FACULTEIT ECONOMIE
EN BEDRIJFSKUNDE

TWEEKERKENSTRAAT 2
B-9000 GENT
Tel. : 32 - (0)9 – 264.34.61
Fax. : 32 - (0)9 – 264.35.92

WORKING PAPER

Title
Bank bailouts in Europe and bank performance

Authors
Maria Gerhardt and Rudi Vander Vennet

May 2016
2016/921

D/2016/7012/05

Bank bailouts in Europe and bank performance*

Maria Gerhardt† and Rudi Vander Vennet‡

Draft: May 2016

Abstract

During the financial crisis, European governments implemented emergency rescue packages to support struggling banks. No less than 114 European banks benefited from government support in the period 2007 to 2013. We investigate the financial condition of banks before and after receiving state support by running logit regressions. Our results indicate that the equity ratio is the decisive indicator to predict distress. Bank-specific variables, such as loan loss provision, nonperforming loans and bank size also perform well in detecting bank bailouts. Surprisingly, the aided banks hardly improve their performance indicators after they have been rescued but maintain similar risk profiles/business models.

Keywords: Bank bailout, state aid, financial crisis, logit analysis

JEL: G21, G28

*Comments from Sean Cleary, Steve Heinke and seminar participants at the Spring Meeting of Young Economists (May 2015, Ghent) and the World Finance Conference (July 2015, Buenos Aires) are gratefully acknowledged.

†DG ECFIN, European Commission and Ghent University. maria.gerhardt@ec.europa.eu.

‡Corresponding author. Ghent University, Department of Financial Economics, Sint-Pietersplein 5, 9000 Ghent, Belgium. rudi.vandervennet@ugent.be. Tel: +32 9 264 3512.

1 Introduction

During the banking crisis, several European governments organised emergency rescue packages to support struggling banks. No less than 114 banks benefited from government support during the period 2007-2013. In this paper, we investigate the financial condition of banks before and after they received state support. More specifically, we identify the bank characteristics that predict bank distress and we investigate whether or not aided bank improved their performance following a bailout.

To answer these questions, we carefully create a database of banks that received state support in the EU, Norway and Switzerland in the years 2007-2013. In this database we include support measures on the asset and liability side, i.e. capital injections, asset guarantees, liquidity support and debt guarantees. Since it is not possible to separate the effect of the different types of state aid for each bank, and since a number of banks actually benefited from various measures within a short period of time, we simply record the moment of time when a bank was supported for the first time. We then run a series of logit regressions to investigate banks' condition in the run-up to the bailout and we compare the aided banks' performance to that of banks that never received support during the period under investigation. An important feature of our sample is that we only include bank parent companies (the ultimate owners) because any government support is typically injected at the group level. This implies that domestic and foreign subsidiaries are excluded from our sample because they would never have been considered for government support in the first place. This sample construction method is an important feature that in our view has received little attention in other studies. Furthermore, we apply a minimum size threshold of EUR 10 billion in total assets (EUR 5 billion for smaller countries), which leads to a sample of 114 aided and 212 non-aided banks in 22 European countries. We exclude countries in which the banking sector is mainly

foreign-owned.

For our empirical analysis, we retrieve information on bank-specific indicators that are related to the CAMELS ratings[1]. More precisely, we use indicators related to banks' equity ratio, core tier 1 capital, loan loss provisions, non-performing loans, cost/income ratio, net interest margin, interbank funding and size. We first carry out two-sample mean difference t-tests, comparing the means of the aided and non-aided banks, before and after bank rescues. This test serves as a first indication for differences between rescued and non-rescued banks. In a second step, we run pooled and unpooled logit regressions with bank-specific variables and macroeconomic control variables.

The main results can be summarized as follows. First, the leverage ratio, measured as total equity/total assets, is a better predictor for bank distress than the risk-weighted core tier 1 capital ratio. In a multivariate setting, the equity ratio turns out to be the decisive indicator; banks with a lower leverage ratio were more likely to be involved in a government-assisted bailout. This result is in line with other studies that have criticised the use of the capital adequacy ratio as predictor of default risk because of its weak performance (Blundell-Wignall and Roulet, 2013; Harada et al., 2013) and its procyclicality (Goodhart, 2008). Interestingly, the mean equity ratio of aided banks was around 3%, which corresponds to the lower bound of the current recommendation in Basel III. We therefore question whether the equity ratio proposed by Basel III is sufficiently high. Second, bank size, both absolute size and systemic size (bank assets in percentage of GDP) is significantly associated with bailout probability, especially in the early stage of the financial crisis. This findings illustrates the too-big-to-fail status of systemic banks and support the introduction of additional capital

[1]The CAMELS methodology is used by the US FDIC for supervisory purposes; each bank's condition is assessed based on six indicators: Capital adequacy, Asset quality, Management, Earnings, Liquidity and Sensitivity to market risk.

buffers for the banks designated as systematically important institutions. Third, other variables that turn out to be significant for distinguishing between aided and non-aided banks are the loan loss provisions/non-performing loans (LLP/NPL) ratio and the net interest margin. Banks with higher LLP/NPL were much less likely to request aid than those with lower buffers. The net interest margin tends to be higher for non-rescued banks, suggesting that a solid core profitability is a protection against distress. Fourth, bank-specific variables are more often significant for banks that were bailed out early in the crisis (39 banks in 2007/2008). From 2009 onwards, many variables become less significant, suggesting that those banks probably failed for different reasons, for instance contagion effects and bank/sovereign exposures that are not accounted for in the standard CAMELS indicators. Fifth, the macroeconomic variables that we include (housing prices, government debt and GDP growth) turn out to be significant. The local economic environment seems to be highly important in explaining bank distress, which is in line with, e.g. Demirguc-Kunt and Detragiache (1997) and Aubuchon and Wheelock (2010). Finally, our evidence indicates that any post-bailout performance improvement in the rescued banks is slow at best. Our post-intervention results show that banks are fairly quick at recognising the need to increase their loan loss provisions, probably partly triggered by supervisory pressure or requirements imposed during stress tests, but there are no visible improvements in terms of performance. While this may be partly due to unfavourable economic conditions in certain countries, this finding underlines that government rescues as such cannot restore bank health.

So far, literature on state support to European banks during the financial crisis is scarce, mostly due to limited data availability on state support for banks in Europe. Two papers that analyse European cases of bank distress or failure are Poghosyan and Cihak (2009) and Betz et al. (2014). Both papers also apply logit models with

CAMELS-based indicators and macroeconomic variables. However, they differ in a number of respects. Poghosyan and Cihak (2009) focus on the period before the crisis (up to 2007) while Betz et al. (2014) define bank distress differently, leaving out all support measures on banks' liability side. Betz et al. (2014) find that banks with higher capital levels and a larger share of deposit funding were less likely to experience distress. Poghosyan and Cihak (2009) find that an indicator focussing on capital adequacy is not sufficient, since other determinants turn out to be relevant for capturing the riskiness of individual banks, such as loan loss provisions and cost/income. Our findings are consistent with their results.

The paper is organised as follows. In section 2, we describe the framework for state aid to banks in the EU and some descriptive statistics. In section 3, we review some of the extant literature and justify our choice of explanatory variables. Section 4 describes the data and section 5 the methodology. In section 6 we perform the means tests and the logit regressions, followed by some robustness checks. Section 7 concludes and highlights a number of policy implications.

2 State aid to banks during the financial crisis

In the economic literature, the rationale for state aid is based on the occurrence of market failures and potential externalities of bank failures (Friederiszick et al., 2007). Government support to banks is intended to avoid bank runs, to assure the functioning of the payment system, to prevent a credit crunch and to limit the social costs and the negative effects on the real economy (Beck et al., 2010; Grande et al., 2011; Panetta et al., 2009). For these reasons, most European governments have engaged in supporting their financial sector during the financial crisis. Granting state aid is only possible within the European Union if certain conditions apply and as

long as the aid is compatible with the internal market[2]. The European Commission has released a number of communications serving as guidelines to deal with financial problems in banks[3]. The Commission has treated more than 400 requests on state aid measures to the financial sector between October 2008 and October 2013.

State aid to banks can be classified into measures on the asset or liability side. On the liability side, the main instruments are liability guarantees and liquidity measures. Liability guarantees basically provide an assurance against default on bank debt. They have been the most used instrument within the EU. According to the European Commission, the outstanding amount of liability guarantees in the EU reached its peak in 2009 with EUR 835.8 billion outstanding (7.1 % of EU 2012 GDP)[4]. Another avenue for state aid is direct capital injections in undercapitalised banks. The European Commission reports that EUR 413.2 billion (3.2 % of EU 2012 GDP) of new capital has been provided to ailing banks by member states in the period 2008-2012[5]. The main asset relief measures are outright asset purchases by government, whereby impaired assets are taken off banks' balance sheets and transferred into a bad bank.

Figure 1 in the appendix gives an overview of the amounts granted to financial institutions in each member state sorted by recapitalisation measures, asset relief interventions, liability guarantees and liquidity measures other than guarantees. The numbers are expressed as a % of GDP. Over the years 2008-2012, Ireland provided EUR 855 billion in liability guarantees and liquidity measures, followed by the UK

[2]Article 107(3)(b) of the Treaty of the Functioning of the European Union (TFEU) specifies that state aid may be compatible with the internal market if it is employed "to remedy a serious disturbance in the economy of a Member State" (EC, TFEU, 2010). Further, in the context of the financial crisis, the European Commission has argued that the same article may be used as a legal basis for aid aimed at addressing systemic risk to limit damage to the economy (EC, Communication, 2008-10-25).

[3]See http://europa.eu/rapid/press-release_MEMO-14-126_en.htm.

[4]See http://ec.europa.eu/competition/state_aid/scoreboard/financial_economic_crisis_aid_en.html.

[5]Idem.

with EUR 571 billion and Germany with EUR 339 billion. Regarding asset side interventions, the relative interventions vary for the member states. In absolute numbers, the highest support measures on the asset side for 2008-12 were provided in Germany (EUR 144. billion), the UK (EUR 122.80 billion) and Spain (EUR 88.14 billion).

3 Literature review and the selection of bank bailout determinants

In this section, we review literature on state aid in the financial sector and its consequences[6]. Since bailouts involve failing banks, we also review the bank failure papers to identify relevant variables. A number of papers have investigated government support measures in the recent financial crisis and in earlier episodes. Our paper is most related to Poghosyan and Cihak (2009), Mayes and Stremmel (2014) and Betz et al. (2014).

Poghosyan and Cihak (2009) analyse bank distress from 1997 to 2007, ending before the financial crisis. Distress in their case is determined by media reports about a bank that involve key words such as bailout, rescue or distressed merger. They use a logit model to show that it is possible to establish thresholds for a set of CAMELS-based indicators to help distinguish between weak versus strong banks. Next to capital adequacy, they report that loan loss provisions, cost/income and profit before taxes are relevant distress indicators. They also include three macro control variables, which improve the fit of the model.

[6]For general reviews of EU intervention policies during the financial crisis, we refer to Boudghene and Maes (2012); Lyons and Zhu (2013); Petrovic and Tutsch (2009); Stolz and Wedow (2010). Beck et al. (2010) extensively discuss EU bank bailouts and emphasize the trade-off between financial stability and competition in that context.

Mayes and Stremmel (2014) carry out a study on bank distress in the US covering the period from 1992 to 2012. They include standard CAMELS indicators and add GDP growth as macroeconomic variable for detecting bank distress. Their main result is that the determinants for bank failure have not been different during the global financial crisis from previous years; the predictive power of CAMELS indicators remains good. They moreover report that a simple capital adequacy measure, the adjusted leverage ratio (total equity minus estimated losses to assets), outperforms more complex risk-weighted capital measures. We also include different capital ratios and arrive at a similar conclusion for European banks.

One of the few papers on European banks and government intervention during the financial crisis is Betz et al. (2014), who investigate distress in European banks from 2000 to 2013. They apply a pooled logit model with a selection of CAMELS variables as well banking sector and macro indicators. In the analysis, their definition of distress events encompasses bankruptcies, defaults, state interventions on the asset side and mergers in distress. They find that their early-warning model performs better when country-specific and banking sector-specific variables are included. They report that banks with lower capital levels, higher cost/income and higher LLP were more likely to experience distress, which is consistent with our results.

There are a number of important differences between the approach taken in these three papers and our study. First, when considering state interventions, which are by far the largest part of their stress events, Betz et al. (2014) only include interventions that have been implemented on the asset side. Excluding the liability side leaves out a large share of state aid. As can be seen in figure 1, the support measures that have been provided in the EU on the liability side are actually larger than the ones on the asset side. In our analysis, we therefore consider interventions both on the asset and liability side. Second, Poghosyan and Cihak (2009), Betz et al. (2014), as

well as other authors do not control for the parent bank or ultimate owner. When considering state aid in the EU, all support measures are typically injected at the parent company of the bank. For example, if a bank has several subsidiaries in the same country, these subsidiaries should all be excluded from the analysis because they would not be considered for state support; any support would be given to the parent/ultimate owner company. Leaving subsidiaries with the same ultimate owner in the sample creates a bias because some banks are counted multiple times, distorting the analysis. When using data from Bankscope, this problem is not solved by simply controlling for the consolidation code; the general ultimate owner (GUO) is decisive. We explicitly control for the GUO.

Inspiration for the identification of relevant indicators of bank distress can also be gauged from the bank failure literature. The most popular methodology to study bank distress has been the logit model (Demirguc-Kunt and Detragiache, 1997; Arena, 2008; Čihák and Schaeck, 2010; Cole and White, 2012; DeYoung and Torna, 2013). The explanatory variables applied in bank failure research can mainly be classified into bank-specific variables and country-specific macroeconomic regressors. The bank-specific variables usually follow the CAMELS categorisation. For European banks, however, much less detailed information is available than can be found in the US call reports, hence the indicators tend to be somewhat cruder. In theory, the most important indicator for bank distress is the equity ratio, since it captures the buffer against unexpected losses that a bank maintains. The equity ratio is calculated as total equity/total assets. Mayes and Stremmel (2014) find that the adjusted leverage ratio (total equity minus estimated losses to assets) outperforms more complex risk-weighted capital measures. In their analysis of international banks' distance-to-default from 2004 to 2011, Blundell-Wignall and Roulet (2013) also find that the unweighted capital ratio performs much better in predicting default than the Basel

tier 1 capital ratio[7].

The other bank-specific CAMELS-type variables that we include in the different regressions have been subject to much less discussion in the literature: loan loss provisions as a measure of loan quality, cost/income ratio as a proxy for management quality; net interest margin as the earnings indicator; and net interbank funding/total funding as a liquidity measure[8]. Combining the information on loan loss provisions and non-performing loans, we include the LLP/NPL ratio on which we expect a negative sign, since it indicates how adequate provisions are to cover any expected loan impairments. To capture liquidity risk, we focus on the net exposure (IB liabilities - IB assets) of banks to potentially volatile interbank funding. As was demonstrated immediately after the failure of Lehman Brothers, the interbank market may suddenly become illiquid and bank refinancing can become excessively expensive. Various papers have shown that reliance on interbank funding may increase bank vulnerability to liquidity shocks (Huang and Ratnovski, 2011).

We include absolute bank size in our regressions, measured as the log of total assets, as well as their systemic size, calculated as bank assets-to-GDP of the home country, to proxy for systemic size, and also the growth in total assets to capture banks which opted for fast asset expansion. The feature of large banks being "too-big-to-fail" or "too-systemic-to-fail", describing the situation in which banks are so large and interconnected that a failure would produce negative externalities for the economy as a whole, is commonly cited as one of the causes of the financial crisis. Rose and

[7]The banking crisis has provide a number of illustrations that risk-weighted capital ratios may be poor predictors of bank distress. Two prominent examples are the failure of Northern Rock and Dexia. Both banks had high capital ratios before they had to be rescued. Dexia even passed the European stress test in July 2011, being considered a safe bank with a high core tier 1 capital ratio even under the "adverse scenario", a few months before being bailed out in October 2011.

[8]We do not use variables based on stock market information since we want to keep our sample as large as possible and most aided banks are not listed. We therefore do not use a direct proxy for the "S" in CAMELS (sensitivity to market risk). As an alternative we include the banks' absolute as well as their systemic size.

Wieladek (2012) investigate the determinant of public banking interventions in the UK, based on a confidential bank-level data set of the Bank of England. They find that bank size is the only explanatory variable that is statistically significant for different types of support measures. In their study of EU mergers and acquisitions (M&As) in the context of government bailouts, Molyneux et al. (2014) find that acquiring banks are willing to pay a premium to the target firm if they grow in market power and therefore become "too-systematically-important-to-fail". According to Vazquez and Federico (2012), there is evidence that smaller banks fail for different reasons than larger banks: while small banks tend to fail due to liquidity problems, large banks struggle with insufficient capital buffers. In our analysis, we also find that the size variable is significant; large banks were saved particularly early in the crisis (mostly in 2008), possibly because of their potential externalities and governments' stability concerns.

The macroeconomic variables that are commonly used in studies on bank distress are related to government finances, economic growth as well as the housing market. The pressure on government finances caused by bailouts may feed back to banks. Banks typically hold government bonds in their securities portfolios and tend to be most exposed to their home sovereign. This so-called bank-sovereign feedback loop has been addressed by different papers BIS (2011); De Bruyckere et al. (2013). To account for this loop, one of our macroeconomic variables is the government debt/GDP of the country where the bank is headquartered. Furthermore, Demirguc-Kunt and Detragiache (1997) show that banking crises tend to occur in a weak macroeconomic environment. Aubuchon and Wheelock (2010) confirm this finding. They relate the bank failures of 2007-2010 to regional economic conditions in the US and compare the recent experience with the period 1987-1992, another period of increased bank failures in the US. For both episodes, bank failures were concentrated in regions that

experienced downturns in economic activity and distress in real estate markets. Borio and Drehmann (2009) report that banking crises are often preceded by unusual rises in credit and asset prices. They find that an indicator incorporating property prices performs better in issuing warning signals about financial distress than equity prices. Following these findings in the literature, we include a government debt/GDP ratio and the evolution of housing prices as our macro control variables. In the robustness section, GDP growth is also included but this does not alter our results.

The ex-post performance of banks that have benefited from government support has been analysed much less than the factors leading to financial distress. For the time being, it is not possible to assess the final ex-post picture in the EU because a number of banks are still under the umbrella of government support. In this paper, we attempt to investigate the post-bailout performance of the aided banks by running logit regressions for the two years following the bank bailouts. Several opposing effects may be at work. On the positive side, studies indicate that rescue programmes during the financial crisis have helped to maintain bank lending (Brei et al., 2013), have been instrumental in restoring bank funding (Grande et al., 2011) and have reduced default risk (as measured by CDS premia) after the announcement of system-wide support measure (Panetta et al., 2009). They also report that the drop in CDS premia is correlated with the size of intervention: the more capital injected, the higher the reduction in default risk. Fratianni and Marchionne (2013) find that general financial sector support measures were perceived positively by stock markets, while bank-specific interventions lead to negative abnormal returns as they were perceived as negative signals about the bank's health. For the US, Cornett et al. (2013) analyse the behaviour of banks that received aid from the US government's Troubled Asset Relief Program (TARP) and find that TARP banks improved their loan portfolio quality, with the healthy banks also reducing their expenses.

On the negative side, bailouts may also incentivise banks to increase their risk profile, as argued by Allen et al. (2013) and this may endanger financial stability. In this respect, Hryckiewicz (2014) analyses 23 banking crises in 23 countries (only including two crises in western European countries - Finland and Sweden - both in 1991), based on the banking crisis database by Laeven and Valencia (2008). She compares the behaviour of rescued banks with those that did not need government support and finds that risk in the banking sector increased in the post-crisis period. This is mainly due to the rescued banks, which show less efficient management and insufficient progress in restructuring, as well as reduced market discipline. Similarly, Brei and Gadanecz (2012) investigate whether public bailouts have been followed by a reduction in banks' loan book riskiness in 14 countries, including 9 EU countries and find that rescued banks do not reduce their loan book riskiness more than non-rescued banks. They conclude that government guarantees may distort rescued banks' incentive to monitor risk. Our results confirm the negative findings, as we also observe that banks do not adjust their risk profile.

4 Sample construction

We start by carefully constructing the sample of banks which benefited from a government intervention between 2007 and 2013 in 27 EU member states[9], Norway and Switzerland. We retrieve information on bank support from the European Commission, national governments, national supervisory authorities, central banks, banks' annual reports, websites and news sources, mainly Reuters. The European Commission lists general information on the type, scope, conditions and length of approved measures per country or bank. For detailed information on the timing of a support measure at the bank level, one needs to do a case-by-case search mainly based on

[9]Croatia is not included as it only joined the EU in July 2013.

information from national supervisors, central banks, banks' annual reports, bank websites and news archives[10]. A number of countries did not intervene to save banks because the banking sector is mainly foreign-owned. These are Bulgaria, Estonia, Czech Republic, Latvia, Lithuania, Romania and Slovakia. We therefore limit our sample to 22 countries (see figure 2).

As mentioned in the literature review, small banks are less likely to be saved since their potential failure poses less systemic risk. When listing the government interventions, we indeed find that the aided banks were in general relatively large. To make sure that we compare representative samples of aided and non-aided banks we apply a bank size threshold of EUR 10 billion in total assets; all banks that had more than EUR 10 billion in total assets in one of the years 2007-2013 are included. In countries where the state-aided banks were smaller than EUR 10 billion, we lower the threshold to EUR 5 billion (this applies to CY, DK, FI, GR, HU, MT, PL, PT, SI, NO). We identify 114 relevant government interventions on the asset or liability side of European banks over the period 2007-2013. Most government interventions were executed in the years 2008 and 2009 (see figure 2). We compare the group of aided banks to those banks that never received aid in the period 2005-2013. For instance, a bank that was bailed out in 2012 is not included in the group of non-aided banks in any previous year. After applying the same size threshold, we arrive at a sample of 212 never-aided banks (see figure 2).

An important feature of our sample is that the banks are selected based on their parent company ("general ultimate owner", GUO)[11]. All government support mea-

[10]The search for information on government interventions is not straightforward, since this is a topic that some banks prefer to remain quiet about. For example, in the UK some banks did not announce that they were benefiting from (liability) guarantees, but only mentioned it in the small print of the prospectus when issuing bonds. In Cyprus, banks apparently did not consider "Special Government Bonds" as a support measure, even though they have the typical characteristics of liquidity measures: the government allocates bonds in return for securities (mortgages etc.), and these bonds can be used to pledge collateral.

[11]The information on the GUO was mainly extracted from Bankscope. We verified the information

sures were injected at the parent company level, never at the subsidiary level. We therefore only include the parent banks in our sample, not their subsidiaries, neither in the home country nor abroad, to avoid any multiple counting of the same GUO. To illustrate this point, consider the Greek Emporiki Bank, which was owned by the French Credit Agricole (until February 2013). This bank is not included in our sample of Greek banks because it would never have been considered for Greek government intervention. Emporiki Bank announced in 2008 that it would not take part in any Greek support plan, but it could benefit from the French support measures via its parent company. In 2013, Emporiki Bank was acquired by the Greek Alpha Bank. This time again, Emporiki is not included in the sample because as a subsidiary of Alpha Bank, any aid in favour of Emporiki would have been given to the parent company Alpha Bank. Given the procedure of state aid measures, it is crucial to include only parent companies, not their domestic or foreign subsidiaries, to avoid any double/multiple counting.

As outlined above, it is difficult to differentiate between banks on basis of the type of aid they have received, because many banks have benefitted from a combination of aid measures. For example, the Dutch bank ING benefitted from three different government support measures within two months. In October 2008, ING received a capital injection by the Dutch government. In January 2009, ING agreed on an "Illiquid Assets Back-up Facility" whereby the Dutch state took over part of ING's US mortgage portfolio. In addition, ING also issued a bond guaranteed by the Dutch state in the same month. In our database, we simply include ING as a bank that started receiving government support in 2008.

For the explanatory variables, we retrieve bank-specific data from Bankscope (see table 1). Our independent variables are related to the CAMELS rating categories,

and had to correct several Bankscope data points. Additional information was taken from banks' websites/annual reports.

table 1 provides a description of the variables. The country-specific data comes from Eurostat, the BIS and the IMF (see table 1). All data is annual.

5 Methodology

In the first part of our empirical analysis, we compare the means of the explanatory variables for aided and non-aided banks each year from 2007 to 2013 by performing a two-sample t-test with unequal variances. In the second part of our analysis, we run various logit regressions with different sets of explanatory variables. For each year from 2007 to 2013, we create a binary variable that takes the value "1" when a bank benefited from government support measures during that year and "0" otherwise.

$$y_i = \begin{cases} 1 & with \ \ probability \quad p \\ 0 & with \ \ probability \quad 1-p \end{cases}$$

The conditional probability has the form:

$$p_i \equiv Pr(y_i = 1|x) = F(x_i'\beta),$$

where $F(\cdot)$ is the cumulative distribution function of $(x'\beta)$. The logit function then has the following form:

$$F(x_i'\beta) = \frac{e^{x'\beta}}{1+e^{x'\beta}}.$$

As a first step, we simply run several univariate regressions on either the core tier 1 ratio or the equity ratio. The objective is to verify whether one of the two capital adequacy variables performs better as an indicator of bank distress in a univariate setting. The pooled, binary variable y_i indicates whether bank i has received state

support during the period 2007-2013. It is regressed on either the core tier 1 ratio or the equity ratio and is included for several moments in time: r, $(r-1)$, $(r-2)$ and 2006, where r is the year of rescue.

In the multivariate logit regressions, we regress the pooled intervention variable y_i on a number of pre-crisis bank- and country-specific variables from 2006. By using pre-crisis data for the independent variables, potential endogeneity problems between the failure dummy and regressors are alleviated (Vazquez and Federico, 2012). Since the pre-intervention data is from 2006 and the bank bailouts took place from 2007 to 2013, the lags vary from 1 to 7 years before the actual rescue. However, since 89 of the 114 bailouts took place in 2008-2009, the data is mainly lagged 2-3 years. It has been shown that pre-failure data may indicate banks' distress as much as four years before failure (Gilbert et al., 1999; Thomson, 1991; Whalen, 1991).

We follow the notation by Mayes and Stremmel (2014):

$$y_i = cons + \beta_C x_{C,i06} + \beta_A x_{A,i06} + \beta_M x_{M,i06} + \beta_E x_{E,i06} + \beta_L x_{L,i06} + \beta_S x_{S,i06} + \beta_{macro} x_{macro,i06} + \epsilon$$

where the subscripts relate to the CAMELS indicators as the determinants of bank rescues: capital adequacy, asset quality, management capability, earnings, liquidity, – in our case – systemic size and the macroeconomic variables. We do not add country dummies because they would be highly correlated with the macroeconomic variables.

In a next set of multivariate logit regressions, we regress the pooled intervention variable y_i on five periods in time: $(r-2)$, $(r-1)$, r, $(r+1)$ and $(r+2)$ in order to assess the pre-distress as well as the post-rescue characteristics of the banks involved in bailouts.

Following the pooled regressions, we run separate regressions on the unpooled dataset. Since most banks received support in 2008/2009, we focus on those two

years. By using unpooled data, it is possible to compare banks that were rescued in 2008 and 2009 and to investigate whether they had similar profiles and characteristics. We choose one logit model and apply it for both years separately. As in the previous regressions, the banks that never received aid in the period 2007-2013 constitute the control group.

6 Results

6.1 Two-sample mean test

The mean comparisons per variable are presented in table 2. Each panel includes data for aided/non-aided banks in the years 2007-2013. The non-aided sample only includes banks that have never been aided during the period. Each variable is presented in a separate panel covering the years around the time of the state-supported rescue, ranging from two years before (r-2) to two years after (r+2). The top row indicates the year in which a bank received state aid and in the panels we present the values of the variables for rescued and non-rescued banks, the difference and the associated t-statistic. The number of observations in the yearly samples may differ throughout the years due to slight variations in sample coverage.

As can be seen in panel 2.a, the equity ratio is much lower for banks rescued early in the crisis (2007 and especially 2008) and the difference with the non-aided banks is significant in all pre-bailout years as well as the year in which the bailout was organised. For banks that were rescued in 2009 we still find that that aided banks had lower capital adequacy, but the difference with the non-aided banks is less significant. This suggests that banks rescued in 2009 may have failed for different reasons than those early in the crisis, a hypothesis that we test in the logit regressions. In the two years following the government interventions, we find that the equity ratio

of the rescued banks hardly improves, but clearly remains below the equity ratio of the banks in the control group, mostly significantly so. The comparison of the means calls attention to the levels of equity ratio of aided versus non-aided banks. From 2005-2013, never-aided banks have equity levels fluctuating around 7.5%, only in 2008 did the equity ratio drop to 6.9%. The aided banks have much lower equity ratios; the 2008 rescues exhibit equity ratios ranging from 3% to 4.1% for the period (r-2) to (r+2). This supports the effort undertaken by regulators (BIS and FSB) and national authorities to impose higher leverage ratios on banks, next to higher risk-based capital ratios in the Basel III framework.

In panel 2.b we repeat the exercise for the capital tier 1 ratio. Again, we observe that the mean values for the aided banks are lower in the pre-bailout periods, but the absolute difference and their significance levels are lower than in the case of the unweighted equity ratio. In the years following the bailouts, the differences in risk-weighted capital ratios becomes insignificant and the ratios increase compared to their pre-crisis levels. It remains to be seen whether or not this reflects a genuine decrease in bank riskiness.

The ratio of loan loss provisions/non-performing loans captures how adequately banks have made provisions to cover actual loan impairments. Panel 2.c shows that non-aided banks hold much larger buffers than the state-supported banks and the difference is statistically significant, especially for banks that failed earlier in the crisis. The differences are large; in the years 2006-2008 banks that were rescued in 2008 had a LLP/NPL ratio of 70%, 66% and 58%, respectively, while the non-aided banks had buffers of 134%, 118%, and 70% for the same years. After the rescues executed in 2008, the LLP/NPL ratio remains higher for the healthy banks, but at lower levels. For banks that failed later in the crisis, the LLP/NPL ratio is much less significant. The insufficient NPL buffer appears to be an early indicator for failure; the

other banks probably failed mainly for other reasons. The LLP/NPL ratio declines throughout the crisis, which is mainly driven by higher NPL, caused by the recession.

Profitability, proxied by the net interest margin (NIM) (see panel 2.d), appears to be an important determinant for bank distress at the beginning of the crisis: aided banks tend to have significantly lower NIM than the non-aided banks up to two years before the bailout. Following the rescues, the difference is smaller, primarily because the non-aided banks also suffer from a decreasing NIM. The implication is that the profitability of the intermediation activity of non-aided banks was much more resilient to the crisis than that of the rescued banks.

The difference in banks' interbank funding is not statistically significant in most cases (see panel 2.e). Nevertheless, banks that were rescued in 2007-2009 always have a higher reliance on interbank funding than non-aided banks. Those banks were apparently strongly affected by the stress on the interbank market in the early stage of the financial crisis.

The difference in the size variables (see panel 2.f and 2.g) is only significant for banks that failed in 2008, and this is the case throughout all periods, before and after the bailouts. The large banks were indeed rescued first, as governments were under pressure to bail them out because of potential externalities. And while a number of banks were required to restructure and divest certain activities following their bailout, in most cases forced by decisions of the European Commission, they generally tend to remain larger than the non-aided banks, also after their rescue. The findings for systemic size (bank size / GDP) are very similar those for absolute bank size. Banks aided in 2008 are systemically larger for all periods, and the results are highly statistically significant.

While the two-sample mean tests do not deliver significant findings for the following variables, we nevertheless include the panels for the sake of completeness for the

LLP/loans, NPL/loans and cost/income ratio (panels 2.h-j).

6.2 Logit regression

Before performing the multivariate logit regressions, we first want to assess the relative strength of the unweighted equity ratio versus the risk-weighted core tier 1 ratio as the relevant measure for capital adequacy. We run pooled univariate regressions in which the government interventions in the period 2007-2013 are pooled around r = time of rescue and regressed on the two capital measures at time r, (r-1), (r-2) and in 2006. In table 3, the dependent variable is the binary state aid variable at time r. In all estimations, the equity ratio and tier 1 ratio all have the expected negative signs indicating that a higher equity or capital tier 1 ratio is associated with a lower probability of bailout. However, whereas the equity ratio is highly statistically significant at the 1%-level in all cases, the tier 1 ratio is only significant at the 5%-level in one of the four cases. The values for the pseudo R-squared confirm that the equity ratio has much higher explanatory power than the risk-weighted tier 1 ratio. This is consistent with various other papers which document that risk-weighted capital ratios are less successful in predicting bank distress probability than an unweighted leverage ratio, see e.g. Blundell-Wignall and Atkinson (2013), Blundell-Wignall and Roulet (2013), Gropp et al. (2010), Haldane (2011). Our findings are also consistent with papers reporting that banks using the internal ratings-based approach typically have lower ratios of risk-weighted assets in total assets, casting doubt on the reliability of risk-based capital measures (Mariathasan and Merrouche, 2014). Given these findings, we include the unweighted equity ratio as the preferred indicator of capital adequacy in all subsequent logit regressions.

In table 4, we regress the pooled bailout dummy variable on data from the year 2006, given that this is the last year preceding the period of financial crisis. Dif-

ferent combinations of the CAMELS-based explanatory variables are included. The most consistent finding is that the unweighted equity ratio is statistically significant in all combinations and carries the expected negative sign, indicating that a higher equity ratio is associated with a lower probability of a government-assisted bailout. This result strongly supports the strengthening of capital adequacy rules in the Basel III framework. Moreover, they underline the importance of enforcing an unweighted leverage ratio, next to the common risk-based measures. With respect to loan quality, we observe that a simple loan loss provisions ratio or a non-performing loans ratio are not significant individually. However, their combination turns out to be relevant, suggesting that the higher the buffer of provisions that banks maintain against bad loans, the lower the probability that they require a bailout to survive. Since a number of banks do not report NPL, the sample size is smaller, but this does not appear to affect the significance of the other explanatory variables. The variables related to the size of the banks are positive and significant in most cases; the absolute and systemic size of banks is positively related to the probability of being rescued. That implies that larger banks are more likely to receive government support, a finding which is consistent with the literature on too-big-to-fail and too-systemic-to-fail; large banks are rescued because their failure might cause contagion and negative spillovers to the real economy. Also, the growth of banks' total assets is positive and significant, indicating that rapid growth just before the crisis is a contributing factor to distress probability. From the macroeconomic side, we include the evolution of housing prices and table 4 shows that this variable has a positive sign and is strongly significant. Banks operating in countries characterised by rapidly increasing housing prices are hence more prone to distress. Given the fact that some European countries suffered severe housing crisis (e.g. Spain and Ireland) and associated bank bailouts, this relationship is expected. Finally, table 4 indicates that a high government debt ratio loads

positively on the odds of bank bailouts. This illustrates the negative feedback loop between weak banks and highly indebted sovereigns, as documented in De Bruyckere et al. (2013).

In tables 5 to 9, we regress the pooled intervention dummy on the same set of explanatory variables as in table 4, but we move the time frame, from two years before the bailout (table 5) to two years following the government intervention (table 9). Investigating the effect of explanatory variables over time allows us to identify which variables become relevant once the bailout event approaches, including the year of the government intervention itself. Tables 8 and 9 are post-bailout estimations, linking the probability of a rescue to bank characteristics one and two years following the bailout. Our intention is not to undertake a detailed analysis of business model and performance changes induced by the bank bailouts, but the logit regressions should indicate whether or not the rescues are associated with post-bailout improvements in the profitability and risk dimension of the rescued banks relative to the peer group of never-aided banks. In these regressions the housing price variable always refers to the pre-event evolution since the build-up of any housing price bubble preceded the banking crisis.

As can be seen from tables 5-7, in all years before and the year of the distress event, the equity ratio is always negative and highly significant. This implies that even two years before bank rescues, the equity ratio already has predictive power. If anything, the magnitude of the association between capital buffers, or the lack thereof, and bailout probability increases as the rescue approaches. These results confirm that adequate capital buffers are the prime defence against unexpected losses. In terms of the quality of the banks' loan portfolios, all indicators exhibit predictive power to anticipate government rescues. In the two years preceding bank rescues (tables 5 and 6) as well as in the contemporaneous logit estimation (table 7), the LLP/loans ratio is

positive and significant, indicating that banks signalling worse loan quality through higher provisioning are the ones that eventually require some form of government assistance. Again, as the bailout events approach, this effect becomes stronger in magnitude and significance. A similar result is found for the NPL ratio, although the significance is lower. The combination of both variables again possesses significant explanatory power; the better banks provision for loan impairments, the lower their probability of being involved in bailouts.

The indicators capturing bank efficiency and profitability enter the picture once the bank bailout approaches. While the cost/income ratio is still insignificant two years before the distress event, it becomes significant from the year preceding the rescue onwards. However, the interpretation has to be done with care, since the ratio may increase because of higher costs but also because of lower revenues. Since many of the large banks that needed government support in the crisis were hit by a severe decrease in the non-interest income (originating from, e.g., investment banking and other financial market-related activities), it is the revenue loss that mainly provokes the positive association between the cost/income ratio and the probability of being involved in a bailout. However, in some cases the distressed banks' increase in the cost/income ratio may also be partly due to managerial largesse and weakened cost awareness during the pre-crisis expansion era that some very large banks experienced.

The interbank funding is positive and partly statistically significant. It is highly statistically significant in the year of rescue (table 7), implying that a higher reliance on interbank funding is related to a bailout.

The absolute size of the bank is a consistent predictor of bailout involvement in the pre-rescue period and also the systemic size turns out to be partly significant. These findings confirm that this financial crisis has been characterised by an increased vulnerability to distress by the largest financial institutions. Those banks had attempted

to drive up their return on equity primarily by increasing their leverage through rapid asset expansion, supposedly in the form of relatively safe asset-backed securities which required very low capital coverage and were in most cases funded by a higher reliance on market-based financing sources (Haldane et al., 2010). The results of the contemporaneous logit regression in table 7 confirm the findings of the pre-distress years. However, interpretation has to be done cautiously because of the endogeneity concern; some government interventions may already partially feed through in the observed bank characteristics. The variables used as a proxy for important macroeconomic features exhibit a consistent behaviour: the higher a bank's home sovereign's debt ratio and the more rapid the increase in domestic housing prices, the higher the probability of bailout involvement.

In tables 8 and 9 we pursue the intuition behind logit regressions and assess the association between the probability of being involved in a government-assisted rescue and bank characteristics one and two years following this event. While this kind of analysis does not constitute a final assessment of the impact of government rescues, it provides indications of how the CAMELS-based features of aided versus never-aided banks evolve after the bailouts. Most interestingly, the coefficient on the equity ratio remains negative but gradually loses significance in the post-rescue period, indicating that restoring the weak banks' capital buffers was indeed the prime intervention variable. This finding confirms the results of the means test: although non-aided banks maintain higher capital buffers, the gap with the rescued banks narrows, mostly due to government-assisted recapitalisations. The bank performance-related variables show no sign of immediate improvement after the government rescues. If anything, the coefficients on the asset quality variables LLP and NPL increase and become more significant. This can be explained by the fact that rescued banks had to account for bad loans and were forced to disclose their non-performing loans and increase their

provisioning to absorb expected losses. Similar to the pre-rescue years, the LLP/NPL ratio exhibits a negative and significant sign, illustrating that more adequate provisioning remains negatively associated with bailout involvement. The cost/income ratio carries a positive sign and the net interest margin remains negatively associated with the probability of bailout, indicating that any performance improvement following state aid does not occur immediately. Apparently, the rescued banks failed to implement decisive changes in their business models. Or, given the adverse macroeconomic conditions that prevailed in the period following the banking crisis, the troubled banks need time to adjust their activities, business model and operational efficiency to the structurally changed regulatory and macroeconomic environment.

6.3 Robustness checks

In order to verify the robustness of our findings, we run a number of checks using different time frames, different sample composition and alternative combinations of explanatory variables.

A first concern that arises from the means tests in table 2 is that not all banks in the sample may have been rescued for the same reason and that pooling all events may obscure relevant differences in the underlying bank characteristics. Since the bulk of the state aid cases occur in 2008 and 2009, were run a separate logit analysis for these two years. We opt for the logit specification with the systemic size variable (TA/GDP) but without the NPL because this reduces the sample size considerably. The dependent variable "state aid in 2008" in table 10 is a binary dummy indicating whether a bank received state aid in 2008 or not. The control group consists of banks that never received state aid, hence the banks that were rescued before or after 2008 are not included. We regress the rescue dummy on variables from the years 2006, 2007, 2008, 2009 and 2010, as indicated in the second line of table 10.

The housing price variable refers to the pre-crisis period to reflect the build-up of any imbalances in that period. For the rescues implemented in 2008, the picture that emerges is the following. The banks requiring state aid were very large (as indicated by the significant coefficient on their systemic size), were too undercapitalised and were holding too few provisions to absorb the losses arising from sudden shocks in the value of their securities portfolios (with in most cases exposures to supposedly safe asset-backed securities, which experienced mounting valuation losses during the peak of the crisis in 2008). After the rescues, the aided banks exhibit significantly higher loan loss provision ratios as a recognition of increasing expected losses. For the banks rescued in 2009, table 11 shows a different picture. The probability of state aid involvement is less linked to size because the largest banks were already saved in 2008. Furthermore, capital adequacy is less significant, but instead the macroeconomic environment, i.e. banks' exposure to housing price bubbles or sovereign debt dynamics, is strongly linked to banks' probability of being bailed out. Moreover, there is no evidence of any post-rescue performance improvement.

In most previous logit regressions, the equity ratio is strongly significant. To verify whether correlation with other variables has an impact on the performance of the other explanatory variables, we report the results when excluding the equity ratio in the (r-1) logit regression in table 12. All variables keep their (expected) sign and some are now more significant, especially the performance variables cost/income and NIM. However, the pseudo R-squared is much lower when leaving out the equity ratio, which is evidence that the equity ratio adds considerable explanatory power. In a different setup, we exclude German and Spanish banks from the pooled (r-1) regression because they represent an important share of the total aided banks. Neither the exclusion of German (table 13) nor of Spanish banks leads to different results[12]. To check whether the results depend on the choice of the macro variables,

[12]The table excluding Spanish banks is not reported, but available upon request. Results are very

we replace the debt/GDP ratio by GDP growth in the year before the banks' rescue. As can be seen in table 14, the effect of all variables remains unaltered. Higher GDP growth is negatively and significantly associated with a lower probability of bank bailout involvement.

7 Conclusion

Based on an exhaustive search, we identify 114 European banks that were involved in a state-supported rescue operation in Europe over the period 2007-2013. We run different sets of logit regressions to establish which bank-specific and macroeconomic factors are consistently associated with the probability of bank bailout involvement. The variable with the highest discriminating power is the equity ratio, as an indicator of the adequacy of banks' capital buffers to absorb unexpected losses. The policy implication of this finding is clear: in order to increase the resilience of banks to sudden shocks, capital buffers need to be increased. Therefore our results lend unambiguous support to the strengthened capital requirements imposed by Basel III and the rules spelled out by the Financial Stability Board in 2015 to further increase the loss absorbency capacity of systemic banks by imposing enhanced total loss-absorbing capacity buffers from 2019 onwards. Since we also find that both absolute and systemic bank size are consistently associated with a higher probability of state aid involvement, our results support the efforts to require additional capital buffers from the systematically important banks (SIB), which is also part of the new Basel framework. Moreover, we document that the unweighted equity/assets ratio performs better than a risk-weighted regulatory capital ratio in predicting bank distress. This result underlines the necessity to supplement risk-based regulatory capital ratios with an unweighted equity ratio to serve as a backstop. Within the Basel III

similar.

framework the introduction of an unweighted leverage ratio is foreseen, although our evidence indicates that the proposed level of 3% would have been too low during the recent financial crisis to ensure stable banks. Supervisors in several advanced countries have proposed tougher rules, which will be implemented gradually alongside the Basel requirements.

Other bank-specific variables that perform well as an indicator for bank distress are related to banks' performance and include loan loss provisions relative to non-performing loans and, in the period immediately preceding the bank rescues, the cost/income ratio and the net interest margin. These results indicate that pursuing an inadequate business model or simply bad management may increase the probability of involvement in government-assisted rescues. The policy implication is that supervisors should not only consider a limited set of bank-specific financial indicators to monitor their resilience, but should take banks' business model and the governance of bank management into consideration. An important impetus for such broader supervisory scrutiny is the gradual roll-out of the (Basel) Pillar 2 supervisory review and evaluation process (SREP) that is now used to determine whether or not banks with specific vulnerabilities require capital add-ons. In the SREP guidelines published by the European Banking Authority (EBA, 2014), a business model analysis (BMA) is a constituent part of the SREP assessment.

Finally, our evidence indicates that any post-bailout performance improvement in the rescued banks is slow at best. Our post-intervention results show that banks are fairly quick at recognising the need to increase their loan loss provisions considerably, probably partly triggered by supervisory pressure or requirements imposed during stress tests, but there are no visible improvements in terms of performance. Here, the recommendation is that when governments set up state-sponsored rescues, they should require rapid and decisive action from the rescued banks in terms of business

model redesign and structural governance changes. The faster banks restore their resilience, the better they can again contribute to the financing of the real economy. Finally, we also document that macroeconomic features are important determinants of bank distress. Hence, a more diligent monitoring of macroeconomic imbalances, such as public debt levels and housing price evolutions seems warranted for increasing financial stability. The establishment of the European Systemic Risk Board and the introduction of the Macroeconomic Imbalances Procedure are useful steps in this direction.

References

Allen, F., Carletti, E., Goldstein, I., and Leonello, A. (2013). Government guarantees and financial stability. *Working paper. University of Pennsylvania.*

Arena, M. (2008). Bank failures and bank fundamentals: A comparative analysis of Latin America and East Asia during the nineties using bank-level data. *Journal of Banking & Finance*, 32(2):299–310.

Aubuchon, C. P. and Wheelock, D. C. (2010). The geographic distribution and characteristics of US bank failures, 2007-2010: Do bank failures still reflect local economic conditions? *Federal Reserve Bank of St. Louis Review*, 92(5):395–415.

Beck, T., Coyle, D., Dewatripont, M., Freixas, X., and Seabright, P. (2010). Bailing out the banks: Reconciling stability and competition. *London, CEPR.*

Betz, F., Oprică, S., Peltonen, T. A., and Sarlin, P. (2014). Predicting distress in European banks. *Journal of Banking & Finance*, 45:225–241.

BIS (2011). The impact of sovereign credit risk on bank funding conditions. *Bank of International Settlements. Committee on the Global Financial System Papers*, (43).

Blundell-Wignall, A. and Atkinson, P. (2013). German Bundestag Finance Committee Hearing on the draft bank-separation law.

Blundell-Wignall, A. and Roulet, C. (2013). Business models of banks, leverage and the distance-to-default. *OECD Journal: Financial Market Trends*, 2012(2):7–34.

Borio, C. E. and Drehmann, M. (2009). Assessing the risk of banking crises - revisited. *BIS Quarterly Review*, 2009/03.

Boudghene, Y. and Maes, S. (2012). Empirical review of EU asset relief measures in the period 2008-2012. *European State Aid Law Quarterly*, (4):31–44.

Brei, M. and Gadanecz, B. (2012). Have public bailouts made banks' loan books safer? *BIS Quarterly Review*, 2012/09.

Brei, M., Gambacorta, L., and Von Peter, G. (2013). Rescue packages and bank lending. *Journal of Banking & Finance*, 37(2):490–505.

Čihák, M. and Schaeck, K. (2010). How well do aggregate prudential ratios identify banking system problems? *Journal of Financial Stability*, 6(3):130–144.

Cole, R. A. and White, L. J. (2012). Déjà vu all over again: The causes of US commercial bank failures this time around. *Journal of Financial Services Research*, 42(1-2):5–29.

Cornett, M. M., Li, L., and Tehranian, H. (2013). The performance of banks around the receipt and repayment of TARP funds: Over-achievers versus under-achievers. *Journal of Banking & Finance*, 37(3):730–746.

De Bruyckere, V., Gerhardt, M., Schepens, G., and Vander Vennet, R. (2013). Bank/sovereign risk spillovers in the European debt crisis. *Journal of Banking & Finance*, 37(12):4793–4809.

Demirguc-Kunt, A. and Detragiache, E. (1997). The determinants of banking crises: Evidence from industrial and developing countries. *The World Bank Policy Research Working Papers*.

DeYoung, R. and Torna, G. (2013). Nontraditional banking activities and bank failures during the financial crisis. *Journal of Financial Intermediation*, 22(3):397–421.

EBA (2014). Guidelines for common procedures and methodologies for the supervisory review and evaluation process. *European Banking Authority. EBA/GL/2014/13.*

Fratianni, M. and Marchionne, F. (2013). The fading stock market response to announcements of bank bailouts. *Journal of Financial Stability*, 9(1):69–89.

Friederiszick, H., Roeller, L., and Verouden, V. (2007). *Handbook of Antitrust Economics*, chapter European State Aid Control: An Economic Framework. MIT Press, London.

Gilbert, R. A., Meyer, A. P., and Vaughan, M. D. (1999). The role of supervisory screens and econometric models in off-site surveillance. *Federal Reserve Bank of St. Louis Review*, (Nov):31–56.

Goodhart, C. (2008). The regulatory response to the financial crisis. *Journal of Financial Stability*, 4(4):351–358.

Grande, G., Levy, A., Panetta, F., and Zaghini, A. (2011). Public guarantees on bank bonds: Effectiveness and distortions. *OECD Journal: Financial Market Trends*, 2011(2):47–72.

Gropp, R., Hakenes, H., and Schnabel, I. (2010). Competition, risk-shifting and public bail-out policies. *Review of Financial Studies*, page hhq114.

Haldane, A. (2011). Capital discipline. Speech given at the American Economic Association, Denver, Colorado, 9 january.

Haldane, A., Brennan, S., and Madouros, V. (2010). What is the contribution of the financial sector: Miracle or mirage? *The Future of Finance: The LSE Report*, pages 87–120.

Harada, K., Ito, T., and Takahashi, S. (2013). Is the distance-to-default a good measure in predicting bank failures? A case study of Japanese major banks. *Japan and the World Economy*, 27:70–82.

Hryckiewicz, A. (2014). What do we know about the impact of government interventions in the banking sector? an assessment of various bailout programs on bank behavior. *Journal of Banking & Finance*, 46:246–265.

Huang, R. and Ratnovski, L. (2011). The dark side of bank wholesale funding. *Journal of Financial Intermediation*, 20(2):248–263.

Laeven, L. and Valencia, F. (2008). Systemic banking crises: A new database. *IMF Working Papers*, 08/224.

Lyons, B. and Zhu, M. (2013). Compensating competitors or restoring competition? EU regulation of state aid for banks during the financial crisis. *Journal of Industry, Competition and Trade*, 13(1):39–66.

Mariathasan, M. and Merrouche, O. (2014). The manipulation of Basel risk-weights. *Journal of Financial Intermediation*, 23(3):300–321.

Mayes, D. G. and Stremmel, H. (2014). The effectiveness of capital adequacy measures in predicting bank distress. *SUERF Studies*.

Molyneux, P., Schaeck, K., and Zhou, T. M. (2014). 'Too systemically important to fail' in banking - Evidence from bank mergers and acquisitions. *Journal of International Money and Finance*, 49:258–282.

Panetta, F., Faeh, T., Grande, G., Ho, C., King, M., Levy, A., Signoretti, F., Taboga, M., and Zaghini, A. (2009). An assessment of financial sector rescue programmes. *Bank for International Settlements Working Papers*, 48.

Petrovic, A. and Tutsch, R. (2009). National rescue measures in response to the current financial crisis. *ECB Legal Working Paper Series*, (8).

Poghosyan, T. and Cihak, M. (2009). Distress in European banks: An analysis based on a new dataset. *IMF Working Papers*, 9.

Rose, A. K. and Wieladek, T. (2012). Too big to fail: Some empirical evidence on the causes and consequences of public banking interventions in the UK. *Journal of International Money and Finance*, 31(8):2038–2051.

Stolz, S. M. and Wedow, M. (2010). Extraordinary measures in extraordinary times: Public measures in support of the financial sector in the EU and the United States. *ECB Occasional Papers*, 117.

Thomson, J. B. (1991). Predicting bank failures in the 1980s. *Federal Reserve Bank of Cleveland Economic Review*, 27(1):9–20.

Vazquez, F. and Federico, P. M. (2012). Bank funding structures and risk: Evidence from the global financial crisis. *IMF Working Papers*, 12/29.

Whalen, G. (1991). A proportional hazards model of bank failure: An examination of its usefulness as an early warning tool. *Economic Review*, 27(1):21–30.

Appendix

Figure 1: Amounts of state aid measures in the EU (2008-2012)

All numbers are expressed as % of GDP. Note that the scale changes in each panel.

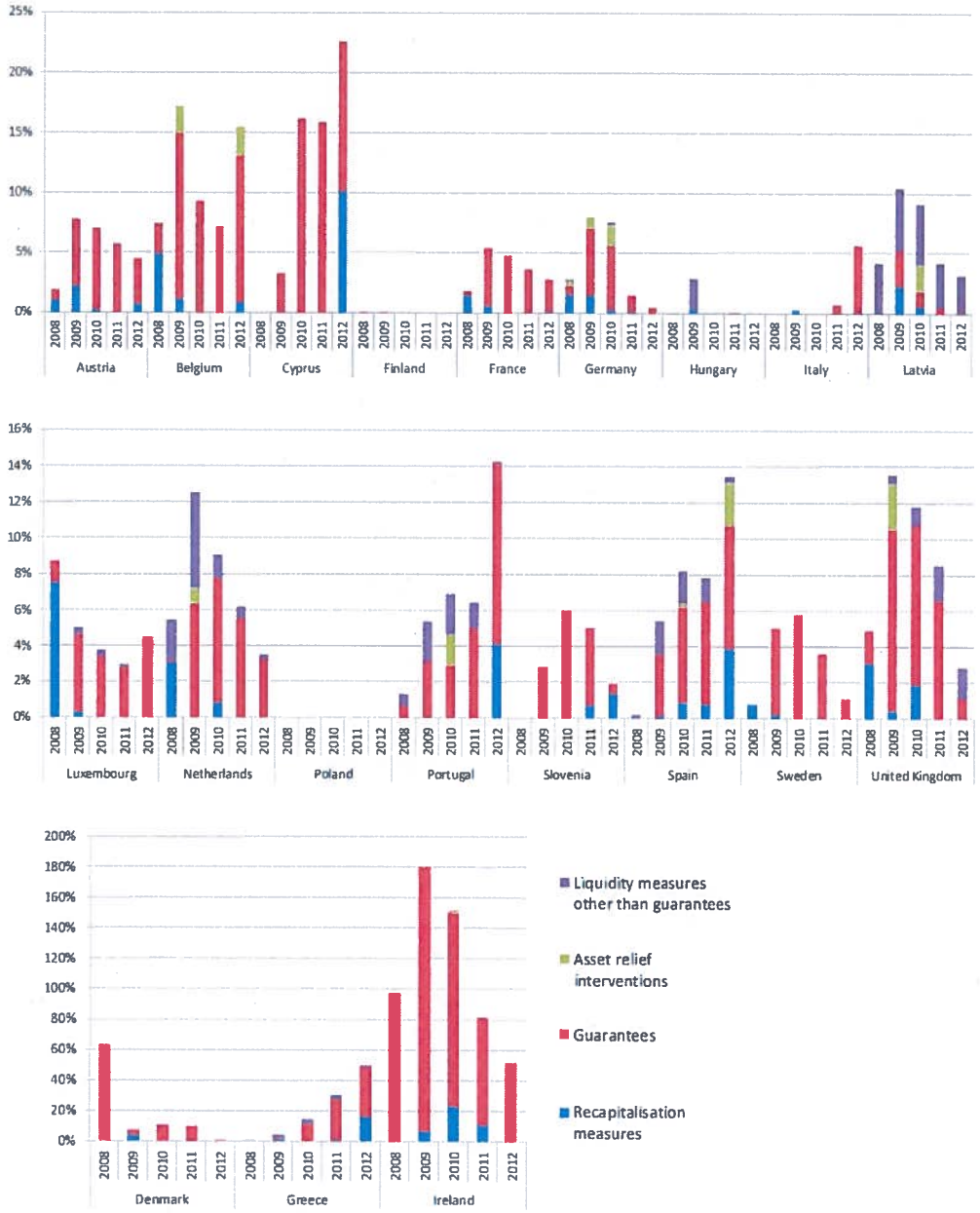

Figure 2: Number of government interventions per country per year

Country	Never-aided	Aided banks							Total aided	Total
		2007	2008	2009	2010	2011	2012	2013		
AT	9	0	2	5	0	0	0	0	7	16
BE	3	0	2	0	0	0	0	0	2	5
CH	28	0	1	0	0	0	0	0	1	29
CY	0	0	0	3	0	0	0	1	4	4
DE	41	1	6	4	0	0	0	0	11	52
DK	4	0	0	7	0	0	0	0	7	11
ES	40	0	0	1	9	3	2	0	15	55
FI	4	0	0	0	0	0	0	0	0	4
FR	7	0	8	0	0	0	1	0	9	16
GB	13	1	7	5	0	0	0	0	13	26
GR	4	0	0	9	0	1	0	0	10	14
HU	3	0	0	2	0	0	0	0	2	5
IE	1	0	5	0	2	0	0	0	7	8
IT	19	0	0	4	0	0	0	0	4	23
LU	2	0	0	0	0	0	0	0	0	2
MT	1	0	0	0	0	0	0	0	0	1
NL	7	0	3	1	0	0	0	0	4	11
NO	13	0	0	3	0	0	0	0	3	16
PL	3	0	0	0	0	0	0	0	0	3
PT	3	0	2	2	0	0	2	1	7	10
SE	5	0	1	2	0	0	0	0	3	8
SI	2	0	0	4	0	0	0	1	5	7
Total	**212**	2	37	52	11	4	5	3	**114**	**326**

Table 1: Summary statistics for the years 2006-2013 and data sources

variable	obs.	mean	std. dev.	min.	max.	definition	source
Equity / assets	1847	6.9	6.5	-6.0	95.4	total equity / total assets	Bankscope
Tier 1 ratio	1294	10.8	4.1	-1.3	29.3	capital tier 1 ratio	Bankscope
LLP / loans	1710	0.8	1.9	-5.5	38.8	loan loss provisions / net loans	Bankscope
NPL / loans	1230	4.3	5.6	0.0	67.6	non-performing loans / net loans	Bankscope
LLP / NPL	1188	75.9	65.0	-4.6	545.2	loan loss provisions / non-performing loans	Bankscope
Cost / income	1818	60.4	26.5	0.5	375.6	cost/income = overhead costs / income	Bankscope
NIM	1811	1.5	0.9	-4.4	4.7	net interest margin= net interest income / total earning assets	Bankscope
IB / funding	1846	3.7	15.3	-76.7	76.6	net interbank funding / total funding	Bankscope
Size	1847	10.2	1.5	-0.9	14.8	ln of total assets	Bankscope
Systemic size	1847	0.2	0.4	0.0	4.3	total assets / home country's GDP	Bankscope, IMF
Asset growth						growth of total assets	Bankscope
Gov debt / GDP						general government net debt / GDP	IMF
Housing prices						change in housing prices index	Eurostat; BIS

Table 2: Two-sample mean tests for aided and non-aided banks

The table reports the mean values of the explanatory variables for the aided and non-aided banks from 2 years before to two years following the rescue, the difference between the aided and non-aided banks and its significance using a t-test.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Panel 2.a: Total equity / total assets

Equity-to-assets								
for banks aided/non-aided in			*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
			2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
year = r-2	Mean	non-aided	7.9	7.4	7.4	6.9	7.3	7.4	7.4
		aided	1.7	3.9	6.2	4.8	4.6	3.5	6.6
	Obs	non-aided	157	185	187	191	193	189	174
		aided	2	33	49	5	3	3	2
		difference	6.194***	3.449***	1.2	2.1	2.7	3.9	0.9
		t-stat	[10.28]	[6.26]	[1.85]	[1.92]	[2.61]	[2.71]	[0.46]
			2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
year = r-1	Mean	non-aided	7.4	7.4	6.9	7.3	7.4	7.4	7.5
		aided	1.7	3.8	5.6	4.6	3.5	3.8	5.1
	Obs	non-aided	185	187	191	193	189	174	171
		aided	2	34	50	5	4	5	3
		difference	5.670***	3.628***	1.267*	2.8	3.875**	3.675*	2.4
		t-stat	[11.60]	[5.97]	[2.06]	[1.67]	[4.02]	[3.31]	[1.26]
			2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
year = r	Mean	non-aided	7.4	6.9	7.3	7.4	7.4	7.5	8.4
		aided	1.2	3.1	5.9	2.8	2.8	2.9	1.8
	Obs	non-aided	187	191	193	189	174	171	167
		aided	1	33	50	8	2	5	3
		difference	6.3	3.761***	1.416*	4.592***	4.6	4.585**	6.6
		t-stat	[.]	[6.34]	[2.41]	[6.63]	[3.59]	[3.83]	[2.51]
			2008	**2009**	**2010**	**2011**	**2012**	**2013**	
year = r+1	Mean	non-aided	6.9	7.3	7.4	7.4	7.5	8.4	
		aided	-0.8	3.6	6.1	3.3	10.2	3.1	
	Obs	non-aided	191	193	189	174	171	167	
		aided	1	33	49	7	1	5	
		difference	7.7	3.707***	1.321*	4.137***	-2.8	5.231**	
		t-stat	[.]	[6.17]	[2.21]	[6.19]	[.]	[3.91]	
			2009	**2010**	**2011**	**2012**	**2013**		
year = r+2	Mean	non-aided	7.3	7.4	7.4	7.5	8.4		
		aided	-0.4	4.1	5.0	0.9			
	Obs	non-aided	193	189	174	171	167		
		aided	1	32	46	5	0		
		difference	7.8	3.290***	2.439***	6.588**			
		t-stat	[.]	[4.88]	[3.42]	[5.14]			

Panel 2.b: Tier 1 ratio

Tier 1 ratio								
for banks aided/non-aided in			*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
			2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
year = r-2	Mean	non-aided	10.5	9.7	9.7	10.0	11.6	12.0	12.0
		aided	7.5	8.5	8.8	6.8	7.1	9.0	8.0
	Obs	non-aided	81	94	105	118	122	123	125
		aided	2	28	46	5	3	2	2
		difference	2.995***	1.249*	0.9	3.266***	4.5	3.049***	4.0
		t-stat	[3.98]	[2.22]	[1.56]	[6.31]	[3.01]	[7.85]	[3.03]
			2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
year = r-1	Mean	non-aided	9.7	9.7	10.0	11.6	12.0	12.0	13.4
		aided	8.1	8.1	8.9	7.5	5.8	9.4	9.0
	Obs	non-aided	94	105	118	122	123	125	132
		aided	2	29	48	5	3	4	3
		difference	1.598*	1.600***	1.1	4.2	6.2	2.611***	4.4
		t-stat	[2.78]	[3.49]	[1.88]	[2.46]	[3.39]	[5.09]	[2.35]
			2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
year = r	Mean	non-aided	9.7	10.0	11.6	12.0	12.0	13.4	14.3
		aided	7.7	9.0	11.0	11.6	6.5	8.1	6.3
	Obs	non-aided	105	118	122	123	125	132	128
		aided	1	30	48	6	2	4	2
		difference	2.0	1.026*	0.7	0.4	5.5	5.3	8.1
		t-stat	[.]	[2.00]	[1.10]	[0.17]	[1.23]	[1.70]	[1.38]
			2008	**2009**	**2010**	**2011**	**2012**	**2013**	
year = r+1	Mean	non-aided	10.0	11.6	12.0	12.0	13.4	14.3	
		aided	-0.4	11.5	11.8	9.8		10.9	
	Obs	non-aided	118	122	123	125	132	128	
		aided	1	31	47	5	0	4	
		difference	10.4	0.1	0.2	2.2		3.5	
		t-stat	[.]	[0.09]	[0.35]	[2.35]		[1.56]	
			2009	**2010**	**2011**	**2012**	**2013**		
year = r+2	Mean	non-aided	11.6	12.0	12.0	13.4	14.3		
		aided	1.9	13.5	10.4	6.7			
	Obs	non-aided	122	123	125	132	128		
		aided	1	29	43	3	0		
		difference	9.8	-1.4	1.7	6.701**			
		t-stat	[.]	[-1.26]	[1.93]	[7.38]			

Panel 2.c: LLP / NPL

LLP-to-NPL								
for banks aided/non-aided in			*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
			2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
year = r-2	Mean	non-aided	146.7	133.6	118.3	70.3	66.8	64.3	66.0
		aided		70.4	84.7	65.8	61.3	75.2	55.5
	Obs	non-aided	84	90	97	105	108	103	113
		aided	0	29	39	5	3	3	2
		difference		63.26***	33.63*	4.5	5.5	-11.0	10.5
		t-stat		[4.06]	[2.11]	[0.31]	[0.37]	[-0.38]	[1.04]
			2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
year = r-1	Mean	non-aided	133.6	118.3	70.3	66.8	64.3	66.0	54.9
		aided	48.2	66.0	73.3	54.4	62.6	69.4	55.7
	Obs	non-aided	90	97	105	108	103	113	122
		aided	1	31	41	5	4	5	2
		difference	85.4	52.27***	-3.0	12.4	1.7	-3.4	-0.8
		t-stat	[.]	[4.14]	[-0.31]	[1.57]	[0.09]	[-0.20]	[-0.03]
			2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
year = r	Mean	non-aided	118.3	70.3	66.8	64.3	66.0	54.9	57.6
		aided	79.1	57.8	61.1	63.7	58.4	72.7	70.4
	Obs	non-aided	97	105	108	103	113	122	119
		aided	1	31	44	5	2	5	2
		difference	39.2	12.51*	5.7	0.5	7.6	-17.8	-12.7
		t-stat	[.]	[2.14]	[0.66]	[0.04]	[0.78]	[-1.09]	[-0.45]
			2008	**2009**	**2010**	**2011**	**2012**	**2013**	
year = r+1	Mean	non-aided	70.3	66.8	64.3	66.0	54.9	57.6	
		aided	124.0	51.1	54.8	60.1	80.4	57.1	
	Obs	non-aided	105	108	103	113	122	119	
		aided	1	30	43	6	1	5	
		difference	-53.8	15.69**	9.5	6.0	-25.5	0.5	
		t-stat	[.]	[3.06]	[1.52]	[0.64]	[.]	[0.03]	
			2009	**2010**	**2011**	**2012**	**2013**		
year = r+2	Mean	non-aided	66.8	64.3	66.0	54.9	57.6		
		aided	53.3	51.5	52.5	49.1			
	Obs	non-aided	108	103	113	122	119		
		aided	1	30	42	4	0		
		difference	13.5	12.74**	13.51*	5.8			
		t-stat	[.]	[2.64]	[2.33]	[0.66]			

Panel 2.d: NIM

NIM								
for banks aided/non-aided in			*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
			2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
year = r-2	Mean	non-aided	2.1	1.9	1.7	1.8	1.6	1.6	1.6
		aided	0.6	1.1	1.9	1.5	1.8	1.0	1.9
	Obs	non-aided	157	184	185	191	193	189	174
		aided	2	33	49	5	3	3	2
		difference	1.525*	0.818***	-0.2	0.3	-0.2	0.6	-0.3
		t-stat	[4.03]	[4.34]	[-1.10]	[1.24]	[-0.63]	[1.18]	[-1.43]
			2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
year = r-1	Mean	non-aided	1.9	1.7	1.8	1.6	1.6	1.6	1.5
		aided	0.6	1.0	2.0	1.2	1.4	1.3	1.5
	Obs	non-aided	184	185	191	193	189	174	171
		aided	2	34	50	5	4	5	3
		difference	1.323*	0.685***	-0.2	0.4	0.1	0.3	0.0
		t-stat	[5.10]	[4.79]	[-1.13]	[0.98]	[0.94]	[0.82]	[-0.06]
			2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
year = r	Mean	non-aided	1.7	1.8	1.6	1.6	1.6	1.5	1.4
		aided	0.6	1.1	1.9	0.8	1.2	1.2	1.7
	Obs	non-aided	185	191	193	189	174	171	167
		aided	1	33	50	7	2	5	3
		difference	1.1	0.670***	-0.3	0.754**	0.386*	0.3	-0.3
		t-stat	[.]	[4.28]	[-1.62]	[4.23]	[2.31]	[0.78]	[-0.29]
			2008	**2009**	**2010**	**2011**	**2012**	**2013**	
year = r+1	Mean	non-aided	1.8	1.6	1.6	1.6	1.5	1.4	
		aided	0.0	1.2	1.9	1.0	1.1	0.8	
	Obs	non-aided	191	193	189	174	171	167	
		aided	1	33	49	7	1	5	
		difference	1.8	0.418*	-0.4	0.535**	0.4	0.6	
		t-stat	[.]	[2.50]	[-1.91]	[3.03]	[.]	[1.60]	
			2009	**2010**	**2011**	**2012**	**2013**		
year = r+2	Mean	non-aided	1.6	1.6	1.6	1.5	1.4		
		aided	1.6	1.2	1.9	1.2			
	Obs	non-aided	193	189	174	171	167		
		aided	1	32	46	5	0		
		difference	0.0	0.371*	-0.3	0.3			
		t-stat	[.]	[2.27]	[-1.40]	[1.62]			

Panel 2.e: IB funding / total funding

Interbank funding over total funding								
for banks aided/non-aided in			*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
			2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
year = r-2	**Mean**	non-aided	2.2	0.9	1.9	3.1	3.8	4.4	4.1
		aided	2.1	3.9	4.3	1.3	2.9	-8.8	4.4
	Obs	non-aided	157	185	187	191	193	189	174
		aided	2	33	49	5	3	3	2
		difference	0.1	-3.0	-2.3	1.8	0.9	13.2	-0.3
		t-stat	[0.02]	[-1.76]	[-1.18]	[0.27]	[0.75]	[1.03]	[-0.09]
			2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
year = r-1	**Mean**	non-aided	0.9	1.9	3.1	3.8	4.4	4.1	5.1
		aided	5.6	6.0	8.1	1.1	5.5	-9.9	13.6
	Obs	non-aided	185	187	191	193	189	174	171
		aided	2	34	50	5	4	5	3
		difference	-4.7	-4.077*	-4.978*	2.7	-1.1	13.9	-8.5
		t-stat	[-0.51]	[-2.36]	[-2.57]	[0.64]	[-0.42]	[1.37]	[-1.32]
			2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
year = r	**Mean**	non-aided	1.9	3.1	3.8	4.4	4.1	5.1	4.6
		aided	26.5	8.9	7.1	20.0	7.8	3.2	20.4
	Obs	non-aided	187	191	193	189	174	171	166
		aided	1	33	50	8	2	5	3
		difference	-24.6	-5.760*	-3.4	-15.6	-3.715**	1.9	-15.8
		t-stat	[.]	[-2.58]	[-1.70]	[-1.85]	[-3.15]	[0.66]	[-1.65]
			2008	**2009**	**2010**	**2011**	**2012**	**2013**	
year = r+1	**Mean**	non-aided	3.1	3.8	4.4	4.1	5.1	4.6	
		aided	7.5	7.8	6.3	10.0	43.4	-2.0	
	Obs	non-aided	191	193	189	174	171	166	
		aided	1	33	49	7	1	5	
		difference	-4.4	-4.1	-1.9	-6.0	-38.3	6.7	
		t-stat	[.]	[-1.97]	[-1.04]	[-1.56]	[.]	[0.69]	
			2009	**2010**	**2011**	**2012**	**2013**		
year = r+2	**Mean**	non-aided	3.8	4.4	4.1	5.1	4.6		
		aided	2.7	7.0	6.2	16.2			
	Obs	non-aided	193	189	174	171	166		
		aided	1	32	46	5	0		
		difference	1.1	-2.7	-2.1	-11.1			
		t-stat	[.]	[-0.95]	[-1.14]	[-2.22]			

Panel 2.f: ln (total assets)

ln(total assets)								
for banks aided/non-aided in			*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
			2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
year = r-2	Mean	non-aided	9.9	9.9	10.1	10.1	10.0	10.1	10.2
		aided	11.3	12.3	10.2	10.1	9.7	10.8	8.4
	Obs	non-aided	157	185	187	191	193	189	174
		aided	2	33	49	5	3	3	2
		difference	-1.5	-2.435***	-0.1	-0.1	0.4	-0.7	1.8
		t-stat	[-3.87]	[-8.83]	[-0.50]	[-0.25]	[0.35]	[-1.46]	[1.39]
			2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
year = r-1	Mean	non-aided	9.9	10.1	10.1	10.0	10.1	10.2	10.2
		aided	11.5	12.4	10.2	10.1	10.1	10.6	8.8
	Obs	non-aided	185	187	191	193	189	174	171
		aided	2	34	50	5	4	5	3
		difference	-1.6	-2.304***	-0.1	0.0	0.0	-0.5	1.5
		t-stat	[-3.19]	[-8.22]	[-0.47]	[-0.20]	[-0.02]	[-1.35]	[1.64]
			2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
year = r	Mean	non-aided	10.1	10.1	10.0	10.1	10.2	10.2	10.2
		aided	11.9	12.5	10.2	10.7	10.6	10.7	8.4
	Obs	non-aided	187	191	193	189	174	171	167
		aided	1	33	50	8	2	5	3
		difference	-1.8	-2.444***	-0.2	-0.6	-0.4	-0.4	1.8
		t-stat	[.]	[-8.76]	[-0.80]	[-1.72]	[-0.72]	[-1.42]	[1.64]
			2008	**2009**	**2010**	**2011**	**2012**	**2013**	
year = r+1	Mean	non-aided	10.1	10.0	10.1	10.2	10.2	10.2	
		aided	11.6	12.4	10.2	11.0	10.0	10.6	
	Obs	non-aided	191	193	189	174	171	167	
		aided	1	33	49	7	1	5	
		difference	-1.6	-2.331***	-0.2	-0.8	0.3	-0.4	
		t-stat	[.]	[-8.17]	[-0.70]	[-2.31]	[.]	[-1.22]	
			2009	**2010**	**2011**	**2012**	**2013**		
year = r+2	Mean	non-aided	10.0	10.1	10.2	10.2	10.2		
		aided	11.5	12.4	10.3	11.0			
	Obs	non-aided	193	189	174	171	167		
		aided	1	32	46	5	0		
		difference	-1.5	-2.269***	-0.1	-0.8			
		t-stat	[.]	[-7.74]	[-0.37]	[-1.54]			

Panel 2.g: Total assets / home country's GDP

Total assets-to-GDP								
for banks aided/non-aided in			*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
			2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
year = r-2	Mean	non-aided	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		aided	0.0	0.6	0.3	0.1	0.0	0.3	0.1
	Obs	non-aided	157	185	187	191	193	189	174
		aided	2	33	49	5	3	3	2
		difference	0.1	-0.500**	-0.153*	0.0558*	0.0766*	-0.2	0.1
		t-stat	[2.19]	[-3.29]	[-2.23]	[2.11]	[2.97]	[-1.03]	[1.67]
			2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
year = r-1	Mean	non-aided	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		aided	0.0	0.6	0.3	0.1	0.0	0.2	0.3
	Obs	non-aided	185	187	191	193	189	174	171
		aided	2	34	50	5	4	5	3
		difference	0.1	-0.503**	-0.167*	0.1	0.0700**	-0.1	-0.2
		t-stat	[1.76]	[-3.49]	[-2.29]	[1.91]	[2.99]	[-0.64]	[-0.76]
			2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
year = r	Mean	non-aided	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		aided	0.1	0.6	0.3	0.1	0.0	0.2	0.3
	Obs	non-aided	187	191	193	189	174	171	167
		aided	1	33	50	8	2	5	3
		difference	0.0	-0.527***	-0.188*	0.0	0.1	-0.1	-0.2
		t-stat	[.]	[-3.83]	[-2.44]	[0.58]	[2.50]	[-0.66]	[-0.70]
			2008	**2009**	**2010**	**2011**	**2012**	**2013**	
year = r+1	Mean	non-aided	0.1	0.1	0.1	0.1	0.1	0.1	
		aided	0.1	0.6	0.3	0.1	0.0	0.2	
	Obs	non-aided	191	193	189	174	171	167	
		aided	1	33	49	7	1	5	
		difference	0.1	-0.474***	-0.189*	0.0	0.1	-0.1	
		t-stat	[.]	[-4.52]	[-2.41]	[0.60]	[.]	[-0.65]	
			2009	**2010**	**2011**	**2012**	**2013**		
year = r+2	Mean	non-aided	0.1	0.1	0.1	0.1	0.1		
		aided	0.1	0.6	0.3	0.1			
	Obs	non-aided	193	189	174	171	167		
		aided	1	32	46	5	0		
		difference	0.1	-0.455***	-0.180*	0.0			
		t-stat	[.]	[-4.31]	[-2.34]	[0.23]			

Panel 2.h: LLP / loans

LLP-to-loans								
for banks aided/non-aided in			*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
			2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
year = r-2	Mean	non-aided	0.4	0.4	0.4	0.7	1.1	0.8	1.4
		aided	0.4	0.2	0.4	1.6	1.9	0.3	3.8
	Obs	non-aided	146	169	169	178	180	170	156
		aided	2	33	49	5	3	3	2
		difference	-0.1	0.214***	0.0	-0.8	-0.8	0.509*	-2.4
		t-stat	[-0.23]	[3.81]	[0.04]	[-1.15]	[-2.09]	[2.74]	[-2.29]
			2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
year = r-1	Mean	non-aided	0.4	0.4	0.7	1.1	0.8	1.4	0.8
		aided	0.3	0.3	0.8	3.8	0.9	0.5	2.9
	Obs	non-aided	169	169	178	180	170	156	154
		aided	2	34	50	5	4	5	3
		difference	0.1	0.1	-0.1	-2.7	-0.1	0.9	-2.1
		t-stat	[0.59]	[0.70]	[-0.44]	[-1.38]	[-0.29]	[1.14]	[-2.52]
			2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
year = r	Mean	non-aided	0.4	0.7	1.1	0.8	1.4	0.8	0.9
		aided	0.2	0.8	1.5	4.1	2.7	3.9	19.9
	Obs	non-aided	169	178	180	170	156	154	148
		aided	1	33	50	7	2	5	3
		difference	0.1	-0.1	-0.4	-3.3	-1.3	-3.1	-19.0
		t-stat	[.]	[-0.39]	[-1.60]	[-0.90]	[-0.48]	[-1.54]	[-1.86]
			2008	**2009**	**2010**	**2011**	**2012**	**2013**	
year = r+1	Mean	non-aided	0.7	1.1	0.8	1.4	0.8	0.9	
		aided	1.2	2.8	1.2	1.5	18.9	1.2	
	Obs	non-aided	178	180	170	156	154	148	
		aided	1	33	49	7	1	5	
		difference	-0.5	-1.8	-0.402*	-0.1	-18.1	-0.2	
		t-stat	[.]	[-1.27]	[-2.01]	[-0.12]	[.]	[-0.59]	
			2009	**2010**	**2011**	**2012**	**2013**		
year = r+2	Mean	non-aided	1.1	0.8	1.4	0.8	0.9		
		aided	1.6	1.7	1.8	10.9			
	Obs	non-aided	180	170	156	154	148		
		aided	1	32	46	5	0		
		difference	-0.6	-0.9	-0.5	-10.14*			
		t-stat	[.]	[-1.31]	[-0.61]	[-3.95]			

Panel 2.i: NPL / loans

NPL-to-loans								
for banks aided/non-aided in			*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
			2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
year = r-2	Mean	non-aided	2.6	2.2	2.1	3.0	4.2	4.7	5.1
		aided		1.8	2.8	5.9	8.7	1.7	16.6
	Obs	non-aided	90	98	102	110	112	109	114
		aided	0	29	41	5	3	3	2
		difference		0.4	-0.7	-2.9	-4.5	3.0	-11.5
		t-stat		[1.24]	[-1.80]	[-1.16]	[-1.09]	[3.09]	[-2.17]
			2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
year = r-1	Mean	non-aided	2.2	2.1	3.0	4.2	4.7	5.1	5.8
		aided	0.3	1.8	4.0	7.5	11.3	6.9	15.4
	Obs	non-aided	98	102	110	112	109	114	123
		aided	1	31	42	5	4	5	2
		difference	1.9	0.3	-1.0	-3.2	-6.6	-1.8	-9.6
		t-stat	[.]	[1.14]	[-1.56]	[-1.58]	[-1.64]	[-0.58]	[-5.22]
			2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
year = r	Mean	non-aided	2.1	3.0	4.2	4.7	5.1	5.8	6.7
		aided	0.6	2.7	6.1	14.8	12.6	9.1	35.9
	Obs	non-aided	102	110	112	109	114	123	122
		aided	1	31	45	6	2	5	2
		difference	1.5	0.3	-1.873*	-10.1	-7.6	-3.3	-29.2
		t-stat	[.]	[0.83]	[-2.50]	[-1.56]	[-1.74]	[-0.86]	[-1.38]
			2008	**2009**	**2010**	**2011**	**2012**	**2013**	
year = r+1	Mean	non-aided	3.0	4.2	4.7	5.1	5.8	6.7	
		aided	1.4	5.4	7.3	11.3	14.8	9.4	
	Obs	non-aided	110	112	109	114	123	122	
		aided	1	30	44	6	1	5	
		difference	1.6	-1.2	-2.578**	-6.2	-9.0	-2.7	
		t-stat	[.]	[-1.12]	[-3.02]	[-2.50]	[.]	[-0.67]	
			2009	**2010**	**2011**	**2012**	**2013**		
year = r+2	Mean	non-aided	4.2	4.7	5.1	5.8	6.7		
		aided	3.4	8.0	10.6	14.7			
	Obs	non-aided	112	109	114	123	122		
		aided	1	30	43	4	0		
		difference	0.8	-3.3	-5.519***	-8.822**			
		t-stat	[.]	[-1.44]	[-3.92]	[-5.65]			

Panel 2.j: Cost / income

Cost-to-income								
for banks aided non-aided in			*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
			2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
year = r-2	**Mean**	non-aided	58.0	55.8	55.0	66.4	58.3	62.9	61.4
		aided	48.6	56.8	57.2	54.3	72.6	55.7	83.3
	Obs	non-aided	157	184	184	187	191	189	169
		aided	2	33	49	5	3	3	2
		difference	9.4	-1.0	-2.3	12.1	-14.3	7.3	-21.86***
		t-stat	[0.71]	[-0.41]	[-1.08]	[1.22]	[-0.42]	[0.64]	[-9.62]
			2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
year = r-1	**Mean**	non-aided	55.8	55.0	66.4	58.3	62.9	61.4	62.6
		aided	41.4	65.4	72.1	62.5	84.8	60.2	112.4
	Obs	non-aided	184	184	187	191	189	169	168
		aided	2	33	49	4	4	5	3
		difference	14.4	-10.40*	-5.8	-4.2	-21.8	1.2	-49.8
		t-stat	[1.63]	[-2.53]	[-0.86]	[-1.22]	[-0.85]	[0.15]	[-1.13]
			2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
year = r	**Mean**	non-aided	55.0	66.4	58.3	62.9	61.4	62.6	60.9
		aided	55.8	71.0	57.8	72.7	72.6	54.6	104.1
	Obs	non-aided	184	187	191	189	169	168	166
		aided	1	29	50	6	2	5	3
		difference	-0.8	-4.6	0.5	-9.8	-11.2	8.0	-43.2
		t-stat	[.]	[-0.85]	[0.16]	[-1.20]	[-1.31]	[0.91]	[-1.58]
			2008	**2009**	**2010**	**2011**	**2012**	**2013**	
year = r+1	**Mean**	non-aided	66.4	58.3	62.9	61.4	62.6	60.9	
		aided	227.7	66.5	57.8	76.3	81.8	64.7	
	Obs	non-aided	187	191	189	169	168	166	
		aided	1	33	48	7	1	5	
		difference	-161.3	-8.205*	5.1	-14.9	-19.2	-3.7	
		t-stat	[.]	[-2.17]	[0.95]	[-1.22]	[.]	[-0.37]	
			2009	**2010**	**2011**	**2012**	**2013**		
year = r+2	**Mean**	non-aided	58.3	62.9	61.4	62.6	60.9		
		aided	22.1	70.4	69.9	190.1			
	Obs	non-aided	191	189	169	168	166		
		aided	1	32	44	5	0		
		difference	36.2	-7.4	-8.4	-127.5			
		t-stat	[.]	[-0.77]	[-1.61]	[-1.71]			

Table 3. Explanatory power: equity ratio vs capital tier 1 ratio

All government interventions between 2007-2013 are pooled around r = time of rescue. Univariate regressions on either the equity ratio or the core tier 1 ratio, from time r, (r-1), (r-2) and 2006.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	state aid at time r							
Equity/assets_(r)	-0.514***							
	(6.27e-07)							
Tier 1 ratio_(r)		-0.0559						
		(0.410)						
Equity/assets_(r-1)			-0.405***					
			(1.55e-05)					
Tier 1 ratio_(r-1)				-0.236**				
				(0.0450)				
Equity/assets_(r-2)					-0.392***			
					(3.34e-05)			
Tier 1 ratio_(r-2)						-0.138		
						(0.152)		
Equity/assets_2006							-0.487***	
							(8.52e-06)	
Tier 1 ratio_2006								-0.136
								(0.160)
Constant	0.648	-0.620	0.346	0.873	0.274	0.0280	0.694	-0.00781
	(0.132)	(0.343)	(0.432)	(0.382)	(0.542)	(0.974)	(0.162)	(0.993)
Observations	218	124	219	123	218	122	213	119
Pseudo R-squared	0.217	0.00601	0.147	0.0458	0.138	0.0225	0.174	0.0224

pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4. Logit regression: Pooled regression on 2006

All government interventions between 2007-2013 are pooled and regressed on values of the variables in 2006.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	dependent variable: state aid in 2007-13					
Equity/assets_06	-0.125*	-0.144**	-0.280***	-0.194***	-0.183**	-0.162**
	(0.0507)	(0.0211)	(0.000757)	(0.00845)	(0.0211)	(0.0426)
LLP/loans_06	-0.972*	-0.815	-1.013			0.310
	(0.0935)	(0.142)	(0.105)			(0.718)
NPL/loans_06				0.125		
				(0.216)		
LLP/NPL_06					-0.00299*	-0.00323*
					(0.0853)	(0.0794)
Cost/income_06	-0.00196	-0.00450	-0.000965	-0.0261	-0.0242	-0.0220
	(0.869)	(0.704)	(0.942)	(0.125)	(0.154)	(0.199)
NIM_06	-0.0969	-0.194	0.0147	-0.228	-0.0897	-0.151
	(0.718)	(0.457)	(0.962)	(0.457)	(0.766)	(0.674)
IB/funding_06	0.00500	0.00266	0.00563	0.000462	-0.00203	-0.00197
	(0.644)	(0.803)	(0.620)	(0.979)	(0.915)	(0.918)
Size_06	0.306***					
	(0.00403)					
Systemic size_06		1.359**		0.871*	0.760	0.775
		(0.0186)		(0.0890)	(0.140)	(0.132)
Asset growth_06			0.0131**			
			(0.0340)			
Housing prices_06	0.107***	0.0986***	0.0977***	0.0910**	0.0911**	0.0889**
	(0.000694)	(0.00173)	(0.00318)	(0.0247)	(0.0361)	(0.0451)
Gov debt/GDP_06	0.0124***	0.0133***	0.00989**	0.00922*	0.00895*	0.00824
	(0.00479)	(0.00202)	(0.0228)	(0.0618)	(0.0698)	(0.113)
Constant	-3.633**	-0.262	0.280	1.391	1.685	1.514
	(0.0165)	(0.746)	(0.768)	(0.215)	(0.151)	(0.200)
Observations	249	249	220	162	152	149
Pseudo R-squared	0.144	0.143	0.135	0.134	0.130	0.124

pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Logit regression: Pooled regression on (r-2)

All government interventions between 2007-2013 are pooled around r = time of rescue and regressed on variables from the year (r-2).

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	dependent variable: state aid at time r					
Equity/assets_(r-2)	-0.182**	-0.215***	-0.241***	-0.297***	-0.279***	-0.224**
	(0.0179)	(0.00490)	(0.00292)	(0.00199)	(0.00423)	(0.0188)
LLP/loans_(r-2)	0.477*	0.451*	0.382			1.506**
	(0.0714)	(0.0860)	(0.180)			(0.0311)
NPL/loans_(r-2)				0.211**		
				(0.0392)		
LLP/NPL_(r-2)					-0.00729***	-0.00792***
					(0.00439)	(0.00333)
Cost/income_(r-2)	0.0113	0.00903	0.0117	-0.0111	-0.0101	-0.0116
	(0.320)	(0.433)	(0.378)	(0.495)	(0.506)	(0.509)
NIM_(r-2)	-0.215	-0.284	-0.311	-0.193	-0.0589	-0.464
	(0.415)	(0.275)	(0.254)	(0.559)	(0.861)	(0.212)
IB_fund/funding_(r-2)	0.0139	0.0106	0.0170	0.00918	-0.00175	0.00616
	(0.228)	(0.343)	(0.151)	(0.634)	(0.934)	(0.772)
Size_(r-2)	0.354***					
	(0.00114)					
Systemic size_(r-2)		1.333**		0.771	0.626	0.667
		(0.0165)		(0.129)	(0.221)	(0.190)
Asset growth_(r-2)			-0.00844			
			(0.493)			
Housing prices_2006	0.132***	0.124***	0.138***	0.112***	0.129***	0.135***
	(3.24e-05)	(0.000100)	(5.72e-05)	(0.00509)	(0.00316)	(0.00256)
Gov debt/GDP_(r-2)	0.00924**	0.0106**	0.00902**	0.00891*	0.0138**	0.0108*
	(0.0285)	(0.0101)	(0.0363)	(0.0651)	(0.0142)	(0.0603)
Constant	-4.925***	-0.974	-0.538	0.765	1.409	1.431
	(0.00155)	(0.235)	(0.584)	(0.485)	(0.206)	(0.243)
Observations	250	250	221	166	156	154
Pseudo R-squared	0.179	0.171	0.145	0.190	0.215	0.249

pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6. Logit regression: Pooled regression on (r-1)

All government interventions between 2007-2013 are pooled around r = time of rescue and regressed on variables from the year (r-1).

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	dependent variable: state aid at time r					
Equity/assets_(r-1)	-0.394***	-0.440***	-0.518***	-0.553***	-0.486***	-0.420***
	(0.000592)	(0.000118)	(1.26e-05)	(6.70e-05)	(0.000430)	(0.00553)
LLP/loans_(r-1)	1.419***	1.381***	1.173***			2.865***
	(7.37e-05)	(0.000107)	(0.00319)			(0.00112)
NPL/loans_(r-1)				0.159		
				(0.135)		
LLP/NPL_(r-1)					-0.00723**	-0.00911***
					(0.0176)	(0.00968)
Cost/income_(r-1)	0.0484***	0.0476***	0.0478***	0.0452***	0.0476***	0.0355**
	(4.59e-05)	(5.63e-05)	(0.000150)	(0.00243)	(0.00153)	(0.0170)
NIM_(r-1)	-0.0751	-0.165	-0.140	0.275	0.386	-0.381
	(0.805)	(0.577)	(0.651)	(0.463)	(0.300)	(0.401)
IB_fund/funding_(r-1)	0.0237*	0.0187	0.0237*	0.0152	0.0122	0.0203
	(0.0863)	(0.155)	(0.0642)	(0.454)	(0.567)	(0.351)
Size_(r-1)	0.410***					
	(0.000636)					
Systemic size_(r-1)		1.443**		0.841	0.637	0.599
		(0.0101)		(0.130)	(0.251)	(0.262)
Asset growth_(r-1)			0.00200			
			(0.836)			
Housing prices_2006	0.182***	0.174***	0.173***	0.136***	0.152***	0.161***
	(3.15e-06)	(5.83e-06)	(7.73e-06)	(0.00217)	(0.00156)	(0.00158)
Gov debt/GDP_(r-1)	0.00801*	0.00963**	0.00865*	0.00843*	0.0103**	0.00534
	(0.0779)	(0.0288)	(0.0621)	(0.0850)	(0.0404)	(0.332)
Constant	-7.799***	-3.247***	-2.384**	-2.208**	-1.844*	-1.008
	(9.75e-06)	(0.000357)	(0.0146)	(0.0257)	(0.0676)	(0.344)
Observations	251	251	227	170	161	159
Pseudo R-squared	0.360	0.348	0.324	0.351	0.356	0.409

pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7. Logit regression: Pooled regression on r

All government interventions between 2007-2013 are pooled around r = time of rescue and regressed on variables from the year r.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	dependent variable: state aid at time r					
Equity/assets_(r)	-0.263**	-0.320***	-0.334***	-0.306**	-0.252**	-0.176
	(0.0243)	(0.00566)	(0.00829)	(0.0104)	(0.0145)	(0.298)
LLP/loans_(r)	2.469***	2.502***	2.478***			7.415***
	(3.14e-07)	(5.49e-07)	(4.12e-06)			(9.80e-07)
NPL/loans_(r)				0.520***		
				(6.74e-05)		
LLP/NPL_(r)					-0.00918**	-0.0114**
					(0.0109)	(0.0289)
Cost/income_(r)	0.0432***	0.0434***	0.0348**	0.00227	0.0120	0.0213
	(0.00182)	(0.00156)	(0.0213)	(0.875)	(0.343)	(0.340)
NIM_(r)	-0.728**	-0.764**	-0.966**	-0.412	0.0943	-2.544***
	(0.0473)	(0.0360)	(0.0189)	(0.316)	(0.788)	(0.00201)
IB_fund/funding_(r)	0.0432***	0.0385**	0.0426**	0.0695***	0.0569**	0.0982***
	(0.00583)	(0.0141)	(0.0102)	(0.00407)	(0.0239)	(0.00566)
Size_(r)	0.298**					
	(0.0275)					
Systemic size_(r)		0.812		0.596	0.398	-0.488
		(0.139)		(0.291)	(0.482)	(0.460)
Asset growth_(r)			-0.0509***			
			(0.000421)			
Housing prices_2006	0.207***	0.203***	0.225***	0.138***	0.148***	0.308***
	(3.99e-06)	(4.44e-06)	(4.89e-06)	(0.00419)	(0.00111)	(0.000319)
Gov debt/GDP_(r)	0.00881*	0.00968**	0.0100**	0.00715	0.0124***	0.00585
	(0.0618)	(0.0372)	(0.0463)	(0.120)	(0.00781)	(0.366)
Constant	-7.089***	-3.722***	-2.168*	-1.087	-0.527	-1.497
	(0.000392)	(0.000817)	(0.0729)	(0.343)	(0.643)	(0.416)
Observations	247	247	220	169	159	157
Pseudo R-squared	0.464	0.456	0.476	0.409	0.329	0.651

pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8. Logit regression: Pooled regression on (r+1)

All government interventions between 2007-2013 are pooled around r = time of rescue and regressed on variables from the year (r+1).

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	dependent variable: state aid at time r					
Equity/assets_(r+1)	-0.110	-0.135	-0.0987	-0.254**	-0.144	0.00684
	(0.188)	(0.107)	(0.355)	(0.0435)	(0.131)	(0.961)
LLP/loans_(r+1)	2.461***	2.505***	2.923***			8.067***
	(2.16e-07)	(2.00e-07)	(1.50e-07)			(1.63e-05)
NPL/loans_(r+1)				0.642***		
				(6.10e-07)		
LLP/NPL_(r+1)					-0.0162***	-0.0286**
					(0.00257)	(0.0114)
Cost/income_(r+1)	0.0421***	0.0410***	0.0408**	0.00724	0.0161	0.0316
	(0.00276)	(0.00354)	(0.0195)	(0.591)	(0.183)	(0.169)
NIM_(r+1)	-1.162***	-1.202***	-1.391***	-0.790*	-0.102	-2.688***
	(0.000903)	(0.000614)	(0.000420)	(0.0529)	(0.761)	(0.000931)
IB_fund/funding_(r+1)	0.0215	0.0185	0.0296*	0.0260	0.0584***	0.0764**
	(0.138)	(0.198)	(0.0688)	(0.274)	(0.00793)	(0.0257)
Size_(r+1)	0.242*					
	(0.0645)					
Systemic size_(r+1)		0.831		0.760	0.719	-0.272
		(0.114)		(0.147)	(0.182)	(0.693)
Asset growth_(r+1)			-0.0574***			
			(3.01e-06)			
Housing prices_2006	0.182***	0.177***	0.201***	0.106**	0.149***	0.327***
	(1.54e-05)	(2.72e-05)	(2.64e-05)	(0.0273)	(0.000826)	(0.000793)
Gov debt/GDP_(r+1)	0.00866*	0.00924*	0.00446	0.000429	0.0132***	0.00469
	(0.0676)	(0.0511)	(0.375)	(0.932)	(0.00444)	(0.446)
Constant	-6.347***	-3.663***	-2.998**	-1.119	-0.714	-1.972
	(0.000746)	(0.000633)	(0.0263)	(0.329)	(0.503)	(0.271)
Observations	248	248	223	169	160	158
Pseudo R-squared	0.462	0.460	0.524	0.464	0.357	0.693

pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9. Logit regression: Pooled regression on (r+2)

All government interventions between 2007-2013 are pooled around r = time of rescue and regressed on variables from the year (r+2).

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	dependent variable: state aid at time r					
Equity/assets_(r+2)	-0.0494	-0.0982	-0.0231	-0.148	-0.116	0.0621
	(0.497)	(0.192)	(0.825)	(0.194)	(0.187)	(0.650)
LLP/loans_(r+2)	2.034***	2.075***	2.003***			6.028***
	(2.44e-06)	(5.63e-06)	(0.000244)			(8.55e-06)
NPL/loans_(r+2)				0.573***		
				(6.45e-06)		
LLP/NPL_(r+2)					-0.0190***	-0.0324***
					(0.00562)	(0.00873)
Cost/income_(r+2)	0.0439***	0.0404***	0.0410**	0.0117	0.0186	0.0397
	(0.00281)	(0.00489)	(0.0237)	(0.275)	(0.130)	(0.120)
NIM_(r+2)	-0.880**	-0.998***	-1.116***	-0.699	0.147	-2.093***
	(0.0126)	(0.00550)	(0.00655)	(0.110)	(0.677)	(0.00369)
IB_fund/funding_(r+2)	0.0183	0.0121	0.0207	0.00866	0.0364	0.0329
	(0.252)	(0.418)	(0.258)	(0.748)	(0.154)	(0.268)
Size_(r+2)	0.450***					
	(0.000637)					
Systemic size_(r+2)		1.298**		0.988*	0.996*	0.611
		(0.0122)		(0.0572)	(0.0798)	(0.280)
Asset growth_(r+2)			-0.119***			
			(2.66e-05)			
Housing prices_2006	0.146***	0.139***	0.198***	0.0932*	0.118**	0.239***
	(0.000598)	(0.000995)	(7.28e-05)	(0.0671)	(0.0105)	(0.00366)
Gov debt/GDP_(r+2)	0.00351	0.00581	0.00155	-0.000683	0.00894*	-0.00104
	(0.474)	(0.227)	(0.760)	(0.897)	(0.0715)	(0.867)
Constant	-8.918***	-3.718***	-2.899**	-1.966*	-1.076	-1.901
	(8.54e-06)	(0.000879)	(0.0424)	(0.0668)	(0.328)	(0.320)
Observations	235	235	212	159	150	148
Pseudo R-squared	0.437	0.421	0.516	0.446	0.356	0.626

pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10. Logit regression: Bank rescues of 2008 regressed on 2006-2010

Logit regression. Only the government interventions in 2008 are considered and regressed on variables before and after the interventions from 2006-2010, as indicated below. The years correspond to the explanatory variables.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	dependent variable: state aid in 2008				
	independent variables from the following years:				
	2006	**2007**	**2008**	**2009**	**2010**
Equity/assets	-0.342**	-0.261*	-0.325**	-0.351***	-0.156
	(0.0253)	(0.0760)	(0.0285)	(0.00877)	(0.101)
LLP/loans	-1.585*	0.0998	-0.0620	0.142	0.188*
	(0.0914)	(0.791)	(0.704)	(0.146)	(0.0598)
Cost/income	-0.0117	0.0249*	-0.0139*	0.00462	0.00422
	(0.488)	(0.0717)	(0.0572)	(0.677)	(0.547)
NIM	-0.288	-0.400	-0.413	-0.422	-0.728*
	(0.524)	(0.334)	(0.293)	(0.326)	(0.0610)
IB_fund/funding	0.00774	0.00462	0.0199	0.0145	0.00375
	(0.614)	(0.766)	(0.237)	(0.392)	(0.808)
Systemic size	1.777***	1.807***	2.330***	2.378***	2.334***
	(0.00533)	(0.00135)	(0.000172)	(1.67e-05)	(1.97e-05)
Housing prices	0.00350	0.0217	-0.00538	-0.0261	-0.0326
	(0.937)	(0.623)	(0.911)	(0.571)	(0.471)
Gov debt/GDP	0.0127	0.00698	0.0140	0.0126	0.0127*
	(0.125)	(0.328)	(0.110)	(0.102)	(0.0625)
Constant	0.307	-2.416**	-0.323	-1.423	-1.789**
	(0.789)	(0.0297)	(0.698)	(0.147)	(0.0353)
Observations	247	246	246	252	243
Pseudo R-squared	0.272	0.251	0.288	0.324	0.264

pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 11. Logit regression: Bank rescues of 2009 regressed on 2007-2011

Only the government interventions in 2009 are considered and regressed on variables before and after the interventions from 2007-2011, as indicated below. The years correspond to the explanatory variables.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	dependent variable: state aid in 2009				
	independent variables from the following years:				
	2007	**2008**	**2009**	**2010**	**2011**
Equity/assets	-0.0719	-0.199**	-0.125	-0.0878	-0.145*
	(0.360)	(0.0417)	(0.119)	(0.225)	(0.0615)
LLP/loans	-0.0128	-0.0548	0.0201	0.0596	-0.00589
	(0.974)	(0.771)	(0.862)	(0.662)	(0.864)
Cost/income	0.0269*	0.00399	0.00520	-0.0102	0.0206**
	(0.0863)	(0.296)	(0.631)	(0.370)	(0.0307)
NIM	0.166	0.522*	0.0110	0.174	0.336
	(0.551)	(0.0796)	(0.969)	(0.531)	(0.269)
IB_fund/funding	0.0167	0.0313**	0.0244*	0.00954	0.00884
	(0.232)	(0.0304)	(0.0688)	(0.510)	(0.614)
Systemic size	0.694	0.526	1.047*	0.982	0.799
	(0.254)	(0.390)	(0.0829)	(0.101)	(0.178)
Housing prices	0.131***	0.118***	0.121***	0.112***	0.108***
	(0.000332)	(0.000762)	(0.000618)	(0.000899)	(0.00291)
Gov debt/GDP	0.00739*	0.00772*	0.00992**	0.00745**	0.00213
	(0.0841)	(0.0840)	(0.0148)	(0.0469)	(0.569)
Constant	-4.032***	-2.849***	-2.525***	-1.915*	-3.515***
	(0.000765)	(5.16e-05)	(0.00691)	(0.0503)	(0.000656)
Observations	213	217	219	211	190
Pseudo R-squared	0.103	0.137	0.124	0.117	0.162

pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 12. Robustness check: no equity ratio

This table shows similar regressions as in table 6. The difference is that the equity ratio is not included.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	dependent variable: state aid at time r					
LLP/loans_(r-1)	1.398***	1.301***	1.145***			3.150***
	(3.07e-05)	(6.17e-05)	(0.000940)			(0.000188)
NPL/loans_(r-1)				0.192**		
				(0.0404)		
LLP/NPL_(r-1)					-0.00943***	-0.0109***
					(0.00379)	(0.00255)
Cost/income_(r-1)	0.0536***	0.0531***	0.0534***	0.0373***	0.0387***	0.0311**
	(1.65e-05)	(1.54e-05)	(4.98e-05)	(0.00812)	(0.00624)	(0.0338)
NIM_(r-1)	-0.613**	-0.796***	-0.914***	-0.734***	-0.489*	-1.180***
	(0.0138)	(0.000928)	(0.000215)	(0.00891)	(0.0809)	(0.00134)
IB_fund/funding_(r-1)	0.0209*	0.0152	0.0195	0.0283	0.0214	0.0285
	(0.0999)	(0.209)	(0.109)	(0.164)	(0.291)	(0.166)
Size_(r-1)	0.531***					
	(3.95e-06)					
Systemic size_(r-1)		1.931***		1.304**	0.938	0.741
		(0.00122)		(0.0315)	(0.114)	(0.178)
Asset growth_(r-1)			-0.00382			
			(0.698)			
Housing prices_2006	0.162***	0.147***	0.151***	0.140***	0.166***	0.174***
	(1.25e-05)	(4.09e-05)	(2.48e-05)	(0.00126)	(0.000497)	(0.000707)
Gov debt/GDP_(r-1)	0.00828*	0.0105**	0.00925**	0.0117**	0.0141***	0.00821
	(0.0631)	(0.0143)	(0.0396)	(0.0185)	(0.00514)	(0.132)
Constant	-10.49***	-4.794***	-4.013***	-3.438***	-2.628**	-1.854*
	(7.22e-10)	(2.68e-07)	(5.28e-05)	(0.000657)	(0.0114)	(0.0941)
Observations	251	251	227	170	160	158
Pseudo R-squared	0.310	0.282	0.227	0.247	0.270	0.356

pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 13. Robustness check: no German banks

Logit regression excluding German banks.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	state aid at time r					
Equity/assets_(r-1)	-0.496***	-0.531***	-0.621***	-0.665***	-0.607***	-0.528***
	(0.000284)	(9.95e-05)	(2.64e-05)	(2.29e-05)	(0.000169)	(0.00273)
LLP/loans_(r-1)	2.604***	2.693***	2.779***			3.310***
	(0.000103)	(4.94e-05)	(8.67e-05)			(0.000821)
NPL/loans_(r-1)				0.309**		
				(0.0260)		
LLP/NPL_(r-1)					-0.00705**	-0.00979**
					(0.0251)	(0.0114)
Cost/income_(r-1)	0.0520***	0.0509***	0.0448***	0.0507***	0.0562***	0.0388**
	(0.000264)	(0.000287)	(0.00392)	(0.00372)	(0.00166)	(0.0283)
NIM_(r-1)	-0.270	-0.302	-0.326	-0.00166	0.277	-0.563
	(0.456)	(0.397)	(0.397)	(0.997)	(0.486)	(0.249)
IB_fund/funding_(r-1)	0.0193	0.0143	0.0332	0.0275	0.0269	0.0361
	(0.319)	(0.460)	(0.112)	(0.270)	(0.302)	(0.172)
Size_(r-1)	0.339**					
	(0.0139)					
Systemic size_(r-1)		1.195**		0.621	0.328	0.297
		(0.0398)		(0.327)	(0.605)	(0.624)
Asset growth_(r-1)			-0.0283*			
			(0.0860)			
Housing prices_2006	0.118***	0.121***	0.0897*	0.0985**	0.107**	0.129**
	(0.00894)	(0.00706)	(0.0530)	(0.0469)	(0.0439)	(0.0287)
Gov debt/GDP_(r-1)	0.00460	0.00570	0.00248	0.00717	0.0101*	0.00474
	(0.341)	(0.222)	(0.624)	(0.153)	(0.0507)	(0.408)
Constant	-6.071***	-2.499**	-0.526	-1.375	-1.086	-0.0520
	(0.00318)	(0.0237)	(0.667)	(0.251)	(0.381)	(0.969)
Observations	204	204	186	154	145	143
Pseudo R-squared	0.416	0.411	0.414	0.420	0.408	0.473

pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 14. Robustness check: different macro variable

The regressions are similar to table 6. The GDP growth variable replaces the debt/GDP ratio.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	state aid at time r					
Equity/assets_(r-1)	-0.346***	-0.410***	-0.519***	-0.466***	-0.383***	-0.383**
	(0.00461)	(0.000976)	(0.000121)	(0.000889)	(0.00597)	(0.0110)
LLP/loans_(r-1)	1.034***	0.985***	0.527			2.178**
	(0.00702)	(0.00942)	(0.295)			(0.0151)
NPL/loans_(r-1)				0.144*		
				(0.0638)		
LLP/NPL_(r-1)					-0.00409	-0.00618
					(0.224)	(0.117)
Cost/income_(r-1)	0.0236**	0.0233**	0.0310**	0.0214*	0.0155	0.0163
	(0.0378)	(0.0480)	(0.0151)	(0.0945)	(0.226)	(0.216)
NIM_(r-1)	0.0880	-0.0521	-0.0276	0.0371	0.108	-0.471
	(0.791)	(0.870)	(0.939)	(0.923)	(0.780)	(0.312)
IB_fund/funding_(r-1)	0.0206	0.0161	0.0146	0.0126	0.0263	0.0305
	(0.173)	(0.269)	(0.306)	(0.527)	(0.196)	(0.129)
Size_(r-1)	0.460***					
	(0.000303)					
Systemic size_(r-1)		1.835***		1.339***	1.171**	1.020**
		(0.000105)		(0.00435)	(0.0132)	(0.0250)
Asset growth_(r-1)			0.00570			
			(0.567)			
Housing prices_2006	0.112***	0.0769**	0.104***	0.0886**	0.0994**	0.136***
	(0.00284)	(0.0445)	(0.00702)	(0.0341)	(0.0224)	(0.00455)
GDP growth_(r-1)	-0.905***	-0.985***	-0.954***	-0.879***	-0.909***	-0.805***
	(5.92e-09)	(1.07e-09)	(5.67e-09)	(1.37e-06)	(1.52e-06)	(5.23e-05)
Constant	-3.862**	1.626	2.176*	2.001*	2.709**	2.502*
	(0.0392)	(0.137)	(0.0711)	(0.0967)	(0.0281)	(0.0503)
Observations	264	264	238	182	173	171
Pseudo R-squared	0.482	0.497	0.471	0.470	0.468	0.489

pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1