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Are Banks Less Likely to Issue Equity When They Are Less Capitalized?*

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Abstract

Debt overhang and moral hazard related to risk-shifting opportunities predict that low capitalized banks have a lower likelihood to issue equity. In contrast to this view, for an international sample of bank Seasoned Equity Offerings (SEOs), we show that the likelihood of issuing an SEO is generally higher in low capitalized banks. We provide a series of tests exploring the variation of capital regulation, systemic conditions and market discipline to understand the driving forces behind this result. We find that market mechanisms rather than capital regulation are the primary, key driver of the decision to issue by low capitalized banks.

JEL Classification: G21, G28, G32
Keywords: SEOs, Banking Regulation, Banking Crises, Counter-cyclical capital regulation

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I. Introduction

Bank capital is essential to ensure bank survival and safeguard financial stability (Berger and Bouwman, 2013; Diamond and Rajan, 2000). Among the different options that banks can pursue to preserve their capital adequacy, raising equity in the stock market appears an effective and timely solution that allows the re-adjusting of leverage without generating the negative systemic effects of de-leveraging strategies implemented via asset sales. Nevertheless, it is a widely held view that numerous disincentives discourage banks to opt for this solution (Acharya et al., 2011; Coates and Scharfstein, 2009; Khan and Vyas, 2014; Krishnan et al., 2010; Squam Lake Working Group, 2009). The disincentives are normally motivated as the outcome of the interplay of two arguments.

A first argument rests its theoretical foundations on the debt overhang framework proposed by Myers (1977). Banks, as other companies, are unwilling to issue equity because creditors and claimants senior to common shareholders would capture a portion of the benefits of new equity while the claim of the existing shareholders will be diluted (Acharya et al., 2011; Admati et al., 2012; Coates and Scharfstein, 2009). As the benefits for debt-holders are higher when equity capital is low, the disincentives to issue equity become especially pronounced in high leverage firms as banks (Admati et al., 2012). A second argument posits that in the banking industry the disincentives to issue equity are further exacerbated by the presence of risk-shifting opportunities for shareholders due to the expectation to receive government support when banks are unable to re-pay their debts (Gornall and Strebulaev, 2013). Essentially, the government support reduces the probability of a bankruptcy and increases the potential losses for shareholders produced by an equity issuance.

The theoretical arguments discussed above imply, therefore, that low capitalized banks have a lower likelihood to issue equity and this is particularly the case when the expectation to receive an

external public support increases, such as during systemic crises that raise public concerns over the systemic effects of bank failures (Gropp et al., 2014). It follows that low capitalized banks might prefer to remain under prolonged conditions of undercapitalization with adverse effects for economic growth and financial stability. Hence, the identification of factors that moderate the disincentives of low capitalized banks to raise equity becomes of critical importance for regulators and policy makers.

In this respect, the banking literature suggests that at least two factors might reduce the reluctance of low capitalized banks to raise equity (see for instance Admati et al., 2012; Dahl and Shrieves, 1990; Erkens et al., 2012). The first is the regulatory pressure to comply with capital requirements that should induce banks to issue equity when the low degree of capital strength signals a low regulatory capital adequacy. The second is the presence of market discipline that might force low capitalized banks to raise equity when they are closer to the default point - independently from their degree of capital strength according to regulatory standards.

In this paper, we evaluate the importance of bank undercapitalization - as a source of debt overhang and moral hazard problems - on the decision to issue equity and test whether capital requirements and market discipline are effective mechanisms in reducing the disincentives of banks to raise equity in the stock market during normal and systemic distress periods. To this end, we present the first study on the determinants and timing of Seasoned Equity Offerings (SEOs) in the banking industry. In conducting our analysis we account for the possibility that the strength of the incentives and disincentives to issue equity varies with the degree of systemic stability by explicitly controlling for times of systemic distress. More specifically, the eruption of a systemic shock does

not simply increase risk-shifting opportunities for shareholders, via an increase in the likelihood of a state intervention to stabilize the banking system, but also influences the effectiveness of market discipline. In other words, while during conditions of systemic distress the need to comply with capital requirements remains, market discipline is expected to be undermined by a lower sensitivity of bank creditors to fundamentals (Hasan et al., 2013; Levy-Yeyati et al., 2004; Martinez-Peria and Schmukler, 2001), also motivated by the increasing value of implicit and explicit government guarantees that occurs when a systemic shock materializes (Acharya et al., 2013; Balasubramnian and Cyree, 2011; Hett and Schmidt, 2013). As a result, market discipline might work as an incentive device for low capitalized banks only during normal systemic conditions.

We build our analysis on a large international sample of banks operating in the G20 countries and selected for an extensive time period ranging from the beginning of 1993 to the first half of 2011. We opt for an international sample of banks for three, key reasons. [3] First, the international dimension of the sample offers the opportunity to assess the importance of pressures stemming from capital requirements on equity issuance via the numerous events of capital regulation changes at the national level observed in our sample. We use these fairly exogenous changes in the required regulatory capital level as quasi-natural experiments to study, via a difference-in-differences approach, how banks react to changes in regulatory pressure. Second, we exploit cross-country differences in systemic conditions and link the timing of bank SEOs to episodes of banking system

[3] Notably, even though our sample includes a large share of US banks, the results are not driven by the peculiarities of these banks: all results are qualitatively confirmed on subsamples consisting of only non-US banks.

distress. This allows us to explore how the behavior of low capitalized banks varies under different systemic conditions; namely, how the sources of incentives and disincentives to issue equity are affected by the degree of systemic stability. Furthermore, the above analysis offers in particular the opportunity to provide evidence on how banks manage their capital strength during periods of systemic distress. We believe that this is particularly relevant because of the pivotal role played by capital to ensure bank survival and, consequently, reduce the risk of negative spillovers on the rest of the financial system (Berger and Bouwman, 2013). Third, the cross-country dimension of the sample gives us the opportunity to provide further evidence on the role played by market discipline on the decision to issue an SEO during normal and distress periods by focusing on a sufficiently large number of weakly capitalized banks for which market discipline can be ineffective since they might be qualified as having a too-big-to-fail status.

The results presented here show that SEOs are more likely to be implemented by low capitalized banks and that the decision to issue is primarily motivated by market forces rather than capital regulation. More precisely, the point of departure of our econometric analysis is a standard corporate finance model on the SEO determinants of non-financial firms (as in De Angelo et al., 2010). We extend this model to control for bank-specific characteristics, the regulatory environment, as well as the degree of competition in the domestic banking sector, a country fiscal's capacity and the degree of systemic stability. Estimating this model, we find evidence of a significantly higher likelihood to issue equity by banks with a low capital strength suggesting that debt overhang and the moral hazard related to risk-shifting opportunities do not normally play a dominant role on equity issuance in the

banking industry. This result holds when we change the definition of weakly capitalized banks, the model specification, the estimation period and the estimation method.

In a next step we explore whether the result that low capitalized banks are more likely to issue is mainly driven by capital regulation. We present several novel tests on the role of capital requirements on equity issuance complementing, therefore, the banking studies that have normally focused on the impact of regulation focusing on bank capital structure (see for instance Gropp and Heider, 2010; Flannery and Rangan, 2008). We explore the role of regulation in two steps. Initially, we disentangle the role of capital requirements from the influence of other incentives to issue by investigating the different behavior of regulatory constrained banks (defined as banks with an extremely low regulatory capital buffer) and regulatory unconstrained banks. We show that low capitalized banks are more likely to issue equity especially when they are not regulatory constrained and are then unlikely to be under the pressure of regulators.

Next, we examine the role of regulation by employing the changes in capital regulation as quasi-natural experiments. We estimate difference-in-differences models to assess how these changes in regulation, which represent fairly exogenous changes in the required capital level, affect the banks' decision to issue capital. Our prior is that if capital requirements are a key driver of equity issuance by banks, we should observe that SEOs becomes more frequent in periods of increases in minimum capital requirements and especially in low capitalized banks. We find that regulatory changes have no effect on the probability of low capitalized banks and a positive effect on the probability of the remaining banks to issue equity. We interpret the finding that low capitalized banks are not further affected by the regulatory change as an indication of the limited role that regulatory pressure plays

on the decision of these banks to raise equity and as a confirmation of the importance of market pressure on this decision. We motivate this interpretation by the fact that since low capitalized banks are already under market pressure to issue even prior to the implementation of the regulatory change, this change has no further impact on their SEO probability; hence the insignificant marginal effect of the regulatory change on the probability that low capitalized banks issue SEOs. By contrast, if regulation played a key role in the decision to issue, then the probability to issue by low capitalized banks would have been increased by the rise in regulatory pressure that should be associated with the implementation of more stringent capital requirements.

Overall, similarly to Gropp and Heider (2010) who conclude that capital requirements are of secondary importance in driving bank equity ratio levels, we find here that regulation is also not the main driving force of the equity issuance decision. This result supports the view proposed by several theoretical models suggesting that capital regulation is not binding (Allen et al., 2011; Diamond and Rajan. 2000; Flannery, 1994; Myers and Rajan, 1998) and with the set of studies that see bank capital structure as the outcome of pressures from shareholders, debt-holders and depositors rather than from regulators (see for instance, Ashcraft, 2008; Flannery and Rangan, 2008).

Having shown that regulation is not the main driving force behind the SEO decision we turn our attention to the role of market discipline by testing whether low capitalized banks are more reluctant to issue equity under a systemic distress. Our tests are based on recent analyses that suggest that in periods of systemic distress market discipline becomes less effective because bank creditors show a lower sensitivity to fundamentals (Hasan et al., 2013; Levy-Yeyati et al., 2004; Martinez-Peria and Schmukler, 2001), also motivated by an increase in the expectation to receive government support

(Acharya et al., 2013; Balasubramnian and Cyree, 2011; Hett and Schmidt, 2013). We find that low capitalized banks do not raise equity in the quarters immediately following the eruption of a severe systemic shock while they are more likely to raise equity than other banks in normal systemic conditions. Hence, weakly capitalized banks rely on equity issuance via SEOs only when they are expected to be subject to more stringent market discipline than other banks. Finally, we offer further evidence on the importance of the expectation to receive government support in reducing the influence of market discipline during systemic crises by showing that in the presence of a too-big-to-fail status a weak degree of capital adequacy significantly reduces the probability to issue equity after a systemic shock. All in all, our results confirm the relevance of the disincentives to raise equity by banks only when market discipline becomes ineffective; namely, under negative systemic conditions when the value of government subsidies increases (Brown and Dinç, 2011; Gropp and Heider 2010).

Overall, we find that market mechanisms rather than capital regulation are the primary, key driver of the decision to issue equity by low capitalized banks. This conclusion motivates regulatory interventions that aim at increasing the default risk-sensitivity of bank funding costs via minimum mandatory requirements for uninsured debts, in the form, for instance, of minimum requirements for forms of subordinated debts (Evanoff and Jagtiani, 2011; Flannery and Sorescu, 1996; Sironi, 2003). Furthermore, the behavior of the largest low capitalized banks during periods of systemic distress suggests that the introduction of countercyclical capital buffer and forms of contingent capital that have to be converted in equity during more unstable systemic conditions has to be especially directed towards too-big-to-fail banks.

The analysis presented here contributes in several ways to the literatures on equity issuance via SEOs. First, we offer the first analysis on the drivers of SEOs in the banking industry and in particular on the role played by bank capital strength. While a wide corporate finance literature has investigated explanations of SEOs in non-financial firms (see for instance Dittmar and Thakor, 2007; De Angelo et al., 2010; Kim and Weisbach, 2008 Erel et al., 2012), these studies suggest the their findings might be problematic to extend to banks because of the peculiar capital structure and the expected influence of regulation on bank capital management. The empirical evidence on bank equity issuance is instead limited to a handful of US-based studies that are not normally focused on what drives the bank decisions to undertake an SEO.[4] More precisely, the extant banking studies have looked at the market reaction following SEOs (Cornett and Tehranian, 1994; Cornett et al., 1998; Krishnan et al., 2010) or have assessed SEOs in the context of the recent global turmoil (Khan and Vyas, 2014; Elyasiani et al., 2014). The existing literature offers limited, and often contrasting, indications on how bank capital strength influences the likelihood to issue equity and lacks of analyses on whether this strength affects the decision of banks to issue equity under negative systemic conditions. Specifically, earlier event studies on US banks indicate that the market do not

[4] The corporate finance studies propose numerous interpretations on why non-financial firms rely on SEOs to modify their capital structure. These interpretations range from capital investments, refinancing, liquidity squeezes, corporate control, stock market microstructure and timing by managers with private information that their stock is overvalued (see for instance Dittmar and Thakor, 2007). More recently, this literature has assessed the importance of the investment financing explanation on an international sample of nonfinancial firms (Kim and Weisbach, 2008), the role of macroeconomic conditions in influencing the selection of different sources of financing, including equity issues, by these firms (Erel et al., 2012) and the relative influence of market timing and the firm life cycle on the decision to issue equity (De Angelo et al., 2010).

penalize low capitalized banks when they issue equity (Cornett et al., 1998), with the implication that for these banks it would be less costly to raise capital in the stock market. More recent analyses, however, conclude that the market reaction to SEO announcements does not vary with bank capital strength (Krishnan et al., 2010). Contrasting results are also offered by two recent studies for the US banking system with analyses that are not build on the nexus between weak capitalization and the likelihood to issue equity by banks (Khan and Vyas, 2014; Elyasiani et al., 2014). Furthermore, the omission of the distinction between normal and crisis periods in these studies bears potential risks on the consistency of their results, since as we show here the trade-off between the incentives and disincentives to issue might change substantially during crisis times.

The rest of the paper is structured as follows. Section II describes the sample, the econometric model and variables, while section III presents the empirical results on the nexus between bank capital strength and the likelihood to issue equity. Section IV extends the analysis to the interplay between capital strength and systemic conditions and their effects on equity issuance. Section V discusses our key findings and offers conclusions.

II. Sample Selection, Econometric Model and Variable Definition

A. The Sample of Banks and SEOs

The estimation of the likelihood that a bank issues common equity requires the identification of i) the population of banks which can opt for an SEO in a given time period; ii) the number of banks that have decided to issue an SEO in the same period.

The population of banks has been identified starting from the list of publicly traded and delisted banking firms drawn from Datastream International for the period from the 1st of January 1993 to the 30th of June 2011. From this list, including more than 4,000 institutions, we maintain in the sample only banks which trade common equity, operate in G20 countries and with accounting information available in WORLDSCOPE. The application of these three criteria yields a population of 2,177 unique banks chartered in 19 countries. Next, we remove US banks listed in OTC markets given their specificity in terms of capital raise. This reduces the number of unique banks in our sample to 1,522.

We then identify which banks within this population have issued common equity during the period under investigation, from the list of announced bank SEOs from January 1993 to June 2011 extracted from Thomson One Banker. This produces an initial list of 3530 SEOs. We merge the initial list of issuing banks within our population of banks. We use the ISIN code to match the two datasets and when not available the SEDOL code. On the resulting sample of issuing banks we apply several additional selection criteria. First, we remove pure secondary offers. These are SEOs based on the exchange of existing shares without any impact on the level of total common equity of the bank. Second, we remove equity offers which have been withdrawn after their announcement and, hence, do not produce any effect on bank capital structure.

******TABLE 1*****

As summarized in Table 1, the application of these criteria leads to a final sample of 912 SEOs in our population of banks with a high concentration of issuances in the latest part of the sample period. The time series evolution of the number of SEOs highlights that banks do not frequently

rely on SEOs and, as suggested by Khan and Vyas (2014), this is especially true before 2008. More precisely, in the period ranging from 1993 to 2007, we observe an annual average of 33 SEOs with a total number equal to 558 (about 61% of the total sample). The rarity of the issues is demonstrated by the ratio between the total number of SEOs and the total number of bank-year observations: over the full sample period this ratio is equal to 5.18%.

******TABLE 2*****

Table 2 reports the distribution of the SEOs sample by country and shows that the largest share of SEOs (around 47%) is concentrated in the US. However, in the following sections we show that our results are similar when we exclude the US banks from our sample. Finally, the average proceed of the issue is equivalent to 490 US$ billions, which is large relatively to the book value of bank equity. For instance, for the median bank, the ratio between the proceeds and the book value of equity is equal to 1.2. In summary, in spite of being not particularly frequent, when SEOs occur they generally produce a relevant change in the amount of capital holds by the issuing bank.

B. Econometric Model

We model the determinants of the probability that a bank issues an SEO using a panel random effect logit specification where the dependent variable is a dummy equal to one when a bank has issued common equity in a given time period. While earlier research on nonfinancial firms mainly uses pooled regressions, and controls for the panel structure of the dataset by clustering the standard errors at the firm level (see for instance Erel et al., 2012), we prefer to incorporate in the analysis a

panel specification as it controls for unobserved bank heterogeneity.[5] Furthermore, we model the firm specific effect as a random component for two reasons. First, the estimation of a logit fixed effect specification would produce a large reduction in the sample size as the model requires some variation in the dependent variable at the bank level. As a result, banks which have not issued equity over the analyzed sample period would have to be removed from the analysis. In our sample this would imply the exclusion of 1021 banks from the analysis with a consequent strong sample selection bias. Second, the use of fixed effects does not allow to control for time (quasi-) invariant variables, such as the characteristics of the regulatory environment characterizing the banking system that are part of our set of covariates.

We estimate via a Maximum Likelihood Estimator (MLE) the following Panel Random-Effects logit model:

$$(1)\ Logit\{Prob\left(SEO_{i,j,t} = 1 \middle| X_{i,j,t-4}, Z_{j,t-4}, \vartheta_i\right) = \alpha + \beta CAP\_STRENGTH_{i,j,t-4} + \gamma X_{i,j,t-4} + \varphi Z_{j,t} + TIME + \vartheta_i + \varepsilon_{i,j,t},$$

where SEO denotes a binary variable equal to one if the bank has issued common equity within a given time period, CAP_STRENGTH is one of our measures of capital adequacy, $X_{i,j,t-4}$ and $Z_{i,j,t}$ are, respectively the vector of bank characteristics and the vector of baking system and country control variables described in the next section, TIME is a vector of time dummies and $\vartheta_i \sim N(0, \sigma)$ are the random intercepts that are assumed to be independent and identically distributed across

[5] Although the clustering of the standard errors controls for heterogeneity in the estimation of the standard errors, it does not remove the potential downward bias of the estimated coefficients that the omission of firm-specific effect could generate (Greene 2002).

banks and independent from the remaining covariates. The subscripts *i*, *j*, and *t* denote the bank, the country and the time period, respectively. Notably, as in Erel et al. (2012), the bank-level explanatory variables are measured at the four-quarter lag to reduce endogeneity concerns in the regression model.

We estimate the models using a calendar quarter as the time unit of observation. This choice is motivated by the fact that the disincentives/incentives by less capitalized banks to raise equity, and the related strength of regulatory and market pressures, are contingent to the degree of systemic stability. For instance, moral hazard related to the presence of risk-shifting opportunities is expected to be higher in the presence of a systemic shock that increases the likelihood of a state intervention to stabilize the banking system. However, due to reduced bank profitability during crises, it might become more problematic to comply with pressure from capital regulation via retained earnings, with the consequence to increase the chances to raise equity in the stock market because of capital requirements. Yet, market discipline while effective in stimulating less capitalized banks to issue equity in normal times, it is predicted to be less important during financial crises given a lower sensitivity of bank creditors to fundamentals (Hasan et al., 2013; Levy-Yeyati et al., 2004; Martinez-Peria and Schmukler, 2001), also motivated by growing bailout expectations (Acharya et al., 2013; Balasubramnian and Cyree, 2011). To assess the effect of bank capital strength on equity issuances it is, therefore, crucial to control for the impact of systemic distress on the likelihood to issue equity as this removes concerns over possible omitted variable problems.

We address these concerns by estimating at quarterly intervals a systemic distress indicator that we initially use to construct control variables. More precisely, to identify when a systemic shock hits

a country during our sample period and construct our controls, we follow von Hagen and Ho (2007). While the literature has proposed different approaches for the identification of when shocks related to banking crises occur (see among others Kaminski and Reinhart 1999; von Hagen and Ho 2007, and Laeven and Valencia 2012), this approach has the merit to be based on publicly available information for the cross-section of countries (the data are drawn from the IMF International Financial Statistics) and, more importantly, allows the identification of the crisis event with a quarterly frequency that leads, therefore, to a more precise matching with the timing of SEOs. The identification of systemic shocks in von Hagen and Ho's (2007) is based on an index of money market pressure. The index measures distress in the money market by both the changes in the money market rate and the changes in bank reserves.[6] It is worth noting that the systemic distress indicator can be computed also at monthly intervals. Nevertheless the remaining variables that we present in the next section are available at best at quarterly frequency. Furthermore, the use of a monthly frequency as in Erel et al. (2012) would generate only a very small portion of non-zero observations of the binary dependent variable since the number of SEOs relative to the number of bank observations is relatively low. Hence, the monthly frequency would cause problems in the estimation of the model through maximum likelihood because the SEO decision would appear as an

[6] We also evaluate the robustness of our results when we employ an alternative definition of systemic distress periods. To this end, we re-run the analysis presented in the following sections using the banking crisis list in Valencia and Laeven (2012) as an alternative measure of banking system conditions. It is worth noting that the disadvantage of this crisis measure is that it comes with an annual frequency only, so that we can re-run only the model specification based on annual data and we lose a precise matching between the timing of the SEOs and the eruption of the systemic shock. However, under this alternative empirical setting we are able to qualitatively replicate the results presented in the paper.

extremely 'rare event' in the sample (see King and Zeng 2001 for a detailed discussion of this problem). We provide more details on how we compute the systemic distress index in the Appendix.

******FIGURE 1 HERE*****

Figure 1 shows the number of countries that have been identified as suffering from a systemic crisis in a given quarter. Overall, we identify 34 country-quarter-crisis events. The large number of cases is concentrated, as predictable, in the peak of the recent global turmoil observed during the years 2008 and 2009. Nevertheless, a substantial number of crisis quarters are also observed prior to the 2007-2009 financial turmoil period, e.g. Argentina in Q1 2001, Mexico in Q4 1994, Russia in Q3 1998. We introduce in some specifications controls for the timing of issuing equity around periods of systemic distress with dummy variables that identify the two (four) quarters following the eruption of systemic crises (**SYSTEMIC SHOCK_2** and **SYSTEMIC SHOCK_4**).[7] Finally, as the behavior of low capitalized banks might differ between normal and distress systemic conditions, in Section 4 we extend (1) with interaction terms between the systemic distress dummies and our measures of bank capital strength.

C. Measures of Bank Capital Strength and Control Variables

Debt overhang and moral hazard imply that the disincentives to issue equity are higher when banks are weakly capitalized while pressure from capital requirements and the presence of market discipline posit an alternative theoretical prediction. To test these two perspectives on equity

[7] Given that the time necessary to complete an SEO has been identified by Khan and Vyas (2012) in about 6 weeks, all these variables reflect a sufficiently long time period to implement an equity offer.

issuance, we employ two measures that signal a weak bank capital adequacy that we report in Panel A of Table 3. The first (**LOW CAPITALIZED**) is a dummy equal to one if the bank equity to asset ratio falls in the first quartile of the sample distribution. The second variable is a dummy equal to one if the bank equity to asset ratio falls in the first quartile of the sample distribution in a given year (**LOW CAPITALIZED_Y)**. This latter variable, therefore, allows us to control for the possibility that the regulatory and market perception of what constitutes a weakly capitalized bank has changed over time. More generally, both variables are direct measures of a weak capital adequacy at the bank level. This is also highlighted by the fact that the average equity ratio in the group of weakly capitalized banks as identified by the first (second) variable is equal to 3.44% (3.45%) while in the group of the remaining banks is 11.63% (11.62%).

******TABLE 3 HERE*****

We control for several firm-specific and country-specific determinants of the probability to issue an SEO that we identify by taking into account the results from previous studies on nonfinancial firms (De Angelo et al., 2010; Erel et al., 2012) and the specificities of banks. Variable definition and summary statistics of the full set of control variables are reported in Panels B and C of Table 3.

First, we control for bank risk measured by the volatility of stock returns in a given quarter (**RISK**). Different theoretical views emerge on the influence of bank risk on the likelihood of an SEO. Risky banks are more likely to be under regulatory scrutiny and subject to a stronger market discipline that should increase the likelihood to issue equity. Nevertheless, more risky banks could also show a lower likelihood to issue an SEO as they have more incentives to shift risk to debt-holders and are characterized by higher costs to raise equity.

Two additional determinants are based on De Angelo et al. (2010) and aim at capturing the market-timing and life cycle effects on the decision to issue equity. The first variable is the relative price to book ratio (**RELPTB**), constructed as the price to book ratio at the bank level divided by the yearly average ratio observed for all the remaining domestic banks in our sample. According to the market timing perspective, firms tend to invest when their shares are overvalued. Thus, higher values of **RELPTB** will be associated with a higher probability of an SEO. A similar positive sign is expected if we interpret this variable as capturing the value of bank rents in the domestic market. The second variable is the log of the number of years (**YEARLISTED**) a bank is listed in the stock market. Younger firms are deemed to rely on equity issues to support growing investments opportunities while more mature firms prefer to opt for internally generated financial resources (De Angelo et al., 2010). Next, we control for the degree of profitability measured by the ratio between net income and total assets (**ROA**). In line with Dahl and Shrieves (1990), our expectation is that more profitable banks, having the opportunity to rely on higher retained earnings, can be induced to avoid the potential negative signaling effect that the market generally link to equity issuance.

Another expected determinant of SEO decisions is bank size that we measure as the log transformation of bank total assets in millions of US dollars (**SIZE**). Recent studies achieve opposite conclusions on the role of bank size: Khan and Vyas (2014) show that large banks are more likely to issue equity while Elyasiani et al. (2014) conclude that the likelihood of an SEO is decreasing in asset size. Usually, large banks are expected to benefit of scale economies in raising capital and of an easier access to capital markets (Dahl and Shrieves, 1990).

The influence of bank funding structure is controlled for with the ratio between total deposits and total liabilities (**DEPOSITS)**. This variable can exercise two opposite effects on the likelihood to issue an SEO. A larger share of deposits is normally linked to less monitoring on bank risk-taking given the presence of deposit insurance on this type of liabilities (Demirgüç-Kunt and Huizinga, 2004). Thus, more deposits should reduce the probability of issuing equity. However, deposits are also a cheap source of funds for banks and thus a larger presence of this type of liabilities should limit bank concerns over the increasing cost of capital due to an equity issue. We then introduce in the model a dummy equal to one if a bank undertakes an M&A in a given quarter (**MERGERS)**.We expect a positive impact of this variable on the likelihood of an SEO given the need to raise funds to support the bank investment strategy.

Next, we control for the impact of government recapitalization programs during the most recent part of our sample period. In this respect, Khan and Vyas (2014) show that US banks that received capital in the context of the Capital Purchase Program initiated in October 2008 have a higher likelihood to issue equity in the following quarters. We, therefore, add in some specifications a dummy (**CPP**) equal to one from the first quarter a US bank has entered the CPP program. In a similar vein, we create another dummy (**RESCUE**) that is equal to one for non-US banks that have benefitted from public recapitalizations. The data on government-funded recapitalizations are collected from Grail Research (2009) that we complement with information from ProPublica (http://projects.propublica.org/bailout/list) for U.S. banks, Mediobanca (2012) for European banks, the website of the Japanese Deposit Insurance Fund for Japanese Banks and policy reports by Central Banks for the remaining countries in our sample.

Our model includes also a set of banking system and country characteristics that are likely to influence SEO decisions. Specifically, we select two regulatory variables from Barth et al. (2004), with updated values from the Worldbank website. The first is an index that ranges from 0 to 3 measuring the degree of independence of the supervisory agency (**REG_INDEPENDENCE**) while the second is an index with values from 0 to 10 that captures the strictness of domestic regulation (**REG_STRENGTH**). We expect that the first variable enters the regression with a positive sign as more independent regulatory agencies are likely to be less prone to forbearance and more effective in forcing banks to comply with regulation. Similarly, we expect a positive sign for the second variable as in a stricter regulatory regime banks might have more pressures to issue equity.

An additional country control is the ratio between public sector debt and domestic GDP (**PUBLIC DEBT**). This ratio should indicate the financial capability of a country to rescue financial institutions when needed. Under a moral hazard framework, therefore, we should expect a positive effect of this variable on the likelihood to issue equity. Nevertheless, it could be also the case that in countries with a higher fiscal capacity, regulators might exercise more pressure on banks to raise equity given the higher moral hazard incentives. We control for the degree of market power (**MARKET_POWER**) in the domestic banking market through the accounting value of bank's net interest revenue as a share of its interest-bearing (total earning) assets as available from Worldbank financial structure databases-2012 edition. Higher values should indicate less competitive pressures on banks and more market rents. Thus, in less competitive market we should observe a lower likelihood to issue equity because of the increased potential to retain earnings (Dahl and Shrieves,

1990). On the other hand, since banks operating in such markets have particularly high charter value, they could be more likely to recapitalize in order to avoid the hazard of losing their charter due to undercapitalization. Finally, we measure stock market development as the ratio between total shares traded on the stock market over GDP (**SHARE_TRADED**) from the Worldbank financial structure database-2012 edition. We expect a higher probability to issue equity by banks that are listed in more developed stock markets due to easier access conditions and lower costs of issuing.

III. Are Low Capitalized Banks Less Likely to Issue Equity

A. Baseline Specification

The results on the nexus between bank capital strength and the likelihood to issue an SEO are reported in Table 4. Initially, we estimate a parsimonious specification with LOW CAPITALIZED as a measure of capital strength and with a limited number of controls. Then, we extend the number of explanatory variables to control for the influence of public recapitalizations during the latest part of our sample period. Next, in columns 3) and 4) we include the two alternative measures of systemic conditions at the timing of the issuance as defined in Section II. We also repeat these tests by employing LOW CAPITALIZED_Y as an alternative measure of capital strength. The final two columns show the results after removing US banks from the sample and when we stop the sample period before July 2007 to control for the high concentration of the SEO sample in the most recent years.

******TABLE 4 HERE*****

Our findings show that the probability to issue an SEO is higher when banks are characterized by lower equity ratios. This conclusion is confirmed under different model specifications. More precisely, using the model in column (1), we estimate that being in the lowest quartile of the sample distribution in terms of capital strength increases the annual probability to issue (holding all other variables at their mean values) from 5.08% to 7.16%. It appears, therefore, that, in contrast with the debt overhang and the moral hazard views on bank equity issuance, the incentives to issue equity are higher when bank capital strength decreases. This suggests that other factors, in the form, for instance, of regulatory pressures related to capital requirements and market discipline have a clear role in bank decision to issue equity.

To further corroborate the validity of this conclusion we conduct additional tests that we do not report in the interest of brevity, with two further alternative measures of capital strength. The first measure controls for the influence of cross-country differences on our main findings and it is based on the distribution of the equity ratio at the county level. The variable takes the value of one if a bank is in the lowest quartile of the equity ratio distribution in a given country. The second is the conventional equity over asset ratio. All these additional analyses confirm that banks with lower capital ratios are more likely to issue equity.

It is worth noting, however, that bank capital strength is not the only significant determinant of the likelihood to issue an SEO in the banking industry. For instance, we find some evidence of discretion in the decision to issue equity by banks as in Krishnan et al. (2010). This is suggested by the positive sign of RELPTB that indicates that banks are likely to time their issues when their shares are overvalued (see also De Angelo et al., 2010). Furthermore, larger banks are more likely to

rely on an SEO as in Dahl and Shrieves (1990) confirming that these banks can achieve economies of scale when they raise capital from the stock market. In addition, in 7 out of 8 specifications, the ROA coefficients show a negative and significant coefficient – consistently with a classic pecking order theory that banks prefer to retain internal resources rather than issuing equity. Similarly, the large majority of the specifications show that more risky banks issue significantly more suggesting that banks might be concerned over their default risk and consequently tend to strengthen their capital structure when they are riskier.

These conclusions are unchanged when we control for the effect of recapitalization via public funds in the latest part of the sample period. We confirm the results in Khan and Vyas (2014) of a higher probability of issuing for US banks joining the CPP program, but we also find a similar result for non-US banks that have received public support, especially when the analysis excludes the US from the sample.

Finally, also some country characteristics significantly influence equity issuance. Banks are more likely to issue equity in countries with a higher fiscal capacity and in countries with higher market rents. Furthermore, we observe that banks raise equity especially after the eruption of a systemic shock: both SYSTEMIC SHOCK_2 and SYSTEMIC SHOCK_4 enter the models with a positive and highly significant coefficient. This latter result is also in contrast with the disincentive views on capital issuance.

Overall, this section shows that lower capital strength is associated with a higher likelihood to issue an SEO; namely, SEOs occur relatively more frequently in banks that are supposed to have more disincentives to raise voluntarily equity under the debt overhang framework and the moral

hazard view on equity issuance. Furthermore, the impact of numerous other variables seems to suggest that the debt overhang and the moral hazard views are not so pivotal in guiding the decision by banks to raise equity in the stock market. For instance, banks are more likely to issue when larger, when they operate in countries with more capability to adopt rescue policies or after the eruption of a systemic shock. All these signal conditions where the conventional wisdom consistent with moral hazard suggests that the disincentives to raise equity are more pronounced.[8]

B. Is This a Story of Regulatory Pressure Due to Risk-Based Capital Requirements?

The results reported in the previous section point to the existence of forces that mitigate the influence of debt overhang and moral hazard on equity issuances and induce low capitalized banks to raise equity in the stock market. One of the obvious mitigating forces is capital regulation: low capitalized banks proceeds with an SEO simply because they need to comply with risk-based capital requirements. In essence, it might be the case that our results are capturing the fact that banks with lower capital ratios are also likely to exhibit low regulatory capital levels. Hence, they issue to avoid a violation of the minimum capital requirements. In this section we conduct two tests to assess whether low capitalized banks issue simply because of capital regulation. We present the results of these tests in Table 5.

[8] Our results hold also when we re-estimate the models by means of a different econometric approach; namely, a pooled binomial logit model with bank-clustered standard errors as in previous studies. Furthermore, we estimate the models using annual data to assess whether the use of a limited number of variables that are observed at quarterly intervals affects our findings. Again, we find that a low value of equity is normally associated with a larger probability of issuing equity.

******TABLE 5 HERE*****

Initially, we extend our baseline specification with the inclusion of a dummy equal to 1 if the difference between a bank's total regulatory capital ratio (including TIER1 and TIER2 capital) and the domestic minimum capital requirement is in the first quartile of the sample distribution (REG_CONSTRAINED). Similarly, we compute REG_CONSTRAINED_Y as a dummy equal to one if, in a given year, a bank is in the first quartile of the sample distribution of the regulatory capital ratio. As in Ragan and Flannery (2008), we interpret the above dummy variables as measures of the pressure on banks to comply with capital requirements. We conjecture that if the influence of the equity ratio on the likelihood of an SEO is entirely driven by regulatory pressures stemming from capital requirements, these additional controls would enter the model with a positive and significant coefficient and simultaneously our key measures of capital strength do not directly related to regulation should lose their explanatory power. It is worth noting that the relatively low correlation between LOW CAPITALIZED (LOW CAPITALIZED_Y) and REG_CONSTRAINED (REG_CONSTRAINED_Y), equal to 0.43 (0.45), allows us to include both variables in the same model without generating problems of multicollinearity. Furthermore, although we can construct the regulatory constrained variables only for a much smaller number of banks (equal to about 70% of the original sample), the total number of observations employed to conduct the test remain extremely large.

The second test discussed in this section focuses on the role of the variable LOW CAPITALIZED in two groups of banks. The first group consists of the regulatory constrained banks with a capital buffer in the first quartile of the sample distribution and the second group

includes all the remaining banks in the sample that are not under regulatory pressure from capital requirements. Our prior is that if banks with low equity ratios do not issue when they have high capital buffers, their decision is simply driven by the pressure to comply with capital requirements.

The results of these tests consistently indicate that the importance of bank capital strength in driving equity issuance is not fully explained by the presence of capital requirements - in line with the view that capital regulation is only of secondary importance (Gropp and Heider, 2010) and not binding (Allen et al., 2011; Diamond and Rajan. 2000; Flannery, 1994; and Myers and Rajan, 1998) when banks have to design their capital structure. More precisely, in spite of adding one of our measures of regulatory constraints (that positively influence the likelihood to issue equity in the stock market) as a control we still observe that banks with a weaker capital ratio remain more likely to issue. Capital levels, therefore, matter even when regulatory pressure is controlled for. Furthermore, in the last two columns of Table 5, we find that low capitalized banks issue especially when they are not suffering from any pressure to comply with capital requirements. By contrast LOW CAPITALIZED is no significant in the group of banks characterized by a low capital buffer; namely, regulatory constrained banks issue independently from the book value of their equity ratio.

The findings presented here are consistent with a strong role for market discipline that imposes a pressure on banks to issue when their leverage ratios are too high even though their equity is well above the level required by the regulators. More precisely, a lower capital ratio indicates that, for a given level of portfolio risk, a bank is closer to a distress condition. Since regulatory capital requirements are based on imperfect risk assessment, investors can view bank capital adequacy as insufficient even though the regulatory capital is well above the required minimum level. In other

words, a bank's decision to issue equity would be motivated by a higher likelihood to incur in bankruptcy costs given, for instance, the increasing risk-premium required by uninsured debt-holders. Low capitalized banks will be then more likely to rely on SEOs independently from the presence of a sufficient regulatory capital as suggested by the findings reported in this section.

Overall, our tests exclude the possibility that the need to comply with capital requirements is the only and primary driver of the decision of low capitalized banks to rely on an SEO and suggest that additional factors are also significant determinants of the bank's decision to issue equity. In this sense, market discipline appears a potential, important driver of our findings.

C. Are Low Capitalized Banks More Likely to Issue Equity When Capital Regulation Changes?

The findings discussed above suggest that a low capital buffer increases the likelihood to issue equity by banks but at the same time they imply that capital regulation is not the only and key driver of the decisions of low capitalized banks to raise equity. These results, however, say little on how low capitalized banks react when they have to comply with changes in capital regulation that introduce more stringent capital requirements, as it is the case of the recent adoption of the Basel III Accord. This is an important omission: the implementation of more stringent capital requirements at the country level is a fairly exogenous shock in regulation that allows us to offer a cleaner test on how much SEOs are motivated by regulatory reasons.

In this section, we therefore explore the role of regulation using a difference-in-differences identification approach, based on the numerous events of regulatory changes that have generated more stringent capital requirements at the national level. We employ these changes as quasi-natural

experiments to study how individual banks react to fairly exogenous changes in the required capital level. We argue that the changes in regulation are exogenous with respect to a bank's SEO decision since they reflect either the international synchronization of capital regulation or a shift in a regulator's perception of what constitutes a sufficient degree of capitalization for all banks rather than the undercapitalization of some specific individual banks.

******TABLE 6 HERE*****

In our initial tests we study how the probability of banks to issue equity differs between affected and non-affected banks with regard to two types of changes in regulation occurring in our sample: i) the adoption for the first time of risk-based capital requirements; ii) the increase in the minimum regulatory capital ratio. We employ these events to construct a dummy variable (REG_CHANGE) equal to one for the periods following a more stringent capital regulation of type i) or ii) and zero otherwise. We then add this variable to our baseline specification. A detailed description of the evolution of capital regulation at the country level is presented in Table A1 in the Appendix. Initially we focus on the regulatory changes described in the first column of Table A1. In this case we do not include in the list of regulatory changes the adoption of the Basel II Accord that has occurred in some of the sampled countries in the latest part of the sample period (as described in the second column of the same Table). This is because Basel II was not expected to generate, on average, any need of additional capital for banks (Vallascas and Hagendorff, 2013) while we want to specifically focus on regulatory changes that are expected to produce a more stringent capital regime that would motivate the need to raise equity by banks.

Overall, in our sample we observe 17 changes in regulation with a total of 13 happened not during a systemic crisis or the following four quarters suggesting that the changes in regulation are not a reaction to bank undercapitalization. We interpret this as further evidence of the exogeneity of regulatory changes. More precisely, five of the sampled countries (Argentina, Brazil, China, Russia, and Turkey) introduced risk based capital requirements for the first time during our sample period. However, since no banks were listed in Argentina and Russia prior to the introduction of risk based capital requirements, in our tests we can only capture the effects of this regulatory change in Brazil, China, and Turkey. Five other countries (Canada, India, Indonesia Republic of Korea, South Africa), which had adopted risk based capital requirements already at the start of our sample period, have produced subsequently six increases in the minimum required level of regulatory capital. Notably, the five countries that have introduced capital requirements after 1993 have also generated six additional changes in the minimum regulatory capital ratio. Out of these changes four happen in Brazil, China, and Turkey and are obscured by the way we construct REG_CHANGE. The remaining two changes occur in Argentina and Russia in points of time when listed banks exist prior to the regulatory changes. These two changes are recorded in our REG_CHANGE variable that captures totally 10 regulatory changes.

We report the results of the tests in the first four columns of Panel A of Table 5. In the first two columns of this Table we extend our baseline specifications with the introduction of the dummy REG_CHANGE. Only in one specification we observe a positive and marginally significant coefficient (at the 10% level) associated with REG_CHANGE and this does not offer much support to the importance of changes in capital requirements on the decision of issuance by banks.

Next, REG_CHANGE is interacted with one of our measures of weak capitalization. As suggested by Norton et al. (2004) in non-linear models it is not possible to infer the role and the degree of significance of the interaction term simply through the estimated coefficient and the related standard error. To circumvent this problem, we follow Berger and Bouwman (2013) and report in Panel B the coefficients and standard errors of the marginal effects of REG_CHANGE on the likelihood to issue equity by banks with different capital levels. These additional tests show that the marginal effects of the regulatory change on the likelihood to issue equity is not significant when banks are less capitalized. Overall, changes in regulation do not lead banks with a low degree of capital strength to raise more equity in the stock market suggesting that capital regulation is unlikely to drive their equity issuance.

By contrast, we find that a change in capital regulation increases the likelihood to issue equity by banks that do not belong to the weakly capitalized group. This latter result confirms that our measures of capital strength have not much to do with regulatory capital requirements; namely, they are not simply imperfect proxies of the regulatory capital ratio of banks. This is also highlighted by the results reported in column (5) based on REG_CONSTRAINED as a measure of capital strength. In such a case, we find that the influence of the changes in regulation on equity issuance does not vary with the value of the regulatory capital buffer; namely, after a regulatory change banks do not issue more independently from the value of their capital buffer.

In the last three columns we run a set of additional analyses on the role of changes in capital regulation on equity issuance. In column (6), we exclude the US from the sample, while in column (7) we consider the adoption of Basel II as part of the regulatory changes increasing, therefore, the

number of regulatory events that are considered as exogenous shocks in our empirical setting. Again, we do not find any evidence that low capitalized banks react to changes in capital regulation by issuing equity.

Finally, it could be the case that low capitalized banks are not more likely to issue after a shock in capital regulation because they anticipate the regulatory change and adjust their capital adequacy earlier than other banks. To evaluate this possibility we construct a dummy equal to one for the first eight quarters before the change in regulation occurs that we add to the baseline specification in column 8 and we interact with our main measure of capital strength (LOW CAPITALIZED) in column 9. This test is based on 15 changes in capital regulation as we include also modifications in the minimum capital ratio that occurred after a country has implemented capital requirements during the sample period that were previously obscured by the earlier adoption of capital regulation.

The results reported in column (8) show that banks issue more in the proximity of regulatory changes, offering some evidence on the fact that banks anticipate the regulatory change when they adjust their capital levels. Nevertheless, in column 9, where we distinguish between low and high capitalized banks, we do not find that decision to issue vary with the degree of capital strength; namely, we do not find that low capitalized banks are more likely to issue in the proximity of regulatory changes. We obtain similar results for the probability to issue prior to a capital regulation change, when we repeat the test by using REG_CONSTRAINED as a measure of capital strength. In the interest of brevity these results are not reported.

To sum up, these tests highlight that low capitalized do not respond to changes in capital requirements by raising equity and do not issue more frequently than other banks in the proximity of

regulatory changes. These findings suggest that weakly capitalized institutions do not employ SEOs as tools to comply with more stringent capital requirements and offer further evidence on the limited role that regulatory pressure plays on the decision of these banks to raise equity. More precisely, the insignificant marginal effect of the regulatory change on the probability that low capitalized banks issue SEO can be explained by the fact that low capitalized banks are already under market pressure to issue even prior to the implementation of the regulatory change. Furthermore, the change in regulation seems to open - through the raised expectations that many banks will issue an SEO - a window of opportunities for better capitalized banks that have been considering to increase their capital levels prior to announcement of the regulatory change but feared the negative market reaction that is typically associated with the announcement of equity issuance. Jointly, these results again underline the limited role of capital regulation as a key driver of the SEO decision.

IV. The Role of Bank Capital Strength on Equity Issuance Under Normal and Distress Systemic Conditions

A. Does a Systemic Distress Reduce the Likelihood of Issuing Equity by Low Capitalized Banks?

While regulatory pressures from capital requirements do not fully explain the decision by low capitalized banks to raise equity via SEOs, market discipline, could be a key driver of that decision. In this section we focus on the role of market discipline by examining how the likelihood to issue equity by low capitalized banks varies between periods of financial system stability and such of systemic distress.

It is a widely held view that negative systemic conditions act as an amplifier of low capitalized banks' disincentives to issue equity given the larger losses in value that the issuance could generate for shareholders. These losses are not simply motivated by the higher costs of issuing in the presence of more unstable systemic conditions but also by the increasing likelihood to benefit from a government support that allows banks to transfer risks to tax-payers (Admati, et al., 2012). A related consequence of the presence of negative systemic conditions is, however, a decrease in the sensitivity of investors to bank fundamentals that has the effect to reduce differences in the strength of market discipline applied to different banks (Hasan et al., 2013; Levy-Yeyati et al., 2004). The reduced sensitivity to banks fundamentals by debt-holders during crises is generally motivated by the presence of large macroeconomic effects which impact on all banks regardless of their characteristics. Hence, a crisis leads to an increase in the relative importance of aggregate factors with a decline in the relevance of bank-specific fundamentals (Martinez-Peria and Schmukler, 2001). A related argument suggests that market discipline becomes ineffective because of the increasing value of implicit and explicit government guarantees that typically occurs under systemic crises that tends to reduce the risk-sensitivity of uninsured bank creditors. For instance, after the rescue of Long Term Capital-Management in 1998, the increased expectation of government interventions in the banking industry led to a lower sensitivity of bank credit spreads to risk for the largest US banks (Balasubramnian and Cyree, 2011). Similarly, market discipline weakened after the rescue of Bear Stearns in March 2008 and then disappeared almost entirely after the failure of Lehman Brothers (Hett and Schmidt, 2013). Furthermore, Acharya et al. (2013) show that an expectation that the government will offer protection from losses induces bondholders of major US financial institutions to not accurately price risk.

From the highlighted theoretical arguments, it follows that if market discipline is the main driving force that reduces the disincentives by low capitalized banks to raise equity in the stock market, these banks should be more inclined to issue when they are deemed to be subject to more stringent market discipline than other banks; namely, under normal systemic conditions.

******TABLE 7 HERE*****

We analyze the influence of bank capital strength on SEOs during systemic distress in Panel A of Table 7 where we extend the regression models reported from column 3 to column 6 of Table 4 with the inclusion of interaction terms between our systemic shock variables and the different measures of bank capital strength. Panel A shows that while the measures of bank capital strength maintain the sign and significant level as in the baseline specification, the interaction terms between these measures and the systemic shock dummies enter the regression models with a negative and highly significant coefficient. A clearer picture of the effect of systemic conditions on our results is offered by the marginal effects reported in Panel B. They indicate that the influence of bank capital strength on the likelihood to issue equity is only present in normal time. Under negative systemic conditions being a weaker capitalized bank does not increase the likelihood to issue.

Next, in unreported tests we adjust the timing of the SEOs to take into account the period necessary to arrange the issuance and to achieve a more precise matching between the bank decision to raise equity and the systemic conditions. In other words, we anticipate the timing of the issuance of six weeks compared with the original data. This is because a period of six weeks has been

identified as the average time necessary to organize an issuance (Khan and Vyas, 2014). This change in the definition of the timing of the SEO does not lead to any substantial change in our results.[9]

In summary, a weaker capital adequacy increases the likelihood to issue an SEO only under normal systemic conditions while it plays no role in periods following systemic shocks. As these periods have been generally associated with a less effective market discipline (Acharya et al., 2013; Balasubramnian and Cyree, 2011; Levy-Yeyati et al., 2004; Hett and Schmidt, 2013), putting together the results discussed in this section with the evidence drawn from the previous sections, we conclude that market forces strongly influence the decisions of weakly capitalized banks to raise equity. When the eruption of systemic shocks reduces the effectiveness of these mechanisms, less capitalized banks do not behave differently from other banks.

B. Capital Strength and Equity Issuance: Too-Big-To-Fail Banks Versus other Banks

The result discussed above implies that, under a systemic crisis, moral hazard might emerge as a possible deterrent to conduct an SEO by low capitalized banks. Essentially, under a systemic shock, market discipline is ineffective because of the attempt of banks and investors to speculate on the increasing value of explicit and implicit government guarantees (Acharya et al., 2013; Balasubramnian and Cyree, 2011; Hett and Schmidt, 2013). However, another possible interpretation is that low capitalized banks find it too costly to issue equity under negative systemic

[9] We also repeat the analysis separately for two sub-periods 1993-June 2007 and July 2007-2011 to evaluate whether this finding depends on the high concentration of crisis episodes and SEOs in the latest part of our sample period. The results, not reported in the sake of brevity, are broadly in line with the findings obtained for the full sample period.

conditions even if they would be willing to do so. In other words, market pressure to issue equity is ineffective simply because of the increasing costs related to equity issuance during periods of systemic distress.

To highlight if moral hazard via the attempt to speculate on the expectation to receive government support has any role on our findings we conduct additional tests that are based on sub-samples of banks. In particular, our purpose is to assess whether our results differ between banks that are likely to be perceived by investors as too-big-to-fail and the remaining banks in our sample; namely, between groups of banks that are subject to different expectations to receive government support and, at the same time, also differ in terms of cost of issuance. Our prior is that if the expectation of a government intervention is somehow important to motivate our findings, we should observe that especially too-big-to-fail banks would be less willing to issue during a systemic shock if low capitalized. By contrast, if our results are simply motivated by an increasing cost of issuance in crisis periods we should observe a stronger reluctance to raise equity in smaller banks than in larger banks when weakly capitalized. This is because smaller banks are typically characterized by a lower likelihood to receive government support while they suffer from higher costs of raising equity given that a certain portion of these costs is fixed and independent from size.

To conduct these tests we use two definitions of too-big-to-fail banks. The first relies on the cross-country dimension of our sample and it is based on the ratio between bank liabilities and country GDP. The choice of this variable is based on the evidence provided by Correa et al. (2014) showing that a higher ratio between bank liabilities and country GDP increases the likelihood that a bank receives government support. We classify banks as too-big-to-fail when the value of this ratio

is in the last quartile of the sample distribution. This leads us to focus on extremely large institutions compared to the size of the domestic economy: in the last quartile the average value of Liabilities/GDP is equal to 6.8%.

The second definition we employ is in terms of bank absolute size. As in Beltratti and Stulz (2012) too-big-to-fail banks are then identified by a value of total assets larger than 50 US$ billion. It is important to note that this size limit is also in line with the US regulatory definition of systemically important banks as stated in the Dodd-Frank Act of July 2010.

******TABLE 8 HERE*****

We report the results for the two definitions of too-big-to-fail banks in Table 8 and the analysis for the rest of the sample in Table 9. Overall, the findings support the view that the expectation to benefit from a government bailout plays a role in discouraging less capitalized banks to raise equity in the market. This is clearly highlighted by Panel B of Table 8 where we report the marginal effects of our measures of bank capital strength in normal and crisis periods for the group of too-big-to-fail banks. While we still observe that these banks are more likely to issue equity in normal times if undercapitalized, during crisis periods we find that, in contrast with the full-sample analysis, the marginal effects of our measures of capital strength are significantly negative. Thus, in the presence of an increasing value of government guarantees, which typically materializes during systemic crises, banks that are expected to be perceived as too-big-to-fail are less likely to raise equity when they show a weaker capital adequacy.

*****TABLE 9 HERE*****

Table 9 shows that we do not achieve a similar conclusion when the analysis is conducted only on the remaining banks in our sample. The marginal effects reported in Panel B shows similar findings as for the full-sample analysis: when smaller, less capitalized banks are more likely to issue in normal times while they do not behave differently from other banks in period of systemic distress. This finding, however, does not exclude the possibility of a role for the expected increase in the cost of issuance during crises on the decision to conduct an SEO: smaller banks are more likely to issue in normal systemic conditions if low capitalized.

All in all, this section offers additional support to the key conclusion of our analysis: market forces exercise a key influence on the decision of banks to issue equity when they are low capitalized. During crisis periods these forces are, to some extent, weakened by the raising value of implicit and explicit government guarantees. This is proved by the fact that too-big-to-fail banks are less likely to raise equity in the quarters following a crisis when they show a weak capital adequacy.

V. Conclusions

In this paper, we present results that are not aligned with the wisdom that low capitalized banks are less likely to raise equity in the stock market because of debt overhang problems. Furthermore, our results do not fully support the importance of disincentives associated with risk-shifting opportunities due to implicit bailout guarantees in the banking industry.

More precisely, we find that low capitalized banks are generally more likely to issue equity than other banks. The issuance does not appear primarily motivated by the presence of capital regulation but by the influence of market forces. This conclusion is supported by numerous tests conducted to evaluate the role of capital regulation on the decision by low capitalized banks to raise equity. These

tests agree on the presence of key, additional forces that induce banks to issue equity when they are weakly capitalized. For instance, low capitalized banks issue more than other banks especially when they are far from the minimum regulatory capital ratio; namely when they are less likely to be subject to pressure related to minimum capital requirements. Furthermore, we exploit the cross-country dimension of our sample to show, by means of a difference-in-differences approach, that low capitalized banks do not react to changes in capital regulation by raising equity in the stock market and do not issue more than other banks even in the proximity of the implementation of these regulatory changes. Overall, we interpret the highlighted results as indicating a primary role for market discipline in guiding equity issuance by low capitalized banks.

Our interpretation is further supported by additional tests that analyze the behavior of low capitalized banks in normal and distress systemic conditions. We show that in the presence of a systemic shock, when investors are less sensitive to bank fundamentals given their expectation to be protected by government guarantees (Acharya et al., 2013), low capitalized banks do not behave differently from other banks. However, they remain more likely to issue equity during normal systemic conditions when market discipline is supposed to be more effective. Furthermore, we show that only during systemic crises the behavior of low capitalized banks is influenced by increasing bailout expectations. More specifically, we find that low capitalized banks that are also too-big-to-fail, and consequently are expected to benefit of largest chances to receive government support, are significantly less likely to raise equity in the aftermath of a systemic shock while they remain more likely to issue in normal times.

The findings discussed here have two implications for the design of capital regulation in the banking industry. First, our results suggest that minimum mandatory requirements on default-risk sensitive forms of debt, such as subordinated debts or types of contingent capital, can generate incentives for equity issuance by banks. This might occur via an increase in bankruptcy costs for shareholders in the form of significantly higher funding costs motivated by a market-discipline channel. Second, given the reluctance to issue during periods of systemic distress especially by larger low capitalized banks, the introduction of countercyclical capital buffer and forms of contingent capital that are then converted in equity during more unstable systemic conditions has to be specifically designed, and stringent, for banks with a too-big-to-fail status.

Overall, despite the presence of the moderating role played by capital requirements but especially by market discipline, it remains evident that issuing an SEO is not an extremely frequent choice also for low capitalized banks. The analysis of alternative strategies that these banks adopt in normal and distress systemic conditions to overcome the weakness of their capital structure is, therefore, an interesting venue for future research.

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Table 1: Distribution of Banks and SEOs

	Number of Banks	Number of SEOs	SEOs/Banks
1993	751	33	4.39
1994	841	39	4.64
1995	907	27	2.98
1996	1045	25	2.39
1997	1130	28	2.48
1998	1124	41	3.65
1999	1105	34	2.99
2000	1073	17	1.58
2001	1040	43	4.13
2002	1011	34	3.36
2003	1003	34	3.39
2004	975	43	4.41
2005	979	59	6.03
2006	955	58	6.07
2007	926	43	4.64
2008	900	72	8.00
2009	878	132	15.03
2010	845	131	15.50
2011 Q2	121	19	15.70
Total	17509	912	5.20

Table 2: Number of SEOs per Country and Year and Average Proceeds (bln US dollars)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Q2-2011	Total	Average Proceeds
Argentina	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	3	64.1
Australia	1	5	6	1	0	1	2	3	2	1	3	2	2	1	3	5	3	1	0	42	233.7
Brazil	2	4	2	5	2	4	0	0	3	0	0	0	0	1	0	2	1	2	0	28	1093.2
Canada	3	1	0	0	0	2	1	0	2	0	0	0	0	0	0	4	0	1	0	14	224.8
China	0	0	0	0	0	0	0	0	0	0	2	0	0	5	6	1	5	15	14	48	1530.4
France	0	1	0	1	2	1	1	1	0	1	1	0	2	2	1	3	1	0	0	18	1294.2
Germany	2	9	5	2	3	3	2	0	0	0	1	0	3	0	0	4	0	1	0	35	764.8
India	0	0	0	0	0	0	0	0	0	0	2	5	7	6	2	5	6	5	0	38	205.5
Indonesia	1	2	3	4	3	2	3	2	2	4	0	3	6	3	3	2	5	10	0	58	213.4
Italy	0	5	1	1	2	4	2	2	7	3	4	2	7	3	3	4	2	0	0	52	425.0
Japan	4	1	2	2	2	2	9	5	5	3	1	4	6	11	4	2	3	2	2	70	399.8
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	223.8
Russia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	1	3	1	0	10	254.1
Saudi Arabia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	1113.9
South Africa	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	2	272.7
Republic of Korea	0	0	0	1	0	1	0	0	0	3	1	1	2	2	2	2	4	4	3	26	214.0
Turkey	0	0	0	0	1	1	0	0	1	0	1	1	0	0	0	2	1	0	0	8	172.7
UK	0	0	0	0	1	1	1	1	2	2	0	2	2	1	2	6	5	3	0	29	1053.5
USA	20	11	8	8	12	17	12	3	19	17	18	22	22	22	13	28	92	85	0	429	260.6
Total Number	33	39	27	25	28	41	34	17	43	34	34	43	59	58	43	72	132	131	19	912	
Average Proceeds	52.9	136.2	86.8	219.6	144.3	125.9	325.5	129.0	68.3	71.2	225.6	171.1	250.5	426.9	818.1	1192.3	956.0	518.3	1472.2	490.0	
Proceeds/Equity (Median)	0.7	0.6	0.6	0.7	1.3	0.6	0.8	0.5	0.3	0.6	1.4	1.5	1.3	1.6	2.0	1.7	2.1	2.8	2.9	1.2	

Table 3: Variable Definition and Summary Statistics

		N	Mean	Median	St. Dev.	1 Pctile	99 Pctile
Panel A: Measures of Bank Capital Strength							
LOW CAPITALIZED	Dummy equal to one if a bank is in the first quartile of equity to assets distribution	53707	0.257	0.000	0.437	0.000	1.000
LOW CAPITALIZED_Y	Dummy equal to one if a bank is in the first quartile of equity to assets distribution in a given year	53707	0.256	0.000	0.436	0.000	1.000
Panel B: Bank-Specific Controls							
RISK	Standard deviation of daily returns computed at quarterly intervals	53707	0.057	0.043	0.051	0.009	0.259
RELPTB	Price to book ratio divided by the average Price to book ratio computed yearly at country level	53707	1.020	0.930	0.571	0.241	2.826
YEARLISTED	Number of years a bank is listed in the stock market	53707	11.472	10.000	8.234	1.000	35.000
SIZE	Log of total assets in millions of U.S. dollars	53707	7.933	7.541	2.110	4.240	13.502
ROA	Net income over total assets	53659	0.007	0.008	0.026	-0.051	0.047
DEPOSITS	Ratio between total deposits and total liabilities	50436	0.790	0.844	0.203	0.102	1.127
MERGERS	Dummy equal to one if a bank has undertaken a merger in a given quarter	53707	0.012	0.000	0.109	0.000	1.000
CPP	Dummy equal to one from the first quarter after capital injection via the Capital Purchase Program	53707	0.034	0.000	0.182	0.000	1.000
RESCUE	Dummy equal to one from the first quarter after a non-US bank has received capital support	53707	0.003	0.000	0.055	0.000	1.000
Panel C: Country-Specific Controls							
REG_INDEPENDENCE	Index assessing the degree of independence of the supervisory agency. The index ranges from 0 to 3 with higher value denoting a more independent supervisory agency. The indicator is constructed based on the following three questions. 1. Can the head of the supervisory agency can be removed by either [(a) the decision of the head of government (e.g. President, Prime Minister), Finance Minister or other cabinet level authority, a simple majority of a legislative body (Parliament or Congress), a supermajority (e.g, 60%, 75%) of a legislative body]; 2. Are the supervisors legally liable for their actions (i.e. if a supervisor takes actions against a bank, the supervisor cannot be sued) (No=1)?; 3. Does the head of the supervisory agency (and other directors) have a fixed term and how long? (=1 if the term>=4). Higher value means a more independent supervisory agency. From Barth et al. (2004) with updated values from the Worldbank website	53707	2.355	3.000	1.052	0.000	3.000
REG_STRENGHT	Index that ranges from zero to ten and is based on the following questions: (1) Does the supervisory agency have the right to meet with external auditors to discuss reports without the approval of the bank? (2) Are the auditors required to communicate misconduct by managers/directors to the supervisory agency? (3) Can legal action against external auditors be taken by supervisors for negligence? (4) Can supervisors force banks to change the internal organizational structure? (5) Are off-balance sheet items disclosed to supervisors? (6) Can the supervisory agency order directors/management to constitute provisions to cover actual/potential losses? (7) Can the supervisory agency suspend director's decisions to distribute: (a) Dividends? (b) Bonuses? (c) Management fees? (8) Can the supervisory agency supersede bank shareholder rights and declare a bank insolvent? (9) Does banking law allow the supervisory agency to suspend some or all ownership rights of a problem bank? (10) Regarding bank restructuring and reorganization, can the supervisory agency or any other government agency do the following: (a) Suspend shareholder rights? (b) Remove and replace management? (c) Remove and replace directors? From Barth et al. (2004) with updated values from the Worldbank website.	53707	8.434	9.000	1.189	5.000	10.000
PUBLIC DEBT	Ratio between Public Sector Debt and Country GDP (in %)	53707	74.078	64.900	36.166	10.700	210.200
SHARE_TRADED	Total shares traded on the stock market over GDP from Worldbank financial structure databases-2012 edition	52657	152.484	133.859	109.977	6.131	401.233
MARKET_POWER	Accounting value of bank's net interest revenue as a share of its interest-bearing (total earning) assets from Worldbank financial structure databases-2012 edition	52657	2.244	2.697	1.128	0.020	5.718
SYSTEMIC SHOCK_2	A dummy equal to one for the first two quarters after the eruption of a systemic shock identified as in Von Hagen and Ho (2007)	53707	0.041	0.000	0.201	0.000	1.000
SYSTEMIC SHOCK_4	A dummy equal to one for the first four quarters after the eruption of a systemic shock identified as in Von Hagen and Ho (2007)	53707	0.054	0.000	0.227	0.000	1.000

Table 4: Probability of Issuing Equity and Bank Capital Strength

This Table shows the regression results on the determinants of the likelihood to issue equity by banks. The models are estimated via a Panel Random Logit estimator which controls for unobserved bank heterogeneity. The dependent variable is a dummy equal to 1 if a bank has issued equity in a given quarter and zero otherwise while the explanatory variables include bank and country characteristics. LOW CAPITALIZED is a dummy equal to one if a bank is the first quartile of the equity/assets distribution, LOW CAPITALIZED_Y is a dummy equal to one if a bank is the first quartile of the yearly equity/assets distribution, RISK is the volatility of the daily prices computed over the last quarter before the issue, RELPTB is Price to book ratio divided by the average Price to book ratio computed yearly at country level, ROA is the ratio between net income and total assets; YEARLISTED is the log of the number of years a bank has been listed in stock market, SIZE is the log of total assets measured in thousands of US dollars, DEPOSITS is computed as total customer deposits over total liabilities and MERGERS is a dummy equal to 1 if a bank has been involved in a merger during the quarter, CPP is a dummy equal to one from the first quarter after a US bank has received capital support via the Capital Purchase Program, RESCUE is a dummy equal to one from the first quarter a non-US bank has received capital support . Country controls includes an index of regulatory independence (REG_INDEPENDENCE), an index measuring the regulatory strength (REG_STRENGHT), the ratio between public sector debt and country GDP (PUBLIC DEBT) the total shares traded divided country GDP (SHARE TRADED) and the total accounting value of bank's net interest revenue as a share of its interest-bearing (total earning) assets (MARKET POWER), a dummy equal to one for the first two quarters following a systemic shock (SYSTEMIC SHOCK_2), a dummy equal to one for the first four quarters following a systemic shock (SYSTEMIC SHOCK_4). Standard errors are reported in round brackets in parentheses *** (**,*) indicates significance at the 1(5,10) percent level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		+Public	**+Systemic Shock**		**Alternative**		**NO US**	**Before**
		Rescue			**LOW CAPITALIZED**			**07/2007**
LOW CAPITALIZED	**0.505*** **	**0.544*** **	**0.535*** **	**0.543*** **			**0.425*** **	**0.608*** **
	(0.111)	**(0.110)**	**(0.110)**	**(0.110)**			**(0.148)**	**(0.144)**
LOW CAPITALIZED_Y					**0.525*** **	**0.530*** **		
					(0.109)	**(0.109)**		
RISK	2.361***	1.525**	1.833***	1.140*	1.869***	1.184*	0.735	1.626
	(0.599)	(0.629)	(0.625)	(0.643)	(0.622)	(0.640)	(1.070)	(1.079)
RELPTB	0.143***	0.188***	0.192***	0.192***	0.192***	0.192***	0.119*	0.210***
	(0.047)	(0.044)	(0.045)	(0.045)	(0.045)	(0.045)	(0.067)	(0.071)
ROA	-7.875***	-6.599***	-6.403***	-6.523***	-6.300***	-6.411***	-3.805	-6.825**
	(1.518)	(1.676)	(1.701)	(1.672)	(1.692)	(1.662)	(2.624)	(3.025)
YEARLISTED	-0.009	-0.012**	-0.012**	-0.012**	-0.012**	-0.013**	-0.000	-0.027***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.009)	(0.009)
SIZE	0.354***	0.332***	0.330***	0.334***	0.325***	0.329***	0.270***	0.292***
	(0.032)	(0.031)	(0.031)	(0.032)	(0.031)	(0.031)	(0.047)	(0.042)
DEPOSITS	0.528*	0.461	0.443	0.454	0.454	0.466	0.415	0.113
	(0.294)	(0.290)	(0.289)	(0.290)	(0.289)	(0.290)	(0.360)	(0.361)
MERGERS	0.365	0.423	0.435	0.431	0.427	0.423	0.640*	0.844***
	(0.272)	(0.272)	(0.272)	(0.272)	(0.272)	(0.272)	(0.361)	(0.287)
CPP		1.434***	1.352***	1.365***	1.378***	1.393***		
		(0.156)	(0.156)	(0.157)	(0.156)	(0.156)		
RESCUE		0.627*	0.557	0.586*	0.525	0.551	0.952***	
		(0.336)	(0.340)	(0.339)	(0.339)	(0.338)	(0.359)	
REG_INDEPENDENCE	0.131*	0.130*	0.172**	0.162**	0.182**	0.174**	0.288***	0.122
	(0.074)	(0.071)	(0.072)	(0.072)	(0.071)	(0.071)	(0.084)	(0.090)
REG_STRENGHT	-0.013	0.004	0.010	0.009	0.018	0.018	0.104**	0.070
	(0.048)	(0.046)	(0.046)	(0.046)	(0.046)	(0.046)	(0.048)	(0.057)
PUBLIC DEBT	-0.004**	-0.006***	-0.005***	-0.006***	-0.006***	-0.006***	-0.007***	-0.007***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
SHARE_TRADED	0.002***	0.001	0.000	0.000	-0.000	-0.000	-0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
MARKET POWER	0.219***	0.173***	0.174***	0.183***	0.132***	0.136***	0.055	-0.003
	(0.055)	(0.054)	(0.053)	(0.054)	(0.044)	(0.045)	(0.047)	(0.047)
SYSTEMIC SHOCK_2			0.837***		0.841***		0.498**	0.964***
			(0.165)		(0.164)		(0.240)	(0.311)
SYSTEMIC SHOCK_4				0.543***		0.542***		
				(0.146)		(0.146)		
CONSTANT	-8.642***	-8.047***	-8.120***	-8.123***	-7.955***	-7.939***	-7.321***	-7.643***
	(0.568)	(0.552)	(0.554)	(0.556)	(0.539)	(0.541)	(0.653)	(0.683)
Pseudo-R-squared	0.332	0.339	0.342	0.342	0.342	0.342	0.425	0.360
Observations	49,872	49,872	49,872	49,872	49,872	49,872	17,147	39,419

Table 5: Probability of Issuing Equity and Capital Requirements

This Table shows the regression results on the determinants of the likelihood to issue equity by banks. The models are estimated via a Panel Random Logit estimator which controls for unobserved bank heterogeneity. The dependent variable is a dummy equal to 1 if a bank has issued equity in a given quarter and zero otherwise while the explanatory variables include bank and country characteristics. LOW CAPITALIZED is a dummy equal to one if a bank is the first quartile of the equity/assets distribution, LOW ,CAPITALIZED_Y is a dummy equal to one if a bank is the first quartile of the yearly equity/assets distribution, REG_CHANGE is a dummy equal to one from the quarter when a country has experimented a regulatory change in capital regulation; REG_CONSTRAINED is a dummy equal to one for banks in the first quartile of the sample distribution in terms of regulatory capital buffer; REG_CONSTRAINED_Y is a dummy equal to one for banks in the first quartile of the sample distribution in a given year in terms of regulatory capital buffer; RELPTB is Price to book ratio divided by the average Price to book ratio computed yearly at country level,RISK is the volatility of the daily prices computed over the last quarter before the issue, ROA is the ratio between net income and total assets; YEARLISTED is the log of the number of years a bank has been listed in stock market, SIZE is the log of total assets measured in thousands of US dollars, DEPOSITS is computed as total customer deposits over total liabilities and MERGERS is a dummy equal to 1 if a bank has been involved in a merger during the quarter. Country controls includes an index of regulatory independence (REG_INDEPENDENCE), an index measuring the regulatory strength (REG_STRENGHT), the ratio between public sector debt and country GDP (PUBLIC DEBT) the total shares traded divided country GDP (SHARE TRADED) and the total accounting value of bank's net interest revenue as a share of its interest-bearing (total earning) assets (MARKET POWER), a dummy equal to one for the first two quarters following a systemic shock (SYSTEMIC SHOCK_2). Standard errors are reported in round brackets in parentheses *** (**,*) indicates significance at the 1(5,10) percent level.

	(1)	(2)	(3)	(4)
			REG_CONSTRAINED	
			YES	NO
LOW CAPITALIZED	**0.320****		0.006	**0.515*****
	(0.130)		(0.178)	**(0.174)**
LOW CAPITALIZED_Y		**0.306****		
		(0.130)		
REG_CONSTRAINED	**0.282*****			
	(0.107)			
REG_CONSTRAINED_Y		**0.422*****		
		(0.105)		
RISK	1.545**	1.601**	0.423	2.020**
	(0.704)	(0.703)	(1.365)	(0.823)
RELPTB	0.214***	0.218***	0.166*	0.228***
	(0.048)	(0.048)	(0.086)	(0.062)
ROA	-10.542***	-9.840***	-12.313***	-9.273***
	(2.774)	(2.806)	(4.772)	(3.397)
YEARLISTED	-0.008	-0.008	-0.022**	-0.005
	(0.006)	(0.006)	(0.011)	(0.007)
SIZE	0.296***	0.294***	0.170***	0.318***
	(0.035)	(0.035)	(0.055)	(0.041)
DEPOSITS	0.285	0.320	-0.092	0.489
	(0.352)	(0.353)	(0.521)	(0.448)
MERGERS	0.218	0.209	0.481	0.055
	(0.332)	(0.332)	(0.525)	(0.426)
CPP	1.185***	1.178***	0.835**	1.277***
	(0.155)	(0.155)	(0.346)	(0.178)
RESCUE	0.759**	0.751**	1.023**	0.390
	(0.340)	(0.340)	(0.440)	(0.497)
REG_INDEPENDENCE	0.171*	0.182**	0.087	0.266**
	(0.088)	(0.089)	(0.126)	(0.110)
REG STRENGHT	-0.036	-0.031	0.055	-0.054
	(0.055)	(0.055)	(0.071)	(0.074)
PUBLIC DEBT	-0.004**	-0.005***	-0.006**	-0.003
	(0.002)	(0.002)	(0.003)	(0.002)
SHARE_TRADED	-0.000	-0.000	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
MARKET POWER	0.311***	0.284***	0.215**	0.274***
	(0.061)	(0.066)	(0.098)	(0.083)
SYSTEMIC SHOCK_2	0.940***	0.936***	0.966***	0.989***
	(0.180)	(0.180)	(0.322)	(0.221)
CONSTANT	-7.367***	-7.336***	-4.956***	-7.743***
	(0.665)	(0.668)	(0.932)	(0.868)
Pseudo R-Squared	0.341	0.340	0.204	0.246
Observations	32,786	32,786	8,614	24,172

Table 6: Probability of Issuing Equity and changes in Capital Regulation

This Table shows the regression results on the determinants of the likelihood to issue equity by banks. The models are estimated via a Panel Random Logit estimator which controls for unobserved bank heterogeneity. The dependent variable is a dummy equal to 1 if a bank has issued equity in a given quarter and zero otherwise while the explanatory variables include bank and country characteristics. LOW CAPITALIZED is a dummy equal to one if a bank is the first quartile of the equity/assets distribution, LOW CAPITALIZED_Y is a dummy equal to one if a bank is the first quartile of the yearly equity/assets distribution, REG_CHANGE is a dummy equal to one from the quarter when a country has experimented a regulatory change in capital regulation; REG_CONSTRAINED is a dummy equal to one for banks in the first quartile of the sample distribution in terms of regulatory capital buffer; REG_CHANGE is a dummy equal to one from the quarter when a change in capital regulation (excluding Basel II) has occurred; REG_CHANGE_II is a dummy equal to one from the quarter when a change in capital regulation (including Basel II) has occurred; PRE_REG_CHANGE is a dummy equal to one for the eight quarter before the regulatory change; RELPTB is Price to book ratio divided by the average Price to book ratio computed yearly at country level, RISK is the volatility of the daily prices computed over the last quarter before the issue, ROA is the ratio between net income and total assets; YEARLISTED is the log of the number of years a bank has been listed in stock market, SIZE is the log of total assets measured in thousands of US dollars, DEPOSITS is computed as total customer deposits over total liabilities and MERGERS is a dummy equal to 1 if a bank has been involved in a merger during the quarter. Country controls includes an index of regulatory independence (REG_INDEPENDENCE), an index measuring the regulatory strength (REG_STRENGHT), the ratio between public sector debt and country GDP (PUBLIC DEBT) the total shares traded divided country GDP (SHARE TRADED) and the total accounting value of bank's net interest revenue as a share of its interest-bearing (total earning) assets (MARKET POWER), a dummy equal to one for the first two quarters following a systemic shock (SYSTEMIC SHOCK_2). Standard errors are reported in round brackets in parentheses *** (**,*) indicates significance at the 1(5,10) percent level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
					Using Capital Buffer	**Excluding US**	**Controlling for Basel II**	**SEOs in the proximity of changes in regulation**	
Panel A: Regression Analysis									
LOW CAPITALIZED	0.516***		0.700***			0.205	0.784***	0.587***	0.595***
	(0.111)		(0.120)			(0.181)	(0.126)	(0.136)	(0.137)
LOW CAPITALIZED_Y		0.530***		0.695***					
		(0.110)		(0.120)					
REG_CONSTRAINED					0.404***				
					(0.110)				
REG_CHANGE	0.304*	0.299	0.786***	0.730***	0.199	0.470*			
	(0.183)	(0.183)	(0.222)	(0.222)	(0.232)	(0.249)			
REG_CHANGE * LOW CAPITALIZED			-0.955***			-0.457			
			(0.260)			(0.289)			
REG_CHANGE * LOW CAPITALIZED_Y				-0.846***					
				(0.258)					
REG_CHANGE * REG_CONSTRAINED					-0.360				
					(0.279)				
REG_CHANGE_II							0.869***		
							(0.204)		
REG_CHANGE _II* LOW CAPITALIZED							-0.847***		
							(0.217)		
PRE_REG_CHANGE								2.016***	2.552***
								(0.661)	(0.832)
PRE_REG_CHANGE * LOW CAPITALIZED									-1.170
									(1.362)
RISK	1.686***	1.669***	1.639***	1.629***	1.652**	0.447	1.585**	1.603	1.592
	(0.634)	(0.633)	(0.632)	(0.632)	(0.706)	(1.104)	(0.633)	(1.029)	(1.031)
RELPTB	0.191***	0.191***	0.186***	0.187***	0.214***	0.109	0.191***	0.205***	0.204***
	(0.045)	(0.045)	(0.045)	(0.045)	(0.048)	(0.068)	(0.045)	(0.066)	(0.066)
ROA	-6.434***	-6.438***	-6.457***	-6.465***	-10.918***	-4.246	-6.024***	-7.125**	-7.185***
	(1.692)	(1.689)	(1.716)	(1.707)	(2.688)	(2.585)	(1.663)	(2.782)	(2.775)
YEARLISTED	-0.011*	-0.011*	-0.011*	-0.011*	-0.009	0.002	-0.011*	-0.015**	-0.015**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.009)	(0.006)	(0.008)	(0.008)
SIZE	0.326***	0.326***	0.324***	0.323***	0.300***	0.278***	0.318***	0.312***	0.313***
	(0.031)	(0.031)	(0.031)	(0.031)	(0.035)	(0.047)	(0.031)	(0.039)	(0.038)

Table6: Probability of Issuing Equity and changes in Capital Regulation (**continued**)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
					Using Capital Buffer	**Excluding US**	**Controlling for Basel II**	**SEOs in the proximity of changes in regulation**	
DEPOSITS	0.407	0.418	0.461	0.464	0.264	0.433	0.437	-0.212	-0.214
	(0.290)	(0.290)	(0.289)	(0.289)	(0.354)	(0.362)	(0.287)	(0.337)	(0.336)
MERGERS	0.439	0.435	0.431	0.426	0.203	0.647*	0.436	0.643**	0.643**
	(0.272)	(0.272)	(0.272)	(0.272)	(0.332)	(0.362)	(0.272)	(0.296)	(0.296)
CPP	1.354***	1.358***	1.358***	1.366***	1.194***		1.407***	0.767**	0.763**
	(0.156)	(0.156)	(0.155)	(0.155)	(0.155)		(0.158)	(0.333)	(0.333)
RESCUE	0.597*	0.596*	0.593*	0.594*	0.747**	0.950***	0.593*	0.597	0.598
	(0.341)	(0.341)	(0.340)	(0.340)	(0.340)	(0.362)	(0.349)	(0.480)	(0.480)
REG_INDEPENDENCE	0.176**	0.172**	0.215***	0.208***	0.210**	0.269***	0.226***	0.177**	0.180**
	(0.072)	(0.072)	(0.072)	(0.072)	(0.088)	(0.084)	(0.073)	(0.086)	(0.086)
REG STRENGHT	0.008	0.009	-0.002	-0.002	-0.037	0.090*	0.002	0.068	0.064
	(0.046)	(0.046)	(0.046)	(0.046)	(0.054)	(0.048)	(0.046)	(0.053)	(0.053)
PUBLIC DEBT	-0.005***	-0.005***	-0.005***	-0.005***	-0.004**	-0.006***	-0.005***	-0.006***	-0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
SHARE_TRADED	0.001	0.001	0.001	0.001	-0.001	0.001	0.001*	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
MARKET POWER	0.131**	0.134**	0.108*	0.116**	0.229***	0.083	0.111**	0.081	0.091
	(0.059)	(0.058)	(0.058)	(0.058)	(0.073)	(0.059)	(0.055)	(0.055)	(0.056)
SYSTEMIC SHOCK_2	0.815***	0.810***	0.798***	0.796***	0.950***	0.487**	0.759***	0.597**	0.597**
	(0.165)	(0.165)	(0.165)	(0.164)	(0.180)	(0.241)	(0.164)	(0.244)	(0.244)
CONSTANT	-8.057***	-8.066***	-8.129***	-8.122***	-7.114***	-7.741***	-8.300***	-8.203***	-8.215***
	(0.555)	(0.554)	(0.555)	(0.554)	(0.658)	(0.690)	(0.559)	(0.655)	(0.655)
Pseudo R-Squared	0.342	0.342	0.344	0.344	0.248	0.425	0.342	0.342	0.342
Observations	49,872	49,872	49,872	49,872	31,786	17,147	49,872	41,208	41,208
Panel B: Marginal Effects of changes in capital regulation									
A. LOW CAPITALIZED=1			0.003	-0.002	0.003	0.000	0.000		0.035
			(0.004)	(0.004)	(0.005)	(0.004)	(0.004)		(0.048)
B. LOW CAPITALIZED=0			0.012***	0.011***	0.003	0.008**	0.013***		0.074
			(0.004)	(0.004)	(0.004)	(0.004)	(0.004)		(0.058)
A=B (differences in margins p-value)			0.06*	0.00***	0.87	0.10	0.00		0.52

Table 7: Probability of Issuing Equity and Systemic Conditions.

This Table shows the regression results on the determinants of the likelihood to issue equity by banks. The models are estimated via a Panel Random Logit estimator which controls for unobserved bank heterogeneity. The dependent variable is a dummy equal to 1 if a bank has issued equity in a given quarter and zero otherwise while the explanatory variables include bank and country characteristics. LOW CAPITALIZED is a dummy equal to one if a bank is the first quartile of the equity/assets distribution, LOW CAPITALIZED_Y is a dummy equal to one if a bank is the first quartile of the yearly equity/assets distribution, RISK is the volatility of the daily prices computed over the last quarter before the issue, RELPTB is Price to book ratio divided by the average Price to book ratio computed yearly at country level, ROA is the ratio between net income and total assets; YEARLISTED is the log of the number of years a bank has been listed in stock market, SIZE is the log of total assets measured in thousands of US dollars, DEPOSITS is computed as total customer deposits over total liabilities and MERGERS is a dummy equal to 1 if a bank has been involved in a merger during the quarter, CPP is a dummy equal to one from the first quarter after a US bank has received capital support via the Capital Purchase Program, RESCUE is a dummy equal to one from the first quarter a non-US bank has received capital support . Country controls includes an index of regulatory independence (REG_INDEPENDENCE), an index measuring the regulatory strength (REG_STRENGHT), the ratio between public sector debt and country GDP (PUBLIC DEBT) the total shares traded divided country GDP (SHARE TRADED) and the total accounting value of bank's net interest revenue as a share of its interest-bearing (total earning) assets (MARKET POWER), a dummy equal to one for the first two quarters following a systemic shock (SYSTEMIC SHOCK_2), a dummy equal to one for the first four quarters following a systemic shock (SYSTEMIC SHOCK_4). Standard errors are reported in round brackets in parentheses *** (**,*) indicates significance at the 1(5,10) percent level.

	(1)	(2)	(3)	(4)
Panel A: Regression Analysis				
LOW CAPITALIZED	**0.567*** **	**0.632*** **		
	(0.112)	**(0.115)**		
LOW CAPITALIZED_Y			**0.589*** **	**0.600*** **
			(0.110)	**(0.113)**
SYSTEMIC SHOCK_2	1.220***		1.159***	
	(0.199)		(0.199)	
SYSTEMIC SHOCK_4		0.796***		0.759***
		(0.172)		(0.173)
SYSTEMIC SHOCK_2* LOW CAPITALIZED	**-1.057*** **			
	(0.327)			
SYSTEMIC SHOCK_4* LOW CAPITALIZED		**-0.671*** **		
		(0.251)		
SYSTEMIC SHOCK_2 * LOW CAPITALIZED_Y			**-0.877*** **	
			(0.316)	
SYSTEMIC SHOCK_4 * LOW CAPITALIZED_Y				**-0.557** **
				(0.248)
RISK	1.908***	1.084*	1.917***	1.138*
	(0.624)	(0.646)	(0.619)	(0.642)
RELPTB	0.185***	0.192***	0.193***	0.192***
	(0.044)	(0.045)	(0.045)	(0.045)
ROA	-5.850***	-6.533***	-6.283***	-6.426***
	(1.771)	(1.643)	(1.687)	(1.638)
YEARLISTED	-0.015**	-0.012**	-0.012**	-0.012**
	(0.006)	(0.006)	(0.006)	(0.006)
SIZE	0.331***	0.332***	0.324***	0.328***
	(0.032)	(0.031)	(0.031)	(0.031)
DEPOSITS	0.082	0.482*	0.418	0.490*
	(0.263)	(0.291)	`(0.272)	(0.290)
MERGERS	0.430	0.431	0.418	0.423
	(0.272)	(0.272)	(0.272)	(0.272)
CPP	1.257***	1.325***	1.351***	1.356***
	(0.155)	(0.158)	(0.156)	(0.157)
RESCUE	0.639*	0.724**	0.637*	0.666**
	(0.336)	(0.339)	(0.338)	(0.339)
REG_INDEPENDENCE	0.291***	0.170**	0.190***	0.180**
	(0.066)	(0.072)	(0.071)	(0.071)
REG_STRENGHT	0.016	0.014	0.021	0.022
	(0.047)	(0.046)	(0.046)	(0.046)
PUBLIC DEBT	-0.006***	-0.006***	-0.006***	-0.006***
	(0.002)	(0.002)	(0.002)	(0.002)
SHARE_TRADED	-0.000	0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
MARKET POWER	0.231***	0.181***	0.131***	0.136***
	(0.051)	(0.053)	(0.044)	(0.045)
Constant	-8.653***	-8.191***	-8.019***	-8.004***
	(0.547)	(0.556)	(0.539)	(0.541)
Pseudo R-squared	0.343	0.343	0.343	0.343
Observations	49,872	49,872	49,872	49,872
Panel B: Marginal effects of low capitalized on the likelihood to issue equity under different systemic conditions				
A) Systemic Shock=1 (systemic distress)	-0.012	0.001	-0.007	0.001
	(0.007)	(0.005)	(0.008)	(0.005)
B) Systemic Shock =0 (normal systemic conditions)	0.007***	0.008***	0.008***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)
A=B (test of differences in margins – p-value)	0.02**	0.01**	0.02**	0.02**

Table 8: Probability of Issuing Equity and Systemic Conditions – Too-Big-To-Fail Banks

This Table shows the regression results on the determinants of the likelihood to issue equity by banks. The models are estimated via a Panel Random Logit estimator which controls for unobserved bank heterogeneity. The dependent variable is a dummy equal to 1 if a bank has issued equity in a given quarter and zero otherwise while the explanatory variables include bank and country characteristics. LOW CAPITALIZED is a dummy equal to one if a bank is the first quartile of the equity/assets distribution, LOW CAPITALIZED_Y is a dummy equal to one if a bank is the first quartile of the yearly equity/assets distribution, RISK is the volatility of the daily prices computed over the last quarter before the issue, RELPTB is Price to book ratio divided by the average Price to book ratio computed yearly at country level, ROA is the ratio between net income and total assets; YEARLISTED is the log of the number of years a bank has been listed in stock market, SIZE is the log of total assets measured in thousands of US dollars, DEPOSITS is computed as total customer deposits over total liabilities and MERGERS is a dummy equal to 1 if a bank has been involved in a merger during the quarter, CPP is a dummy equal to one from the first quarter after a US bank has received capital support via the Capital Purchase Program, RESCUE is a dummy equal to one from the first quarter a non-US bank has received capital support . Country controls includes an index of regulatory independence (REG_INDEPENDENCE), an index measuring the regulatory strength (REG_STRENGHT), the ratio between public sector debt and country GDP (PUBLIC DEBT) the total shares traded divided country GDP (SHARE TRADED) and the total accounting value of bank's net interest revenue as a share of its interest-bearing (total earning) assets (MARKET POWER), a dummy equal to one for the first two quarters following a systemic shock (SYSTEMIC SHOCK_2), a dummy equal to one for the first four quarters following a systemic shock (SYSTEMIC SHOCK_4). Standard errors are reported in round brackets in parentheses *** (**,*) indicates significance at the 1(5,10) percent level.

	(1)	(2)	(3)	(4)
Panel A: Regression Analysis				
LOW CAPITALIZED	**0.323***		**0.682*****	
	(0.170)		**(0.193)**	
LOW CAPITALIZED_Y		**0.460*****		**0.715*****
		(0.173)		**(0.191)**
SYSTEMIC SHOCK_2	1.290***	1.347***	1.436***	1.391***
	(0.333)	(0.346)	(0.366)	(0.376)
SYSTEMIC SHOCK_2* LOW CAPITALIZED	**-1.377*****		**-2.241*****	
	(0.508)		**(0.644)**	
SYSTEMIC SHOCK_2 * LOW CAPITALIZED_Y		**-1.375*****		**-1.976*****
		(0.500)		**(0.606)**
RISK	1.839	1.856	2.044*	2.019*
	(1.157)	(1.159)	(1.203)	(1.201)
RELPTB	0.088	0.095	0.090	0.087
	(0.098)	(0.097)	(0.068)	(0.068)
ROA	-4.507	-4.134	-5.047**	-5.015**
	(3.990)	(4.126)	(2.301)	(2.306)
YEARLISTED	-0.002	-0.002	-0.002	-0.002
	(0.009)	(0.009)	(0.008)	(0.008)
SIZE	0.176***	0.164***	0.232***	0.229***
	(0.063)	(0.063)	(0.056)	(0.056)
DEPOSITS	-0.693*	-0.713*	1.279**	1.305**
	(0.419)	(0.419)	(0.516)	(0.514)
MERGERS	0.789**	0.800**	0.255	0.249
	(0.363)	(0.362)	(0.482)	(0.481)
CPP	0.478	0.486	1.123***	1.133***
	(0.542)	(0.545)	(0.273)	(0.273)
RESCUE	0.483	0.466	0.848**	0.821**
	(0.433)	(0.433)	(0.364)	(0.363)
REG_INDEPENDENCE	0.153	0.148	-0.167	-0.168*
	(0.097)	(0.097)	(0.102)	(0.101)
REG_STRENGHT	0.068	0.077	-0.045	-0.041
	(0.055)	(0.055)	(0.061)	(0.061)
PUBLIC DEBT	-0.005**	-0.005**	-0.007***	-0.007***
	(0.002)	(0.002)	(0.002)	(0.002)
SHARE_TRADED	0.001	0.001	0.002*	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
MARKET POWER	0.081	0.085	0.245***	0.236***
	(0.055)	(0.056)	(0.082)	(0.081)
Constant	-6.282***	-6.312***	-6.141***	-6.130***
	(0.861)	(0.863)	(0.905)	(0.896)
Pseudo R-squared	0.324	0.324	0.504	0.504
Observations	11,285	11,285	6,242	6,242
Panel B: Marginal effects of low capitalized on the likelihood to issue equity under different systemic conditions				
A) Systemic Shock=1 (systemic distress)	**-0.035****	**-0.032****	**-0.074****	**-0.064****
	(0.018)	**(0.016)**	**(0.031)**	**(0.031)**
B) Systemic Shock =0 (normal systemic conditions)	**0.006****	**0.009*****	**0.024****	**0.025*****
	(0.003)	**(0.003)**	**(0.007)**	**0.007**
A=B (test of differences in margins – p-value)	0.00**	0.00**	0.00**	0.00**

Table 9: Probability of Issuing Equity and Systemic Conditions – Other Banks

This Table shows the regression results on the determinants of the likelihood to issue equity by banks. The models are estimated via a Panel Random Logit estimator which controls for unobserved bank heterogeneity. The dependent variable is a dummy equal to 1 if a bank has issued equity in a given quarter and zero otherwise while the explanatory variables include bank and country characteristics. LOW CAPITALIZED is a dummy equal to one if a bank is the first quartile of the equity/assets distribution, LOW CAPITALIZED_Y is a dummy equal to one if a bank is the first quartile of the yearly equity/assets distribution, RISK is the volatility of the daily prices computed over the last quarter before the issue, RELPTB is Price to book ratio divided by the average Price to book ratio computed yearly at country level, ROA is the ratio between net income and total assets; YEARLISTED is the log of the number of years a bank has been listed in stock market, SIZE is the log of total assets measured in thousands of US dollars, DEPOSITS is computed as total customer deposits over total liabilities and MERGERS is a dummy equal to 1 if a bank has been involved in a merger during the quarter, CPP is a dummy equal to one from the first quarter after a US bank has received capital support via the Capital Purchase Program, RESCUE is a dummy equal to one from the first quarter a non-US bank has received capital support . Country controls includes an index of regulatory independence (REG_INDEPENDENCE), an index measuring the regulatory strength (REG_STRENGHT), the ratio between public sector debt and country GDP (PUBLIC DEBT) the total shares traded divided country GDP (SHARE TRADED) and the total accounting value of bank's net interest revenue as a share of its interest-bearing (total earning) assets (MARKET POWER), a dummy equal to one for the first two quarters following a systemic shock (SYSTEMIC SHOCK_2), a dummy equal to one for the first four quarters following a systemic shock (SYSTEMIC SHOCK_4). Standard errors are reported in round brackets in parentheses *** (**,*) indicates significance at the 1(5,10) percent level.

	(1)	(2)	(3)	(4)
Panel A: Regression Analysis				
LOW CAPITALIZED	**0.777*** **		**0.626*** **	
	(0.179)		**(0.140)**	
LOW CAPITALIZED_Y		0.725***		**0.579*** **
		(0.177)		**(0.139)**
SYSTEMIC SHOCK_2	1.345***	1.270***	1.283***	1.228***
	(0.298)	(0.295)	(0.236)	(0.237)
SYSTEMIC SHOCK_2* LOW CAPITALIZED	**-0.825***		**-0.658***	
	(0.456)		**(0.380)**	
SYSTEMIC SHOCK_2 * LOW CAPITALIZED_Y		-0.506		-0.462
		(0.437)		(0.372)
RISK	1.632*	1.856	1.786**	1.786**
	(0.849)	(1.159)	(0.744)	(0.743)
RELPTB	0.262***	0.262***	0.290***	0.288***
	(0.075)	(0.075)	(0.065)	(0.065)
ROA	-6.899**	-6.975**	-5.855**	-5.957**
	(3.354)	(3.348)	(2.616)	(2.599)
YEARLISTED	-0.029***	-0.029***	-0.026***	-0.026***
	(0.009)	(0.009)	(0.008)	(0.008)
SIZE	0.421***	0.422***	0.313***	0.314***
	(0.056)	(0.056)	(0.044)	(0.044)
DEPOSITS	1.297***	1.295***	0.082	0.084
	(0.473)	(0.473)	(0.349)	(0.348)
MERGERS	0.238	0.232	0.507	0.500
	(0.463)	(0.463)	(0.332)	(0.332)
CPP	0.653***	0.653***	0.946***	0.951***
	(0.182)	(0.182)	(0.182)	(0.182)
RESCUE	0.362	0.365	0.242	0.247
	(1.094)	(1.093)	(1.063)	(1.063)
REG_INDEPENDENCE	0.682***	0.680***	0.352***	0.352***
	(0.185)	(0.185)	(0.094)	(0.094)
REG_STRENGHT	-0.017	-0.012	0.068	0.068
	(0.137)	(0.137)	(0.065)	(0.065)
PUBLIC DEBT	-0.007*	-0.007*	-0.007***	-0.007***
	(0.004)	(0.004)	(0.002)	(0.002)
SHARE_TRADED	-0.003**	-0.003**	-0.002**	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
MARKET POWER	0.053	0.048	0.028	0.022
	(0.137)	(0.138)	(0.049)	(0.049)
Constant	-10.417***	-10.437***	-8.526***	-8.483***
	(1.217)	(1.219)	(0.715)	(0.714)
Pseudo R-squared	0.254	0.254	0.275	0.275
Observations	35,365	35,365	43,630	43,630
Panel B: Marginal effects of low capitalized on the likelihood to issue equity under different systemic conditions				
A) Systemic Shock=1 (systemic distress)	-0.001	0.006	-0.001	0.003
	(0.011)	(0.011)	(0.008)	(0.009)
B) Systemic Shock =0 (normal systemic conditions)	**0.008*** **	**0.008*** **	**0.006*** **	**0.006*** **
	(0.003)	**(0.002)**	**(0.002)**	**(0.002)**
A=B (test of differences in margins – p-value)	0.00***	0.53	0.08	0.21

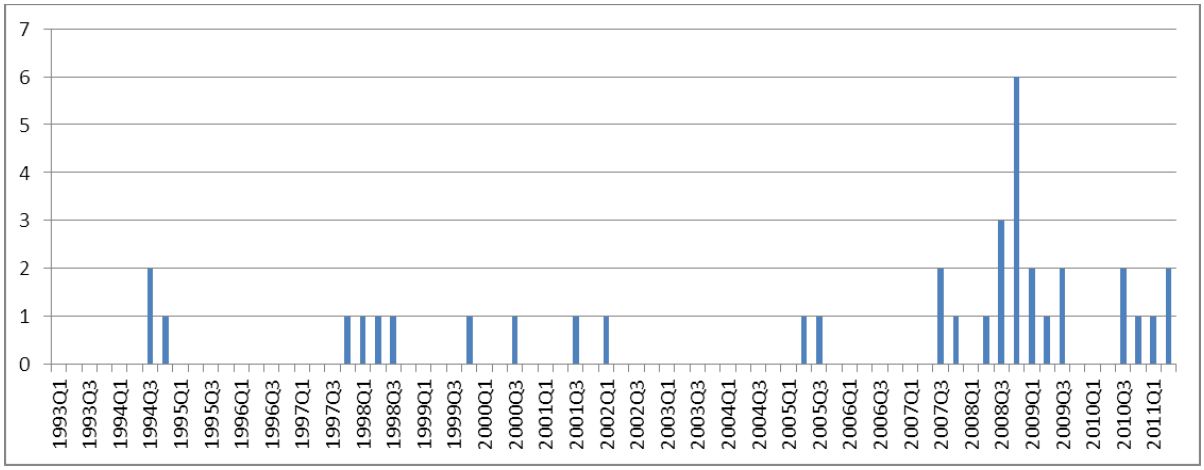

Figure 1: Number of Countries Affected by a Severe Systemic Shock in a Given Quarter.

This figure shows the number of countries that have been affected by a systemic shock, as defined by Von Hagen and Ho (2007), in a given quarter during the sample period ranging from the first quarter of 1993 to the second quarter of 2011. We report details on the methodology proposed by Von Hagen and Ho (2007) in the Appendix.

Appendix

I.A. The identification of periods of systemic distress

The index proposed by von Hagen and Ho (2007) identifies systemic crises via the identification of distress conditions in the money market. More precisely, the distress is related to both the changes in the money market rate and the changes in bank reserves. More formally, the index is constructed as follows:

$$IMP_{j,t} = \frac{\Delta r_{j,t}}{\sigma_{\Delta r_j}} + \frac{\Delta \gamma_{j,t}}{\sigma_{\Delta \gamma_j}}, \qquad (1.A)$$

where $r_{j,t}$ is the real short-term money market rate in country *j* in the quarterly period *t* and $\gamma_{j,t}$ is the ratio of total credit from the monetary authority (as a measure of central bank's liquidity support) to total deposits in country *j* in the same quarter *t*. Δ is the difference operator, and $\sigma_{\Delta \gamma_j}$ and $\sigma_{\Delta r_j}$ are the standard deviations of the two components. $\sigma_{\Delta \gamma_j}$ and $\sigma_{\Delta r_j}$ serve as scaling factors and are computed based on rolling windows of the 8 preceding quarters.

von Hagen and Ho (2007) argue that the index can be used to detect banking crises since a banking crisis eventually results in a severe shortage of aggregate private liquidity either because of sudden withdrawal of retail and wholesale deposits or because of deteriorating asset quality. The shortage of aggregate private liquidity will generate an increase of the price of this liquidity as measured by the increase in the short-term money-market rate. In this case the index will detect a banking crisis by the sharp rise in its first component. The Central Bank can decide to counteract the shortage of private liquidity and flood the banking sector with additional public liquidity which comes in the form of credit to financial institutions. In this case the index will signal a banking crisis

because of the rise in central bank's credit (the second component of the index) even in the case of no detectable rise in the price of private liquidity. Following this argument, extremely high values of the index of money market pressure can be used as a signal of periods of severe liquidity shortages and banking system distress.

As in von Hagen and Ho (2007) we establish that a systemic shock leading to a banking crisis occurs when the value of the index is very high; namely, if it exceeds the 97.5th percentile of the sample distribution of the index for the respective country. In addition, the increase in the index value from the previous period has to be at least 5%. If these two conditions are simultaneously met the crisis variable takes the value of 1 in a given quarter, otherwise it takes the value of 0. As pointed out by von Hagen and Ho (2007), the index offers indications on the beginning date of a severe crisis while it does not permit a precise identification of its conclusion. Nevertheless, this is a general problem of any method adopted to identify banking crises.

II.A Changes in Capital Regulation

Table A1 describes the changes in capital regulation that we have employed in our analysis reported in section 3.3. Column (1) describes the changes in regulation related to the Basel I Accord while column (2) describes the implementation of the Basel II Accord in the sampled countries. Information on the implementation of Basel I have been obtained from the data sources elaborated by Barajas et al. (2004) and Vallascas and Hagendorff (2013) that we have complemented with information from policy documents from Central Banks, additional academic papers and from the notes to Annual Reports for the largest banking firms in our sample. As far as the implementation of Basel II is concerned, one of our key sources of information has been the Financial Stability

Institute (FSI) Survey on "Basel II, 2.5 and III implementation" released in June 2013 by the Bank of International Settlements. This survey, launched in 2012, is annually updated with information on the status of implementation of Basel II, 2.5 and III, collected through a specific questionnaire that the FSI sends to jurisdictions that do not belong either to the Basel Committee on Banking Supervision (BCBS) and to the European Union. Additional data have been manually gathered from Central Banks or local Monetary Authorities websites and from bank annual reports.

Table A1: List of changes in capital regulation

Country	Capital requirements shocks before Basel II	Basel II Adoption before 2011
Argentina	Argentinean Banks had to comply with minimum capital requirements from 1994. The minimum regulatory capital requirements increased in 1996 from 8% to 11.5%. The increase lasted up to the end of 2004.	-
Australia	-	Australian Banks have to comply with Basel II since January 2008
Brazil	Brazil introduced minimum capital requirements in 1994. The minimum regulatory capital requirements increased in 1998 from 8% to 11%.	-
Canada	Canada increased the minimum regulatory capital requirements in 2000 from 8% to 10%.	Canadian Banks have to comply with Basel II since first of November 2007
China	The minimum regulatory capital requirement of 8% was adopted in 1995.	-
France	-	French banks have to comply with Basel II sinc the first of January 2008
Germany	-	German Banks have to comply with Basel II since the first of January 2008
India	Indian Banks had to comply with a minimum capital requirement of 8% from march 1996 (from the 4% required by March 1993). The minimum increased to 9% in October 1998 (to be satisfied by march 2009).	Indian banks have to comply with Basel II since the end of the fiscal year 2008 (march 2009).
Indonesia	Indonesia increased the minimum capital requirements from 4% to 8% from 2000. The 4% limit was introduced in 1998 and 1999 during the Asian financial crisis	In Indonesia banks have to comply with Basel II since the first of January 2008
Italy	-	Italian banks have to comply with Basel II sinc the first of January 2008
Japan	-	Japanese banks have to comply with Basel II since the end of the fiscal year 2006 (ending in march 2007).
Mexico	-	
Russia	Russian banks had to comply with minimum capital requirements from 1996 with minimum regulatory ratio of 6%. The regulatory minimum was then increased to 7% in 1998 and to 10% in 2000.	Russian Banks have to comply with Basel II since July 2010
Saudi Arabia	-	In Saudi Arabia banks have to comply with Basel II since the first of January 2008
South Africa	South Africa increased the minimum regulatory capital ratio from 8% to 10% in 2001. The ratio has been then reduced to 9.5% in 2008.	In South Africa banks have to comply with Basel II since the first of January 2008
Republic of Korea	Korea increased the minimum capital requirements from7.25% to 8% in 1995.	In Korea banks have to comply with Basel II since the first of January 2008
Turkey	Turkish banks have to comply with minimum capital requirements from 1994. After 2006 the minimum has increased from 8% to 12% for banks that want to open new branches.	-
UK	-	British banks have to comply with Basel II since the first of January 2008
USA	-	-