

# Why are some banks recapitalized and others taken over?

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## *Abstract*

This paper investigates the likelihood of EU listed banks becoming involved in takeovers as targets as well as the likelihood of being recapitalized, over a period including the financial crisis. If we consider takeovers and recapitalizations as potential alternatives which may be used to shore up financial institutions, bank recapitalizations are more likely for banks with less tangible equity, but with positive growth and prospects, and bank takeovers are more likely when their troubles are more evident (when their performance on traditional banking activity is lower). The determinants however differ widely pre-crisis from during the crisis. Whilst pre-crisis, there are few differences between the determinants of being taken over and recapitalized, there are major differences during the crisis, the major one being that the likelihood of being taken over is adversely affected by the bank's net interest margin and the likelihood of being recapitalized is adversely affected by the magnitude of tangible equity and positively affected by growth. Finally, the likelihood of a bank being subject to state recapitalization is adversely affected by the bank's liquidity (although this is mitigated by the bank's size), tangible equity, and GDP growth, and positively affected by growth in the past year.

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## ***1 Introduction***

The past decade has seen major activity in the European banking industry partly as a result of the recent financial crisis. In order to provide financial support to the distressed financial sector, EU member states introduced a number of emergency measures ranging from state guarantee schemes, to state recapitalizations, forced takeovers and acquisitions, and nationalisations (Petrovic and Tusch, 2009). This paper investigates the likelihood of a listed bank becoming involved in a takeover as a target as well as the likelihood of being (privately or publicly) recapitalized, over a period including the financial crisis. It compares the determinants of being involved in such ways before the crisis with those obtaining thereafter. As takeovers and bank recapitalizations are potential alternatives which may be used to shore up financial institutions, it compares the determinants of a bank being taken over with those of a bank being (privately or publicly) recapitalized. Our results show that bank takeovers are more likely than private recapitalizations for banks when their troubles are more evident (when their performance on traditional banking activity is lower). Our evidence provides a tool for prudential supervision by identifying characteristics that enable supervisory authorities to forecast the most likely outcome (takeover vs. recapitalization), and national governments/supervisory authorities to engineer takeovers in the case of forced takeovers. It also supports the view of the Basel III Committee that prudential regulation must require banks to hold higher levels of capital and to impose the liquidity coverage ratio and the net stable funding ratio.

Wheelock and Wilson (2000) examine the characteristics that make banks more likely to disappear (either via failures or via acquisitions); in this paper we shift the focus on the characteristics that ex-ante make banks more likely either to disappear (via acquisitions) or to survive (via recapitalization) in the EU industry. Although the characteristics of banks being involved in acquisitions have been thoroughly researched (Moore, 1997; Hadlock et al., 1999; Wheelock and Wilson, 2000; Hannan and Pilloff, 2006, 2009; Goddard et al., 2009; Hernando et al. 2009; Pasiouras et al. 2011; Beccalli and Frantz 2013), to our knowledge, there is no published empirical work on how these characteristics differ post-crisis from pre-crisis.<sup>1</sup> Furthermore, whilst the literature on the characteristics of banks being involved in state recapitalizations (especially via the Troubled Asset Relief Program, TARP) is growing (Bayazitova and Shivdasani, 2012;

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<sup>1</sup> For the US, there is evidence on the ex-post effects on market performance of acquirers in the resolution of failed banks during the crisis (Cowan and Salotti, 2013), and on the impact of disclosure requirements in the acquisition of undercapitalized banks promoted and subsidized by governments (Granja, 2011).

Mariathasan and Merrouche, 2011)<sup>2</sup>, there is surprisingly no work to our knowledge on the characteristics of banks being privately recapitalized<sup>3</sup>, and no evidence on how these characteristics differ for takeovers and recapitalizations.

The most common reasons given for bank takeovers, as suggested in Wheelock and Wilson (2000), are the aim to better manage the assets of poorly managed banks to create increased profits and value, the desire to grow (to expand market power, to achieve economies of scale, or perhaps for other reasons), or the desire of bank managers with a large ownership stake to be acquired in the hope of receiving an attractive takeover premium. The most common reasons given for bank public recapitalizations, as documented in Berger et al. (2012), are the need to revive the banks and reduce bank risk taking<sup>4</sup>, or the need to create liquidity<sup>5</sup>, a core function of banks. In this industry nevertheless banks take steps to use as little equity as possible as they perceive it to be an expensive form of financing; indeed a primary challenge for capital regulation is forcing banks to hold more equity than they would like (Kashyap et al. 2008).

For banks that are doing badly, which are therefore potentially subject to bank runs especially in the crisis period, takeovers show several advantages over recapitalizations. First, in a context in which the time required to solve the bank troubles is a primary issue due to systemic risk, takeovers appear preferable as they tend to be quicker whereas recapitalizations tend to be sluggish due to higher coordination costs and higher information asymmetry of small shareholders. In such a context of high information asymmetry, other banks are expected to be better able to evaluate the quality of a counterpart bank and less affected by the adverse selection problem in comparison to

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<sup>2</sup> For the US, evidence is provided on the ex-post effects of government assistance on bank risk taking (Duchin and Sosyura, 2013) and on the effects on bank risk taking and liquidity creation following regulatory interventions and capital support (Berger et al. 2012).

<sup>3</sup> The non-banking literature has instead extensively investigated the most common reasons given for private recapitalizations (see for a review Eckbo et al. 2007), which are “to raise capital for capital expenditures and new investment projects, to refinance or replace existing or maturing securities, to modify a firms capital structure, to exploit private information about securities intrinsic value, to exploit periods when financing costs are historically low, to finance mergers and acquisitions, to facilitate asset restructuring such as spin-offs and carve-outs, to shift wealth and risk bearing among classes of securities, to improve the liquidity of existing securities, to create more diffuse voting rights and ownership, to strengthen takeover defenses and to facilitate blockholder sales, privatizations, demutualizations and reorganizations”.

<sup>4</sup> See among the others theoretical models: Bhattacharya et al. (1998); Diamond and Rajan (2005); Philippon and Schnabl (2013).

<sup>5</sup> See among the others theoretical models: Bryant (1980); Diamond and Dybvig (1983); Kashyap et al. (2002).

small shareholders. In addition, capital is a relatively costly mode of funding at all times, and it becomes particularly costly during times of great uncertainty (Kashyap et al. 2008) given the higher concerns among private investors on bank failures (Okonkwo Osili and Paulson, 2009). Second, a negotiated takeover is less likely to involve information leakages to depositors and thus it is less likely to lead to bank runs. This explains why takeovers during a crisis have been driven by government intervention aimed at restructuring in order to avoid contagion (UK House of Commons Treasury Committee 2009). Third, equity investors in a bank are not armed to monitor the management (Jensen and Meckling, 1976) and therefore must constantly worry that bad decisions by management will dissipate the value of their shareholdings, and this is especially important in the case of a bank badly managed in the past (Kashyap et al. 2008): the high level of discretion that an equity-rich balance sheet grants to bank management explains the cost-of-capital premium and the preference for takeovers rather than further capital injections in badly managed banks.

The main aim of this paper is to investigate the characteristics that determine the likelihood of banks becoming targets or being recapitalized, by using the multinomial logistic and Cox regressions. With reference to the EU banking industry (i.e. 635 private recapitalization, 33 state recapitalizations, and 277 deals involving targets), our results show that if we consider takeovers and bank recapitalizations as potential alternatives which may be used to shore up financial institutions, bank recapitalizations are more likely for banks with less tangible equity, but with positive growth and prospects, and bank takeovers are more likely when their troubles are more evident (when their performance on traditional banking activity is lower). The determinants however differ widely pre-crisis from post-crisis. Whilst pre-crisis, there are few differences between the determinants of being taken over and recapitalized, there are major differences post-crisis, the major one being that the likelihood of being taken over is adversely affected by the bank's net interest margin and the likelihood of being recapitalized is adversely affected by the magnitude of tangible equity and positively affected by growth. This suggests that the main motivation for takeovers is to better manage poorly managed banks (inefficient management hypothesis), whereas for private recapitalizations is to reduce bank risk (risk taking hypothesis) in presence of more efficient management. Finally, a higher likelihood of going through a state recapitalization is associated to lower liquidity and lower capitalization at the bank level as well as lower growth at the country level. This evidence on equity and liquidity, would support the view of the Basel III Committee that macro-prudential regulation must require banks to hold higher levels of capital (not only to reduce the likelihood of a bank requiring a bailout, but also to reduce the capital transfer to and from the government and the cost of such an intervention) and to impose the liquidity coverage ratio and the

net stable funding ratio (to address the issue of maturity mismatch in the short and medium term, with the aim to reduce the probability and cost of state recapitalizations). Moreover we find that the adverse effect of liquidity is reinforced for larger banks, this means that the larger the size in relation to liquidity the higher the likelihood of a state bailout. This is clearly in line with the current discussion on the regulation of too big to fail.

Section 2 describes the methodology, the sample and the data sources. Section 3 provides the empirical evidence, whereas section 4 introduces robustness tests. Finally section 5 provides a conclusion.

## 2 Methodology

To identify the determinants of recapitalizations and takeovers, we use a multi-period, multinomial logistic regression.<sup>6</sup> This regression, also known as logit, explains the likelihood of an event taking place as a function of a vector of independent covariates  $\mathbf{X}$  and parameters  $\mathbf{B}$ , with the cumulative distribution function being the logistic distribution function.<sup>7</sup> Let us denote the multinomial response variable indicating the occurrence of an event in a distinct time interval ranging from zero to  $T$  by  $Y_t$  and the constant defining the risk in the case of  $\mathbf{X}=0$  by  $\alpha$ . It then follows that:

$$p(Y_t = i | t-1, \mathbf{X}) = \frac{e^{\alpha + \mathbf{B} \cdot \mathbf{X}}}{1 + e^{\alpha + \mathbf{B} \cdot \mathbf{X}}}, \quad (1)$$

where:

- $i=1$  represents the event of becoming a target,  $i=2$  represents the event of being privately recapitalized, and  $i=0$  represents the event of being uninvolved in a recapitalization or takeover; or alternatively  $i=1$  represents the event of being recapitalized by the State,  $i=2$  represents the event of being privately recapitalized, and  $i=0$  represents the event of being uninvolved in a recapitalization, and

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<sup>6</sup> We use a multi-period logistic regression to take into account the fact that recapitalizations and takeovers are relatively uncommon events (see Shumway, 2001; Pagano et al., 1998; Chava and Jarrow, 2004).

<sup>7</sup> An alternative to the logistic regression is the probit regression, which uses a normal cumulative distribution function. Probit regressions however produce results that are very similar to logistic regression in binary cases. As a robustness test, we use the probit regression and obtain qualitatively similar results. These are all available from the authors on request.

- $p(Y_t = i | t-1, \mathbf{X})$  represents the probability that  $Y_t = i$  at date  $t$  conditional on the information set available at date  $t-1$ .

The parameters  $\alpha$  and  $\mathbf{B}$  are estimated using the logistic regression. Following Palepu (1986), the selection of variables included in our models is undertaken on the basis of hypotheses about banks that are likely to become involved in takeovers and recapitalizations. Table 1 shows a set of pre-specified hypotheses used in this study, and the relevant variables in the year prior to the event, as well as the expected sign in an acquisition/recapitalization likelihood prediction model as documented in prior studies (when available). The hypotheses are as follows:

1. inefficient management hypothesis, tested by the profitability of operating activities (*ROA*), the profitability of the traditional banking activities (*NIM*), the free cash flow return (FCFR), the cost-to-income ratio (*CTI*), the growth in total assets over the last year (*GROWTH*) and the occurrence of a prior state recapitalization (*STATE\_RECAP*);
2. risk taking hypothesis, tested by insolvency risk (proxied by the amount of tangible equity over total assets, *EQUITY*; here higher values of equity imply lower insolvency risk) and credit risk (proxied by the amount of net charge off over total assets, *NCO*);
3. liquidity creation hypothesis, tested by the amount of liquid assets over total assets (*LIQ*);
4. control variables:
  - a. size, tested by the natural logarithm of total assets (*LNTA*);
  - b. market reward, tested by the change in the market price (return) of the bank over the last year (*PRICE\_CH*);
  - c. regulatory/macroeconomic setting, tested by the level of economic freedom (*EC\_FREE*) and regulatory quality (*REG\_Q*) of the country where each bank operates, the size of the national banking system where each bank operates (*CLAIMS*), the geographical location of each bank (*EU*) and the level of GDP growth of each country (*GDPG*).

The inefficient management hypothesis assumes that takeovers might be used to better manage the assets of poorly managed banks to create increased profits and value (Wheelock and Wilson 2000; Hernando et al. 2009), whereas recapitalizations might be more likely in presence of more efficient management and growth (either by expanding market power or by achieving economies of scale) that could encourage investors to subscribe the new equity issues. The bank risk taking hypothesis derives from the financial fragility' theory (Diamond and Rajan, 2000; 2001), which argue that highly levered capital structure in banks makes them fragile and subject to runs, therefore recapitalizations might be used to reduce such a bank fragility. Moreover, according to the

theories on the strengthening of banks' monitoring incentives (Holmstrom and Tirole, 1997; Allen, Carletti and Marquez, 2011; Mehran and Thakor, 2011), recapitalizations might be used to reduce bank risk taking. The liquidity creation hypothesis derives from theories on banks' role as risk transformers, which argue that liquidity creation exposes banks to risk (Allen and Santomero, 1998; Allen and Gale, 2004), and that higher capital improves banks' ability to absorb risk (Bhattacharya and Thakor, 1993; Repullo, 2004; von Thadden, 2004), therefore recapitalizations may be used by banks in presence of higher liquidity to reduce risk (risk absorption). The above hypothesis will also enable us to provide policy and regulatory implications in terms of too big to fail regulation (size hypothesis) and Basel III regulation (bank risk taking and liquidity creation hypotheses).

## ***2.1 Data set and sample***

The sample is limited to credit institutions as defined in the EU's Second Banking Directive (securities firms, insurance companies, investment banks or finance companies are excluded from our sample). We investigate (private and state) recapitalizations and takeovers that occurred between January 2002 and December 2011, and distinguish two sub-periods (pre-crisis: 2002-2006; and over the acute crisis period: 2007-2011)<sup>8</sup>. The focus is on the EU banking industry considering also its cross-border activities; specifically, private recapitalized banks as well as the targets are banks operating in any country of the world providing they are involved in a takeover with a EU bank<sup>9</sup>, whereas state recapitalized banks are EU banks. State recapitalizations are government purchases of participation capital securities (not limited to common stocks)<sup>10</sup>, defined according to the European Central Bank (Petrovic and Tutsch, 2009). Private recapitalizations are defined according to our calculations of the percentage increase in the number of outstanding shares totaling 1, 5 and 10 percent.<sup>11</sup>

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<sup>8</sup> These dates are taken from the Bank for International Settlements (2010).

<sup>9</sup> We consider private recapitalizations for non-EU banks only when the recapitalized bank has also been a target in a deal where the acquirer is a EU bank. The rationale for including non-EU private recapitalizations is that we want to consider the two possible alternatives (takeover vs. recapitalization) for any bank in the sample. Robustness test on the sample are provided, specifically by focusing on a restricted sample comprising EU banks only without any cross-border activity.

<sup>10</sup> In addition to state recapitalizations, we also investigate state interventions not directly linked to equity, or rather guarantee schemes (e.g. guarantees for bank deposits and guarantees for bonds issued by credit institutions).

<sup>11</sup> As a robustness test, we control for the nature of a private recapitalization and when motivated by a takeover, we did not classify the event as a recapitalization.

The sample includes 635 private recapitalization (at 1 percent)<sup>12</sup>, 33 state recapitalizations, and 277 deals involving targets for which full financial information about the banks is available. The sample also comprises banks that have never engaged in any recapitalization/takeover operation over the life span of this study and consists of 4,866 observations over the period under investigation.

The data are obtained by combining four sources: Thomson One Banker M&A for information on takeovers; Petrovic and Tutsch (2009) for information on state recapitalization, Thomson Financial Datastream for prices of listed banks and economic indexes, and Bankscope for balance sheet and profit and loss data.

### **3 *Empirical results***

We first examine bank-specific characteristics and regulatory/institutional variables, and report descriptive statistics for state and private recapitalizations (Table 2, Panel A) and for targets (Panel B, Table 2), and correlations (Table 3).<sup>13</sup> The values highlighted in Table 2 (Panel A) show that recapitalized banks are larger than their non-recapitalized counterparts and less capitalized. Recapitalized banks tend to operate in countries with more economic freedom and bigger banking systems. Interestingly strong differences affect state and private recapitalizations. State recapitalizations concern banks that are larger, less profitable (in terms of ROA), less oriented to traditional banking, less cost efficient, less capitalized, and that have grown less over the last year. In terms of regulatory/macroeconomic variables, state recapitalizations take place in countries with more economic freedom, less GDP growth, bigger banking systems and more regulatory quality. The values reported in Table 2 (Panel B) highlight that banks involved in takeovers are larger than their counterparts not involved, less oriented to traditional banking, less able to generate free cash flow returns, less capitalized and grown more over the last year. The comparison between banks involved in takeovers and recapitalizations reveals that banks involved in takeovers are larger, less oriented to traditional banking and less capitalized. In terms of regulatory variables, banks involved in takeovers operate in countries with less economic freedom than recapitalized banks.

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<sup>12</sup> Private recapitalizations at 5 percent are 479, and at 10 percent are 400.

<sup>13</sup> The correlations between all these independent variables have been tested in order to investigate the existence of multicollinearity problems in the logistic regression models (Table 3). On average correlation values are low, providing a preliminary indication of low/absent multicollinearity problems. The tolerance index and variance inflation factor (VIF), as shown in Table 3, confirm that no obvious multicollinearity problem affects the variables assumed to be determinants of the likelihood of being acquirers and targets except for regulatory/macroeconomic variables.



### 3.1 *Logistic regression*

Evidence on the likelihood of becoming a target or being privately recapitalized (Table 4, Panel A) over the all sample period shows that banks with less liquidity are more likely to be acquired or to get capitalized. Interestingly some factors affect differently the likelihood of being recapitalized vs. acquired. Recapitalizations are more likely for banks with higher performance on traditional banking activity, less tangible equity, and with positive growth and prospects: that is, banks that have grown more over the last year and banks operating in bigger banking systems potentially leading to an expansion in their business. Smaller banks are more likely to get recapitalized (although this effect is decreasing in size). Instead, banks are more likely to become targets when their troubles are more evident, or rather when their performance on traditional banking activity is lower (i.e. lower net interest margin, higher probability to become a target). This suggests that the main motivation for takeovers is to better manage poorly managed banks (inefficient management hypothesis), whereas for private recapitalizations is to reduce bank risk taking and to create liquidity (risk taking and liquidity creation hypotheses) in presence of more efficient management. The market reward does not appear to motivate takeovers and recapitalizations.

The evidence on the likelihood of becoming a target or being recapitalized for the subsample of worst performers (that is banks in the lower tertile in terms of NIM, as reported in Table 4, Panel B) shows that banks with less liquidity and less tangible equity are more likely to be taken over or recapitalized (and the adverse effect of liquidity is mitigated by higher equity only for target banks). Moreover worst performing banks that experienced a bad performance in terms of stock returns are more likely to go through recapitalizations (and not instead in takeovers). This is consistent with bank managers with a large ownership stake to have the desire to be acquired only when they can receive an attractive takeover premium. It is worthwhile noting that the case of recapitalizations for worst performers is the only one in which the market reward hypothesis matters. Finally, consistent with the findings discussed for the all sample, banks operating in bigger banking systems are more likely to be recapitalized, whereas this is not the case for targets.

Our results show that bank takeovers are more likely than private recapitalizations for banks when their troubles are more evident (when their performance on traditional banking activity is lower). Banks that are doing badly are potentially subject to bank runs, especially in the crisis period, and the time required to solve the bank troubles is a primary issue. In such a context, takeovers have several advantages over recapitalizations (as supported by our results and anecdotal evidence). First, takeovers are quicker, whereas recapitalizations tends to be sluggish (higher

coordination costs and higher information asymmetry of small shareholders). Not only is capital a relatively costly mode of funding at all times, it is particularly costly for a bank to raise new capital during times of great uncertainty (Kashyap et al. 2008). Second, a negotiated takeover is less likely to involve information leakages to depositors and thus it is less likely to lead to bank runs. This explains why takeovers during a crisis have been driven by government intervention aimed at restructuring in order to avoid contagion (UK House of Commons Treasury Committee 2009). Third, equity investors in a bank must constantly worry that bad decisions by management will dissipate the value of their shareholdings, and this is especially important in the case of a bank badly managed in the past (Kashyap et al. 2008).

We then disentangle the overall period into pre-crisis (2002-2006) and during the crisis (2007-2011) as reported in Table 4, Panels C and D. The evidence on the pre-crisis period shows that the same factors affect the likelihood of becoming a target or of being recapitalized: essentially, lower liquidity and lower tangible equity, although the adverse effect of liquidity tends to be mitigated in presence of higher tangible equity; banks may be acquired/recapitalized as they have run into liquidity problems difficult to resolve, but when their capitalization is large enough the probability of being acquired/recapitalized decreases. The evidence on the likelihood of becoming targets is consistent with Beccalli and Frantz (2013): banks with lower liquidity may be acquired as they have run into liquidity problems difficult to resolve, and banks with lower capitalization are more likely targets because acquirers may prefer lower capitalization as they can generate larger gains by improving the efficiency of the target and because they can pay less for the deal. Instead, during the crisis, there is a neat difference in the determinants for targets and recapitalizations: recapitalizations are more likely when banks have lower tangible equity and positive growth, whereas acquisitions are more likely when banks have a lower performance on their traditional banking activities. Interestingly, acquisitions (but not recapitalizations) are more likely when banks have lower liquidity (whereas before the crisis both recapitalizations and takeovers are more likely with lower liquidity): this may suggest that the liquidity creation hypothesis (i.e. recapitalizations used by banks in presence of higher liquidity to reduce risk) holds in normal times, but not during the crisis. Also, banks have a higher probability to being recapitalized when they went through a state recapitalization in the previous year. Moreover a higher likelihood of being involved in recapitalizations is found for smaller size, bigger banking systems and for banks operating outside the EU. Conversely a higher likelihood of being involved in acquisitions is found for targets operating in countries with more economic freedom and less regulatory quality.

The neat difference in the determinants for targets and recapitalizations during the crisis, as opposed to their similarity before the crisis, might be explained by the sharp increase in systemic risk, that induced governments to intervene by encouraging acquirors to take over weaker banks. Moreover, the higher concerns among private investors on bank failures, and their lower confidence on the banking system, made them less prone to provide equity in the form of recapitalizations during the crisis (Okonkwo Osili and Paulson, 2009) therefore leading to takeovers rather than recapitalizations especially in cases of bigger troubles.

We finally focus specifically on bank bailouts operated via state interventions during the crisis (Table 5). The evidence on state recapitalizations (Panel A) shows that a higher likelihood of going through a state recapitalization is associated to lower liquidity and lower capitalization at the bank level as well as lower growth at the country level. The evidence on state recapitalizations and guarantees (Panel B) reveals that a higher likelihood of state intervention is associated to lower country growth, whereas liquidity and capitalization are not relevant any more. Regulatory variables become relevant, with a higher regulatory quality and a lower economic freedom being associated to a higher likelihood of state intervention. The evidence on equity and liquidity for state recapitalizations is consistent with Mariathasan and Merrouche (2011), who find the probability of a bank being recapitalized is decreasing in the bank's Tier 1 capital and liquidity and increasing in the bank's size. Note that for the US government equity infusions (Capital Purchase Program of the TARP), Bayazitova and Shivdasani (2013) show that strong banks opted out of participating in CPP and that equity infusions were provided to banks that posed systemic risk, faced high financial distress costs, but had strong asset quality. Our evidence on public recapitalizations in Europe would support the view of the Basel III Committee that macro-prudential regulation must require banks to hold higher levels of capital (not only to reduce the likelihood of a bank requiring a bailout, but also to reduce the capital transfer to and from the government and the cost of such an intervention) and to impose the liquidity coverage ratio and the net stable funding ratio (to address the issue of maturity mismatch in the short and medium term, with the aim to reduce the probability and cost of state recapitalizations). Moreover we find that the adverse effect of liquidity is reinforced for larger banks, this means that the larger the size in relation to liquidity the higher the likelihood of a state bailout. This is clearly in line with the current discussion on the regulation of too big to fail.

## **4 Robustness tests**

### **4.1 Cox regression**

As a robustness test, we also use the Cox regression methodology (a sub-class of survival models) to investigate the likelihood of banks becoming targets or acquirers or recapitalized and

compare the nature of the determinants. Survival models derive the hazard of an event as a function of a vector of independent variables  $\mathbf{X}$  and parameters  $\Theta$ . The response variable, survival time, is the time till the event occurs. Survival models explicitly control for each firm's period at risk. Cox regressions are proportional hazard models. In a Cox regression with time-dependent covariates, the vector of independent variables  $\mathbf{X}$  depends explicitly on time. Furthermore, the hazard rate  $h(t)$ , that is, the likelihood of an event taking place at date  $t$  given that the event did not take place previously, is assumed to take the following functional form:

$$h(t) = h_0(t) e^{\Theta \cdot \mathbf{X}(t)} \quad , \quad (2)$$

where  $h_0(t)$  denotes the baseline hazard, that is, the hazard obtained when  $\mathbf{X}(t) = \mathbf{0}$ . Both  $h_0(t)$  and  $\Theta$  are estimated by the regression. We use Cox regressions with time-varying covariates estimated using the partial likelihood method, as done in Wheelock and Wilson (2000), Hannan and Pilloff (2006, 2009), and Goddard et al. (2009). No functional form is imposed on the baseline hazard but the covariates enter the model linearly, so the estimation has semi-parametric features. In modelling the time-to-takeover and time-to-recapitalization, banks acquired/recapitalized are censored in the year in which they are acquired/recapitalized, and acquiring banks are censored in the year in which they complete the acquisitions. A positive (negative) coefficient indicates that an increase in the relevant variable leads to an increase (decrease) in the event hazard, regardless of whether it is an acquirer/target/recapitalization hazard.

The results from the Cox hazard regressions are extensively in line with those generated by the multinomial logistic regression and appear robust to the variant tested.

As for the state recapitalizations (Table 5), fully in line with the logistic regression, a higher likelihood of a bailout is associated with lower liquidity (with a reinforcing effect of size), lower tangible equity, lower country's growth and higher bank's growth.

As for the comparison among target/recapitalization (Table 6, Panel A), in line with the logistic regression, the likelihood of becoming a target decreases with net interest margin and liquidity (although the adverse effect of liquidity is mitigated by a higher tangible equity). In the Cox regression, we also find that the likelihood of becoming a target decreases with the bank's capitalization and the country's regulatory quality. In line with the logistic regression, the likelihood of being recapitalized increases with the bank's growth and the presence of a previous state recapitalization, whereas decreases with the location of the bank in the EU.

As for the comparison among worst performers (Table 6, Panel B), fully in line with the logistic regression, the likelihood of becoming a target decreases with liquidity and tangible equity. In line with the logistic regression, the likelihood of being recapitalized increases with the bank's

growth and prospects (that is, banks that have grown more over the last year and banks operating in bigger banking systems). In the Cox regression, we also find that the likelihood of being recapitalized is lower with the location of the bank in the EU.

#### ***4.2 Predictive accuracy of logistic regressions***

The multinomial logistic regression generates probabilities of a bank becoming involved in takeovers as a target as well as probabilities of it being recapitalized. With respect to each potential event, becoming a target or recapitalized, each observation is assigned to one of two portfolios: observations with probabilities higher than the median probability generated by the multinomial logistic regression are assigned to the higher probability portfolio (HPP) whilst observations with probabilities lower than the median probability are assigned to the lower probability portfolio (LPP). The median probabilities are 7.2% for becoming a target, and 17.9% for being recapitalized. Table 7 provides the number of banks in each portfolio actually becoming targets or recapitalized. If the multinomial logistic regression is useful in identifying future banks undergoing the above-described events, the higher probability portfolio should contain a higher number of event banks than the low probability portfolio. As shown in Table 7 (Panel A), the higher probability portfolio contains about twice as many targets and banks being recapitalized. The null hypothesis that the multinomial logistic regression is not useful in predicting events is rejected at the 1% level.

As a further robustness test, the multinomial regression is estimated in a crisis sub-period consisting of the years 2007, 2009, and 2011 and validated in another crisis sub-period consisting of the years 2008 and 2010. In the estimation sub-period, all banks are allocated to three different portfolios based on the output of the logistic regression. The thirteenth of observations with the highest estimated probability of an event taking place is allocated to the HPP portfolio, the second thirteenth to the MPP portfolio, and the last thirteenth to the LPP portfolio. As shown in Table 7 (Panel B), the number of correctly predicted events is highest in the HPP portfolio and lowest in the LPP portfolio. The estimated regression coefficients as well as the portfolio threshold probabilities are then used to generate predictions in the validation subsample. As shown in Table 7 (Panel B), the number of correctly predicted events is still highest in the HPP portfolio and lowest in the LPP portfolio. It is also worthwhile noting that all the variables that were found to be significant in the multinomial regression involving the all sample are also found to be statistically significant and with the same signs when the multinomial regression is estimated in the estimation sample.

### ***4.3 Restricted sample and control for the nature of recapitalizations***

To test the robustness of our results to the sample definition, we also estimate the likelihood of becoming a target or being recapitalized (as in Table 4) for the EU banking industry without considering any cross-border activity (i.e. restricted sample to domestic activities only); specifically private and state recapitalized banks as well as targets are EU banks (Table 8, Panel A). Results taking into account cross-border activities are confirmed here for the full period and the crisis period: recapitalizations are more likely for banks with less tangible equity but with positive growth and prospects, whereas banks are more likely to become targets when their troubles are more evident, especially during the crisis (less liquidity and lower performance on traditional banking).

To test the robustness of our results to the dependent variable definition, we also control for the nature of a private recapitalization and when motivated by a takeover, we did not classify the event as a recapitalization, but as a private recapitalization associated with a takeover (Table 8, Panel B). Prior results on the likelihood of being recapitalized vs. acquired are confirmed: the main motivation for takeovers is to better manage poorly managed banks, whereas for private recapitalizations is to reduce bank risk taking and to create liquidity in presence of more efficient management. Interestingly, recapitalizations associated with takeovers show different determinants: positive performance and growth do not matter in recapitalizations associated with takeovers, whereas positive performance, growth and prospects increase the likelihood of being recapitalized. Moreover, private recapitalizations associated with takeovers are more likely when a state recapitalization occurred in the previous year: after a bank bailouts operated via state interventions, banks in troubles are recapitalized and taken over.

## ***5 Conclusions***

In order to identify the characteristics that make banks more likely either to disappear (via acquisitions) or to survive (via recapitalization) in Europe, this paper uses a multinomial regression in order to identify the determinants of a bank being involved in a takeover as a target as well as the likelihood of being recapitalized. The sample consists of credit institutions over a period starting in January 2002 and ending in December 2011. We consider two sub-periods: pre-crisis (2002-2006) and the acute crisis period (2007-2011). This paper compares the determinants of being involved in such ways before the crisis with those obtaining thereafter. As takeovers and bank recapitalizations are potential alternatives which may be used to shore up financial institutions, it compares the determinants of a bank being taken over with those of a bank being recapitalized.

The main results are as follows. Bank recapitalizations are more likely for banks with less tangible equity, but with positive growth and prospects, and bank takeovers are more likely when their troubles are more evident (when their performance on traditional banking activity is lower). The determinants however differ widely pre-crisis from post-crisis. Whilst pre-crisis, there are few differences between the determinants of being taken over and recapitalized, there are major differences post-crisis, the major one being that the likelihood of being taken over is adversely affected by the bank's net interest margin and the likelihood of being recapitalized is adversely affected by the magnitude of tangible equity and positively affected by growth. This suggests that the main motivation for takeovers is to better manage poorly managed banks (inefficient management hypothesis), whereas for private recapitalizations is to reduce bank risk (risk taking hypothesis) in presence of more efficient management. Finally, the likelihood of a bank being subject to state recapitalization is adversely affected by the bank's liquidity (although this is mitigated by the bank's size), tangible equity, and GDP growth, and positively affected by growth in the past year.

Our evidence provides a tool for prudential supervision by identifying characteristics that enable supervisory authorities to forecast the most likely outcome (takeover vs. recapitalization), and national governments/supervisory authorities to engineer takeovers in the case of forced takeovers. It also supports the view of the Basel III Committee that prudential regulation must require banks to hold higher levels of capital and to impose the liquidity coverage ratio and the net stable funding ratio. Finally, by documenting that the larger the bank size in relation to liquidity the higher the likelihood of a state bailout, our evidence contributes to the current discussion on the regulation of the too big to fail matter.

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**Table 1: Takeover/recapitalization likelihood hypotheses and independent variables**

| Hypothesis                              | Variable                | Variable name | Variable proxy  | Expected sign targets | Expected sign recap |
|---|-------------------------|---------------|---|-----------------------|---------------------|
| Hp 1. Inefficient management hypothesis | Operating profitability | ROA           | Net income /Total assets  | -                     | +                   |
|   | Net interest margin     | NIM           | [Interest Income - Interest Expense]/Loans  | -                     | +                   |
|   | Free cash flow          | FCFR          | Free Cash Flow Return = [Operating income - (Earning assets – Earning assets <sub>LVI</sub> ) + (Deposits - Deposits <sub>LVI</sub> )] / Operating income   | -                     | +                   |
|   | Cost-to-income          | CTI           | Operating costs/Intermediation margin   | -                     | +                   |
|   | Growth                  | GROWTH        | [Total assets – Total assets <sub>LVI</sub> ]/ Total assets <sub>LVI</sub>  | -                     | +                   |
|   | State recapitalization  | State.Recap   | Dummy equal 1 for State recapitalized banks   |                       | +                   |
| Hp 2. Risk taking hypothesis            | Capital strength        | Equity        | Tangible equity / Total assets  | +/-                   | -                   |
| Hp 3. liquidity creation hypothesis     | Credit risk             | NCO           | Net charge off/Total assets   | +/-                   | +                   |
|   | Liquidity risk          | LIQ           | Liquid assets / Total assets  | -                     | -                   |
| Control variables                       | Size                    | LNTA          | Ln (Total assets)   | +/-                   | +/-                 |
|   | Market price change     | PRICE_CH      | Change in the market price (return) over the last 12 months   |                       |                     |
|   | Economic freedom        | EC_FREE       | Includes business freedom, trade freedom, monetary freedom, freedom from government, fiscal freedom, property rights, investment freedom, financial freedom, freedom from corruption and labour freedom [Heritage Foundation] | +/-                   | +/-                 |
|   | Regulatory quality      | REG_Q         | Ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development [World Bank]   | +/-                   | +/-                 |
|   | Banking industry size   | CLAIMS        | Bank claims on the private sector / GDP [Euromonitor international]   | +/-                   | +                   |
|   | European bank           | EU            | Dummy equal 1 for banks located in Europe   |                       |                     |
|   | GDP growth              |               | Growth in the GDP of the country where the bank is listed   | +/-                   | +                   |

**Table 2: Descriptive statistics for bank-specific and regulatory/institutional variables**

| Panel A                  |            |           |        |        |          |           |           |        |         |             |        |           |                  |            |             |              |
|--------------------------|------------|-----------|--------|--------|----------|-----------|-----------|--------|---------|-------------|--------|-----------|------------------|------------|-------------|--------------|
|                          |            | lnTA      | Loans  | Liquid | ROA      | NIM       | FCFR      | CTI    | NCO     | Tangible Eq | Price  | Growth    | Economic Freedom | GDP Growth | Bank Claims | Reg. Quality |
| State recap              | N          | 33        | 33     | 33     | 33       | 33        | 33        | 33     | 28      | 33          | 33     | 33        | 33               | 33         | 33          | 33           |
|                          | Mean       | 18.74     | 0.545  | 0.206  | 0.0036   | 0.027     | -1.02     | 0.66   | 0.002   | 0.038       | 0.03   | 0.12      | 69.83            | -2.39      | 138.42      | 1.36         |
|                          | Median     | 19.45     | 0.598  | 0.15   | 0.004    | 0.028     | 0.165     | 0.63   | 0.001   | 0.029       | 0      | 0.095     | 70.5             | -2.7       | 111.3       | 1.39         |
|                          | Dv.std     | 1.789     | 0.216  | 0.169  | 0.009    | 0.013     | 4.57      | 0.198  | 0.003   | 0.019       | 0.68   | 0.18      | 7.8              | 2.46       | 54.82       | 0.38         |
|                          | Min        | 14.83     | 0.175  | 0.014  | -0.031   | 0.005     | -11.57    | 0.46   | -0.006  | 0.017       | -0.81  | -0.16     | 61               | -7         | 69.8        | 1            |
|                          | Max        | 20.17     | 0.9    | 0.616  | 0.026    | 0.065     | 9.129     | 1.316  | 0.0098  | 0.091       | 2.28   | 0.89      | 82               | 1.8        | 234.5       | 2            |
| Private recap            | N          | 496       | 492    | 494    | 495      | 487       | 431       | 494    | 268     | 440         | 635    | 424       | 629              | 635        | 635         | 635          |
|                          | Mean       | 16.18     | 0.57   | 0.2    | 0.008    | 0.05      | -0.016    | 0.618  | 0.002   | 0.08        | 0.047  | 0.176     | 67.13            | 1.97       | 111.8       | 1.08         |
|                          | Median     | 16.103    | 0.61   | 0.169  | 0.008    | 0.036     | 0.665     | 0.587  | 0.001   | 0.06        | 0      | 0.122     | 67.2             | 2.3        | 104.5       | 1.22         |
|                          | Dv.std     | 2.28      | 0.22   | 0.15   | 0.01     | 0.059     | 4.069     | 0.205  | 0.006   | 0.063       | 0.418  | 0.249     | 8.536            | 3.848      | 62.678      | 0.658        |
|                          | Min        | 11.02     | 0.026  | 0.0096 | -0.033   | 0.005     | -14.52    | 0.226  | -0.015  | 0.017       | -0.95  | -0.243    | 46               | -17.7      | 0           | -1           |
|                          | Max        | 20.17     | 0.938  | 0.074  | 0.046    | 0.337     | 9.13      | 1.316  | 0.1259  | 0.349       | 2.98   | 0.892     | 90               | 13.1       | 397.8       | 2            |
| No recap                 | N          | 518       | 514    | 516    | 517      | 509       | 453       | 516    | 285     | 462         | 657    | 446       | 651              | 657        | 657         | 657          |
|                          | Mean       | 16.288    | 0.567  | 0.202  | 0.008    | 0.052     | -0.073    | 0.622  | 0.002   | 0.0798      | 0.0454 | 0.172     | 67.23            | 1.825      | 112.71      | 1.09         |
|                          | Median     | 16.2      | 0.61   | 0.169  | 0.0078   | 0.0351    | 0.659     | 0.589  | 0.001   | 0.061       | 0      | 0.117     | 67.2             | 2.2        | 105         | 1.22         |
|                          | Dv.std     | 2.319     | 0.2218 | 0.152  | 0.0147   | 0.0581    | 4.08      | 0.2059 | 0.0058  | 0.0627      | 0.432  | 0.248     | 8.517            | 3.894      | 62.56       | 0.652        |
|                          | Min        | 11.02     | 0.0256 | 0.0096 | -0.033   | 0.005     | -14.52    | 0.2255 | -0.0149 | 0.0165      | -0.95  | -0.2427   | 46               | -17.7      | 0           | -1           |
|                          | Max        | 20.167    | 0.938  | 0.784  | 0.0463   | 0.3367    | 9.1295    | 1.316  | 0.0259  | 0.3499      | 2.98   | 0.892     | 90               | 13.1       | 397.8       | 2            |
| State vs Private         | Difference | 2.601     | -0.057 | 0.019  | -0.006   | -0.027    | -1.162    | 0.089  | -0.001  | -0.045      | -0.044 | -0.085    | 3.636            | -4.381     | 27.179      | 0.315        |
|                          | t-test     | 6.507***  | -1.182 | 0.461  | -2.434** | -6.653*** | -1.246    | 1.843* | -0.802  | -8.554***   | -0.276 | -2.924*** | 2.181**          | -7.366***  | 2.318**     | 3.951***     |
| Recap vs No recap        | Difference | 0.341     | -0.007 | -0.010 | 0.000    | -0.002    | -0.177    | -0.007 | 0.000   | -0.012      | 0.025  | 0.029     | 1.891            | -0.239     | 8.067       | 0.005        |
|                          | t-test     | 3.046***  | -0.630 | -1.367 | -0.005   | -0.656    | -0.847    | -0.720 | -0.499  | -3.592***   | 1.461  | 2.229     | 3.992***         | -1.493     | 3.100***    | 0178         |
| Panel B                  |            |           |        |        |          |           |           |        |         |             |        |           |                  |            |             |              |
|                          |            | lnTA      | Loans  | Liquid | ROA      | NIM       | FCFR      | CTI    | NCO     | Tangible Eq | Price  | Growth    | Economic Freedom | GDP Growth | Bank Claims | Reg. Quality |
| Targets                  | N          | 201       | 200    | 201    | 201      | 199       | 188       | 201    | 108     | 171         | 276    | 175       | 258              | 278        | 276         | 277          |
|                          | Mean       | 16.06     | 0.58   | 0.21   | 0.01     | 0.05      | 0.16      | 0.62   | 0.002   | 0.08        | 0.01   | 0.19      | 65.88            | 2.43       | 96.91       | 0.86         |
|                          | Median     | 15.88     | 0.62   | 0.19   | 0.01     | 0.03      | 0.5       | 0.62   | 0.001   | 0.06        | 0      | 0.15      | 64.3             | 2.15       | 91.65       | 0.98         |
|                          | Dv.std     | 2.36      | 0.20   | 0.15   | 0.01     | 0.05      | 3.99      | 0.19   | 0.006   | 0.06        | 0.41   | 0.25      | 8.86             | 3.37       | 63.59       | 0.75         |
|                          | Min        | 11.02     | 0.03   | 0.01   | 0.03     | 0.005     | 14.52     | 0.23   | 0.015   | 0.017       | -0.9   | -0.24     | 41               | -14.8      | 0           | -1           |
|                          | Max        | 20.17     | 0.94   | 0.76   | 0.05     | 0.34      | 9.13      | 1.31   | 0.03    | 0.35        | 4.26   | 0.89      | 90               | 14.2       | 400.9       | 2            |
| Non involved             | N          | 2389      | 2364   | 2380   | 2381     | 2339      | 2102      | 2377   | 1181    | 2015        | 4208   | 1994      | 4076             | 4216       | 4198        | 4208         |
|                          | Mean       | 15.77     | 0.57   | 0.21   | 0.008    | 0.056     | 0.16      | 0.623  | 0.0026  | 0.09        | 0.02   | 0.146     | 67.22            | 2.03       | 104.99      | 1.08         |
|                          | Median     | 15.76     | 0.61   | 0.175  | 0.0075   | 0.037     | 0.67      | 0.6    | 0.001   | 0.07        | 0      | 0.08      | 67.2             | 2.1        | 104.1       | 1.22         |
|                          | Dv.std     | 2.17      | 0.22   | 0.15   | 0.015    | 0.059     | 3.78      | 0.205  | 0.007   | 0.072       | 0.28   | 0.25      | 8.14             | 3.38       | 58.82       | 0.65         |
|                          | Min        | 11.02     | 0.026  | 0.009  | 0.033    | 0.005     | 14.52     | 0.226  | 0.015   | 0.017       | -0.97  | -0.24     | 37               | -17.7      | 0           | -1           |
|                          | Max        | 20.17     | 0.94   | 0.78   | 0.046    | 0.337     | 9.129     | 1.316  | 0.026   | 0.349       | 3.78   | 0.89      | 90               | 14.2       | 484.5       | 2            |
| Takeover vs Non involved | Difference | 1.449     | 0.006  | -0.001 | -0.001   | -0.012    | -0.553    | -0.012 | 0.000   | -0.027      | -0.012 | 0.021     | -0.068           | 0.001      | 5.402       | 0.001        |
|                          | t-test     | 12.299*** | 0.568  | -0.133 | -1.363   | -4.833*** | -2.602*** | -1.370 | -0.797  | -8.829***   | -0.758 | 1.709*    | -0.114           | 0.003      | 2.123**     | 0.056        |
| Takeover vs Recap        | Difference | 0.958     | 0.012  | 0.006  | 0.000    | -0.008    | -0.411    | -0.006 | 0.000   | -0.011      | -0.024 | -0.008    | -1.423           | 0.258      | -1.534      | 0.011        |
|                          | t-test     | 6.260***  | 0.870  | 0.615  | -0.205   | -2.379**  | -1.457    | -0.513 | -0.034  | -2.782***   | -1.064 | -0.460    | -2.079**         | 1.332      | -0.441      | 0.310        |

Variables (as defined in Table 1) refer the year prior to the deal. \*\*\*, \*\*, \* t-test respectively statistically significant at 1%, 5% and 10%.

**Table 3: Correlation analysis**

| Spearman<br>Pearson | lnTA      | Loans     | LIQ      | ROA      | NIM      | FCFR     | CTI      | NCO      | Equity    | Price_ch  | Growth   | StateRec | EU       | Liq_Equity | EC_FREE  | GDPG      | Claims   | REQ_Q    |
|---------------------|-----------|-----------|----------|----------|----------|----------|----------|----------|-----------|-----------|----------|----------|----------|------------|----------|-----------|----------|----------|
| lnTA                | 1         | -0.05**   | -0.11*** | -0.16*** | -0.44*** | -0.13*** | -0.2***  | 0.08***  | -0.62***  | -0.07***  | -0.15*** | 0.12***  | 0.2***   | -0.45***   | 0.32***  | -0.21***  | 0.34***  | 0.30***  |
| Loans               | -0.020    | 1         | -0.68*** | -0.06*** | -0.35*** | -0.04**  | -0.21*** | -0.02    | 0.10***   | -0.03*    | -0.02    | -0.02    | -0.03    | -0.47***   | 0.02     | -0.14***  | 0.08***  | -0.02    |
| LIQ                 | -0.13***  | -0.67***  | 1        | 0.04**   | 0.35***  | 0.03     | 0.28***  | -0.10*** | -0.04**   | 0.03*     | 0.15***  | -0.012   | -0.06*** | 0.75***    | -0.17*** | 0.17***   | -0.17*** | -0.14*** |
| ROA                 | -0.10***  | -0.074*** | 0.040**  | 1        | 0.37***  | -0.08*** | -0.39*** | -0.05**  | 0.46***   | 0.05**    | 0.303*   | -0.053   | -0.078   | 0.31***    | -0.09*** | 0.20***   | -0.20*** | -0.08*** |
| NIM                 | -0.322*** | -0.415*** | 0.29***  | 0.28***  | 1        | 0.13***  | 0.09***  | 0.13***  | 0.49***   | 0.07***   | 0.08***  | -0.09*** | -0.18*** | 0.56***    | -0.33*** | 0.17***   | -0.41*** | -0.36*** |
| FCFR                | -0.123*** | 0.018     | 0.024    | -0.014   | 0.064    | 1        | 0.12***  | 0.08***  | 0.09***   | 0.05***   | -0.38*** | -0.019   | -0.022   | 0.07***    | -0.10*** | -0.021    | -0.06*** | -0.15*** |
| CTI                 | -0.198*** | -0.195*** | 0.23***  | -0.42*** | -0.003   | 0.07***  | 1        | -0.031   | -0.08***  | 0.018     | -0.07*** | 0.014    | 0.037**  | 0.20***    | -0.08*** | -0.02     | -0.10*** | -0.05*** |
| NCO                 | 0.039     | -0.024    | -0.063** | -0.13*** | 0.13***  | 0.032    | -0.004   | 1        | -0.06**   | 0.02      | -0.06**  | -0.003   | -0.03    | -0.13***   | 0.13***  | 0.08***   | 0.002    | 0.10***  |
| Equity              | -0.555*** | -0.154*** | 0.06***  | 0.32***  | 0.47***  | 0.06***  | 0.012    | -0.09*** | 1         | 0.016     | 0.05**   | -0.13*** | -0.21*** | 0.57***    | -0.32*** | 0.11***   | -0.34*** | -0.35*** |
| Price_ch            | -0.085*** | -0.070    | 0.045**  | 0.002    | 0.06***  | 0.039*   | 0.015    | 0.011    | 0.009     | 1         | -0.06*** | -0.012   | -0.015   | 0.033      | -0.009   | 0.09***   | -0.07*** | 0.03**   |
| Growth              | -0.196*** | -0.024    | 0.16***  | 0.26***  | 0.037*   | -0.26*** | -0.08*** | -0.076*  | 0.041*    | -0.04**   | 1        | -0.006   | -0.08*** | 0.15***    | -0.12*** | 0.24***   | -0.17*** | -0.11*** |
| State.Recap         | 0.131***  | -0.014    | -0.003   | -0.034*  | -0.05*** | -0.033*  | 0.019    | -0.013   | -0.09***  | 0.002     | -0.015   | 1        | 0.04***  | -0.09***   | 0.028**  | -0.11***  | 0.05***  | 0.03**   |
| EU                  | 0.208***  | -0.050*** | -0.05*** | -0.029   | -0.08*** | -0.034*  | 0.024    | -0.07*** | -0.12***  | -0.049*** | -0.09*** | 0.043*** | 1        | -0.17***   | 0.17***  | -0.25***  | 0.38***  | 0.32***  |
| Liq_Equity          | -0.44***  | -0.44***  | 0.61***  | 0.16***  | 0.43***  | 0.07***  | 0.17***  | -0.12**  | 0.65***   | 0.031     | 0.11***  | -0.05*** | -0.09*** | 1          | -0.30*** | 0.21***   | -0.31*** | -0.30*** |
| EC_FREE             | 0.33***   | 0.021     | -0.19*** | -0.06*** | -0.17*** | -0.08*** | -0.05*** | 0.08***  | -0.27***  | -0.016    | -0.18*** | 0.028*   | 0.29***  | -0.24***   | 1        | -0.16***  | 0.68***  | 0.88***  |
| GDPG                | -0.19***  | -0.091*** | 0.14***  | 0.15***  | 0.06***  | -0.02    | -0.05*** | 0.064**  | 0.045**   | 0.048***  | 0.28***  | -0.11*** | -0.24*** | 0.07***    | -0.14*** | 1         | -0.35*** | -0.20*** |
| Claims              | 0.33***   | 0.035*    | -0.13*** | -0.12*** | -0.15*** | -0.07*** | -0.11*** | 0.00     | -0.19***  | -0.09***  | -0.18*** | 0.046*** | 0.31***  | -0.15***   | 0.57***  | -0.325*** | 1        | 0.72***  |
| REQ_Q               | 0.37***   | -0.027    | -0.13*** | -0.03    | -0.17*** | -0.14*** | -0.04**  | 0.08***  | -0.234*** | -0.41***  | -0.18*** | 0.035**  | 0.48***  | -0.18***   | 0.75***  | -0.266*** | 0.645*** | 1        |
| <b>Tolerance</b>    | 0.415     | 0.341     | 0.230    | 0.571    | 0.509    | 0.839    | 0.636    | 0.883    | 0.188     | 0.958     | 0.696    | 0.944    | 0.731    | 0.137      | 0.383    | 0.786     | 0.511    | 0.311    |
| <b>VIF</b>          | 2.409     | 2.928     | 4.346    | 1.752    | 1.964    | 1.192    | 1.572    | 1.132    | 5.625     | 1.044     | 1.437    | 1.059    | 1.369    | 6.721      | 2.608    | 1.273     | 1.958    | 3.217    |

Variables (as defined in Table 1) refer the year prior to the deal. \*\*\*, \*\* correlation respectively significant at 1% and 5% (2-tailed).

**Table 4: Determinants of takeovers and private recapitalizations (full period, pre-crisis and crisis, multinomial logistic)**

| Hp       | Variables (lagged values by 1 year) <sup>o</sup> | Panel A. Full period all sample (T, R) |                       | Panel B. Full period worst performers (bottom 33% NIM) |                      | Panel C. Pre-crisis all sample (T, R) |                      | Panel D. Crisis all sample (T, R) |                       |
|----------|--|--|-----------------------|--|----------------------|---------------------------------------|----------------------|-----------------------------------|-----------------------|
|          |  | Target                                 | Private recap         | Target   | Private recap        | Target                                | Private recap        | Target                            | Private recap         |
| Hp 1     | Intercept  | -1.142<br>(0.064)                      | 6.915**<br>(5.864)    | -12.863<br>(1.973)                                     | 16.049***<br>(7.668) | 8.963<br>(1.210)                      | -0.346<br>(0.003)    | -2.115<br>(0.171)                 | 6.655***<br>4.660     |
|          | ROA  | 9.144<br>(0.453)                       | 11.428<br>(1.610)     | 28.765<br>(28.338)                                     | 24.277<br>(1.273)    | 11.820<br>(0.162)                     | 21.801<br>(1.155)    | 5.154<br>(0.126)                  | 11.872<br>(1.544)     |
|          | NIM  | -12.202*<br>(3.006)                    | 3.708*<br>(2.791)     | -48.556<br>(1.695)                                     | -23.151<br>(0.690)   | -4.069<br>(0.716)                     | 0.696<br>(0.052)     | -18.450**<br>(4.549)              | 2.035<br>(0.679)      |
|          | FCFR   | 0.004<br>(0.018)                       | -0.005<br>(0.058)     | -0.004<br>(0.010)                                      | -0.034<br>(1.535)    | -0.063<br>(1.300)                     | -0.023<br>(0.216)    | 0.009<br>(0.071)                  | 0.006<br>(0.068)      |
|          | CTI  | -0.038<br>(0.003)                      | -0.294<br>(0.327)     | 0.619<br>(0.380)                                       | -0.434<br>(0.298)    | -0.011<br>(0.001)                     | 0.286<br>(0.067)     | -0.073<br>(0.008)                 | -0.304<br>(0.300)     |
|          | GROWTH   | 0.183<br>(0.087)                       | 0.670*<br>(2.820)     | 1.101<br>(1.119)                                       | 0.566<br>(0.627)     | -0.358<br>(0.127)                     | 0.374<br>(0.262)     | 0.583<br>(0.765)                  | 0.748**<br>(2.812)    |
|          | STATE_RECAP                                      | 0.372<br>(0.217)                       | 0.382<br>(0.702)      | 0.941<br>(0.991)                                       | -1.788<br>(2.070)    | -                                     | -                    | 0.526<br>(0.422)                  | 0.392<br>(0.721)      |
| Hp 2     | EQUITY   | -6.887<br>(1.273)                      | -10.660***<br>(6.451) | -22.508*<br>(2.600)                                    | -21.046**<br>(4.700) | -23.202**<br>(3.736)                  | -13.497**<br>(4.391) | -8.640<br>(1.553)                 | -9.734**<br>(4.486)   |
|          | NCO  | -4.007<br>(0.043)                      | -2.852<br>(0.053)     | 38.179<br>(0.745)                                      | 24.240<br>(0.681)    | -                                     | -                    | 1.262<br>(0.003)                  | 0.758<br>(0.003)      |
| Hp 3     | LIQ  | -4.058**<br>(4.201)                    | -2.504**<br>(4.364)   | -7.098**<br>(3.753)                                    | -4.929**<br>(4.277)  | -5.143*<br>(3.600)                    | -5.234**<br>(6.222)  | -6.256***<br>(6.608)              | -1.851<br>(3.901)     |
|          | LIQ*EQ   | 35.448<br>(2.479)                      | 18.588<br>(1.502)     | 170.373**<br>(5.940)                                   | 71.788<br>(1.974)    | 61.772**<br>(5.458)                   | 47.522***<br>(7.358) | 45.862*<br>(3.193)                | 8.115<br>(0.203)      |
| Controls | LnTA   | -0.209<br>(0.304)                      | -0.739***<br>(11.442) | 0.870<br>(1.175)                                       | -1.350***<br>(9.998) | -0.504<br>(0.459)                     | -0.192<br>(0.102)    | -0.246<br>(0.313)                 | -0.784***<br>(11.313) |
|          | LnTA <sup>2</sup>                                | 0.006<br>(0.300)                       | 0.019***<br>(11.141)  | -0.023<br>(1.198)                                      | 0.031***<br>(8.464)  | 0.019<br>(0.828)                      | 0.004<br>(0.057)     | 0.006<br>(0.218)                  | 0.020***<br>(11.311)  |
|          | PRICE_CH   | -0.258<br>(0.551)                      | -0.034<br>(0.026)     | -0.358<br>(0.395)                                      | -1.110***<br>(7.022) | 0.619<br>(0.897)                      | 0.679<br>(2.281)     | -0.313<br>(0.660)                 | -0.097<br>(0.182)     |
|          | EC_FREE  | 0.036<br>(0.973)                       | -0.010<br>(0.149)     | 0.065<br>(1.039)                                       | -0.031<br>(0.423)    | -0.088<br>(2.121)                     | 0.015<br>(0.094)     | 0.075*<br>(3.362)                 | 0.005<br>(0.031)      |
|          | REG_Q  | -0.474<br>(0.840)                      | 0.123<br>(0.118)      | -0.574<br>(0.278)                                      | 0.292<br>(0.157)     | 0.726<br>(0.667)                      | -0.022<br>(0.001)    | -1.157*<br>(3.600)                | -0.194<br>(0.231)     |
|          | CLAIMS   | 0.003<br>(1.435)                       | 0.003*<br>(3.341)     | 0.001<br>(0.102)                                       | 0.007**<br>(4.404)   | -0.008<br>(1.261)                     | 0.002<br>(0.255)     | 0.004<br>(2.208)                  | 0.004**<br>(4.630)    |
|          | GDPG   | 0.027<br>(0.666)                       | -0.038*<br>(3.678)    | -0.032<br>(0.308)                                      | -0.021<br>(0.254)    | -0.148<br>(1.470)                     | -0.021<br>(0.051)    | 0.045<br>(1.518)                  | -0.036*<br>(2.946)    |
|          | EU   | -0.671**<br>(4.285)                    | -0.560**<br>(5.985)   | 0.004<br>(0.001)                                       | -0.650*<br>(3.068)   | -0.73<br>(1.535)                      | 0.410<br>(0.744)     | -0.562<br>(0.352)                 | -0.620**<br>(6.181)   |
|          | N. targets                                       | 79                                     |                       | 35   |                      | 28                                    |                      | 68                                |                       |
|          | N. recapitalized                                 | 212                                    |                       | 85   |                      | 57                                    |                      | 185                               |                       |
|          | N. non involved                                  | 828                                    |                       | 399  |                      | 290                                   |                      | 708                               |                       |
|          | Chi-square                                       | 64.680***                              |                       | 63.544***  |                      | 36.519*                               |                      | 73.997***                         |                       |
|          | Nagelkerke R <sup>2</sup>                        | 0.073                                  |                       | 0.185  |                      | 0.125                                 |                      | 0.097                             |                       |

<sup>o</sup>Variables (as defined in Table 1) refer the year prior to the deal. Wald test in parentheses; \*\*\*, \*\*, \* Wald test respectively statistically significant at 1%, 5% and 10%. N: number of observations.

**Table 5: Determinants of state recapitalizations (crisis, multinomial logistic and Cox regressions)**

| Hp       | Variables (lagged values by 1 year) <sup>o</sup> | Panel A<br>State recap |                      | Panel B<br>State recapitaliz and guarantees |                       |
|----------|--|------------------------|----------------------|---|-----------------------|
|          |  | Logistic               | Cox                  | Logistic                                    | Cox                   |
|          | Intercept  | -0.928<br>(0.011)      | -                    | 0.229<br>(0.001)                            | -                     |
| Hp 1     | ROA  | 17.935<br>(0.209)      | 0.944<br>(0.029)     | -1.443<br>(0.002)                           | 3.673<br>(0.639)      |
|          | NIM  | 3.444<br>(0.082)       | 0.489<br>(0.076)     | -3.414<br>(0.078)                           | -1.042<br>(0.255)     |
|          | FCFR   | 0.063<br>(1.747)       | 0.007<br>(1.023)     | 0.044<br>(1.721)                            | 0.007<br>(2.227)      |
|          | CTI  | 0.711<br>(0.270)       | -0.013<br>(0.005)    | 0.847<br>(0.798)                            | 0.084<br>(0.358)      |
|          | GROWTH   | 2.44*<br>(3.596)       | 0.406**<br>(5.737)   | 2.154**<br>(4.886)                          | 0.370***<br>(7.049)   |
| Hp 2     | EQUITY   | -24.908*<br>(2.724)    | -3.458*<br>(2.681)   | -14.202<br>(1.569)                          | -2.909<br>(2.539)     |
|          | NCO  | 10.75<br>(0.046)       | 1.467<br>(0.043)     | -25.319<br>(0.286)                          | -0.381<br>(0.003)     |
| Hp 3     | LIQ  | -76.891**<br>(5.490)   | -12.024**<br>(6.498) | -8.158<br>(0.229)                           | -3.257<br>(1.326)     |
|          | LIQ*LnTA   | 3.735**<br>(5.399)     | 0.603**<br>(6.704)   | 0.15<br>(0.030)                             | 0.146<br>(0.962)      |
| Controls | LnTA   | 0.31<br>(0.233)        | 0.057<br>(0.334)     | -0.341<br>(0.626)                           | 0.005<br>(0.005)      |
|          | LnTA <sup>2</sup>                                | -0.007<br>(0.152)      | -0.002<br>(0.442)    | 0.026**<br>(5.304)                          | 0.001<br>(0.417)      |
|          | PRICE_CH   | 0.737<br>(2.235)       | 0.092<br>(1.581)     | 0.076<br>(0.038)                            | -0.059<br>(0.839)     |
|          | EC_FREE  | -0.099<br>(1.246)      | -0.008<br>(0.343)    | -0.11*<br>(2.774)                           | -0.017<br>(2.491)     |
|          | REG_Q  | 1.112<br>(0.599)       | 0.039<br>(0.033)     | 1.865*<br>(3.083)                           | 0.266<br>(2.652)      |
|          | CLAIMS   | -0.003<br>(0.264)      | 0.001<br>(0.292)     | 0.007*<br>(3.933)                           | 0.001<br>(2.599)      |
|          | GDPG   | -0.28***<br>(18.156)   | -0.03***<br>(11.15)  | -0.274***<br>(32.113)                       | -0.034***<br>(21.399) |
|          | EU   | 1.023<br>1.261         | 0.19<br>(1.812)      | -0.577<br>(1.203)                           | -0.056<br>(0.458)     |
|          | N. state recapitalized                           | 28                     |                      | 56  |                       |
|          | N. non involved                                  | 1091                   |                      | 1063  |                       |
|          | Chi-square                                       | 79.265***              |                      | 111.268***                                  |                       |
|          | Nagelkerke R <sup>2</sup>                        | 0.361                  |                      | 0.400                                       |                       |

<sup>o</sup>Variables (as defined in Table 1) refer the year prior to the deal. Wald test in parentheses; \*\*\*, \*\*, \* Wald test respectively statistically significant at 1%, 5% and 10%. N: number of observations.

**Table 6: Determinants of takeovers and private recapitalizations (full period, Cox regression)**

| Hp       | Variables (lagged values by 1 year) <sup>o</sup> | Panel A. Full period all sample (T, R) |                     | Panel B. Full period worst performers (bottom 33% NIM) |                     |
|----------|--|--|---------------------|--|---------------------|
|          |  | Target                                 | Private recap       | Target   | Private recap       |
| Hp 1     | ROA  | 1.811<br>(0.661)                       | 1.283<br>(0.419)    | 6.376<br>(1.222)                                       | -1.187<br>(0.076)   |
|          | NIM  | -2.531*<br>(3.507)                     | 0.083<br>(0.020)    | -6.106<br>(0.946)                                      | 0.688<br>(0.010)    |
|          | FCFR   | -0.003<br>(0.223)                      | -0.001<br>(0.042)   | -0.002<br>(0.055)                                      | 0.003<br>(0.162)    |
|          | CTI  | -0.073<br>(0.274)                      | -0.062<br>(0.227)   | 0.117<br>(0.461)                                       | 0.125<br>(0.361)    |
|          | GROWTH   | 0.127<br>(1.211)                       | 0.211**<br>(4.014)  | 0.195<br>(1.138)                                       | 0.341*<br>(2.703)   |
|          | STATE_RECAP                                      | -0.008<br>(0.002)                      | 0.176**<br>(4.573)  | 0.101<br>(0.335)                                       | 0.117<br>(0.678)    |
| Hp 2     | EQUITY   | -2.186*<br>(3.744)                     | -1.121<br>(1.390)   | -5.354**<br>(3.792)                                    | -4.517**<br>(4.688) |
|          | NCO  | -2.401<br>(0.525)                      | 4.424<br>(2.616)    | 7.129<br>(0.851)                                       | 6.866<br>(0.764)    |
| Hp 3     | LIQ  | -0.706*<br>(3.303)                     | -0.174<br>(0.359)   | -1.378**<br>(8.305)                                    | -0.311<br>(0.362)   |
|          | LIQ*EQ   | 7.524*<br>(3.171)                      | 0.620<br>(0.028)    | 30.297***<br>(8.305)                                   | 6.390<br>(0.383)    |
| Controls | LnTA   | -0.184<br>(1.355)                      | -0.182<br>(1.660)   | 0.720<br>(2.092)                                       | -0.120<br>(0.052)   |
|          | LnTA <sup>2</sup>                                | 0.005<br>(1.115)                       | 0.005<br>(1.439)    | -0.020<br>(2.136)                                      | 0.002<br>(0.014)    |
|          | PRICE_CH   | -0.010<br>(0.026)                      | -0.012<br>(0.069)   | 0.038<br>(0.194)                                       | -0.031<br>(0.111)   |
|          | EC_FREE  | 0.010<br>(2.277)                       | 0.004<br>(0.414)    | 0.009<br>(0.705)                                       | -0.004<br>(0.120)   |
|          | REG_Q  | -0.157*<br>(2.918)                     | -0.068<br>(0.494)   | -0.115<br>(0.453)                                      | -0.027<br>(0.019)   |
|          | CLAIMS   | 0.001<br>(0.730)                       | 0.001<br>(0.205)    | 0.001<br>(0.001)                                       | 0.001*<br>(2.720)   |
|          | GDPG   | 0.008<br>(1.522)                       | -0.005<br>(2.109)   | 0.001<br>(0.004)                                       | 0.002<br>(0.036)    |
|          | EU   | -0.060<br>(1.396)                      | -0.135**<br>(5.293) | -0.005<br>(0.003)                                      | -0.249**<br>(4.613) |
|          | N. targets                                       | 109                                    |                     | 45   |                     |
|          | N. recapitalized                                 |  | 228                 |  | 93                  |
|          | N. non involved                                  | 1608                                   | 880                 | 398  | 324                 |
|          | Chi-square                                       | 24.445                                 | 46.415***           | 24.751   | 28.430*             |



**Table 7: Predictive accuracy of the multinomial logistic regression**

| Panel A                   |                       |                   |                       |                   |
|---------------------------|-----------------------|-------------------|-----------------------|-------------------|
| Portfolios                | Targets               | Non-Targets       | Recapitalized         | Not-Recapitalized |
| HPP                       | 56                    | 504               | 137                   | 420               |
| LPP                       | 23                    | 536               | 75                    | 487               |
|                           | 79                    | 1040              | 212                   | 907               |
| Pearson's $\chi^2$        | 14.8***               |                   | 23.1***               |                   |
| Likelihood Ratio $\chi^2$ | 28.6***               |                   | 27.0***               |                   |
| Panel B                   |                       |                   |                       |                   |
|                           | Estimation sub-sample |                   | Validation sub-sample |                   |
| Portfolios                | Targets               | Recapitalizations | Targets               | Recapitalizations |
| LPP                       | 5                     | 22                | 7                     | 17                |
| MPP                       | 6                     | 32                | 11                    | 24                |
| HPP                       | 23                    | 55                | 16                    | 35                |
|                           | 34                    | 109               | 34                    | 76                |

Number of correct predictions. HPP is the portfolio with the highest probability of an event taking place. MPP is the portfolio with a medium probability of an event taking place. LPP is the portfolio with the lowest probability of an event taking place.

**Table 8: Determinants of takeovers and private recapitalizations (multinomial logistic) – restricted sample to domestic activities and control for the nature of recapitalizations**

| Hp       | Variables (lagged values by 1 year) <sup>o</sup> | Panel A. Restricted to domestic activities<br>EU domestic sample (T, R) |                        |                      |                       | Panel B. Control for the nature of recapitalizations<br>Full sample (T, R, T&R) |                       |                              |
|----------|--|---|------------------------|----------------------|-----------------------|---|-----------------------|------------------------------|
|          |  | Full period   |                        | Crisis               |                       | Full period   |                       |                              |
|          |  | Target  | Private recap          | Target               | Private recap         | Target only   | Private recap only    | Recap associated with target |
|          | Intercept  | 2.491<br>(0.117)  | 7.850**<br>(3.699)     | 5.672<br>(0.513)     | 6.822<br>(2.440)      | -0.911<br>(0.032)   | 7.380***<br>(6.667)   | -7.215<br>(0.508)            |
| Hp 1     | ROA  | 23.370<br>(0.956)   | 2.735<br>(0.049)       | 19.332<br>(0.581)    | -6.026<br>(0.221)     | 17.815<br>(1.264)   | 10.905<br>(1.459)     | -18.993<br>(0.540)           |
|          | NIM  | -18.415*<br>(2.847)   | 1.761<br>(0.478)       | -26.960**<br>(3.755) | 0.349<br>(0.015)      | -19.017**<br>(4.627)  | 4.075*<br>(3.369)     | 5.542<br>(0.353)             |
|          | FCFR   | -0.024<br>(0.365)   | -0.013<br>(0.212)      | -0.009<br>(0.042)    | 0.006<br>(0.044)      | -0.017<br>(0.222)   | -0.005<br>(0.048)     | 0.078<br>(1.043)             |
|          | CTI  | 0.198<br>(0.040)  | -1.075<br>(2.587)      | -0.152<br>(0.021)    | -1.014<br>(2.066)     | 0.182<br>(0.050)  | 0.379<br>(0.534)      | -0.652<br>(0.154)            |
|          | GROWTH   | -0.710<br>(0.570)   | 0.713*<br>(2.974)      | -0.211<br>(0.046)    | 0.947*<br>(2.872)     | -0.012<br>(0.001)   | 0.697*<br>(3.046)     | 1.188<br>(0.817)             |
|          | STATE_RECAP                                      | 0.562<br>(0.471)  | 0.792*<br>(2.671)      | 0.620<br>(0.559)     | 0.835*<br>(2.900)     | -18.672<br>(0.001)  | 0.389<br>(0.722)      | 2.209**<br>(5.167)           |
| Hp 2     | EQUITY   | -14.166<br>(2.095)  | -21.679***<br>(10.799) | -16.321<br>(2.385)   | -18.949***<br>(7.291) | 6.526<br>(0.907)  | -11.145***<br>(6.983) | -18.207<br>(1.582)           |
|          | NCO  | -5.548<br>(0.041)   | -2.228<br>(0.017)      | -15.852<br>(0.273)   | -3.524<br>(0.035)     | 16-080<br>(0.594)   | 2.802<br>(0.051)      | -83.355*<br>(2.940)          |
| Hp 3     | LIQ  | -7.121**<br>(3.873)   | -3.348**<br>(3.929)    | -9.383**<br>(4.379)  | -2.729<br>(2.032)     | -3.350<br>(2.434)   | -2.530**<br>(4.444)   | -8.293*<br>(3.009)           |
|          | LIQ*EQ   | 72.189<br>(2.326)   | 74.895***<br>(9.897)   | 70.854<br>(1.418)    | 67.021**<br>(5.786)   | 38.922<br>(2.500)   | 19.726<br>(1.681)     | 59.753<br>(1.352)            |
| Controls | LnTA   | -0.184<br>(0.108)   | -0.962***<br>(11.802)  | -0.541<br>(0.513)    | -0.990***<br>(11.060) | -0.192<br>(0.200)   | -0.750***<br>(11.757) | -0.031<br>(0.001)            |
|          | LnTA <sup>2</sup>                                | 0.002<br>(0.028)  | 0.022***<br>(9.653)    | 0.010<br>(0.428)     | 0.023***<br>(9.583)   | 0.005<br>(0.175)  | 0.019***<br>(11.453)  | 0.004<br>(0.034)             |
|          | PRICE_CH   | -0.191<br>(0.180)   | 0.090<br>(0.124)       | -0.468<br>(0.902)    | 0.040<br>(0.019)      | -0.141<br>(0.129)   | -0.040<br>(0.036)     | -0.706<br>(0.896)            |
|          | EC_FREE  | 0.024<br>(0.156)  | 0.041<br>(0.1.256)     | -0.003<br>(0.002)    | 0.058<br>(2.099)      | 0.023<br>(0.324)  | -0.015<br>(0.347)     | 0.091<br>(1.289)             |
|          | REG_Q  | 0.277<br>(0.088)  | -0.977<br>(2.539)      | 0.344<br>(0.119)     | -1.225*<br>(3.483)    | -0.467<br>(0.659)   | 0.224<br>(0.387)      | -0.723<br>(0.409)            |
|          | CLAIMS   | 0.003<br>(0.858)  | 0.006**<br>(6.119)     | 0.003<br>(0.692)     | 0.006**<br>(6.155)    | 0.004<br>(1.887)  | 0.003*<br>(2.457)     | -0.003<br>(0.199)            |
|          | GDPG   | -0.026<br>(0.348)   | -0.047*<br>(2.920)     | -0.038<br>(0.649)    | -0.044<br>(2.101)     | 0.024<br>(0.435)  | -0.039**<br>(3.846)   | 0.032<br>(0.182)             |
|          | EU   | -   | -                      | -                    | -                     | -0.527<br>(2.051)   | -0.598***<br>(6.839)  | -1.157*<br>(2.712)           |
|          | N. targets                                       | 47  |                        | 42                   |                       | 62  |                       |                              |
|          | N. recapitalized                                 | 141   |                        | 123                  |                       | 211   |                       |                              |
|          | N. recap associated with takeovers               |   |                        |                      |                       | 16  |                       |                              |
|          | N. non involved                                  | 786   |                        | 689                  |                       | 830   |                       |                              |
|          | Chi-square                                       | 71.602***   |                        | 73.102***            |                       | 86.514***   |                       |                              |
|          | Nagelkerke R <sup>2</sup>                        | 0.117   |                        | 0.135                |                       | 0.095   |                       |                              |

<sup>o</sup>Variables (as defined in Table 1) refer the year prior to the deal. Wald test in parentheses; \*\*\*, \*\*, \* Wald test respectively statistically significant at 1%, 5% and 10%. N: number of observations.