

DETERMINANTS OF EUROPEAN BANKS' BAILOUTS FOLLOWING THE 2007-2008 FINANCIAL CRISIS

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Abstract

Extraordinary amounts of public funds and/or assistance were made available to banks since the onset of the 2007-2008 financial crisis. Governments worldwide have launched a massive bailout package to support banks in distress. Using a probit model, this paper investigates the likelihood of bailouts following the financial crisis. Our results lead us to conclude that the governance characteristics of banks, specifically the characteristics of boards, bank risks, as well as bank-level and country-specific banking sector features, explain the likelihood of bailouts in the European banking sector. In particular we find that board banking experience, longer directors' tenure, less busy boards and the existence of a corporate governance committee decrease the likelihood of banks participating in a bailout programme. Inversely, board independence, credit and liquidity risks increase the probability of banks being bailed out. Furthermore, fewer limitations on banking freedom and greater openness of the banking sector have a harmful impact on the occurrence of bailouts. Our study therefore suggests relevant policy implications, which might help supervisors, regulators and other public authorities in avoiding costly bailouts.

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1. Introduction

The global financial crisis, starting in 2007, generated numerous public interventions into banking systems. Given that the failure of many banks was imminent, governments all over the world enacted a variety of rescue plans to prevent wide scale financial collapse. Among the many means of government intervention were: (1) direct equity injections, providing liquidity support to banks, (2) government guaranteed debt issuance programmes and the issuance of guarantees to reassure depositors and (3) purchases of distressed assets by the government or, more generally, the provision of mechanisms to relieve financial institutions from impaired or “toxic” assets (Breitenfellner and Wagner, 2010; Grossman and Woll, 2014). Most of the government bailout programmes were a mix of distinct means of government interventions. The Troubled Asset Relief Program (TARP) in the United States (US) was a mix of equity injections and distressed asset purchases, while most of the European bailout programmes combined government guaranteed debt issuance programmes with direct equity injections (Breitenfellner and Wagner, 2010). More specifically, in the European Union (EU) most member states provided general guarantees for the whole banking system as well as support for the weakest banks, through guarantees on bank liabilities, capital injections, impaired asset relief and funding support. State aid to the banking system in each member state had to be notified to - and approved by - the European Commission’s Directorate General for Competition, which aims to ensure that the measures do not distort competition. Since October 2008 hundreds of decisions authorising State aid measures were taken. The bulk of this aid represented guarantees on liabilities, with recapitalisations being the second most used support instrument.¹ Support measures have commonly been accompanied by restrictions on dividend payments and on executive compensation, requirements for regular reporting on banking activity developments, government participation in the management of banks and restructuring requirements.

Based on much of the policy literature on banking crisis, we would expect a larger amount of bailouts whenever the banking sector has a relevant position in the economy. In particular, as the size of the banking sector become larger, the need for government intervention will become more intense (Laeven and Valencia, 2010). Thus, the

¹ For detailed information see:
http://ec.europa.eu/competition/state_aid/scoreboard/financial_economic_crisis_aid_en.html

significance of the banking system for the financing of the economy (e.g., the dependence of firms on funding provided by banks) is likely to play a role, urging governments to intervene. Accordingly, variation in policy responses might be a function of economic issues, where the government has little choice but to intervene once the crisis has erupted. Moreover, a concentrated banking sector will have more lobbying resources and is more likely to have access to the government than a very dispersed one (Grossman and Woll, 2014).

Also, in countries “bank-financed”, where capital access depends on the bank credit, bankers and entrepreneurs tend to have personal relationships, with tight connections with the the government. Therefore, one might expect that close connections between the banking sector and the government (or, in other words, between bankers and members of the government) would impact on the occurrence of bailouts. The closer their relations the more likely are bailouts.

Additionally, if politicians do have some discretion when designing bailout plans, we should see variation across countries according to political factors (Grossman and Woll, 2014). The political ideology of government might make a difference. Traditionally, conservative parties are assumed to have closer relationships with the banking sector and financial interests, while left governments should be concerned about the redistributive effects of bank rescues (Cioffi and Höpner, 2006). Also, countries with a liberal market tradition should refrain from extensive government aid, while more interventionist countries should be more proactive (Grossman and Woll, 2014).

When banks have very serious financial problems, solving them will imply, very often, the need for bailouts, which are extremely costly. The enormous magnitude of the global financial crisis, illustrated by the unparalleled volume of government support packages for the financial system, has highlighted the need for a clear identification of the determinants of bailouts in the banking sector. However, the literature lacks a deep and detailed analysis of the factors that determine bailouts in the context of the financial crisis.

The aim of this paper is to fill this gap. Unlike previous studies that focus on the likelihood of financial distress or bankruptcy, which raises the question of defining the

requirements, not always consensual, for a firm to be considered in financial distress² or in bankruptcy, in this study, we focus on bailouts, that can be considered a specific status in the firm's life, in the crisis context. So, our sample consists of banks which received government assistance, due to their critical financial distress status, in order to avoid the stage of bankruptcy. Substantial financial distress effects are incurred well prior to default (Elloumi and Gueyié, 2001) and to bailouts. Fich and Slezak (2008) identify the various aspects of a firm's governance structure that affect the probability and the predictability of bankruptcy once the firm has entered the state of financial distress. Overall, their findings indicate that governance characteristics are associated with the likelihood that financially distressed firms become bankrupt. Also, some other studies have found a significant relationship between a set of corporate governance attributes and the financial distress of firms, such as Elloumi and Gueyié (2001) for Canadian firms, Tsun-Siou and Yin-Hua (2004) for Taiwanese firms, Abdullah (2006) for Malaysian firms and Miglani et al. (2015) for Australian firms. However, the literature that analyses the determinants of the probability of bailouts of banks in the financial crisis, including governance mechanisms, either in a cross-country or in a single country context, is to the best of our knowledge almost non-existent.³ Bailed-out banks are, by definition, in some sort of distress and exhibit high risk (Dam and Koetter, 2012).

Being the "ultimate centre of control" of a firm (Mizruchi, 1983), the board is responsible for its health and survival and thus, for the potential need of a bailout. Corporate boards of directors are responsible for different tasks and responsibilities. "Among these, and possibly the most critical is the obligation to maintain the firm's solvency" (Platt and Platt, 2012, p. 1139). Previous studies have acknowledged that the board's functions of monitoring, advising and providing resources are essential to any firm's survival but they do not devote attention to how board configuration influences the probability of bailouts of banks in the financial crisis. So, our first research question is whether bank board characteristics prior to the financial crisis affect the likelihood of bank bailouts following the crisis.

The financial crisis has also raised questions related to risk measurement, risk

² "Different countries have different accounting procedures and rules, and the definition of financial distress put forward by different scholars is not always the same" (Geng et al., 2015, p. 236).

³ The exceptions are the studies of Adams (2012) and Carty and Weiss (2012) both analysing the US Federal Government bailout programmes.

growth and risk management within financial organisations in general and banks in particular. So, our second research question is whether the specific risks levels of banks - such as credit risk, liquidity risk and growth risk - before the crisis influence the probability of receiving bailouts following the crisis. If this relationship exists then a proper and regular assessment/analysis of risk can mitigate or even avoid bank bailouts.

Finally, our third research question is whether the pre-crisis size of banks, in order to analyse the well-known “too-big-to-fail” issue, and the pre-crisis bank capital are related to the likelihood of banks being bailed out following the crisis.

We examine the effect of the board of banks, specific risks levels of banks, size and capital of banks capital immediately prior to the financial crisis (2006) on the likelihood of bailouts following the crisis (2007 to 2009). Additionally, we include a set of control variables: bank-level and country-level control variables. We measure the variables before the crisis for two main reasons. First, since the effects of the crisis are overwhelming it is crucial to know if, and how, boards, specific risks levels, size and capital determine the probability of bank rescue from financial distress, in order to avoid bankruptcy, thereby influencing banking stability. For example, it is very useful to be aware whether a bank that has more experienced boards when entering the crisis will benefit from this greater experience following the crisis. Thus, we attempt to identify, at a bank level, early warning indicators of bank bailouts. Second, this approach mitigates endogeneity concerns because we use lagged independent variables to explain the probability of bailout, which makes it less likely that these variables are jointly determined.

Our study contributes to the ongoing debate regarding appropriate regulatory reform in the banking system by shedding light on the extent to which bank-specific corporate governance characteristics and in particular the features of the board of banks, which is one of the main governance mechanisms, specific risks levels of banks, bank size and bank capital have an impact on the likelihood of bailouts and, consequently, on the stability/fragility of the banking system. The severity of the financial crisis has produced strong pressure in favour of reforming financial regulation. So, by analysing the determinants of the likelihood of banks receiving State aid, our study helps public authorities in the process of introducing new recommendations, rules and practices, namely in their corporate governance codes, in order to prevent or mitigate a collapse in

the future and, thus, promote stability. In short, our findings provide useful insights into the determinants of the banking sector health in Europe and, thereby, they are helpful in assisting banking supervisors and regulators in their task of guaranteeing a stable system.

Our paper seeks to contribute to the existing literature in four ways. First, unlike previous studies that analyse firms' probability of financial distress or bankruptcy in individual countries or groups of countries outside of Europe, we focus on the likelihood of bailout occurrence for banks in 17 European countries. We are not interested in financial distress *per se* nor in bankruptcy, but rather in financial distress that due to bailouts do not reach the stage of bankruptcy. So, we focus on a specific and different dimension of financial distress. Second, our paper adds to the literature that examines the influence of the features of the board on bank life as it provides a detailed analysis of the impact the characteristics of the board on bailouts. Therefore, it may be useful in the process of (re)configuring boards and may assist directors in taking steps that will decrease the likelihood of State aid. Third, we also include in our study the examination of the role of the specific risks of banks in predicting bailouts, using accounting and market measures. So, risk indicators are explicitly incorporated in our model.

Many banks had to be bailed out by their governments. It is believed that an analysis of the factors that led to the problems suffered by banks in Europe will be of enormous benefit. First, the findings can help banking authorities in their duty of ensuring a stable financial system. Second, the early detection of potential problems is likely to help reduce the expected cost of State aid and to decrease the likelihood of the problem spreading more widely through the financial system due to banking interconnectedness. Thus, we intend to provide an identification of the factors that make banks more prone to being bailed out by their governments, helping to predict bank bailouts and permitting the development of the necessary steps to avoid them.

We note that we investigate the determinants of the likelihood of bailouts of European banks following the financial crisis in order to answer the question "What is behind the bailouts of European banks?" We do not examine the amount of the bailout received by banks (e.g. the impact of the characteristics of the board on the amount of government assistance provided to banks) for two reasons. The first is that for some banks it is not possible to know exactly the amount of aid received but only the maximum

amount of aid made available by the government,⁴ thereby introducing potential errors in our analysis. The second is that for some other banks there is no available information on the amount of the bailout, either available or used. Thus, we would lose an important number of observations (banks), significantly reducing the sample size.

The remainder of the study proceeds as follows. Section 2 present the literature review and the hypotheses development, Section 3 describes the data and methodology, Section 4 provides the empirical results and Section 5 provides the conclusion.

2. Literature review and hypotheses development

The literature which focuses on bailouts in the context of the crisis is practically inexistent, therefore we refer several times to the available literature relating to financial distress and bankruptcy as a basis for the formulation of our hypotheses.

2.1 Board independence and bailouts

Board composition critically influences the success of a firm (Hsu and Wu, 2014). Hambrick and D'Aveni (1992) argue that corporate failure may occur when the composition of a board is imbalanced or inadequate. So, incorrect representation of independent directors may affect a firm's ability to survive. For Daily and Dalton (1994b) although neither the number of independent directors nor the proportion of such directors are associated with bankruptcy, the effect of the interaction between the percentage of independent directors and the joint Chief Executive Officer (CEO)/Chairman roles is strongly related to bankruptcy. Identically, for Lajili and Zéghal (2010) the proportion of independent directors is positively but not significantly associated with the likelihood of bankruptcy. Nevertheless, the three-way interaction term between independence, cumulative blockholding and duality structure show a positive and significant relationship. Furthermore, Daily and Dalton (1994a) show evidence that bankrupt firms have a higher proportion of affiliated directors. The structure-composition interaction term (the interaction between CEO/Chairman structure and the proportion of affiliated directors) is significant as well. Additionally, Platt and Platt (2012) comparing non-

⁴ For example, for some banks of our sample we only know that the government “provided up to a certain amount of capital” but not the exact amount used.

bankrupt firms with bankrupt firms conclude that non-bankrupt firms have a higher percentage of independent directors. However, more recently, Hsu and Wu (2014) examining the effect of board composition on the likelihood of corporate failure in the United Kingdom between 1997 and 2010, demonstrate that the likelihood of corporate failure is positively related to the proportion of independent directors on boards.

Concerning financial distress, Elloumi and Gueyié (2001) find that the proportion of outside directors is negatively associated with financial distress status. So, boards of financially distressed firms have significantly fewer outside members. On the contrary, Abdullah (2006), Brédart (2014a), Brédart (2014b) and Miglani et al. (2015) show that the impact of board independence on the occurrence of financial distress is not significant.

In the context of the financial crisis, Adams (2012) compares a set of selected governance characteristics in 2007 between sample banks that received bailout money from the US government in 2008 and beginning of 2009 (up until April 10, 2009) and sample banks that survived until April, 2009 and did not receive bailout money and she concludes that banks receiving bailout money had boards that were more independent. According to Adams (2012), this suggests that board independence may not necessarily be beneficial for banks. Independent directors may not always have the required expertise to oversee complex banking firms. Regarding the advisory role of boards, the lack of firm-specific knowledge on the part of independent directors may compromise their effectiveness and, so, explaining the positive relationship between the incidence of bailouts and board independence. The above arguments lead us to the first hypothesis (H₁): **H₁**: Board independence increases the likelihood of a bank participating in a bailout programme following the financial crisis.

2.2 Board size and bailouts

Board size has a number of implications for the functioning of the board (Chaganti et al., 1985).

Larger boards are less likely to become involved in strategic decision-making process (Judge Jr and Zeithaml, 1992) and may not be able to act effectively as a controlling body as they may have difficulties in coordinating their efforts, which leaves management relatively free to pursue their own goals (Chaganti et al., 1985). From this point of view, a small number of board members produces a more effective control mechanism (Jensen,

1993). Large boards also may have difficulty building the interpersonal relationships that further cohesiveness or maintaining high board effort norms (Forbes and Milliken, 1999) due to the potential "social loafing" that exists in large groups (Latané et al., 1979). In addition, a smaller board may benefit from its ability to make decisions more quickly and avoid time-consuming debates.

However, a smaller board may more easily be influenced by the CEO and, also, a larger board tends to offer a wider range of experience, skills and different views and permit the inclusion of multiple perspectives on corporate strategy and operations (Pearce and Zahra, 1992; Simpson and Gleason, 1999; Platt and Platt, 2012). Some studies support these arguments (Chaganti et al., 1985; Platt and Platt, 2012; Brédart, 2014b). Chaganti et al. (1985) find that non-failed retailing firms tend to have bigger boards than failed ones and Platt and Platt (2012) indicate that a smaller board is positively associated with bankrupt firms. Also, Brédart (2014b) shows a negative association between board size and financial distress. Additionally, for Brédart (2014a) the hypothesis which suggests that the board size has a negative impact on financial distress probability is partially supported by his model.

In contrast, other studies contradict this evidence. For Simpson and Gleason (1999) the number of directors on the board does not appear to impact future financial distress and Elloumi and Gueyié (2001) report that there is no significant difference between the board size of the financially distressed and healthy firms. Additionally, Lajili and Zéghal (2010) and Darrat et al. (2014) report that board size is not significantly associated with the likelihood of bankruptcy.

Some other studies support the advantages of smaller boards (Fich and Slezak, 2008; Adams, 2012; Salloum and Azoury, 2012). Fich and Slezak (2008) contend that distressed firms with smaller boards are more likely to avoid bankruptcy, meaning that board size is significantly positively related to the probability of bankruptcy. Also, according to Salloum and Azoury (2012) board size and financial distress are positively correlated. In the financial crisis, Adams (2012) compares banks that received TARP money in 2008 and 2009 to those that did not and concludes that banks with TARP funds have larger boards. The second hypothesis (H_2) is then stated as follows: **H₂**: Board size increases the likelihood of a bank participating in a bailout programme following the financial crisis.

2.3 CEO duality and bailouts

CEO duality has come under renewed scrutiny because of the perceived loss of board vigilance and resultant abuse of power. Carty and Weiss (2012) investigate whether CEO duality is associated with the receipt of bailout funds by publicly traded banks in the US and they do not find evidence that banks with a dual CEO corporate governance structure are more likely to participate in the Federal Government's bailout programmes. Consistent with this view, other studies do not find a significant association between duality and the probability of financial distress (Elloumi and Gueyié, 2001; Abdullah, 2006; Miglani et al., 2015).

However, Daily and Dalton (1994b) have evidenced that bankrupt firms are not more likely to be associated with the joint CEO/board structures but firms that are simultaneously characterized by joint CEO/Chairman structures and lower proportions of independent directors are associated with bankruptcy. Additionally, Lajili and Zéghal (2010) note that the duality structure is not a significant governance variable that affects the likelihood of bankruptcy, but when combined with board independence and cumulative blockholding the impact is positively significant.

It has been repeatedly emphasised that boards are more effective when one person does not simultaneously occupy the positions of CEO and Chairman. Lorsch and MacIver (1989, p. 185) specifically suggest that *“providing a leader [of the board] separate from the CEO could significantly help directors prevent crises, as well as to act swiftly when one occurs.”* Evidence by Hambrick and D'Aveni (1992) supports this idea as they report that dominant CEOs are more likely to be associated with firm bankruptcy. Also, other studies report that this duality is more prevalent in bankrupt firms (e.g., Daily and Dalton, 1994a; Darrat et al., 2014). Based on the previous arguments, although not specific and directly related to bailouts, we predict the third hypothesis (H₃) as follows: **H₃**: Dual CEO corporate governance structure increases the likelihood of a bank participating in a bailout programme following the financial crisis.

2.4 Board experience and bailouts

Operations of some firms are more technically demanding, thereby requiring specialist knowledge (Darrat et al., 2014) as is the case of banks. Industry expertise equips

directors with a deeper understanding of the more complex financial instruments and transactions, industry dynamics and regulatory environment. Additionally, boards with financial experience have a better comprehension of the more opaque assets and complex activities, but financially experienced boards must also be given the right incentives to dissuade them from taking excessive risks (Becht et al., 2011). On the one hand, boards with significant financial expertise should moderate risk exposure at their financial institutions and consequently mitigate or even prevent losses. A more financially knowledgeable board can recognise risks that will not pay off or that are unsound for the financial stability of the bank and can advise managers on avoiding such risks. On the other hand, financial experts on the board might recognise the government guarantee offered to banks and, consequently, be encouraged to pursue more risk-taking activities.

Concerning the financial crisis we expect that financial/banking experience plays a key role. An analysis of Lehman Brothers and Merrill Lynch prior to their collapse shows that their boards of directors lacked sufficient financial expertise (Fernandes and Fich, 2013). Hau and Thum (2009) find evidence that the lack of financial experience of board members in German banks was strongly positively related to losses by the banks. In a sample of banks bailed out under the TARP, Fernandes and Fich (2013) show that the probability of a bailout decreases as experience increases. Overall, the results indicate that banks with banking experts on their boards are less likely to be bailed out. So, the banking experience of boards is expected to equally be of great relevance concerning the probability of bailouts of banks in Europe, providing them monitoring and advisory advantages. The fourth hypothesis (H₄) is then stated as follows: **H₄**: Supervisory directors' banking experience decreases the likelihood of a bank participating in a bailout programme following the financial crisis.

2.5 Director tenure and bailouts

The question of dealing with the length of service period or tenure should directly impact the way firms are governed (Lajili and Zéghal, 2010). Boards with low tenure lack internal knowledge of the firm and industry specific issues and thus, are not as effective in decision making as boards with longer tenure (Muller-Kahle and Lewellyn, 2011). On the other hand, extended tenure may magnify agency problems between insiders and outsiders (McNulty et al., 2013). However, Vance (1983) contends that forcing directors

to retire leads to a waste of talent and experience. By being allowed to serve more time on the board, supervisory directors could gain more intrinsic and precious knowledge about the firm's business environment, products and markets, as well as its financial position and growth strategies (Lajili and Zéghal, 2010). This firm-specific knowledge obtained over time helps reduce information asymmetry between the board and management (Kim et al., 2014).

In the context of the subprime lending, Muller-Kahle and Lewellyn (2011) find that the board configuration of the financial institutions that engaged in subprime lending were significantly different from those that did not. Specifically, subprime lenders had less board tenure.

Considering the special nature of banks, by extending the tenure on the boards, supervisory directors are in a better position to effectively monitor, detect and control opportunistic managerial behaviour in a timely manner, as well as to provide valuable and appropriate advice, thus potentially avoiding bailouts of banks. Supervisory directors with relatively short tenure on the board would be unable to detect signs of the severity of the problems, as in the pre-crisis period, and respond in a timely manner to problems arising from the activities of the bank on whose board they serve, making it more likely to be bailed out. Therefore, we formulate the fifth hypothesis (H₅) as follows: **H₅**: The longer the supervisory directors have served on the board, the less the likelihood of a bank participating in a bailout programme following the financial crisis.

2.6 Board busyness and bailouts

More recent theoretical and empirical research highlights the importance of busy directors for the board process. Nevertheless, there is compelling theory and evidence to support competing positions on the governance impact of busy directors.

The first perspective, referred to as the *Reputational Hypothesis*, reflects the view that busy directors are preferred due to their superior ability as they are familiar with different managerial styles and business strategies and also bring a useful network and business contacts.

The second view of the role of busy directors, called *Busyness Hypothesis*, asserts that serving on multiple boards overcommits a director, which results in the director becoming too busy to adequately monitor management or, otherwise, shirking their

governance responsibilities. The point behind the problem of busy directors is that, the busier a director is, the less effort he/she devotes to each of his/her tasks. So, multiple board appointments can adversely affect a board's decision-making effectiveness. However, according to the *Reputational Hypothesis* the directors who are considered "busy" or "extremely busy" are chosen to be on so many boards precisely because of their high ability, which serves to offset the effect of their insufficient time. Muller-Kahle and Lewellyn (2011) provide evidence that effort levels by board members decrease when directors serve on several boards. Thus, busy directors will not be able to devote sufficient effort to any one board, which provides support for the *Busyness Hypothesis*. Elloumi and Gueyié (2001) show that the likelihood of financial distress increases as outside directors hold more directorships. This result is consistent with the view that additional directorships held by outside directors distract these directors from their monitoring responsibilities, thereby increasing the likelihood of financial distress. In the same way, Berberich and Niu (2011) document a positive relationship between director busyness and the likelihood of encountering governance problems, which suggests that holding too many board appointments has a detrimental effect on corporate governance. Further, Muller-Kahle and Lewellyn (2011) find a positive relationship between busy outside directors and subprime lending. Thus, subprime lenders had boards that were busier. Decisions by financial institutions to engage heavily in subprime lending may have arisen from the board being busy with the tasks of other firms, consequently lacking time and motivation to put in the effort required to provide significant and proper strategic guidance. "Thus, firms with busy boards are more likely to suffer from ineffective group decision making that could lead to financial firms choosing to take part in subprime lending" (Muller-Kahle and Lewellyn, 2011, p. 448) and, thereby, to participate in a bailout programme. In accordance with previous studies we expect to confirm the *Busyness Hypothesis*. Accordingly, we state the sixth hypothesis (H₆) as follows: **H₆**: Busier supervisory directors on the board increase the likelihood of a bank participating in a bailout programme.

2.7 Bank specific risks and bailouts

The financial crisis has led to a further growing awareness and need for appropriate risk analysis in its different components. In quantitative risk management, the focus lies

on how to enhance the measurement and management of specific risks such as liquidity risk, credit risk and market risk (Aebi et al., 2012). Bank soundness can be affected by different sources of risk, such as credit risk and liquidity risk (Poghosyan and Čihák, 2011) and so we examine whether, and how, various bank specific risks affect the likelihood of being bailed out. If there is a relationship, then regular monitoring of risk and early detection of related potential problems may help to prevent/mitigate government assistance. In order to capture bank specific risks, (i.e. credit risk, liquidity risk and growth risk of the equity markets), indicators from the balance sheets of banks and from the market are used.

For Davis and Karim (2008) a symptom of banking crises is increased credit risk or the probability that a borrower will default, converting an asset into a “bad” or non-performing loan (NPL). *“Although banks enjoy advantages in screening and monitoring borrowers, both of which reduce credit risk, the high levels of NPLs associated with crises indicate risk assessment by banks deteriorates during pre-crisis periods”* (Davis and Karim, 2008, p. 93). Cipollini and Fiordelisi (2012) find that a higher proportion of NPLs increases the probability of observed distressed Shareholder Value Ratio. Similarly, Mayes and Stremmel (2012) show that NPLs positively influence the likelihood of bank distress. Also, Dam and Koetter (2012) show that credit risk is associated with a higher expected bailout probability. Thus, the seventh hypothesis and the first related to bank specific risks (H_{7.1}) is stated as follows: **H_{7.1}: Credit risk increases the likelihood of a bank participating in a bailout programme.**

Banks need liquidity to meet deposit withdrawals and satisfy customer loan demand. Liquidity risk at banks can be defined as the likelihood that the demand for cash by bank customers exceeds the bank’s ready supply of cash (DeYoung and Jang, 2015). Liquidity risk arises from the inability of a bank to accommodate decreases in liabilities or to fund increases in assets (Cipollini and Fiordelisi, 2012). Banks need to have sufficient liquidity assets to avoid incurring a high liquidity risk. This ensures that immediate funds will be available at the lowest cost. According to the Basel Committee on Banking Supervision, BCBS (2008, p. 1), *“liquidity is the ability of a bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses.* Mayes and Stremmel (2012), using as measure of liquidity the loan-

to-deposit ratio find that the lack of liquidity influences positively the likelihood of bank distress. Additionally, to control for liquidity risk Dam and Koetter (2012) use the sum of cash and overnight interbank assets to total assets and conclude that liquidity is not significant in explaining the probability of bank bailouts during 1995-2006.

In the context of the financial crisis and in accordance with the Basel Committee on Banking Supervision, BCBS (2008), which emphasises the importance of liquidity to the functioning of financial markets and the banking sector, as well as the need for adequate risk management, the seventh hypothesis and the second related to bank specific risks ($H_{7.2}$) is stated as follows: **H_{7.2}**: Liquidity risk increases the likelihood of a bank participating in a bailout programme.

Finally, we analyse the growth risk measured by market-to-book ratio. Since book value does not include future growth potential but market value does, the ratio of the market value to the book value is expected to be higher for a firm that is perceived to have many growth opportunities (Ramezani et al., 2002). Therefore, the deviation of market value from book value depends on the expected growth opportunities and so, it reflects investor expectations regarding the future growth of the firm. Market-to-book ratio is considered a good proxy for the presence of profitable growth options (Ramezani et al., 2002), measuring the market's perception of the firm (Rose and Thomsen, 2004). Therefore, it may also be used as a proxy for growth risk. Higher market-to-book ratios may signal aggressive and riskier strategies to support a higher market evaluation of the growth opportunities materialized, for example, in the loosening of lending and other banking activity standards. In other words, as more growth opportunities are available, banks have stronger incentives to pursue riskier strategies in order to exploit those opportunities to compete. In fact, the top management of high-growth firms would need to make strategic and riskier decisions to stay competitive (Bathala and Rao, 1995). Since the market-to-book ratio is a standard measure in the literature to proxy for growth opportunities (Linck et al., 2008), banks with more growth opportunities have higher market-to-book ratio, which reflect higher risk. Thus, the market to book ratio is used as a measure of growth risk. Accordingly, the seventh hypothesis and the third related to bank specific risks ($H_{7.3}$) is stated as follows: **H_{7.3}**: Growth risk increases the likelihood of a bank participating in a bailout programme.

2.8 Bank size and bailouts

Large banks have received generous sums of government money and other support measures in order to keep them afloat, given their looming insolvency. *“The argument for such policy intervention is that some banks are of a size (and with so important interconnections with other banks) that gives them system-wide relevance”* (Rötheli, 2010, p. 123). The failure of a large financial institution will have ramifications for other financial institutions and therefore the risk to the economy would be enormous (Helwege, 2010). For Panageas (2010) governments sponsored bailouts given that some of the financial institutions were considered “too-big-to-fail”. On the one hand, public bailouts become necessary because the collapse of large banks can impose substantial costs on the real economy. On the other hand, government support of "too-big-to-fail" financial institutions during the crisis provided incontestable proof that these institutions benefit from large explicit and implicit public subsidies, including the expectation that they will receive similar public support during future emergencies (Wilmarth Jr., 2011). In this way, public bailouts can create moral hazard problems. Banks have an incentive to grow to a size that, in case of misfortune, ensures that they are saved (Stern and Feldman, 2004).

Fernandes and Fich (2013) find that the probability of a bank being bailed out increases as its size increases. This result is in accordance with the commonly held view that many banks were bailed out because they were deemed “too-big-to-fail” by regulators. Large banks are likely to play a greater role in a country’s economic performance and thus may be more likely to receive bailouts. Thus, the eighth hypothesis (H₈) is formulated as follows: **H₈**: Bank size increases the likelihood of a bank participating in a bailout programme.

2.9 Bank capital and bailouts

Public requirement for more bank capital tends to be greater after financial crises and reform proposals usually focus on how capital regulation should adapt to prevent future crises (Berger and Bouwman, 2013).

In the Basel framework bank capital is a main variable for ensuring healthy banks. Also, many theories suggest that capital improves a bank’s survival probability. On the one hand, bank capital serves as a cushion to absorb losses and shocks (Rahman et al.,

2004; Repullo, 2004; Poghosyan and Čihak, 2011). A higher level of capital acts as a buffer against financial losses, protecting a bank's solvency, and is expected to decrease the probability of a bank failure (Rahman et al., 2004; Betz et al., 2014). On the other hand, bank capital has a direct positive effect on monitoring incentive, as well as reducing the probability of default (Mehran and Thakor, 2011). Additionally, a stronger capital base attenuates the excessive risk-taking incentives.

Cole and White (2012) use proxies for the CAMELS indicators⁵ to explain banking failures in the recent financial crisis and they find that capital is one of the factors that explains bank failures during 2009. Berger et al. (2012) analyse the role of corporate governance on US commercial bank failures during the financial crisis and also find that larger amounts of capital decrease the probability of default. Finally, Berger and Bouwman (2013) show that having more capital increases the probability of survival of small banks at all times and of medium and large banks during banking a crisis. According with the arguments presented above, the ninth hypothesis (H₉) is formulated as follows: **H₉**: Bank capital level decreases the likelihood of a bank participating in a bailout programme.

3. Data and methodology

3.1 Sample and data sources

The 72 banks in our sample corresponds to those that actually meet the cumulative selection criteria of (i) being publicly listed at the end of December 2005 that is, listed, at least, for the whole of 2006 (so, at least one complete year before the beginning of 2007) and not delisted during the crisis period, (ii) with common shares traded on a regulated market and that are not a subsidiary of a bank already included in the sample so as to prevent duplication of data, and (iii) that are covered by BoardEx, our data source on board information. Given the existence of a number of missing observations in some of the variables and the fact that the omitted variables are different between banks, this led

⁵ CAMELS is an acronym for capital adequacy, asset quality, management, earnings, liquidity and sensitivity to market risk that is used by bank supervisors.

to the usage of a smaller number of observations which can further vary according to each model specification.

In our analysis we are interested in troubled banks receiving different types of State assistance (recapitalisation, guarantees or other aid) from their national government so as to avoid failure or dissolution. To identify such banks we use various sources of information.

Our first source is the European Commission website, in which we run detailed searches on the individual banks. We combine this source with two other sources: the annual reports and other documents available on the bank's official website. Additionally, we conduct keyword Google searches using a combination of: (1) the name of each bank in our sample, (2) the terms "bailout", "bailed out", "rescue", "capital injection", "recapitalisation", "guarantee" or "aid" and (3) the words "government" or "State." Based on all these searches, we create a bank bailout dummy variable equal to one if there is at least one reference to "bailout" for the particular bank during the interval 2007- 2009.⁶ We are interested in whether a specific bank is bailout out, not in the total number of bailouts. More specifically, the distribution of the number of bailouts in each year is as follows: 1 bailout in 2007, 20 bailouts in 2008 and 25 bailouts in 2009. There were 19 banks that were bailed out once, 12 banks that were bailed out twice and 1 bank that was bailed out three times.

Further, concerning independent and control variables, data has been extracted from several other sources: BoardEx, Datastream, Thomson Financial, annual reports, World Bank and Heritage Foundation websites.

3.2 Variables description

3.2.1 Bailout variable

A dichotomous qualitative dependent variable is used in this study, which we call *Bank bailout*. *Bank bailout* is a binary variable taking the value of one for a bailed-out bank and zero otherwise.

⁶ The results of our study are unchanged over the period 2007-2011. All banks that received aid in 2010 and 2011 had already received assistance in the previous period.

3.2.2 Board characteristics variables

Our variables of interest regarding the board of banks are: *Board independence*, *Board size*, *CEO duality*, *Board experience*, *Director tenure* and *Board busyness*. *Board independence* is defined as the percentage of independent directors. *Board size* is defined as the total number of directors on the board. *CEO duality* is a dummy variable with a value of one if the CEO is also the Chairman of the board and zero otherwise. *Board experience* is measured as the average years of experience in the banking sector of the supervisory directors and *Director tenure* is measured as the average length of time, stated in years, that the supervisory directors have been on the board of the bank. Said differently, it is the average number of years that the supervisory directors have served on the board of the bank. Finally, *Board busyness* is measured as the average number of board positions (number of directorships) held by supervisory directors.

3.2.3 Risk variables

We include a set of variables in order to capture various aspects of a bank's vulnerability: *Credit risk* (or default risk), *Liquidity risk* and *Growth risk*. Information from the balance sheets of banks as well as the market is used to measure bank specific risks.

Following the literature, we account for credit risk, which is directly linked to asset composition (or asset quality as defined in the CAMELS framework) (Simpson and Gleason, 1999; Rahman et al., 2004; Männasoo and Mayes, 2009; Berger et al., 2012; Dam and Koetter, 2012). According to Rahman et al. (2004) and Dam and Koetter (2012), *Credit risk* is measured using the non-performing loan ratio, calculated as non-performing loans to total loans. A high ratio indicates a high probability of a bank being bailed out.

Liquidity risk reflects the probability that banks will be unable to satisfy the claims of depositors. Similarly to Mayes and Stremmel (2012), as proxy for *Liquidity risk* we use the loan-to-deposit ratio, this is, total loans divided by total deposits. A high ratio may indicate the lack of liquidity and possible repayment problems for sudden unforeseen obligations. We expect a positive sign for the *Liquidity risk* variable.

Growth risk is measured by the market-to-book ratio, that is, the ratio of the market value to the equity book value. A higher ratio indicates a more favourable market

perception and, thus, assessment of the growth options. Therefore, the likelihood of a bank being bailed out is lower.

In a robustness check, we use alternative risk measures.

3.2.4 Other specific variables of banks: size and capital

Large-scale collapses can impose substantial costs on the real economy, making a public bailout inevitable. Thus, large banks may be more likely to receive government support when confronted with financial distress. To capture the size of the bank, *Bank size* variable, we use the natural logarithm of market capitalization and alternatively, in a robustness check, we use the natural logarithm of total assets.

Additionally, following several papers, we measure bank capital, *Capital* variable, by the ratio of total equity to total assets. We expect that a higher ratio makes the bank more resilient to shocks (such a sudden decline in the value of bank assets), other things being equal. Although the risk-weighted capital ratios measures are used in some previous studies “*they are open to manipulation and provide space for discretion to cover up the real condition of the bank*” (Mayes and Stremmel, 2012, p. 12). More fragile banks tend to manipulate risk-weighted measures, thereby helping to make less clear their true position (Mariathasan and Merrouche, 2012). Accordingly, similarly to various other studies,⁷ we use a non-risk-weighted capital measure.⁸ However, alternatively, as a robustness check, we re-run our model using as a risk-weighted capital ratio measure the capital adequacy ratio Tier 1, which represents the ratio of Tier 1 Capital to total risk-weighted assets, calculated in accordance with banking regulations and expressed as a percentage, obtained directly from Datastream.

3.2.5 Control variables

3.2.5.1 Bank-level indicators

We consider stock returns from January 2006 to December 2006 (*2006 performance*) to account for prior bank performance, institutional ownership

⁷ See, e.g., Curry et al. (2003) and Männasoo and Mayes (2009).

⁸ Also, for Mayes and Stremmel (2012, p. 2), “*the risk-weighted measures that lie at the heart of the Basel system are not the best predictor available*” [of bank weakness].

(*Institutional ownership*) to control for ownership structure and the existence of a corporate governance committee (*CG committee*), which is represented by a dummy variable coded as one if the bank has a corporate governance committee and as zero otherwise. *Institutional ownership* is measured as the percentage of shares owned by institutional investors. Additionally, in an alternative version of our baseline model we account for the existence of a board audit committee (*Audit committee*), which is represented by a dummy variable coded as one if a separate audit committee is present in a particular bank and as zero otherwise.

3.2.5.2 Country-specific banking sector and macroeconomic environment indicators

Evidence shows that country-level banking sector variables are important determinants of a firm's policies, financial distress, bankruptcy and bailouts, although as regards bailouts the literature is far less abundant.

First, we include *Concentration* as a control variable. Variables such as the concentration of the banking sector are proxies that can give indications on the economic importance of the sector and the potential influence of the sector's lobby (Grossman and Woll, 2014). Economic theory provides conflicting predictions about the relationship between the concentration and the competitiveness of the banking industry and banking system fragility (Beck et al., 2006). Some theoretical arguments support the "concentration-stability" view that banking system concentration reduces fragility (Allen and Gale, 2000). Concentration enhances market power and increases profits. Higher profits provide a "buffer" against adverse shocks, decreasing the probability of bank distress. In contrast, alternative arguments support the "concentration-fragility" view that a more concentrated banking structure raises bank fragility and so, bank distress (Boyd and Nicoló, 2005). Caminal and Matutes (2002) show that less competition can lead to less credit rationing, larger loans and a higher probability of failure if loans are subject to multiplicative uncertainty. In the same way, Poghosyan and Čihák (2011) show that banks operating in more concentrated banking sectors are more likely to experience bank distress relative to banks operating in less concentrated markets, using as measure of concentration the Herfindahl Index. Advocates of the "concentration-fragility" view also argue that policymakers are more concerned about bank failures when there are only a few banks. Concentration may reduce competition, increase the market power and

political influence of financial conglomerates and cause instability of the financial system as banks use their influence to shape banking regulations and policies. Our *Concentration* variable is a measure of concentration in the banking industry, calculated as the fraction of assets held by the five largest banks in each country.

Second, another relevant country-level banking sector variable relates to the degree of international integration. To control for this we include as variable the ratio of consolidated foreign claims to Gross Domestic Product (GDP) of the banks that are reporting to Bank for International Settlements (BIS) (Čihák et al., 2012), which we call *IIBIS*. We can, then, evaluate whether bailed out banks were from countries where the banking system was more exposed to the international environment. Additionally, in order to control for international exposure, and as alternative to the variable *IIBIS*, we also include the foreign presence in domestic banking markets as an additional control variable (*Foreign*). Recent decades have seen an unprecedented degree of globalisation, especially in financial services. Banking markets have become increasingly international on account of financial liberalisation and overall economic and financial integration (Claessens et al., 2001). In many countries, foreign bank presence in terms of numbers has increased dramatically between 1995 and 2009 (Claessens and van Horen, 2011). Banks have expanded internationally, namely, by establishing foreign subsidiaries and branches. The global financial crisis has highlighted that there can be risks associated with cross-border banking and foreign bank presence (Claessens and van Horen, 2011). In fact, since the onset of the global financial crisis, several papers have pointed out the risks of foreign banking for financial stability (Claessens and van Horen, 2011). Increasingly foreign bank presence may work as a channel of international shocks transmission, increasing the vulnerability of domestic banking markets to the international environment. As a measure of foreign bank presence, we consider the importance of foreign banks in terms of numbers and not in terms of assets. On the one hand, data on banking assets that are held by foreign banks is not available for all the countries of our sample, whereas, on the other hand, the number of foreign entrants matters rather than their market share (Claessens et al., 2001). So, our measure of the degree of foreign participation in domestic banking markets, *Foreign*, which is a proxy of the level of international exposure/integration to foreign banks, is the ratio of the number of foreign owned banks to the number of the total banks in an economy. A foreign

bank is defined as having at least 50% of its shares owned by foreigners.

Third, as a macroeconomic environment control variable, similarly to Faccio et al. (2006), we include *GDP per capita* to control for differences in the level of economic development across countries. More specifically, our variable *GDP per capita* is the natural logarithm of *GDP per capita*. Alternatively, in a robustness check we use the natural logarithm of *GDP per capita* based on purchasing power parity.

3.2.5.3 Supervisory and regulatory environment indicators

Additionally, to control for supervisory and regulatory environment we include two variables: *Official index* and *Financial freedom*.

The official supervisory powers index, *Official index*, measures the degree to which the country's commercial bank supervisory agency has the authority to take specific actions. It comprises information on many features of official supervision, including elements such as the right of the supervisor to meet with the external auditors, demand information from them and take legal action against them for negligence and force a bank to change its internal organizational structure. Higher values of the index indicate greater power. Data on official supervisory powers was obtained from the third survey of bank regulation and supervision carried out by the World Bank, available at the World Bank website, and discussed in Barth et al. (2008).

Financial freedom is an indicator of banking efficiency, as well as a measure of independence from government control and interference in the financial sector. It is a composite index covering if foreign banks are able to operate freely, the degree to which the government influences allocation of credit, how difficult it is to open domestic banks and other financial services firms, the extent to which the financial system is regulated, the presence of State-owned banks and whether banks are free to provide insurance and securities services to customers. Thus, this aggregate financial freedom indicator, *Financial Freedom*, uses data from regulatory restrictions, entry restrictions and State ownership. Higher values indicate fewer restrictions on banking freedom and a greater openness of the banking system. On the one hand, fewer official impediments to bank operations and entry can stimulate efficiency and diversification that fosters stability. On the other hand, greater freedom and openness promotes greater international exposures which, during a crisis, can serve as a contagion channel. One source of instability in

financial systems is the possibility of contagion, in which a small shock that initially affects one region or sector or even a few institutions, spreads from bank to bank throughout the rest of the system, and then affects the entire economy (Allen and Gale, 2003), as well as other economies (Eichengreen et al., 2012).

3.2.5.4 Corruption indicator

Finally, in order to control for differences in perceived corruption across countries, we include the variable freedom from corruption, called *Freedom corruption*. Higher values denote lower levels of corruption. Corruption deteriorates freedom by introducing insecurity and uncertainty into economic relationships and is a failure of integrity in the economic system. Freedom from corruption is expected to promote equitable treatment and greater regulatory efficiency.

There is an overlap between some of the control variables, which are used for robustness purposes. Thus, we note these overlaps and we do not include them simultaneously in the regressions.

The definitions of all the variables are detailed in Appendix 1.

3.3 Empirical framework

In the proposed empirical model the dependent variable is binary (bailed out or not bailed out). Therefore, we estimate cross-sectional probit model regressions to determine the likelihood of bank bailouts.

More specifically, in our model the dependent variable *Bank bailout* is a bailout indicator variable equal to one for banks that are bailed out at any time over the interval July 2007 to December 2009 and equal to zero otherwise. Thus,

$$Bank\ bailout_{i,[2007,2009]} = \begin{cases} 1 & \text{if bank } i \text{ received a bailout in } [2007,2009] \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

We assume that $Bank\ bailout_{i,[2007,2009]}^*$ is an unobserved variable of the probability that bank i received a bailout in the period between July 2007 and December 2009 and is a function of the board of the bank, bank specific risks, bank size, bank capital and a set of control variables, X_i , so that:

$$Bank\ bailout_{i,[2007,2009]}^* = \beta X'_{i,2006} + \varepsilon_{i,[2007,2009]} \quad (2)$$

where, i is the index of the i^{th} bank, $X'_{i,2006}$ is the vector of explanatory variables of bank i as of December 31, 2006, β is the vector of coefficients of the explanatory variables and $\varepsilon_{i,[2007,2009]}$ is the error term.

Specifying equation (2) then,

$$\begin{aligned} Bank\ bailout_{i,[2007,2009]}^* = & \beta_0 + \beta_1(Board\ independence)_{i,2006} + \\ & + \beta_2(Board\ size)_{i,2006} + \beta_3(CEO\ duality)_{i,2006} + \\ & + \beta_4(Board\ experience)_{i,2006} + \\ & + \beta_5(Director\ tenure)_{i,2006} + \\ & + \beta_6(Board\ busyness)_{i,2006} + \beta_7(Credit\ risk)_{i,2006} + \\ & + \beta_8(Liquidity\ risk)_{i,2006} + \beta_9(Growth\ risk)_{i,2006} + \\ & + \beta_{10}(Bank\ size)_{i,2006} + \beta_{11}(Capital)_{i,2006} + \\ & + \beta_{12}(Control\ variables)_{i,2006} + \varepsilon_{i,[2007,2009]} \end{aligned} \quad (3)$$

We examine the heteroscedasticity using the Lagrange Multiplier (LM) test and heteroscedasticity was not confirmed in our model.⁹ Also, we estimate the model with robust variances-covariances.¹⁰

4. Empirical results

4.1 Descriptive statistics and correlation matrix

Table 1 presents the descriptive statistics for the independent variables used in our analysis.

⁹ We carry out the Lagrange Multiplier (LM) test for heteroscedasticity using the artificial regression method described in detail by Davidson and MacKinnon (1993). We test the null hypothesis of homoscedasticity against the alternative of heteroscedasticity of the form: $Var(\varepsilon_i) = exp(2Z_i'\gamma)$, where γ is an unknown parameter.

¹⁰ So, the standard errors are robust to certain misspecification of the underlying distribution of the binary dependent variable.

Table 1 – Descriptive statistics

The table reports the descriptive statistics of each variable by showing mean, median, standard deviation (Std. dev.), maximum (Max.) and minimum (Min.).

Variable	# Obs.	Mean	Median	Std. dev.	Max.	Min.
Board independence (%)	72	41.449	44.097	28.729	95.454	0.000
Board size (N°)	72	16.389	15.000	5.700	31.000	6.000
CEO duality	72	0.069	0.000	0.256	1.000	0.000
Board experience (years)	72	12.751	10.778	6.509	35.064	3.000
Director tenure (years)	72	5.286	4.900	1.741	11.700	1.100
Board busyness (N°)	72	2.631	2.375	1.011	5.750	1.100
Credit risk (%)	57	2.127	1.080	3.993	28.920	0.080
Liquidity risk (%)	68	177.439	157.400	148.217	1186.760	46.320
Growth risk (%)	72	238.588	209.703	108.612	692.477	47.080
Bank size (€ bil.)	72	22.727	11.410	29.588	160.442	0.220
Capital (%)	72	5.480	5.244	2.705	14.672	1.792
2006 performance (%)	72	25.072	20.836	19.611	93.981	-29.251
Institutional ownership (%)	69	44.464	44.320	27.001	100.000	0.030
CG committee	68	0.176	0.000	0.384	1.000	0.000
Audit committee	69	0.812	1.000	0.394	1.000	0.000
Concentration (%)	72	80.348	82.283	15.275	100.000	49.460
IIBIS (%)	72	102.401	73.553	57.191	307.321	58.280
Foreign (%)	72	22.847	13.000	22.324	90.000	1.000
GDP <i>per capita</i> (US\$)	72	38,304.91	36,472.07	10,794.59	72,959.73	19,820.43
Official index	72	9.306	8.000	2.499	14.000	5.000
Financial freedom	72	65.000	70.000	15.291	90.000	50.000
Freedom corruption	72	73.139	75.000	16.733	97.000	43.000

Note: Observations vary because of missing data.

Please refer to Appendix 1 for the definition of each variable.

As can be noted from Table 1, on average, 41.449% of the directors on the board are independent. The board has, on average, 16.389 directors, confirming the existing literature that banks have on average larger boards than non-financial firms, and a very small proportion of banks (6.9%) have a dual CEO corporate governance structure. Concerning board experience, director tenure and board busyness we find that, on average, supervisory directors have 12.751 years of experience in the banking sector, have served on the board 5.286 years and held 2.631 board positions. One aspect relating to bank specific risks that stands out is, with the exception of the credit risk, the high dispersion. Bank size is, on average € 22.727 billion¹¹ and the capital ratio is, on average,

¹¹ Due to the quite positively skewed distribution of the *Bank size* we use the natural logarithm, $\ln(\text{Bank Size})$, in the regression analysis.

5.48%, which is a low value comparatively to the limits of the different components of capital imposed in the Basel III framework.¹²

Regarding bank-level control variables, the stock returns before the financial crisis (2006) are, on average 25.072%, a positive value, although the minimum value is negative (-29.251%) and institutional investors own, on average, 44.464% bank shares. Also, 17.6% of banks have a corporate governance committee, while about 81.2% have an audit committee. So, in our sample of banks the existence of an audit committee is more common than a corporate governance committee.

With respect to country-specific control variables, we note that the percentage of assets held by the five largest banks is, on average, 80.348%, a higher percentage relatively to other studies (e.g., De Nicoló et al. (2004) reports a mean five-firm concentration ratio of 57% in 1995, which increased slightly to 60% in 2000). The ratio of consolidated foreign claims to GDP of the banks that are reporting to BIS is, on average, 102.401% and the percentage of foreign banks among total banks is, on average, 22.847%. The *GDP per capita* ranges from a high of US\$72,959,73 to a low of US\$19,820.43 and the mean is US\$38,304.91.¹³

Furthermore, in our sample, the official supervisory index ranges from a minimum of 5 to a maximum of 14, which is also the highest value of the index, and the mean is 9.306. Financial freedom ranges from a minimum of 50 to a maximum of 90, where the highest value of the index is 100, and a mean is 65. Finally, freedom from corruption ranges from a minimum of 43 to a maximum of 97, where the highest value of the index is 100, and the mean is 73.139.

To obtain a first impression on potential differences between bailed out and not bailed out banks we compare our main variables, underlying to our hypotheses, between these two groups of banks. Descriptive statistics and the univariate tests of differences between bailed out and not bailed out banks are reported in Table 2. The univariate tests

¹² In the Basel III framework, 1) Common Equity Tier 1 must be at least 4.5% of risk-weighted assets at all times, 2) Tier 1 Capital must be at least 6.0% of risk-weighted assets at all times, 3) Total Capital (Tier 1 Capital plus Tier 2 Capital) must be at least 8.0% of risk-weighted assets at all times and 4) a minimum Tier 1 leverage ratio of 3% during the parallel run period from 1 January 2013 to 1 January 2017.

¹³ Although we use the natural logarithm of *GDP per capita* in the regression analysis, $\ln(\text{GDP per capita})$, in Table 1 the *GDP per capita* is reported.

are the t-test and the nonparametric Wilcoxon/Mann-Whitney test for the continuous variables and the Chi-squared test for the categorical variable.

Table 2 – Comparison between bailed out and not bailed out banks

The table reports a comparison of the main variables used in the paper’s multivariate analysis between bailed out and not bailed out banks. Descriptive statistics and the univariate tests of differences between the two groups of banks are presented.

Variable	# Obs.	Mean	Median	Std. dev.	Max.	Min.	t-test ^{a)}	Wilcoxon test/Chi-squared test ^{a)}
<i>Board independence</i>								
Bailed out/Not Bailed out	32/40	41.971/41.032	46.875/43.651	31.316/26.882	94.736/95.455	0.000/0.000	-0.137	0.380
<i>Board size</i>								
Bailed out/Not Bailed out	32/40	17.875/15.200	16.000/15.000	5.890/5.321	31.000/29.000	10.000/6.000	-2.021**	1.745*
<i>CEO duality</i>								
Bailed out/Not Bailed out	32/40	0.098/0.050	0.000/0.000	0.296/0.221	1.000/1.000	0.000/0.000	---	0.527
<i>Board experience</i>								
Bailed out/Not Bailed out	32/40	12.722/12.773	10.060/11.298	7.783/5.384	35.064/26.613	3.751/3.000	0.033	0.799
<i>Director tenure</i>								
Bailed out/Not Bailed out	32/40	5.053/5.473	4.900/4.900	1.741/2.278	8.100/11.700	1.700/1.100	0.859	0.544
<i>Board busyness</i>								
Bailed out/Not Bailed out	32/40	2.840/2.463	2.575/2.325	1.153/0.860	5.750/5.250	1.100/1.450	-1.588	1.303
<i>Credit risk</i>								
Bailed out/Not Bailed out	26/31	3.237/1.197	1.350/0.890	5.696/0.870	28.920/3.420	0.280/0.080	-1.970*	1.210
<i>Liquidity risk</i>								
Bailed out/Not Bailed out	32/36	186.242/169.614	154.680/157.400	189.402/100.730	656.560/1186.760	64.220/46.320	-0.459	0.197
<i>Growth risk</i>								
Bailed out/Not Bailed out	32/40	230.937/244.708	203.066/223.497	89.938/122.315	422.249/692.477	132.475/47.080	0.532	0.504
<i>Bank size</i>								
Bailed out/Not Bailed out	32/40	16.518/15.760	16.621/15.837	1.072/1.674	18.390/18.893	14.225/12.305	-2.221**	2.000**
<i>Capital</i>								
Bailed out/Not Bailed out	32/40	4.653/6.143	4.416/5.528	1.877/3.083	10.317/14.672	2.08/1.79	2.399**	2.306**

Note: Observations vary because of missing data.

Asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test. Please refer to Appendix 1 for the definition of each variable.

^{a)} t-test and the nonparametric Wilcoxon/Mann-Whitney test for the continuous variables and the Chi-squared test for the categorical variable (CEO duality).

Table 2 reports the descriptive statistics categorised for banks that received bailouts between 2007 and 2009 and for banks that did not. Also, Table 2 reports the results of the t-test, nonparametric Wilcoxon/Mann-Whitney test and Chi-squared test of the null hypothesis that there is no difference between the two subsamples of banks.

Comparing the results for bailed out and not bailed out banks, and according to the mean difference test (t-test), we find that bailed out banks have a larger board, higher credit risk, larger size and less capital. The results remain unchanged, with the exception of credit risk, according to the median difference tests (Wilcoxon/Mann-Whitney test and Chi-squared test). Since in a univariate setting we do not control for various factors that may influence the likelihood of a bank being bailed out, we will forego a detailed analysis of the univariate statistics and instead rely on the multivariate regression results to interpret the influence of the variables on bank bailouts in greater detail.

Table 3 presents the Pearson correlation matrix for the independent variables. Due to the problem of space, given the number of variables, we present the correlation matrix in three different panels. Panel A presents the correlation between the main variables themselves, Panel B presents the correlation between the main variables and the control variables and Panel C presents the correlation between the control variables themselves.

Table 3 – Pearson correlation matrix: Panel A

	Variables	1	2	3	4	5	6	7	8	9	10	11
1	Board independence	1.000										
2	Board size	-0.141	1.000									
3	CEO duality	0.021	-0.084	1.000								
4	Board experience	-0.153	0.223	-0.057	1.000							
5	Director tenure	0.091	0.046	0.099	0.193	1.000						
6	Board busyness	-0.142	0.376***	-0.034	0.434***	0.135	1.000					
7	Credit risk	-0.011	0.068	0.290**	-0.015	-0.154	-0.221	1.000				
8	Liquidity risk	-0.017	-0.020	-0.165	0.018	0.280	0.141	-0.263	1.000			
9	Growth risk	0.066	-0.288**	0.077	-0.037	0.130	-0.217	-0.057	-0.100	1.000		
10	Bank size	0.442***	0.240*	0.097	0.065	-0.056	0.136	-0.037	0.453***	0.219	1.000	
11	Capital	-0.176	-0.193	0.153	0.050	0.029	-0.065	0.070	-0.183	-0.025	-0.376***	1.000

Asterisks indicate significance at the 1% (***), 5% (**) and 10% (*), using a two-tailed test. Please refer to Appendix 1 for the definition of each variable.

Table 3 – Pearson correlation matrix: Panel B

	Variables	1	2	3	4	5	6	7	8	9	10	11
12	2006 performance	-0.192	0.038	-0.161	0.415***	0.030	0.185	0.074	-0.107	0.351***	-0.084	-0.083
13	Institutional ownership	-0.009	0.094	-0.325**	0.269*	0.125	0.237*	-0.104	0.043	-0.064	-0.163	-0.139
14	CG committee	0.248	-0.050	0.061	0.086	0.276	0.009	-0.020	-0.031	0.168	0.125	-0.088
15	Audit committee	-0.032	-0.053	-0.030	0.024	0.011	-0.109	-0.300**	-0.205	0.307**	0.191	-0.306**
16	Concentration	-0.191	-0.083	-0.106	0.099	0.075	0.083	-0.373***	-0.176	0.104	-0.045	-0.256*
17	IIBIS	0.157	-0.179	-0.154	-0.091	0.015	-0.078	-0.173	-0.188	-0.011	0.081	0.059
18	Foreign	0.124	-0.016	-0.085	-0.123	0.002	-0.104	0.007	-0.203	0.040	0.166	0.011
19	GDP per capita	0.051	-0.323**	-0.193	-0.303**	-0.295**	-0.076	-0.279**	-0.168	-0.240*	0.046	-0.061
20	Official index	-0.147	-0.073	-0.035	0.277**	0.099	-0.048	-0.114	-0.161	0.269*	-0.135	0.108
21	Financial freedom	0.295**	-0.387***	-0.181	-0.174	0.084	-0.221	-0.427***	-0.041	0.124	0.202	-0.131
22	Freedom corruption	-0.004	-0.209	-0.239*	-0.029	-0.085	0.026	-0.534***	0.049	-0.038	0.133	-0.328**

Asterisks indicate significance at the 1% (***), 5% (**) and 10% (*), using a two-tailed test. Please refer to Appendix 1 for the definition of each variable.

Table 3 – Pearson correlation matrix: Panel C

	Variables	12	13	14	15	16	17	18	19	20	21	22
12	2006 performance	<i>1.000</i>										
13	Institutional ownership	0.184	<i>1.000</i>									
14	CG committee	-0.012	-0.136	<i>1.000</i>								
15	Audit committee	-0.042	0.035	0.108	<i>1.000</i>							
16	Concentration	0.011	0.066	0.151	0.742***	<i>1.000</i>						
17	IIBIS	-0.203	0.023	0.281**	0.354***	0.261*	<i>1.000</i>					
18	Foreign	-0.277**	0.099	0.281**	0.337**	0.124	0.878***	<i>1.000</i>				
19	GDP <i>per capita</i>	-0.183	-0.034	-0.214	0.149	0.241*	0.402***	0.092	<i>1.000</i>			
20	Official index	0.108	-0.126	0.346**	0.416***	0.455***	0.453***	0.304**	-0.105	<i>1.000</i>		
21	Financial freedom	-0.147	0.100	0.037	0.498***	0.287**	0.623***	0.518***	0.483***	0.125	<i>1.000</i>	
22	Freedom corruption	-0.007	0.162	-0.052	0.613***	0.660***	0.368***	0.141	0.702***	0.144	0.684***	<i>1.000</i>

Asterisks indicate significance at the 1% (***), 5% (**) and 10% (*), using a two-tailed test. Please refer to Appendix 1 for the definition of each variable.

Multicollinearity does not appear to be a problem in our model. The correlation coefficients among all independent variables included in each regression analysis are less, in absolute value, than 0.8,¹⁴ that is the threshold beyond which multicollinearity problems arise (e.g., Gujarati, 2004). In addition, to double check for any multicollinearity issue we also compute the Variance Inflation Factor (VIF) for each independent variable. All the VIF values (unreported but available upon request) are below the critical value of 10 (e.g., Gujarati, 2004; Asteriou and Hall, 2011), which indicate that multicollinearity is not a major problem in the regression analyses. We note that, since multicollinearity is mainly an issue involving independent variables in a regression rather than the dependent variable or the link function between the independent and the dependent variables, the use of available linear regression methods is usually applicable in nonlinear regression settings. As Menard (2002, p. 76) points up “*because the concern is with the relationship among the independent variables, the functional form of the model for the dependent variable is irrelevant to the estimation of collinearity.*”

4.2 Estimation results on the determinants of bailouts

In this sub-section we present and analyse the results of the probit regressions which test the relationship between the dependent variable *Bank bailouts* and a set of corporate governance variables, bank specific risks, bank capital, bank size and control variables. Our goal is to analyse the determinants of the likelihood of bailouts in the European banking sector in the context of the global financial crisis.

Table 4, in Column (1), reports the results of the probit regressions for the baseline model. In Columns (2) to (4) we test the robustness of our findings.

Table 5 reports the results of the baseline model augmented by additional control variables.

¹⁴ The Pearson correlation between the variables *IIBIS* and *Foreign* is higher than 0.8 (specifically 0.878). However, and first of all for theoretical reasons explained in the text, these variables are not included simultaneously in the regression.

Table 4 – Determinants of bailouts

The table presents the results of the probit regressions used to predict the probability of bailouts in the European banking sector in the context of the financial crisis.

Variable	(1)	(2)	(3)	(4)
	Baseline Model			
Board independence	0.021*	0.022**	0.026**	0.009
	(0.055)	(0.044)	(0.019)	(0.409)
Board size	0.034	0.035	0.038	0.047
	(0.552)	(0.542)	(0.476)	(0.381)
CEO duality	-0.139	2.845**	-0.092	1.735*
	(0.883)	(0.013)	(0.919)	(0.090)
Board independence × CEO duality	---	-0.049**	---	---
		(0.032)		
Board experience	-0.190***	-0.185***	-0.144**	-0.201***
	(0.002)	(0.002)	(0.016)	(0.001)
Director tenure	-0.594***	-0.617***	-0.544**	-0.772***
	(0.010)	(0.007)	(0.020)	(0.001)
Board busyness	1.328***	1.285***	1.296**	1.134***
	(0.005)	(0.004)	(0.011)	(0.006)
Credit risk	1.083***	1.080***	1.050***	1.356***
	(0.000)	(0.000)	(0.000)	(0.005)
Liquidity risk	0.010**	0.010***	0.011***	-0.077**
	(0.013)	(0.009)	(0.007)	(0.019)
Growth risk	-0.001	0.002	0.001	-0.009
	(0.969)	(0.957)	(0.970)	(0.383)
Bank size	0.210	0.203	0.018	0.102
	(0.497)	(0.504)	(0.952)	(0.704)
Capital	-0.233	-0.222	-0.249	-0.071
	(0.149)	(0.168)	(0.134)	(0.566)
2006 performance	0.043**	0.042*	0.053**	0.049**
	(0.050)	(0.055)	(0.035)	(0.025)
Institutional ownership	-0.006	-0.006	-0.017	0.007
	(0.529)	(0.510)	(0.172)	(0.486)
CG committee	-2.266***	-2.215***	-1.955**	-2.220**
	(0.007)	(0.006)	(0.023)	(0.011)
Concentration	0.083***	0.086***	0.044***	0.064***
	(0.002)	(0.001)	(0.004)	(0.002)
IIBIS	0.029***	0.029***	---	0.037***
	(0.000)	(0.000)		(0.000)
Foreign	---	---	0.062***	---
			(0.002)	
GDP per capita	-3.513**	-3.599**	-1.688	-7.793***
	(0.016)	(0.013)	(0.155)	(0.001)
N	53	53	53	50
Bailed out/ Not bailed out	23/30	23/30	23/30	22/28
% correct	83.02	83.02	81.13	84.00
LR statistics	35.801	36.418	34.236	34.696
	(0.005)	(0.006)	(0.008)	(0.007)
Pseudo R ²	0.493	0.502	0.472	0.506

The p-values of coefficient significance are in brackets and asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test.

Please refer to Appendix 1 for the definition of each variable.

4.2.1 The baseline model

The baseline estimation results, Column (1) in Table 4, show that the coefficient on the *Board independence* variable is positive and statistically significant and thus, board independence positively influence the likelihood of a bailout. This confirms hypothesis H₁ and is consistent with previous studies in the context of the financial crisis (Adams, 2012) and related to corporate failure (Hsu and Wu, 2014). Our result suggests that independent directors suffer from bank-specific knowledge, which penalises the effectiveness of the board and thus, increases the likelihood of a bank participating in a bailout programme. The coefficient on the *Board size* variable, on the contrary, is not statistically significant, indicating no association between the board size and the probability of bailouts of our sample banks. This finding is consistent with Elloumi and Gueyié (2001), Lajili and Zéghal (2010) and Darrat et al. (2014) respectively on financial distress and bankrupt firms, but contradicts Adams (2012) who finds that banks that received funds from TARP in the US have larger board. In a sample of European banks we do not find evidence that larger boards of banks are detrimental and, thereby, increase the probability of participating in a bailout programme. Our hypothesis H₂ is not confirmed. The lack of statistical significance regarding the *CEO duality* variable indicates that separating the positions of CEO and Chairman has no impact on the likelihood of a bank being bailed out. Therefore, we do not find support for the hypothesis H₃. This finding is consistent with previous financial distress studies (Elloumi and Gueyié, 2001; Abdullah, 2006; Miglani et al., 2015), bankruptcy studies (Lajili and Zéghal, 2010) and the study by Carty and Weiss (2012) which, using a sample of US publicly traded banks, shows that banks with a dual CEO structure are not more likely to participate in bailout programmes. Thus, results in the European context are in accordance with results in the US context. On the contrary, Column (1) in Table 4 reveals that banking experience matters and so, we find support for hypothesis H₄. The coefficient on the *Board experience* variable is negative and statistically significant, indicating that banking experience providing a deep and sound knowledge of the complexity, dynamics and specificities of the banking activity, as well as a better comprehension of its opaqueness and regulatory environment, make it less likely for a bank to be bailed out as found by Fernandes and Fich (2013). Thus, banking experience of the board's supervisory directors enables banks to be safer from government assistance. Similarly, the coefficient on the

Director tenure variable is negative and statistically significant, confirming hypothesis H₅. As expected, banks with shorter supervisory directors' tenure are more likely to need State aid. Thus, a bank is better served by longer-standing supervisory directors', who have more bank specific knowledge and are better able to monitor and advise bank managers. This finding is also found, for example, by Lajili and Zéghal (2010). The positive and statistically significant coefficient on the *Board busyness* variable indicates that busier supervisory directors increase the probability of a bank participating in a bailout programme, confirming hypothesis H₆. This result provides support for the *Busyness Hypothesis* and the view that the presence of supervisory directors holding too many directorships compromises board effectiveness.

With respect to bank specific risks, the coefficients on the *Credit risk* and *Liquidity risk* variables are positive and statistically significant, while the coefficient on the *Growth risk* variable is not statistically significant. Thus, the credit and liquidity risks increase the likelihood of a bank being bailed out while the growth risk has no impact. These results confirm hypotheses H_{7.1} and H_{7.2} but not hypothesis H_{7.3}. Consistent with the general view, (e.g., Dam and Koetter, 2012), the decline in the quality of banks' loan portfolios, resulting in an increasing proportion of non-performing loans, is associated with a higher probability of being bailed out. The larger the proportion of non-performing loans, the more likely a bank will participate in a bailout plan. Also, as expected, we find a positive sign for the liquidity risk measure in predicting bailouts. So, as the loan-to-deposit ratio increases the likelihood of a bank being bailed out increases. This finding is in accordance with the existence of benefits associated with liquidity.

Furthermore, in our sample of cross-country European banks the coefficient on the *Bank size* variable is not statistically significant, which does not confirm hypothesis H₈. So, our findings do not support the view that individual bank size creates a moral hazard problem resulting from the fact that, as banks grow they increase their importance and so the probability of being saved. The issue of "too-big-to-fail" is not validated at bank-level but is validated at country-level given that the coefficient on the *Concentration* variable is positive and statistically significant. *Concentration* variable is used as proxy for the importance of the banking sector and its potential influence on banking regulations and policies. Size of individual banks does not seem to matter, but size (and importance) of the banking sector in a country increases the probability of receiving bailouts from

government. In contrast to our expectation, the coefficient on the *Capital* variable is not statistically significant. Thus, the capital of banks, in our sample, has no impact on the likelihood of bailouts and hypothesis H₉ is not confirmed.

Concerning bank-level control variables, the coefficient on the *2006 performance* variable is positive and statistically significant and the coefficient on the *CG committee* variable is negative and statistically significant. Our results show that performance before the crisis increases the likelihood of bailouts. So, the better-performing banks before the crisis are the most likely to be bailed out following the crisis. Also, banks with a corporate governance committee are less likely to participate in a bailout programme. On the contrary, the coefficient on the *Institutional ownership* variable is not statistically significant and thus, institutional investors do not influence the likelihood of bailouts. Moreover, we find that country-level variables explain the probability of individual banks being bailed out. The coefficients on *Concentration* and *IIBIS* variables are both positive and statistically significant. In line with the “concentration-fragility” view, (e.g., De Nicoló et al., 2004; Poghosyan and Čihák, 2011), we find that banks located in more concentrated banking sectors are more likely to be bailed out. Furthermore, we provide empirical evidence suggesting the importance of the degree of international integration. Increasing the international exposure of a country’s banking system increases the probability of a bank of that country participating in a bailout programme. Finally, the coefficient on the *GDP per capita* is negative and significant, indicating that banks are more likely to be bailed out in poorer countries.

4.2.2 Robustness checks

To assess the reliability of the baseline results, we employ a set of robustness checks, Table 4, Columns (2)-(4).

While we do not formally hypothesize interactive effects, we now extend our research by explicitly modelling a corporate governance interaction term. The underlying idea is that, in addition to the effect of various governance variables (taken individually) on the likelihood of bailouts, the interaction effect among these variables can help to predict bailouts. Encouraged by previous studies in the context of corporate bankruptcy (Daily and Dalton, 1994a, 1994b) we test the interaction between board independence and CEO duality. This interaction variable is the unweighted multiplication of a bank's

proportion of independent directors and dual CEO corporate governance structure. Column (2) presents the results when the interaction term among the corporate governance variables is included. Interestingly, although board independence and CEO duality (taken individually) have a positive impact on the likelihood of bailouts, the two-way interaction between board independence and CEO duality has a negative impact. Our findings do not confirm those of Daily and Dalton (1994a, 1994b), who find a positive relationship in the context of bankrupt firms. The introduction of the interaction term leaves the results unchanged, with the exception of CEO duality that gains statistical significance.

In column (3) we replace the *IIBIS* variable in the baseline model with the *Foreign* variable, which is the fraction of the number of foreign owned banks to the number of the total banks in the country. As result of increasing financial integration, foreign banks have become important in domestic financial intermediation (Claessens and van Horen, 2011). As there is a potential overlap between both variables we do not include them simultaneously in the regressions below. Similarly to the coefficient on the *IIBIS* variable, the coefficient on the *Foreign* variable is significantly positive. Additionally, our qualitative findings with respect to the main explanatory variables remain unchanged and with regard to the control variables the differences are negligible, supporting the robustness of our results.

In Column (4) we investigate the sensitivity of the results of our baseline model using a different definition of specific risks, bank size, capital, concentration and level of economic development. Specifically, we measure: 1) credit risk as the ratio of non-performing assets to total assets, 2) liquidity risk as the ratio of total deposits to total assets, 3) growth risk as the percentage of assets growth in the year immediately prior to the financial crisis, 4) bank size as the natural logarithm of total assets, 5) capital as the capital adequacy ratio Tier 1, which represents the ratio of Tier 1 Capital to total risk-weighted assets, 6) concentration in the banking industry as the fraction of assets held by the three largest banks in each country and 7) level of economic development as the natural logarithm of GDP *per capita*, based on purchasing power parity. Estimation results are very similar to the baseline model thus, suggesting that our results are scarcely affected by the use of alternative variables. We note that only the coefficient on the *Board*

independence variable loses statistical significance, but the coefficient on the *CEO duality* variable is now statistically significant.

Additionally, in unreported regression we replicate the estimation in Columns (2) and (4) using *Foreign* variable instead of the *IIBIS* variable and we arrive at similar conclusions.

4.2.3 Introducing additional control variables

As a new step we augmented the baseline model by introducing additional bank-level and country-level control variables. First, we want to confirm that our main conclusions hold when additional control variables are accounted for. Second, we intend to test whether the existence of a board audit committee, the supervision and the regulation in the banking sector affect the likelihood of a bank being bailed out. Controlling for differences in national policies provides not only a simple robustness test but it is also independently valuable as countries implement regulations to promote stability.

Table 5 presents the results.

Table 5 – Determinants of bailouts with additional control variables

The table presents the results of the probit regressions used to predict the probability of bailouts in the European banking sector in the context of the financial crisis, including additional control variables.

Variable	(1)	(2)	(3)	(4)
Board independence	0.021* (0.099)	0.026** (0.040)	0.014 (0.130)	0.024* (0.062)
Board size	0.053 (0.358)	0.025 (0.679)	0.089 (0.126)	0.047 (0.496)
CEO duality	0.400 (0.711)	-0.496 (0.609)	-0.355 (0.728)	-0.334 (0.727)
Board experience	-0.202*** (0.001)	-0.291*** (0.000)	-0.114** (0.016)	-0.196*** (0.001)
Director tenure	-0.639*** (0.006)	-0.703*** (0.001)	-0.450*** (0.002)	-0.609*** (0.005)
Board busyness	1.252*** (0.009)	1.692*** (0.000)	1.079** (0.000)	1.390*** (0.002)
Credit risk	1.127*** (0.001)	1.320*** (0.000)	1.053*** (0.000)	1.256*** (0.001)
Liquidity risk	0.010** (0.019)	0.012** (0.020)	0.005 (0.122)	0.011** (0.030)
Growth risk	0.004 (0.380)	-0.004 (0.381)	0.003 (0.363)	0.001 (0.910)
Bank size	0.243 (0.445)	0.541 (0.149)	-0.046 (0.860)	0.154 (0.654)
Capital	-0.296* (0.089)	-0.248 (0.170)	-0.031 (0.800)	-0.213 (0.177)
2006 performance	0.031 (0.194)	0.055 (0.170)	0.016 (0.426)	0.041* (0.065)
Institutional ownership	0.001 (0.928)	8.99E-05 (0.993)	-0.008 (0.500)	-0.011 (0.394)
CG committee	-2.861*** (0.001)	-3.322** (0.002)	-0.289 (0.694)	-2.270*** (0.009)
Audit committee	-2.055** (0.037)	---	---	---
Concentration	0.115*** (0.000)	0.098*** (0.000)	0.064*** (0.007)	0.076*** (0.008)
IIBIS	0.036*** (0.000)	0.029*** (0.001)	---	0.029*** (0.000)
GDP per capita	-3.768*** (0.008)	-4.182*** (0.003)	-4.755* (0.099)	-4.372** (0.003)
Official index	---	0.244 (0.221)	---	---
Financial freedom	---	---	0.059*** (0.010)	---
Freedom corruption	---	---	---	0.030 (0.459)
N	53	53	53	53
Bailed out/ Not bailed out	23/30	23/30	23/30	23/30
% correct	84.91	84.91	77.36	83.02
LR statistics	37.907 (0.004)	37.327 (0.005)	28.906 (0.035)	36.213 (0.007)
Pseudo R ²	0.523	0.515	0.398	0.499

The p-values of coefficient significance are in brackets and asterisks indicate significance at the 1% (***), 5% (**) and 10% (*) levels, using a two-tailed test.

Please refer to Appendix 1 for the definition of each variable.

In Table 5, Column (1), to account for the impact of the existence of a separate audit committee, we also include the *Audit committee* variable, which is a dummy variable with a value of one if the bank has an audit committee and zero otherwise. We conclude that, similarly to Miglani et al. (2015), the coefficient on the *Audit committee* variable is negative and statistically significant. The existence of an audit committee, as well as the existence of a corporate governance committee, decreases the likelihood of bailouts. This finding is consistent with the argument of Forker (1992) that the presence of an audit committee enhances board monitoring quality and attenuates agency costs. We note that the coefficient on the *Capital* variable is, now, negative and statistically significant.

Next we account for differences in bank supervision and regulation. In Column (2), we add to our baseline model the official supervisory powers index, *Official index* variable, which is an index of the power of the country's commercial bank supervisory agency. We find that the coefficient on the *Official index* variable is not statistically significant and that our results are robust to the introduction of this additional control variable.

Further, alternatively, in Column (3), we include the variable *Financial freedom*, which is an indicator of the general openness and regulatory framework as it contains elements like openness to foreign competition and the extent of government regulation of financial services. Also, we note the potential overlap between the *IIBIS* and the *Financial freedom* variables, yet we do not include them at the same time. The results are not very different from the baseline model. Regarding our main variables, the coefficients on the *Board independence* and *Liquidity risk* variables are now not statistically significant. Also, we find that the coefficient on the *Financial freedom* variable is positive and statistically significant, indicating that fewer restrictions on banking freedom and greater openness increase the likelihood of bailouts. Thus, our results suggest detrimental effects of financial freedom. Banks are able to operate more freely and to engage in different and risky activities, far beyond their core activities. Also, the data points to the presence of contagion effects.

Lastly, in Column (4), we check the extent to which our results might be driven by corruption differences in countries. The estimation results corroborate our findings for the baseline specification. Also, the coefficient on the *Freedom corruption* variable is not

significant at the conventional levels. Thus, as Faccio et al. (2006), the level of corruption is not statistically significant in explaining the likelihood of a bailout.

5. Conclusion

Governments intervened massively and repeatedly to support banks during the financial crisis in order to ensure their survival. Due to the uniqueness of banks and their impact on the stability of the financial system, several rescue programmes were adopted. Given the tremendous and costly bailout packages worldwide, the analysis of the determinants of the likelihood of banks being bailed out is of the utmost importance, namely in the process of reforming the financial regulation, the weaknesses of which were revealed by the global financial crisis. The results of our study therefore have relevant public policy implications. Overall, our results show that a set of characteristics of the board, bank risks and control variables have predictive power in explaining the probability of bailouts. Specifically, banks with more experienced boards, longer tenure and less busy supervisory directors are less likely to be bailed out. So, strong emphasis should be placed on the analysis of the board of a bank. On the other hand, both credit risk and liquidity risk, as well as the country-specific banking sector factors, concentration and international exposure, increase the likelihood of a bank participating in a bailout programme. These qualitative findings are unchanged in all regressions. Also, in the baseline model, board independence, performance prior to the financial crisis, the existence of a corporate governance committee and the level of economic development, measured by GDP *per capita*, have predictive power.

Additionally, we first examine the impact of the existence of an audit committee and, second, the impact of the supervisory and regulatory environment variables. We find that the existence of an audit committee and the index of financial freedom are, respectively, negatively and positively associated with the likelihood of bailouts. These findings are consistent with the idea that the presence of an audit committee strengthens board monitoring and reduces agency costs and that greater freedom, acting as a contagion channel of shocks, has a detrimental effect.

Appendix 1 – Variables definitions

Variables	Definitions	Measurement period	Data sources
Bank bailouts	A dummy variable equal to 1 if the bank is bailed out any time over the period from July 2007 to December 2008 and 0 otherwise.	July 2007 to December 2009	European Comission website; Bank's official website; Annual Reports; Google website
Board independence	Percentage of independent directors, that is, the number of independent board directors on the board divided by board size.	December 2006	BoardEx
Board size	Total number of directors serving on the board of the bank.	December 2006	BoardEx
CEO duality	A dummy variable equal to 1 if the CEO is also the Chairman, 0 otherwise.	December 2006	BoardEx; Annual Reports
Board experience	Supervisory directors' average years of experience in the banking sector. To track banking experience we examine each supervisory director's biography as provided in the BoardEx database. First, we compute the number of years each supervisory director has worked in the banking sector and sum all these years. Second, we divide this total by the number of supervisory directors on the board of the bank.	December 2006	BoardEx
Director tenure	Average length of time, stated in years, that the supervisory directors have been on the bank's board.	December 2006	BoardEx
Board busyness	Average number of board positions (number of directorships) held by supervisory directors.	December 2006	BoardEx
Credit risk	Non-performing loan ratio, calculated as non-performing loans to total loans; Alternatively, non-performing assets ratio, calculated as non-performing assets to total assets.	December 2006	Datastream
Liquidity risk	Loan-to-deposit ratio, that is, total loans divided by total deposits. Alternatively, ratio of total deposits to total assets, that is, total deposits divided by total assets.	December 2006	Datastream
Growth risk	Market-to-book ratio, that is, ratio of the market value of equity to the book value of equity. Alternatively, percentage of assets growth in the year immediately prior to the financial crisis.	December 2006	Datastream
Bank size	Natural logarithm of the bank's market capitalisation. Alternatively, natural logarithm of the bank's total assets.	December 2006	Datastream
Capital	Bank capital, computed as the ratio of total equity to total assets. Alternatively, capital adequacy ratio Tier 1, which represents the ratio of Tier 1 Capital to total risk-weighted assets, calculated in accordance	December 2006	Datastream

Appendix 1 – Variables definitions (cont.)

Variables	Definitions	Measurement period	Data sources
Capital (cont.)	with banking regulations and expressed as a percentage	December 2006	Datastream
2006 performance	Buy-and-hold stock returns.	January 2006 to December 2006	Datastream
Institutional ownership	Percentage of shares owned by institutional investors.	December 2006	Thomson Financial
CG committee	A dummy variable equal to 1 if the bank has a corporate governance committee, 0 otherwise.	December 2006	BoardEx; Annual Reports
Audit committee	A dummy variable equal to 1 if the bank has an audit committee, 0 otherwise.	December 2006	Datastream
Concentration	Measure of concentration in the banking industry. Assets of the five largest banks as a share of total commercial banking assets. Alternatively, assets of the three largest banks as a share of total commercial banking assets.	December 2006	World Bank website ¹⁵
IIBIS	Measure of the degree of international integration. Ratio of consolidated foreign claims to Gross Domestic Product (GDP) of the banks that are reporting to Bank for International Settlements (BIS).	December 2006	World Bank website ¹⁶
Foreign	Percentage of the number of foreign owned banks to the number of the total banks in an economy. A foreign bank is a bank where at least 50% of its shares are owned by foreigners	December 2006	World Bank website ¹⁷
GDP per capita	Natural logarithm of GDP per capita. Alternatively, natural logarithm of GDP per capita, based on purchasing power parity	December 2006	World Bank website ¹⁸
Official index	The official supervisory powers index measures the degree to which the country's commercial bank supervisory agency has the authority to take specific actions. It is composed of information on many features	2007 (revised June 2008) ¹⁹	World Bank website ²⁰ ; Barth et al. (2008)

¹⁵ Global Financial Development Database, available at <http://data.worldbank.org/data-catalog/global-financial-development>

¹⁶ Global Financial Development Database, available at <http://data.worldbank.org/data-catalog/global-financial-development>

¹⁷ Global Financial Development Database, available at <http://data.worldbank.org/data-catalog/global-financial-development>

¹⁸ Global Financial Development Database, available at <http://data.worldbank.org/data-catalog/global-financial-development>

¹⁹ We use data as close as possible to the financial crisis.

²⁰ Survey of Bank Regulation and Supervision carried out by the World Bank, available at: http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:20345037~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html#Survey_III

Appendix 1 –Variables definitions (cont.)

Variables	Definitions	Measurement period	Data sources
Official index (cont.)	of official supervision: 1. Does the supervisory agency have the right to meet with external auditors about banks? 2. Are auditors required to communicate directly to the supervisory agency about illicit activities, fraud, or insider abuse? 3. Can supervisors take legal action against external auditors for negligence? 4. Can the supervisory authority force a bank to change its internal organisational structure? 5. Are off-balance sheet items disclosed to supervisors? 6. Can the supervisory agency order the bank's directors or management to constitute provisions to cover actual or potential losses? 7. Can the supervisory agency suspend the directors' decision to distribute: a) Dividends? b) Bonuses? c) Management fees? 8. Can the supervisory agency supersede the rights of bank shareholders-and declare a bank insolvent? 9. Can the supervisory agency suspend some or all ownership rights? 10. Can the supervisory agency: a) Supersede shareholder rights? b) Remove and replace management? c) Remove and replace directors? The official supervisory index has a maximum value of 14 and a minimum value of 0, where higher values indicate greater power.	2007 (revised June 2008)	World Bank website; Barth et al. (2008)
Financial freedom	Indicator of financial and banking freedom specifically, whether foreign banks are able to operate freely, whether the government influences allocation of credit, how difficult it is to open domestic banks and other financial services firms, to which extent the financial system is regulated, the presence of State-owned banks and whether banks are free to provide insurance and securities services to customers. The index ranges from 0 to 100, with high values signifying more freedom and thus fewer restrictions.	December 2006	Heritage Foundation website ²¹
Freedom corruption	Indicator of freedom from corruption. Values range from 0 to 100, with higher values indicating lower levels of corruption.	December 2006	Heritage Foundation website ²²

²¹ <http://www.heritage.org>

²² <http://www.heritage.org>

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