0215]
N-W									
	1721164	555330.1	40599.75	56.35	546	2019419	756	60.57	0.0222
	[1.09e+07]	[4990619]	[246300.6]	[283.60]	[3.771]	[1.33e+07]	[4.316]	[15.43]	[0.0123]
N-E									
	4241102	2371109	126523	112.80	1283	5961578	3885	66.19	0.0292
	[1.89e+07]	[1.14e+07]	[505172.3]	[446.30]	[5.895]	[2.55e+07]	[1630.15]	[23.97]	[0.0403]
Italy									
	2264396	1035054	59976.01	65.24	704	2948960	1625	61.74	0.0234
	[1.30e+07]	[7027130]	[319877.1]	[308.54]	[4.056]	[1.67e+07]	[10539.01]	[18.09]	[0.0241]
CB's									
	203546	83731.98	3264.213	9.04	69	249918.9	375	60.09	0.0209
	[360719.8]	[160671.1]	[8366.673]	[12.33]	[165]	[442801.1]	[249]	[14.41]	[0.0109]
NO CB's									
	6282893	2890057	170559.6	174.82	1944	8211881	4061	64.95	0.0282
	[2.18e+07]	[1.19e+07]	[532234.7]	[512.27]	[6794.32]	[2.79e+07]	[17850.22	[23.34]	[0.0380]

Source: own calculations upon BilBank 2000 database from ABI (values on average).
Notes: customer loans (y_1), securities and other loans (y_2), services or non-traditional activities (y_3), number of branches (x_1), number of workers (x_2), fundraising (x_3); cost of physical capital (w_1), labour cost (w_2), cost of financial capital (w_3). All variables averaged between 2001 and 2012. All monetary aggregates are in thousands of Euros (at 2005 prices). Standard deviation in brackets.

Table 5. Descriptive Statistics of Variables used in the Analysis

	VAC	BD	DD	PD	ETA	TA	NPLL
South							
	0.0451	0.0766	0.0084	408.1684	0.1333	1946289	0.0250
	[0.0096]	[0.0616]	[0.0091]	[687.8695]	[0.0569]	(1.97e+07]	(0.0198]
Centre							
	0.0508	0.0729	0.0121	341.0445	0.1199	4350311	0.0176
	[0.0072]	[0.0565]	[0.0077]	[335.2338]	[0.0533]	[1.95e+07]	[0.0156]
N-W							
	0.0526	0.0904	0.0122	234.9837	0.1353	2779249	0.0137
	[0.0071]	[0.0662]	[0.0054]	[219.6781]	[0.0544]	[2.08e+07]	[0.0168]
N-E							
	0.0569	0.0580	0.0182	892.9089	0.1251	8144746	0.0132
	[0.0073]	[0.0405]	[0.0135]	[849.1097]	[0.0743]	[3.73e+07]	[0.0166]
Italy							
	0.0513	0.0769	0.0125	431.1484	0.1293	4019072	0.0170
	[0.0087]	[0.0597]	[0.0094]	[596.9964]	[0.0582]	[2.48e+07]	[0.0178]
CB's							
	//	//	//	//	0.1304	338165.7	0.0184
	//	//	//	//	[0.0403]	[628525.5]	[0.0161]
NO-CB's							
	//	//	//	//	0.1271	1.12e+07	0.0143
	//	//	//	//	[0.0825]	[4.18e+07]	[0.0206]

Notes: see Table 1 for more details about the description and construction of variables included in the regression. All variables averaged between 2001 and 2012. All monetary aggregates are in thousands of Euros (at 2005 prices). Standard deviation in brackets.

Table 6: Correlation between variables (2001-2012), Whole sample

	FS	**$MS_{LOANS,SLL}$**	**$MS^2_{LOANS,SLL}$**	**$MS^2_{LOANS,PROV}$**	**$MS^2_{LOANS,PROV}$**	**$MS^2_{LOANS,REG}$**	**$MS^2_{LOANS,REG}$**	**VAC**	**BD**	**DD**	**PD**	**CB**	**COM**	**POP**	**ETA**	**TA**	**NPLL**
FS	1																
$MS_{LOANS,SLL}$	0.0085	1															
	[0.4582]																
$MS2_{LOANS,SLL}$	0.0119	0.9756	1														
	[0.2992]	[0.0000]															
$MS_{LOANS,PROV}$	-0.2052	0.5043	0.4827	1													
	[0.0000]	[0.0000]	[0.0000]														
$MS^2_{LOANS,PROV}$	-0.1734	0.4408	0.4411	0.9572	1												
	[0.0000]	[0.0000]	[0.0000]	[0.0000]													
$MS_{LOANS,REG}$	-0.2237	0.2201	0.1965	0.5096	0.4893	1											
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]												
$MS^2_{LOANS,REG}$	-0.1329	0.1633	0.1578	0.3805	0.3980	0.9193	1										
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]											
VAC	-0.0973	-0.4547	-0.4185	-0.0707	-0.0638	0.0267	0.0267	1									
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0198]	[0.0199]										
BD	0.1768	[0.2369	0.1910	-0.0720	-0.0646	-0.1088	-0.0762	-0.4549	1								
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000									
DD	-0.1948	-0.4149	-0.3548	-0.1153	-0.0907	0.0033	0.0060	0.6380	-0.4905	1							
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.7780]	[0.6081]	[0.0000]	[0.0000]								
PD	-0.2143	-0.3218	-0.2651	-0.0563	-0.0385	0.0139	0.0260	0.4060	-0.4094	0.6763	1						
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0008]	[0.2256]	[0.0237]	[0.0000]	[0.0000]	[0.0000]							
CB	0.6188	-0.0517	-0.0547	-0.3802	-0.3256	-0.3257	-0.1860	-0.2594	0.3154	-0.3202	-0.3263	1					
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]						
COM	-0.6604	-0.0268	-0.0192	0.2731	0.2360	0.2756	0.1580	0.2607	-0.2930	0.3371	0.3240	-0.8807	1				
	[0.0000]	[0.0195]	[0.0953]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]					
POP	0.0225	0.1612	0.1524	0.2502	0.2099	0.1314	0.0737	0.0225	-0.0738	-0.0040	0.0364	-0.3346	-0.1516	1			
	[0.0502]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0500]	[0.0000]	[0.7290]	[0.0015]	[0.0000]	[0.0000]				
ETA	0.3296	-0.0832	-0.0570	-0.1051	-0.0765	-0.1123	-0.0681	-0.0620	0.0607	-0.0480	0.0487	0.0266	-0.0225	-0.0109	1		
	[0.0000]	[0.0000]	[0.0000]	[0.0000	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0203]	[0.0502]	[0.3437]			
TA	-0.1389	0.0720	0.0539	0.2477	0.2296	0.4649	0.4196	0.0898	-0.0947	0.1497	0.1087	-0.2069	0.1811	0.0716	-0.0567	1	
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]		
NPLL	0.0850	0.1036	0.1030	0.0309	0.0288	0.0095	0.0165	-0.1349	-0.0129	-0.0726	-0.0827	0.1056	-0.1339	0.0461	-0.0834	-0.0056	1
	[0.0000]	[0.0000]	[0.0000]	[0.0070]	[0.0120]	[0.4063]	[0.1502]	[0.0000]	[0.2672]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0001]	[0.0000]	[0.6264]	

Notes: own elaboration; p-value in brackets;

Table 7a. Testing inverted U-shaped of financial stability and market concentration (SLL as relevant market)

	(a)	(b)	(c)	(d)	(e)	(f)
	ALL BANKS ALL PERIOD	**ALL BANKS PRE CRISIS**	**ONLY CB's ALL PERIOD**	**ONLY CB's PRE CRISIS**	**ONLY NO CB's ALL PERIOD**	**ONLY NO CB's PRE CRISIS**
$\mathbf{MS_{LOANS,\ SLL}}$	**3.714*** **	**5.176*** **	**4.384*** **	**6.406*** **	**0.516*** **	**0.921*** **
	[0.110]	[0.148]	[0.116]	[0.175]	[0.155]	[0.198]
$\mathbf{MS^2_{LOANS,SLL}}$	**-3.049*** **	**-4.271*** **	**-3.613*** **	**-5.298*** **	-0.000583	-0.356
	[0.109]	[0.150]	[0.115]	[0.177]	[0.154]	[0.198]
Time dummies	YES	YES	YES	YES	YES	YES
Shaped	Inverted U	Inverted U	Inverted U	Inverted U	Monotonic	Monotonic
Turning point	0.6089	0.6059	0.6067	0.6045	//	//
p-value	0.00	0.00	0.00	0.00	//	//
t-value	21.06	21.18	24.01	22.37	//	//
$ln\alpha$						
Constant	-0.277***	-0.0736***	-0.671***	-0.166***	-0.848***	-0.886***
	[0.0178]	[0.0223]	[0.0261]	[0.0283]	[0.0343]	[0.0473]
N	7596	4567	5005	3063	2576	1504

Notes: Lind and Mehlum (2010) tests for the following hypotheses: H1: Inverse U shape; H0: Monotone or U shape; Standard errors in brackets;; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$;

Table 7b. Testing inverted U-shaped of financial stability and market concentration (SLL as relevant market)

	(a)	(b)	(c)	(d)	(e)	(f)
	ALL BANKS ALL PERIOD	**ALL BANKS PRE CRISIS**	**ONLY CB's ALL PERIOD**	**ONLY CB's PRE CRISIS**	**ONLY NO CB's ALL PERIOD**	**ONLY NO CB's PRE CRISIS**
$\mathbf{MS_{DEPOSITS,\ SLL}}$	**3.930*** **	**5.362*** **	**4.507*** **	**6.493*** **	**0.622*** **	**1.007*** **
	[0.108]	[0.145]	[0.114]	[0.168]	[0.157]	[0.198]
$\mathbf{MS^2_{DEPOSITS,SLL}}$	**-3.243*** **	**-4.435*** **	**-3.706*** **	**-5.354*** **	-0.108	**-0.448***
	[0.107]	[0.147]	[0.112]	[0.171]	[0.156]	[0.199]
Time dummies	YES	YES	YES	YES	YES	YES
Shaped	Inverted U	Inverted U	Inverted U	Inverted U	Monotonic	Monotonic
Turning point	0.606	0.604	0.608	0.603	//	//
p-value	0.00	0.00	0.00	0.00	//	//
t-value	23.03	22.65	25.27	23.35	//	//
$ln\alpha$						
Constant	**-0.291*** **	**-0.0972*** **	**-0.689*** **	**-0.199*** **	**-0.847*** **	**-0.885*** **
	[0.0178]	[0.0223]	[0.0260]	[0.0283]	[0.0342]	[0.0473]
N	7596	4570	5008	3066	2574	1504

Notes: Lind and Mehlum (2010) tests for the following hypotheses: H1: Inverse U shape; H0: Monotone or U shape; Standard errors in brackets;; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$;

Table 7c. Testing inverted U-shaped of financial stability and market concentration (SLL as relevant market)

	(a)	(b)	(c)	(d)	(e)	(f)
	ALL BANKS ALL PERIOD	**ALL BANKS PRE CRISIS**	**ONLY CB's ALL PERIOD**	**ONLY CB's PRE CRISIS**	**ONLY NO CB's ALL PERIOD**	**ONLY NO CB's PRE CRISIS**
$\mathbf{MS_{ASSETS,\ SLL}}$	**3.805*** **	**5.267*** **	**4.487*** **	**6.472*** **	**0.429****	**0.853*** **
	[0.109]	[0.146]	[0.115]	[0.170]	[0.156]	[0.200]
$\mathbf{MS^2_{ASSETS,SLL}}$	**-3.126*** **	**-4.348*** **	**-3.698*** **	**-5.347*** **	0.0803	-0.295
	[0.108]	[0.148]	[0.113]	[0.173]	[0.155]	[0.200]
Time dummies	YES	YES	YES	YES	YES	YES
Shaped	Inverted U	Inverted U	Inverted U	Inverted U	Monotonic	Monotonic
Turning point	0.608	0.606	0.607	0.605	//	//
p-value	0.00	0.00	0.00	0.00	//	//
t-value	21.84	21.91	24.98	23.07	//	//
$ln\alpha$						
Constant	**-0.280*** **	**-0.0836*** **	**-0.681*** **	**-0.188*** **	**-0.846*** **	**-0.882*** **
	[0.0177]	[0.0223]	[0.0260]	[0.0283]	[0.0343]	[0.0473]
N	7596	4570	5008	3066	2574	1504

Notes: Lind and Mehlum (2010) tests for the following hypotheses: H1: Inverse U shape; H0: Monotone or U shape; Standard errors in brackets;; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$;

Table 7d. Testing inverted U-shaped of financial stability and market concentration (PROV as relevant market)

	(a)	(b)	(c)	(d)	(e)	(f)
	ALL BANKS ALL PERIOD	**ALL BANKS PRE CRISIS**	**ONLY CB's ALL PERIOD**	**ONLY CB's PRE CRISIS**	**ONLY NO CB's ALL PERIOD**	**ONLY NO CB's PRE CRISIS**
$MS_{LOANS, PROV}$	**1.883*** **	**4.221*** **	**4.644*** **	**9.068*** **	**1.115*** **	**1.158*** **
	[0.149]	[0.227]	[0.205]	[0.382]	[0.158]	[0.205]
$MS^2_{LOANS,PROV}$	**-2.287*** **	**-4.599*** **	**-4.635*** **	**-9.139*** **	**-0.867*** **	**-0.913*** **
	[0.167]	[0.257]	[0.231]	[0.422]	[0.175]	[0.229]
Time Dummies	YES	YES	YES	YES	YES	YES
Shaped	Inverted U	Inverted U	Inverted U	Inverted U	Inverted U	Inverted U
Turning point	0.4115	0.4588	0.5009	0.4961	0.6431	0.6336
p-value	0.00	0.00	0.00	0.00	0.00	0.006
t-value	12.66	16.48	16.88	18.62	3.05	2.51
$ln\alpha$						
Constant	**-0.179*** **	**0.178*** **	**-0.511*** **	**0.198*** **	**-0.804*** **	**-0.829*** **
	[0.0188]	[0.0227]	[0.0287]	[0.0282]	[0.0340]	[0.0472]
N	7599	4570	5008	3066	2576	1504

Notes: Lind and Mehlum (2010) tests for the following hypotheses: H1: Inverse U shape; H0: Monotone or U shape; Standard errors in brackets;; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$;

Table 7e. Testing inverted U-shaped of financial stability and market concentration (REG as relevant market)

	(a)	(b)	(c)	(d)	(e)	(f)
	ALL BANKS ALL PERIOD	**ALL BANKS PRE CRISIS**	**ONLY CB's ALL PERIOD**	**ONLY CB's PRE CRISIS**	**ONLY NO CB's ALL PERIOD**	**ONLY NO CB's PRE CRISIS**
$MS_{LOANS, REG}$	**-3.580*** **	-0.891	**18.92*** **	**75.69*** **	0.0853	0.250
	[0.287]	[0.512]	[1.790]	[4.079]	[0.248]	[0.346]
$MS^2_{LOANS,REG}$	**3.217*** **	-0.134	**-19.93*** **	**-96.40*** **	-0.178	-0.697
	[0.415]	[0.766]	[1.813]	[5.144]	[0.352]	[0.518]
Time dummies	YES	YES	YES	YES	YES	YES
Shaped	Inverted U	Monotonic	Inverted U	Inverted U	Inverted U	Inverted U
Turning point	0.5563	//	0.4747	0.3925	0.2391	0.1797
p-value	0.00	//	0.00	0.00	0.36	0.23
t-value	4.96	//	10.57	18.56	0.34	0.72
$ln\alpha$						
Constant	**-0.236*** **	**0.188*** **	**-0.467*** **	**0.300*** **	**-0.783*** **	**-0.824*** **
	[0.0195]	[0.0237]	[0.0302]	[0.0274]	[0.0340]	[0.0477]
N	7599	4570	5008	3066	2576	1504

Notes: Lind and Mehlum (2010) tests for the following hypotheses: H1: Inverse U shape; H0: Monotone or U shape; Standard errors in brackets;; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$;

Table 8a. SFA Regressions to estimate the relationship between financial stability, market concentration and other determinants

	(A)	(B)	(C)	(D)	(E)
Determinants of inefficiency of financial stability					
CB's	**-3.821****	**-3.745****	**-4.409***	**-3.855****	**-3.962***
	[1.438]	[1.418]	[1.806]	[1.448]	[1.637]
NO CB's	**1.313*****	**1.309*****	**1.676*****	**1.274*****	**1.592*****
	[0.285]	[0.293]	[0.362]	[0.282]	[0.346]
ln(TA)	**-0.0497***	**-0.0513***	**-0.0803****	**-0.0424***	**-0.0720****
	[0.0212]	[0.0223]	[0.0270]	[0.0210]	[0.0256]
ETA	**-0.831***	**-0.693***	**-0.905***	**-0.803***	**-0.816***
	[0.366]	[0.347]	[0.400]	[0.354]	[0.377]
lNPLL	**0.0540*****	**0.0536*****	**0.0543*****	**0.0605*****	**0.0574*****
	[0.0134]	[0.0134]	[0.0135]	[0.0143]	[0.0139]
$MS_{LOANS,SLL}$	**-4.235*****	-3.033	**-40.14*****	**-15.74****	**-48.34*****
	[1.211]	[1.769]	[11.57]	[5.424]	[13.67]
$MS^2_{LOANS,SLL}$	**2.492****	2.012	**41.47*****	**15.25****	**54.13*****
	[0.784]	[1.808]	[12.05]	[5.361]	[14.98]
$MS_{LOANS,SLL}$*ETA		-11.53			13.58
		[16.49]			[12.98]
$MS^2_{LOANS,SLL}$*ETA		5.318			-25.90
		[17.46]			[14.88]
$MS_{LOANS,SLL}$*lnTA			**2.327*****		**2.217*****
			[0.671]		[0.629]
$MS^2_{LOANS,SLL}$*lnTA			**-2.562*****		**-2.597*****
			[0.746]		[0.740]
$MS_{LOANS,SLL}$*lnNPLL				**-1.228***	**-0.928***
				[0.484]	[0.416]
$MS^2_{LOANS,SLL}$*lnNPLL				**1.384****	**1.041***
				[0.519]	[0.446]
Log likelihood	3617.8611	3621.612	3662.0035	3633.7525	3679.697
Wald	123102.97	122505.54	125654.18	121951.98	124217.37
σ_U					
Constant	**-1.252*****	**-1.242*****	**-1.118*****	**-1.256*****	**-1.168*****
	(-4.54)	(-4.44)	(-4.09)	(-4.61)	(-4.24)
σ_V					
Constant	**-4.356*****	**-4.362*****	**-4.349*****	**-4.351*****	**-4.352*****
	(-93.90)	(-93.88)	(-91.39)	(-93.71)	(-93.26)
N	7327	7327	7327	7327	7327

Notes: Logit tranformation of FS: lnFS=ln(1+(FS/100)); Logit tranformation of NPLL: lNPLL=ln(1+(NPLL/100)); Standard errors in brackets; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8b. SFA Regressions to estimate the relationship between financial stability, market concentration and other determinants

	(A1)	(B1)	(C1)	(D1)	(E1)
Determinants of inefficiency of financial stability					
CB's	**-3.779****	**-3.736****	**-3.994***	**-3.793****	**-3.705***
	[1.432]	[1.425]	[1.617]	[1.454]	[1.519]
NO CB's	**1.334*****	**1.313*****	**1.600*****	**1.327*****	**1.578*****
	[0.286]	[0.288]	[0.339]	[0.283]	[0.330]
lnTA	**-0.0520***	**-0.0506***	**-0.0734****	**-0.0502***	**-0.0725****
	[0.0211]	[0.0218]	[0.0246]	[0.0210]	[0.0238]
ETA	**-0.821***	**-0.799***	**-0.844***	**-0.808***	**-0.910***
	[0.372]	[0.370]	[0.388]	[0.369]	[0.400]
lNPLL	**0.0561*****	**0.0556*****	**0.0566*****	**0.0570*****	**0.0534*****
	[0.0139]	[0.0139]	[0.0141]	[0.0150]	[0.0145]
$MS_{DEPOSITS,SLL}$	**-4.340*****	**-4.799****	**-32.38****	-7.080	**-38.00****
	[1.193]	[1.850]	[10.02]	[6.998]	[12.49]
$MS^2_{DEPOSITS,SLL}$	**2.551*****	**3.696***	**34.77*****	6.599	**45.81*****
	[0.774]	[1.774]	[10.53]	[6.968]	[13.91]
$MS_{DEPOSITS,SLL}$*ETA		4.317			**33.16***
		[12.76]			[15.55]
$MS^2_{DEPOSITS,SLL}$*ETA		-10.12			**-46.51***
		[14.45]			[18.33]
$MS_{DEPOSITS,SLL}$*lnTA			**1.857****		**2.012****
			[0.587]		[0.630]
$MS^2_{DEPOSITS,SLL}$*lnTA			**-2.166****		**-2.540*****
			[0.659]		[0.756]
$MS_{DEPOSITS,SLL}$*lnNPLL				-0.300	0.0159
				[0.744]	[0.679]
$MS^2_{DEPOSITS,SLL}$*lnNPLL				0.460	0.0793
				[0.744]	[0.675]
Log likelihood	3626.8218	3628.9841	3657.928	3633.2047	3673.95
Wald	126464.79	125858.85	127041.90	123818.10	125072.37
σ_U					
Constant	**-1.250*****	**-1.252*****	**-1.167*****	**-1.250*****	**-1.201*****
	[0.276]	[0.277]	[0.278]	[0.277]	[0.284]
σ_V					
Constant	**-4.350*****	**-4.354*****	**-4.350*****	**-4.346*****	**-4.352*****
	[0.0460]	[0.0464]	[0.0468]	[0.0461]	[0.0459]
N	7325	7325	7325	7325	7325

Notes: Logit tranformation of FS: lnFS=ln(1+(FS/100)); Logit tranformation of NPLL: lNPLL=ln(1+(NPLL/100)); Standard errors in brackets; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8c. SFA Regressions to estimate the relationship between financial stability, market concentration and other determinants

	(A2)	(B2)	(C2)	(D2)	(E2)
Determinants of inefficiency of financial stability					
CB's	**-3.659***	**-3.546***	**-4.389***	**-3.548****	**-3.908***
	[1.423]	[1.401]	[1.822]	[1.357]	[1.625]
NO CB's	**1.400*****	**1.410*****	**1.945*****	**1.353*****	**1.858*****
	[0.300]	[0.312]	[0.436]	[0.290]	[0.410]
lnTA	**-0.0598****	**-0.0633****	**-0.105****	**-0.0501***	**-0.0947****
	[0.0225]	[0.0242]	[0.0334]	[0.0218]	[0.0310]
ETA	**-0.823***	-0.654	**-0.922***	**-0.802***	**-0.885***
	[0.383]	[0.361]	[0.440]	[0.371]	[0.421]
lNPLL	**0.0571*****	**0.0560*****	**0.0578*****	**0.0647*****	**0.0614*****
	[0.0149]	[0.0149]	[0.0149]	[0.0163]	[0.0155]
$MS_{ASSETS,SLL}$	**-3.234*****	-1.883	**-42.24*****	-9.976	**-46.56*****
	[0.924]	[1.792]	[11.72]	[5.240]	[12.79]
$MS^2_{ASSETS,SLL}$	**1.589****	0.728	**43.23*****	9.355	**51.32*****
	[0.554]	[1.810]	[12.17]	[5.193]	[13.92]
$MSD_{ASSETS,SLL}$*ETA		-12.85			13.42
		[18.31]			[12.13]
$MS^2_{ASSETS,SLL}$*ETA		8.795			-23.10
		[18.32]			[13.20]
$MS_{ASSETS,SLL}$*lnTA			**2.533*****		**2.450*****
			[0.705]		[0.666]
$MS^2_{ASSETS,SLL}$*lnTA			**-2.743*****		**-2.785*****
			[0.776]		[0.773]
$MS_{ASSETS,SLL}$*lnNPLL				-0.748	-0.484
				[0.531]	[0.413]
$MS^2_{ASSETS,SLL}$*lnNPLL				0.866	0.575
				[0.547]	[0.434]
Log likelihood	3601.9822	3604.7771	3661.0394	3610.6533	3670.737
Wald	128652.77	127467.98	130247.75	127610.44	129379.05
σ_U					
Constant	**-1.253*****	**-1.247*****	**-1.069*****	**-1.279*****	**-1.125*****
	[0.289]	[0.294]	[0.280]	[0.283]	[0.280]
σ_V					
Constant	**-4.360*****	**-4.365*****	**-4.356*****	**-4.360*****	**-4.362*****
	[0.0464]	[0.0466]	[0.0467]	[0.0462]	[0.0459]
N	7325	7325	7325	7325	7325

Notes: Logit tranformation of FS: lnFS=ln(1+(FS/100)); Logit tranformation of NPLL: lNPLL=ln(1+(NPLL/100)); Standard errors in brackets; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8d. SFA Regressions to estimate the relationship between financial stability, market concentration and other determinants

	(A3)	(B3)	(C3)	(D3)	(E3)
Determinants of inefficiency of financial stability					
CB's	**-3.768***	**-3.894***	**-4.905***	**-3.967***	-0.352
	[1.537]	[1.621]	[2.069]	[1.595]	[0.480]
NO CB's	**1.686*****	**1.699*****	**2.187*****	**1.612*****	**1.653*****
	[0.377]	[0.397]	[0.497]	[0.367]	[0.370]
ln(TA)	**-0.0913****	**-0.0963****	**-0.130*****	**-0.0801****	**-0.0968****
	[0.0295]	[0.0318]	[0.0395]	[0.0286]	[0.0316]
ETA	**-1.093***	-0.852	**-1.273***	**-1.099***	-0.575
	[0.490]	[0.445]	[0.568]	[0.482]	[0.336]
lNPLL	**0.0733*****	**0.0735*****	**0.0724*****	**0.0835*****	**0.0390****
	[0.0198]	[0.0204]	[0.0193]	[0.0213]	[0.0130]
$MS_{LOANS,PROV}$	**-4.733****	-1.083	**-55.94****	**-19.04***	-11.30
	[1.679]	[2.582]	[17.52]	[8.226]	[6.702]
$MS^2_{LOANS,PROV}$	**2.914***	0.841	**52.12****	14.96	13.51
	[1.183]	[2.899]	[16.90]	[8.299]	[7.210]
$MS_{LOANS,PROV}$*ETA		-35.99			0.349
		[30.56]			[7.776]
$MS^2_{LOANS,PROV}$*ETA		19.90			-4.212
		[31.01]			[9.733]
$MS_{LOANS,PROV}$*lnTA			**3.253****		0.563
			[1.005]		[0.353]
$MS^2_{LOANS,PROV}$*lnTA			**-3.147****		-0.770
			[1.012]		[0.395]
$MS_{LOANS,PROV}$*lnNPLL				**-1.493***	-0.167
				[0.730]	[0.252]
$MS^2_{LOANS,PROV}$*lnNPLL				1.249	0.0912
				[0.816]	[0.311]
Log likelihood	3551.5248	3559.2153	3609.5335	3564.7314	2779.95
Wald	129922.15	129463.97	131175.89	127376.48	142037.52
σ_U					
Constant	**-1.122*****	**-1.093*****	**-0.943****	**-1.103*****	**-1.599*****
	[0.317]	[0.327]	[0.311]	[0.314]	[0.308]
σ_V					
Constant	**-4.368*****	**-4.364*****	**-4.367*****	**-4.369*****	**-4.202*****
	[0.0479]	[0.0491]	[0.0478]	[0.0486]	[0.0428]
N	7325	7325	7325	7325	7325

Notes: Logit tranformation of FS: lnFS=ln(1+(FS/100)); Logit tranformation of NPLL: lNPLL=ln(1+(NPLL/100)); Standard errors in brackets; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8e. SFA Regressions to estimate the relationship between financial stability, market concentration and other determinants

	(A4)	(B4)	(C4)	(D4)	(E4)
Determinants of inefficiency of financial stability					
CB's	**-3.560***	-3.509	**-4.044***	**-3.773***	**-3.974***
	[1.813]	[1.811]	[1.879]	[1.854]	[1.873]
NO CB's	**2.519*****	**2.503*****	**2.889*****	**2.500*****	**2.764*****
	[0.686]	[0.683]	[0.708]	[0.671]	[0.699]
ln(TA)	**-0.176****	**-0.176****	**-0.194****	**-0.170****	**-0.185****
	[0.0591]	[0.0591]	[0.0624]	[0.0575]	[0.0582]
ETA	**-1.469***	**-1.389***	**-1.697***	**-1.581***	**-1.661***
	[0.720]	[0.706]	[0.762]	[0.741]	[0.748]
lNPLL	**0.0949****	**0.0937****	**0.0927*****	**0.106****	**0.0974*****
	[0.0323]	[0.0323]	[0.0263]	[0.0342]	[0.0288]
$MS_{LOANS,REG}$	**-5.766***	-2.932	**-110.2****	**-31.65***	**-126.8****
	[2.421]	[6.699]	[37.40]	[14.06]	[45.65]
$MS^2_{LOANS,REG}$	**6.015***	2.775	**146.6****	26.48	**162.6****
	[2.555]	[7.957]	[50.55]	[14.34]	[60.72]
$MS_{LOANS,REG}$*ETA		-27.40			-16.23
		[68.94]			[33.20]
$MS^2_{LOANS,REG}$*ETA		31.66			14.63
		[83.25]			[46.07]
$MS_{LOANS,REG}$*lnTA			**6.451****		**6.196****
			[2.174]		[2.122]
$MS^2_{LOANS,REG}$*lnTA			**-8.791****		**-8.334****
			[3.038]		[2.934]
$MS_{LOANS,REG}$*lnNPLL				**-2.708***	**-2.375***
				[1.276]	[1.124]
$MS^2_{LOANS,REG}$*lnNPLL				2.077	2.620
				[1.334]	[1.682]
Log likelihood	3486.2636	3486.6386	3547.0663	3499.5561	3556.5978
Wald	138107.78	137358.01	144879.68	136435.95	135377.26
σ_U					
Constant	**-0.971***	**-0.979***	**-0.889****	**-0.936***	**-0.912****
	[0.390]	[0.394]	[0.341]	[0.380]	[0.350]
σ_V					
Constant	**-4.375*****	**-4.374*****	**-4.391*****	**-4.380*****	**-4.390*****
	[0.0496]	[0.0502]	[0.0480]	[0.0492]	[0.0497]
N	7325	7325	7325	7325	7325

Notes: Logit tranformation of FS: lnFS=ln(1+(FS/100)); Logit tranformation of NPLL: lNPLL=ln(1+(NPLL/100)); Standard errors in brackets; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 1 – Boxplots of financial stability and of market concentration by macro-areas