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Does ‘Too High’ Profitability Hamper Stability for European Banks?

Abstract: We investigate how high profitability influences the occurrence of bank distress in Europe. We utilize four indicators for ‘too high’ profitability, defined as the top quantiles of earnings, in logit models to explain bank distress with a hand-collected dataset of European bank distresses over the 2001-2014 period. We test the hypothesis that profitability can be beneficial for stability until a certain level but can turn detrimental at high level. We find that ‘too high’ profitability does not reduce the occurrence of bank distress. We obtain limited evidence that the top quantiles of the profitability distribution can lead to enhance such occurrence through a time horizon of about 3 years. With the hindsight of the Great Financial Crisis, our findings therefore qualify the view that bank profitability only should be promoted to favor bank stability.

Keywords: Bank profitability, financial distress, financial stability.

JEL Classification: G21, G33.

Une rentabilité ‘trop élevée’ est-elle signe d’instabilité pour les banques européennes ?

Résumé : Cette étude analyse dans quelle mesure une rentabilité ‘trop élevée’ influence la survenance de détresses bancaires en Europe. Nous constituons une base de données sur les détresses bancaires européennes sur la période 2001-2014, à laquelle nous appliquons une régression logit avec pour variables explicatives principales quatre indicateurs de rentabilité ‘trop élevée’, définie comme les réalisations les plus élevées de la distribution de résultats. Nous testons l’hypothèse selon laquelle la rentabilité peut favoriser la stabilité jusqu’à un certain seuil, mais peut se révéler préjudiciable si elle est importante. L’analyse montre qu’une rentabilité élevée ne réduit pas la probabilité d’occurrence d’une détresse bancaire ; l’étude suggère au contraire que les réalisations les plus élevées de la distribution de rentabilité peuvent accroître une telle probabilité à horizon d’environ trois ans. Avec le recul de la crise financière, ces résultats conduisent donc à nuancer la thèse selon lequel la rentabilité bancaire est par nature un facteur de stabilité bancaire.

Mots-clés: Rentabilité bancaire, détresse financière, stabilité financière.

Non-Technical Summary

There is a general view that greater profitability of banks enhances financial stability: typically, central bankers and banking supervisors will express concerns if banks do not prove profitable enough. However, the view that greater profitability of banks would enhance financial stability is far from being consensual in the academic literature; from an empirical perspective in particular, literature has provided mixed evidence on the impact of profitability on bank distress. The persistent puzzle about the relation between profitability and bank distress stresses the need to provide additional evidence on this link.

In this empirical study we address the issue of the impact of high profitability on the occurrence of bank distress in Europe. We contribute to the understanding of the effects of bank profitability by providing the first empirical investigation on this question. Empirical literature has widely considered the linear influence of bank profitability on financial stability without taking into account the fact that profitability can be beneficial for stability until a certain threshold. Our hypothesis is that profitability can be beneficial for stability until a certain level but can turn detrimental at high level.

We thus build a dataset on distress in EU banks which combines information on balance sheet indicators of banks and hand-collected information over the period 2001 to 2014 to provide new evidence on this question. Several indicators of high bank profitability derived from the common profitability measures (Return on Assets, Return on Equity) are then used to see if some emerge as predictors of greater likelihood of distress.

We obtain two main conclusions. First, we do not find evidence that high profitability is associated with lower occurrence of bank distress. Second, we find limited evidence that high profitability leads to greater occurrence of bank distress. We observe that high profitability might be a predictor of bank distress with a lag of 3 to 4 years in particular.

These findings yield positive and normative implications. On the positive side, they contribute to explain the puzzle observed during the financial crisis of distressed banks which were characterized by high profits before the crisis. On the normative side, prudential authorities and policy makers should not consider high profitability to be associated with better bank stability as a general rule. Furthermore, early-warning models could include high profitability indicators considered as threatening forces for bank stability.

Résumé non technique

Il est communément admis que la profitabilité des banques est favorable à leur stabilité : typiquement, les banquiers centraux et les superviseurs bancaires lanceront une mise en garde s'ils jugent insuffisante la profitabilité dégagée par les banques. Cependant, l'idée selon laquelle une profitabilité accrue est signe de stabilité financière est loin de faire l'unanimité dans la littérature académique ; particulièrement, les études empiriques sur le sujet se montrent partagées. La relation entre profitabilité et détresse bancaire constitue donc une énigme qui mérite d'être explorée plus avant.

Dans cette étude empirique nous nous intéressons précisément à la question de l'impact d'une profitabilité élevée sur la probabilité d'occurrence de detresses bancaires en Europe. Il s'agit de la première étude empirique de ce type sur des banques européennes : nous contribuons ainsi à une meilleure compréhension des effets de la profitabilité bancaire. La littérature empirique a généralement analysé l'influence de la profitabilité bancaire sur la stabilité financière comme une relation linéaire, c'est-à-dire sans considérer que la profitabilité peut être facteur de stabilité, mais seulement jusqu'à un certain point. Notre hypothèse dans cette étude est au contraire que la profitabilité peut favoriser la stabilité jusqu'à un certain seuil, mais peut se révéler préjudiciable si elle est importante.

A cette fin, nous avons constitué une base de données qui recense les detresses bancaires survenues en Europe sur la période 2001-2014, complétée d'informations financières sur un large échantillon de banques européennes. Nous retenons plusieurs indicateurs de profitabilité bancaire élevée (basés sur les indicateurs usuels de profitabilité bancaire : rendement des actifs - Return on Assets en anglais- et des fonds propres - Return on Equity en anglais) afin de tester s'ils peuvent constituer des indicateurs avancés de detresses bancaires.

L'étude conduit à deux conclusions principales. En premier lieu, une profitabilité élevée ne réduit pas nécessairement la probabilité d'occurrence d'une détresse bancaire. Au contraire, une profitabilité élevée peut accroître une telle probabilité : en effet nous observons en particulier qu'une profitabilité élevée peut être un bon prédicteur de détresse bancaire à horizon de 3-4 ans.

Ces résultats ont des implications tant positives que normatives. Sur le plan positif, ils contribuent à éclairer les cas intrigants de banques tombées en détresse pendant la crise financière alors même qu'elles dégageaient des profits élevés avant la crise. D'un point de vue normatif, les autorités prudentielles et les responsables politiques ne devraient pas systématiquement associer profitabilité élevée et stabilité bancaire. Par ailleurs, il pourrait être envisagé d'inclure dans les modèles dits d'alerte précoce (early-warning models en anglais, modèles conçus pour détecter la survenance de crises financières) des mesures de profitabilité élevée comme indicateurs avancés d'instabilité bancaire.

1. Introduction

When commenting the impact of low interest rates on bank profits on October 3, 2016, ECB Executive Board member Yves Mersch claimed that «*one also has to ask if a bank that cannot weather headwinds over a few years still has a sufficiently robust business model to stay in the market*». This sentence is one among many¹ which illustrate the concern of policymakers on bank profitability based on the view that the latter favors financial stability. However the view that greater profitability of banks would enhance financial stability is far from being consensual in the literature.

From a theoretical perspective, it is based on Keeley (1990)'s argument that profitable banks are more adverse to risk, as they can lose more value if downside risks realize. In addition, more profitable banks can increase their core capital and ensure their viability. However this dominant view contradicts the risk-return tradeoff according to which higher profits only occur if investors are willing to accept the possibility of losses. It is therefore at odds with the view that greater bank profitability would go with lower potential losses for the shareholders. Furthermore this view has been recently challenged by Martynova, Ratnovski and Vlahu (2015) who try to solve the puzzle of high risk-taking by very profitable banks before the occurrence of the global financial crisis like UBS. They argue that profitable banks have more incentives to take risks because banks with a profitable core business can borrow more and can then take greater risks in side activities, leading to greater likelihood of distress.

From an empirical perspective, literature has provided mixed evidence on the impact of profitability on bank distress. Namely, while US studies are prone to support a negative link between bank profitability and bank failure (e.g., Cole and White, 2011), European-based investigations do not consensually support the view that greater profitability would lower the occurrence of a bank distress. Pogoshyan and Cihak (2011) find evidence of a negative impact of ROE on occurrence of distress in line with the beneficial view of bank profitability, but this result does not stand for all robustness checks. Betz et al. (2014) observe that ROE is not significant to explain bank distress while ROA is significant and positive, suggesting that profitability would even encourage bank distress.

¹ For instance, ECB's Chief Economist, Peter Praet, observed on July 1, 2016 that "*the profitability of the [banking] sector will be a key consideration*" in assessing how the ECB can help to stimulate the Eurozone economy. Also Ravi Menon, the Head of Singapore central bank said on April 20, 2017 that "*banks need to be profitable in order to be strong*".

Our aim in this study is to examine the impact of high profitability on the occurrence of bank distress. We contribute to the understanding of the effects of bank profitability by providing the first empirical investigation on this question. The persistent puzzle about the relation between profitability and bank distress stresses the need to provide additional evidence on this link. Empirical literature has widely considered the linear influence of bank profitability on financial stability without taking into account the fact that profitability can be beneficial for stability until a certain threshold. Our hypothesis is that profitability can be beneficial for stability until a certain level but can turn detrimental at high level. We use a dataset on distress in EU banks which combines information on balance sheet indicators of banks and hand-collected information to provide new evidence on this question.

We propose different indicators to define high bank profitability. Firstly, high profitability is defined as a relative indicator by comparing the bank to the full sample of the period. A bank is considered highly profitable if its profitability ranges above the 90th percentile of the distribution of profitability measures. Secondly, high profitability is measured as the difference between profitability and the mean profitability in the country for the given period. Thirdly, we combine both former indicators to define highly profitable banks as top 10% banks for the gap in profitability relative to their country mean. This indicator therefore provides a binary measure of the high profitability of bank relative to its country. Fourthly, high profitability is defined as profitability exceeding a certain level defined as 2% for ROA and 10% for ROE. We therefore provide a battery of high profitability measures to see if some emerge as predictors of greater likelihood of distress.

This work has therefore major implications for authorities monitoring banks. Evidence of the absence of link between high profitability and bank distress would challenge the commonly accepted view that greater bank profitability would always be beneficial for financial stability. To go one step further, the finding of a positive link between high profitability and occurrence of distress would even mean that early-warning models could include high profitability indicators considered as threatening forces for bank stability.

The remainder of the paper proceeds as follows. Section 2 reviews the relevant literature. Section 3 describes the data and the methodology. Section 4 reports the estimations. Section 5 provides concluding remarks.

2. Related literature

Our research question deals with the relation between high profitability and bank distress. It is therefore related to the literature investigating the determinants of bank distress or failure. We briefly report in this section the main findings obtained in this strand of literature on the impact of profitability on bank distress and failure.

A bunch of papers have provided information on how profitability shapes bank stability in the US. Wheelock and Wilson (2000) aim at identifying the characteristics increasing the likelihood of US banks to fail or to be acquired. They consider all US banks from 1984 to 1993 to implement a survival model. While their focus is on the impact of efficiency measures, they find that ROA does not explain the likelihood of failure defined as banks closed by the FDIC, but it has a negative and significant impact on failure defined as a ratio of equity to total assets lower than 2%.

Cole and White (2011) investigate US bank failures in 2009 with CAMELS components from 2004 to 2008. They perform logit models to explain the occurrence of bank failure. They find strong support for the CAMELS approach to predict bank failures during the global financial crisis. Regarding profitability, they find strong evidence of a negative link between ROA and likelihood of bank failure.

A few studies have also provided evidence on the determinants of bank failures in emerging countries. Arena (2008) provides a cross-country investigation of what has influenced bank failures during the 90's banking crises in eight countries from Latin America and East Asia. A cross-sectional logit model is estimated for each region in which probability of failure is a dummy variable equal to one if the bank failed during the period defined as a financial crisis for each country of the sample. He finds evidence of a significantly and negative impact of ROA on the occurrence of bank failures in both regions. Focusing on eleven Asian countries, Lin and Yang (2016) analyze the influence of bank fundamentals and economic conditions on bank failures with a panel logit model for the period 1999-2011. They find a negative influence of ROA on the occurrence of bank failure.

While studies on the US and on emerging countries provide support to the view that profitability is beneficial for bank stability, empirical evidence for European banks shows however a different perspective. The context of European banking industries is very different from emerging countries or from the US since bank failures are very scarce in Europe. Hence these studies rather focus on bank distress.

Pogoshyan and Cihak (2011) provide an investigation of the determinants of bank distress for a sample of banks from EU-25 countries in 1996-2008. Distress is not defined by financial ratios but by keyword searches in news articles. Namely the authors consider that a bank distress takes place when keywords like “rescue” or “bailout” are used in articles on a bank. Using this approach, they identify 79 distress events. They estimate panel logit models in which profitability is measured by ROE and explaining variables are lagged by one year.

Evidence appears to be mixed for the relation between profitability and bank distress. On the one hand, ROE is significantly negative in the baseline model and in several robustness checks, supporting the view that greater profitability favors bank stability. On the other hand, ROE turns significantly positive in some robustness checks, notably when Germany is excluded or when time effects are included, raising questions on the fact that profitability might weaken bank stability.

Betz et al. (2014) provide an investigation of the determinants of bank distress for European countries for the period 2000-2013. Their approach mainly differs from Pogoshyan and Cihak (2011), with regard to the definition of bank distress. They create a dataset of bank distress events including bankruptcies, liquidations, defaults, state interventions, and mergers in distress. With their definition, they identify 194 distress events over the period of study.

They perform panel logit models including lagged bank balance-sheet items by one semester. Profitability is taken into account in the models by the simultaneous inclusion of ROA (for Asset quality) and of ROE (for Management). They find a significantly positive coefficient for ROA, meaning that greater ROA would enhance the likelihood of distress, and a non-significant coefficient for ROE. Hence they support the view that profitability does not reduce the occurrence of bank distress in Europe.

Männasoo and Mayes (2009) also investigate the determinants of bank distress in Europe but with a focus on transition countries. They study the determinants of bank distresses with a survival model for 19 Central and Eastern European countries for 1995-2004. Earnings are taken into account in the analysis through the ratio of interest and fee income to total assets. They find no significant coefficient for this variable, suggesting no link between profitability and bank distresses for the events which have taken place in transition countries before the wave of EU memberships.

This brief survey on the empirical literature suggests that there is evidence that greater profitability reduces bank failures. However this evidence has only been observed in the US or in emerging countries from Asia or Latin America. In the context of Europe, there is empirical support

that greater profitability does not reduce bank distress and might even enhance its likelihood. Furthermore, we observe that no study has considered the use of thresholds for profitability levels when investigating the relation between profitability and bank distress indicators.

Summarizing, we extend the literature by focusing on the linkage between high profitability and bank distress to provide a better understanding of the reality of the stabilizing role of profitability for European banks.

3. Data and methodology

This section first describes the data. We then explain the variables used to define financial distress, profitability, and the considered control variables. We finally elaborate on the methodology used in the estimations.

3.1 Data

We collect bank-level consolidated financial statements on Bloomberg for European countries. We apply a series of filters to the original data. First, we drop observations where total assets are lower than 0.1 million of euros. Second, we do not consider observations where total assets are lower than book equity. Third, a few banks suffer from very low profitability over the period: we thus drop observations for which Return on Assets is lower than -100% over the period in order not to bias the estimates. Fourth, we drop banks where information on some financial ratios included in our model is missing. The final sample is an unbalanced panel composed of 266 banks from 26 European countries (all EEA countries except Czech Republic, Estonia, Romania, Slovakia and Liechtenstein) over the period June 2001 to December 2014.

We supplement bank-level data with country-specific macroeconomic data. We collect real GDP growth and inflation rates on S&P Global IQ. We also add financial development indicators from the World Bank GFDD database.

3.2 Definition of financial distress

Our goal is to determine whether profitability is a relevant indicator of future financial distress. We thus need to define financial distress events over the period of study. Following Betz et al. (2013), we build a database of bank distressed events, which comprises three types of financial distress events: state intervention following bank financial difficulties, bank defaults (including bankruptcies and liquidations), banks taken over by other banks due to financial difficulties (“distress merger”).

We identify state intervention via the state aid cases website² of the Competition Directorate General of the European Commission. In the European Union, government support has to comply with European rules: a company should not receive state aid unless there is a general economic interest for it. The European Commission is in charge of controlling that state aids do not distort competition among European countries. The banks’ state aid decisions over the period provide us information on financial distress cases. In each decision, the motive of the state support is made explicit (e.g., a regional economic development purpose or a remedy against a serious disturbance for the economy). This allows us to identify cases of bank financial distress over the period. Moreover, most decisions provide a timeline of the financial difficulties triggering the state intervention, which help identify the semester in which the financial distress occurred. For every case, we retain the earliest financial distress date in the timeline.³ We also cross-check the date of the financial distress with news report for every case we identify. To do so, we rely on Bloomberg company news, SNL Financial or banks’ own press releases: when we identify public news that were reporting serious financial difficulties before the date in the timeline of the European state aid cases, we give priority to the earliest date in defining financial distress. State support can take several forms (not mutually exclusive): capital injections, state guarantee, liquidity assistance, nationalization, resolution⁴.

Regarding defaults and distress mergers, instances of distress mergers were primarily identified through the EC database. Once again, the dates chosen for distress were the ones provided in the EC database, unless news of financial distress were already public knowledge beforehand. This was complemented by a systematic review of M&A banking deals listed by SNL, focusing on the deals that satisfied the following conditions: i) the target was a European bank; ii) the acquirer acquired a

² See <http://ec.europa.eu/competition/elojade/isef/>

³ We are however mostly interested in the semester of distress than the exact date, given that we use half-yearly financial statements as predictors in our model.

⁴ Resolution is defined by the European Single Resolution Board as “*the restructuring of a bank by a resolution authority through the use of resolution tools in order to safeguard public interests, including the continuity of the bank’s critical functions, financial stability and minimal costs to taxpayers.*”

stake of at least 50% of the target at one time, so that the operation could be considered an acquisition; iii) the target was in financial distress when the deal was announced. On the last point, we considered that a bank was in financial distress when its coverage ratio (defined as the ratio of the sum of capital and loan loss reserves to which we subtract non-performing loans divided by total assets, calculated on the basis of data from Bloomberg) was negative at the announcement date of the acquisition. 8 distressed mergers were selected through this procedure, 7 of which were already mentioned in the EC database.

The source of banks' defaults is Moody's « *Annual default study: corporate default and recovery rates* » for the period under consideration in the study (2000-2014). Events of defaults include liquidations and bankruptcies. Although Moody's identifies 38 defaults of European banks over the period, a majority of them occurred after the bank had experienced other types of distress events (e.g., state intervention) and were thus already identified with the state aid cases. In addition, our financial data did not cover all the defaulted banks (8 of them provided no quarterly financial data, or no data at all). As a result, only 2 defaults – that were not already accounted for by the state aid cases – are included in our final list of distress events.

Table 1 presents descriptive statistics on banks' financial distresses over the period June 2001 to December 2014 by country (panel A) and date (panel B). In total, we identify 43 financial distresses⁵ in our sample. Not surprisingly, countries such as Greece, Ireland, Cyprus or Portugal, which experienced a severe financial turmoil over the period, stand out with a relatively high number of financial distresses (panel A). Panel B shows that Europe experienced a high number of bank distresses during two sub-periods (2008-2009, 2011-2012).

3.3 Profitability measures

The aim of the study is to assess whether high bank profitability exerts an impact on the probability of distress. We therefore rely on two profitability indicators: ROA and ROE. These indicators measure the intrinsic, or “absolute”, level of bank profitability.

We complement these ‘base’ indicators by considering high profitability indicators based on relative performance in terms of bank profitability. To quantify high profitability, we utilize several definitions.

⁵ We identify 124 instances that can be considered as distress events, but a number of banks experience more than one distress over the period (in which case we only consider the 1st distress event) and financial data before the distress events are not available for some banks.

A first set of indicators aims at assessing the relative level of bank profitability by comparing it to its peers at a given date. We define *Top ROA (Top ROE)* as a dummy variable equal to 1 if a bank is in the ROA (ROE) last decile at a given date and 0 otherwise. We aim to check if being in the top earners at a given date increases the probability of financial distress in the future.

A second set of indicators compares bank's profitability to its country domestic average at a given date. Bank profitability indeed depends strongly on the country characteristics since most EU banks have their domestic country as primary market. We define *ROA DEV (ROE DEV)* as the deviation between bank's ROA (ROE) from its country average at a given date.

A third set of indicators combines elements of the two previous sets by utilizing a binary approach for the definition of high profitability and by considering the country of origin rather than the full sample as the benchmark for high profitability. We then define *Top ROA DEV (Top ROE DEV)* as a dummy variable which equals 1 if a bank is in the ROA DEV (ROE DEV) top decile at a given period and 0 otherwise.

Finally, a fourth set of indicators defines an absolute profitability threshold above which profitability might affect the probability of a financial distress occurrence. To that aim, we define the dummy variable *Top ROA2% (Top ROE10%)* which takes the value of 1 if a bank's ROA (ROE) is above 2% (10%) at a given date and 0 otherwise. While these levels are arbitrarily chosen, we also tested in unreported robustness checks the effects of different thresholds with no major qualitative change in the results. The main difference when setting a profitability limit is that the thresholds are time-invariant. In the case of *Top ROA* and *Top ROE*, the threshold for the last decile varies through the cycle.

Table 2 presents descriptive statistics for our profitability measures. The mean of *Top ROA*, *Top ROE*, *Top ROA DEV* and *Top ROE DEV* are close but not equal to 10% because our sample suffers from missing values on other financial ratios for some observations. These observations are therefore used in the computation of the profitability measures but not in the estimations.⁶

3.4 Control variables

In addition, we include bank-specific and country-specific control variables. We consider three bank-specific financial variables: an indicator of bank size (*Size*), calculated as the logarithm of bank's

⁶ Even if these observations cannot be included in the estimations, it is necessary to use them in the profitability measure as we aim at having the most representative sample of banks to compute *Top ROA*, *Top ROE*, *Top ROA DEV* and *Top ROE DEV*.

total assets, a measure of the bank's capitalization (*Cap ratio*), defined as the accounting capital ratio; an indicator of the dependence of the bank's short term funding (*ST fund ratio*), computed as the ratio of market funding with a maturity of less than one year divided by bank's total liabilities. We do not control for bank risk since the dependent variable, the occurrence of bank distress, is the outcome of bank risk. As a consequence, the equation would then be misspecified.

We add four country-level control variables. Two variables take into account the macroeconomic environment: real GDP growth (*GDP growth*), and inflation rate (*Inflation*), both considered on a semi-annual basis. We also include two variables to control for the financial sector importance and size: a measure of the concentration of the banking market (*3bank asset*) defined as the market share of the three largest banks in terms of total assets, an indicator of banking development (*Credit to GDP*) defined as the ratio of private credit from deposit money banks and other financial institutions to GDP. Table 3 reports descriptive statistics of the control variables.

3.5 Methodology

To investigate how profitability (absolute or high) influences the probability of a bank distress, we estimate logistic regressions as follows:

$$\log \frac{\Pr(\text{Distress} = 1)_{i,t}}{\Pr(\text{Distress} = 0)_{i,t}} = \alpha + \beta \cdot \text{PROFITABILITY}_{i,t-k} + X_{i,t-k} \cdot \delta + W_{c,t-k} \cdot \gamma + \varepsilon_{i,t} \quad (1)$$

Where $\Pr(\text{Distress} = 1)_{i,t}$ is the probability that a bank i becomes distressed at time t . PROFITABILITY is bank i profitability ratio (either *ROA*, *ROE*, *Top ROA*, *Top ROE*, *ROA DEV*, *ROE DEV*, *Top ROA DEV*, *Top ROE DEV*, *Top ROA2%* or *Top ROE10%*) measured at time $t - k$. X is a vector of bank-specific control variables of bank i measured at time $t - k$. W is a vector of country-specific c variables measured at time $t - k$. k is the number of lagged time periods applied to the independent variables (from 1 to 8, i.e. 6 months to 4 years). ε is a disturbance term. Standard-errors are robust to heteroscedasticity and clustered at the bank-level to account for potential correlation of the error-term within clusters. We provide in the Appendix the estimations without profitability measures for sake of comparison. Once a bank has been distressed, we do not include it for the following periods in the estimations in line with former literature since its characteristics can be strongly influenced after that by this event.

We consider alternatively the lagged values of explaining variables with lags from one

semester to eight semesters and therefore do not include all lagged values of profitability measures in the estimations for that reason. Namely, it would not be relevant to perform these estimations in which banks which have been distressed would be dropped. In addition, we do not consider all lagged values of profitability together in the estimations since our objective in the paper is policy-oriented in the sense that we want to assess which profitability at which period preceding the event can predict financial distress.

4. Results

This section is devoted to the presentation of the empirical results of the investigation. Since our concern is with high profitability we focus on the estimations linking high profitability to the occurrence of bank distress. We however start the analysis by a first glance on the relation between profitability and bank distress.

4.1 A first look at the impact of profitability

We begin the empirical investigation of the relation between high profitability and bank distress by studying the relation between profitability and bank distress. As explained above, there is a common view that profitability would diminish bank vulnerability which is at odds with empirical findings for European banks. It therefore makes sense to check how profitability exerts an impact on the occurrence of bank distress before digging deeper into the investigation of high profitability.

We perform logit regressions explaining how profitability affects the occurrence of bank distress. We report the results alternatively with ROA and with ROE as profitability measure respectively in Tables 4 and 5.⁷ We consider alternatively the lagged values of explaining variables with lags from one semester to eight semesters.

We observe that the coefficient for profitability is not significant in the vast majority of estimations. While ROE is never significant whatever the tested lag, ROA is significant only with lags

⁷ We also perform estimations respectively with ROA and ROA² and with ROE and ROE² to test the existence of a nonlinear relationship. We find no evidence supporting a nonlinear relationship between profitability and the likelihood of bank distress.

of 1 semester and of 6 semesters. Interestingly ROA is significantly negative with 1 semester but significantly positive with 6 semesters. Therefore, only ROA one semester before the distress is negatively associated with the likelihood of bank distress. For the rest, profitability measures do not influence bank vulnerability, with the exception of ROA 3 years before the distress which even exacerbates the occurrence of bank distress.

These findings support the view that profitability is not associated with bank stability for European banks. They accord with the results obtained by Betz et al. (2014) in their investigation of the predictive factors of bank distresses in Europe. Thus they raise questions about the relevance of considering profitability as an indicator of bank stability for European policymakers.

4.2 Investigating high profitability

We turn to the study of the relation between high profitability and the occurrence of bank distress. As explained above, we consider four different indicators to define high profitability of banks. For each indicator, we perform logit regressions using alternatively high profitability indicators based on ROA or on ROE and we utilize 8 different lags to test the impact of time horizon prior to distress since high profitability can have lagged effects which can vary over time.

First, we define high profitability with *Top ROA* and *Top ROE*, which measure the profitability of the bank relative to the full sample of banks for a given semester. Tables 6 and 7 report these estimations. With all lags and for both high profitability variables, we consistently find no impact of high profitability on the likelihood of bank distress: *Top ROA* and *Top ROE* are not significant in all estimations. Consequently, we do not find that being among the most profitable banks in Europe is associated with either greater or lower vulnerability.

Second, we measure high profitability with *ROA DEV* and *ROE DEV*. These indicators measure high profitability for a given bank relative to the other banks of the same country with a continuous measure. We display these estimations in Tables 8 and 9.

We observe a significantly negative coefficient for *ROA DEV* with a lag of 1 semester. It supports the view that high profitability relative to other banks in the country reduces bank

vulnerability. However the coefficient for *ROA DEV* becomes not significant when the time horizon is increased to 2 semesters and remains not significant with 3, 4, and 5 semesters.

A striking result appears when the time horizon is 6 lags and 7 lags: the coefficient for *ROA DEV* becomes significantly positive. Hence, high profitability for a bank relative to other banks in the country about 3 years before the distress would not reduce but would enhance the likelihood of bank distress. In other words, these results provide some evidence that high profitability can be detrimental for bank stability in the medium term, while at the same time it is associated with less bank vulnerability in the short term. With *ROE DEV*, we find however no significant coefficient whatever the considered time horizon.

Thus, with measures based on ROA, we find some support to the view that being highly profitable relative to other banks of the country can be detrimental to bank stability at a horizon of about 3 years, even if it is beneficial one semester before the distress. Therefore, high profitability could have different effects on bank vulnerability according to the time horizon.

Third, we define high profitability with *Top ROA DEV* and *Top ROE DEV*. These indicators measure high profitability for a given bank relative to the other banks of the same country with a dummy variable. We report these estimations in Tables 10 and 11.

We find again some evidence in favor of a detrimental impact of high profitability on bank stability. With ROA measures, we find a significant and positive coefficient for *Top ROA DEV* with lags of 7 and 8 semesters while the variable is not significant for all other lags. With ROE measures, we observe a significant and positive coefficient for *Top ROE DEV* with lags of 1, 4, and 5 semesters, while the variable is not significant for all other lags.

Hence these results tend to corroborate those obtained with *ROA DEV* and *ROE DEV*, the former high profitability measures considering the difference with the country average. We provide some support to the view that high profitability can exert a detrimental impact on bank stability.

Fourth, we measure high profitability with *Top ROA2%* and *Top ROE10%*. High profitability is therefore measured relative to thresholds which are constant over time and is thus not influenced by the distribution of profitability measures in the sample for a given period. We report these estimations in Tables 12 and 13.

Again we obtain limited support for the positive impact of high profitability on the occurrence of bank distress with ROA-based indicators. Indeed *Top ROA2%* is significantly positive with lags 5 and 7, while it is not significant with all other lags. At the same time, *Top ROE10%* is never significant. Therefore, a ROA exceeding the threshold of 2% tends to enhance the likelihood of bank distress in a horizon of about 3 years.

We complete the investigation by commenting the economic significance of our results. To this end, we provide the average marginal effects for all profitability measures in Table 14. We observe that the impact of a change in high profitability is economically significant. With continuous indicators for high profitability, we notably observe that an increase of one unit of ROA DEV leads to an increase of 1.334 point of the likelihood of bank distress after 7 semesters. When considering dummy variables for high profitability indicators, we observe that a change for a bank for ROA from below 2% to above 2% (with *Top ROA2%*) leads to an increase of 3.8 percentage points of the likelihood of bank distress.

In summary, our investigation of the relation between high profitability and the occurrence of bank distress based on four high profitability indicators provides two main conclusions.

First, we do not find evidence that high profitability reduces the likelihood of bank distress. This finding suggests that profitability would not be beneficial for bank stability at high levels. When associated with our initial observation of the absence of significant relation between profitability and the occurrence of bank distress, it even leads to the more general conclusion that profitability does not favor bank stability for European banks.

Second, we find limited support that high profitability can be associated with greater occurrence of bank distress. But we observe some evidence of a positive impact of high profitability on the occurrence of bank distress with three of the four tested high profitability indicators. This impact is particularly observed with ROA-based indicators and with a time horizon of about 3 years before the distress.

4.3 Robustness checks

We perform additional robustness checks to test the relevance of our findings.

Our main estimations already include a set of alternative specifications since we test four alternative measures of high profitability and we try eight different lags for the explained variables in the estimations.

First, we test the influence of the set of control variables on the results. To this end, we redo all our estimations by considering two alternative sets of control variables: without country-level control variables, without bank-level country variables. These new estimations are respectively displayed in Tables 15 and 16.

We find the same main conclusions than in the main estimations with these alternative sets of control variables. First, there is no evidence that high profitability diminishes the occurrence of bank distress. Second, we find again limited evidence that greater profitability can enhance the likelihood of bank distress. Estimations without country-level control variables and without bank-level control variables show again evidence of a positive impact of high profitability on the occurrence of bank distress with three of the four tested high profitability indicators.

Second, we perform estimations with country fixed effects. Since the set of country control variables can have small variation over time, we can question whether our results are sensitive to the inclusion of country fixed effects. The estimations are reported in Table 17. We obtain the same findings than in the main estimations. Namely, we find limited evidence that high profitability can hamper bank stability. The coefficient of the profitability measure is significantly positive in several cases, in particular when we use ROA DEV and TOP ROE DEV to measure high profitability which is in line with the main estimations.

Third, we redo our estimations with year fixed effects. The high frequency of bank distresses during some years of our period of study motivates us to test this check. The estimations are displayed in Table 18. The main findings do not change. We still observe limited evidence that high profitability increases the probability of bank distress. Again this result is observed in particular when we utilize ROA DEV and TOP ROE DEV as high profitability measures.

Our main results have thus been confirmed by several robustness tests, leading to findings that provide limited evidence that greater profitability can increase the likelihood of bank distress.

5. Conclusion

In this study we address the issue of the impact of high profitability on the occurrence of bank distress in Europe. We utilize several indicators of high profitability to test their impact on bank vulnerability in logit models estimated on a hand-collected dataset of bank distresses in Europe.

We obtain two main conclusions. First, we do not find evidence that high profitability is associated with lower occurrence of bank distress. Second, we find limited evidence that high profitability leads to greater occurrence of bank distress. We observe that high profitability might be a predictor of bank distress with a lag of 3 to 4 years in particular.

These findings yield positive and normative implications. On the positive side, they contribute to explain the puzzle observed during the financial crisis of distressed banks which were characterized by high profits before the crisis. On the normative side, authorities should not consider high profitability to be associated with better bank stability as a general rule. Furthermore, high profitability indicators could be added to early-warning models.

Further research should be done to analyze whether high levels in all CAMELS components can be associated with lower financial stability. For instance, while a high ratio of non-performing loans to total loans is associated with higher likelihood of bank distress, the observation of a very low value of this ratio might also mean banking troubles. We let these questions for further research.

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Table 1: Descriptive statistics on sample financial distresses

This table presents the number of banks incurring a financial distress over the period June 2001 to December 2014 by country (panel A) and date (panel B).

Panel A: By country			Panel B: By date		
Country	# of banks	# financial distresses	Date	# of obs.	# financial distresses
Austria	15		Jun-01	40	
Belgium	4	2	Dec-01	39	
Bulgaria	4		Jun-02	42	
Croatia	17		Dec-02	42	
Cyprus	4	3	Jun-03	54	
Denmark	32	6	Dec-03	56	
Finland	4		Jun-04	67	
France	7		Dec-04	66	
Germany	17	4	Jun-05	89	
Greece	10	10	Dec-05	89	
Hungary	1		Jun-06	111	
Iceland	2		Dec-06	111	
Ireland	4	2	Jun-07	100	
Italy	47	3	Dec-07	104	3
Latvia	1		Jun-08	112	
Lithuania	3	1	Dec-08	113	11
Luxembourg	3		Jun-09	121	7
Malta	4		Dec-09	119	
Netherlands	8	1	Jun-10	140	1
Norway	20		Dec-10	143	
Poland	9		Jun-11	146	2
Portugal	6	5	Dec-11	147	5
Slovenia	4	2	Jun-12	156	8
Spain	17	3	Dec-12	146	3
Sweden	7		Jun-13	153	2
UK	16	1	Dec-13	150	
			Jun-14	138	
			Dec-14	134	1
Total	266	43	Total	2928	43

Table 2: Bank profitability measures

This table describes profitability measures used in the study. All data is collected on Bloomberg. We do not observe these variables after the distress date, hence the difference in total observations with Panel B of table 1.

	Description	# obs.	Mean	Std Dev.	Median
ROA	Return on assets	2885	0.47%	1.48%	0.5%
ROE	Return on equity	2885	1.26%	153.15%	7.46%
Top ROA	Dummy variable equal to 1 if ROA is in the last decile at a given date; 0 otherwise	2885	9.91%		
Top ROE	Dummy variable equal to 1 if ROE is in the last decile at a given date; 0 otherwise	2885	9.15%		
ROA DEV	ROA minus the country average ROA at a given date	2885	0%	1.01%	0.03%
ROE DEV	ROE minus the country average ROE at a given date	2885	-0.8%	83.89%	-6.3%
Top ROA DEV	Dummy variable equal to 1 if ROA_DEV is in the last decile in at a given date; 0 otherwise	2885	11.58%		
Top ROE DEV	Dummy variable equal to 1 if ROA_DEV is in the last decile at a given date; 0 otherwise	2885	12.06%		
Top ROA2%	Dummy variable equal to 1 if ROA is above 2%	2885	4.82%		
Top ROE10%	Dummy variable equal to 1 if ROE is above 10%	2885	37.78%		

Table 3: Descriptive statistics

This table presents descriptive statistics of variables used in the model. Data for Cap ratio, Size, ST fund ratio is collected on Bloomberg. Data for GDP growth and Inflation rate is obtained from S&P IQ Capital. Data for 3bank asset and Credit to GDP is obtained from the Global Financial Development Database of the World Bank. The sample covers the period June 2001 to December 2014. We do not observe these variables after the distress date, hence the difference in total observations with Panel B of table 1.

	Description	# obs.	Mean	StD	Median
Cap ratio	Accounting capital ratio	2885	8.14%	7.11%	6.93%
Size	Logarithm of total assets	2885	9.63	2.47	9.85
ST fund ratio	Ratio of market funding with maturity under 1 year over total liabilities	2885	14.12%	11.70%	11.38%
GDP Growth	Semi-annual real GDP growth	2885	1.05%	2.80%	1.24%
Inflation	Semi-annual inflation rate	2885	2.18%	1.38%	2.19%
3bank asset	Share of 3 largest commercial banks assets over the sector total assets	2885	72.03%	16.16%	72.72%
Credit to GDP	Share of private credit from deposit money banks and other financial institutions to GDP	2885	108.12%	45.34%	93.4%

Table 4: Past ROA levels and the probability of financial distress

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. All explanatory variables are lagged with the lag number indicated at the top of each column. ROA is bank's return on assets. Size is the logarithm of bank's total assets. ST fund ratio is the share of market funding with a maturity of less than one year over the total liabilities of the bank. Cap ratio is the accounting capital ratio of the bank. GDP growth is the semi-annual real GDP growth. Inflation rate is the semi-annual inflation rate. 3bank asset is the share of the 3 largest commercial banks over the sector total assets. Credit to GDP is the share of private credit from deposit money banks and other financial institutions to GDP. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual except for 3bank asset and Credit to GDP where only annual data is available. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
Intercept	-8.611*** (1.742)	-7.994*** (1.539)	-5.636*** (1.487)	-3.079* (1.705)	-1.520 (1.822)	-2.863 (1.810)	-2.428 (1.877)	-5.896*** (1.971)
ROA	-30.096*** (6.899)	-10.021 (7.729)	-10.669 (10.994)	-11.487 (11.948)	-2.442 (28.321)	40.665** (18.357)	40.866 (27.171)	9.572 (24.185)
Size	0.098 (0.075)	0.077 (0.073)	0.023 (0.075)	-0.002 (0.081)	-0.024 (0.095)	-0.060 (0.092)	-0.069 (0.095)	-0.014 (0.103)
ST fund ratio	1.943* (1.107)	3.147*** (1.004)	1.459 (1.065)	1.553 (1.135)	0.549 (1.622)	0.636 (1.535)	-0.736 (1.528)	0.843 (1.586)
Cap ratio	-14.478*** (5.231)	-4.545 (4.213)	-6.374* (3.721)	-6.625* (4.021)	-7.182 (6.333)	-18.190*** (6.762)	-23.188*** (7.828)	-10.685 (6.762)
GDP growth	-18.144*** (4.296)	-9.893 (6.110)	8.688 (7.736)	17.198*** (6.643)	9.109 (7.148)	-19.336*** (5.789)	-8.745 (6.636)	21.490*** (6.962)
Inflation	53.734*** (8.412)	39.870*** (8.466)	10.244 (10.650)	-45.626*** (17.568)	-76.684*** (19.525)	19.064 (17.320)	36.601*** (11.311)	23.374*** (9.027)
3bank asset	2.178* (1.137)	1.152 (0.934)	-0.019 (0.899)	-1.681* (0.970)	-2.165** (1.062)	-0.415 (1.024)	-0.827 (1.038)	1.500 (1.001)
Credit to GDP	0.965*** (0.365)	1.013*** (0.334)	1.117*** (0.352)	1.195*** (0.404)	1.107** (0.468)	0.460 (0.423)	0.454 (0.487)	0.580 (0.558)
# obs.	2662	2408	2169	1943	1737	1538	1363	1195
Pseudo-R ²	0.1857	0.0837	0.0453	0.0624	0.0909	0.0566	0.0668	0.0727
Log-likelihood	-179.18	-193.98	-186.52	-171.76	-155.74	-150.39	-138.05	-126.56
LLR p-value	<0.0001	<0.0001	0.024	0.004	0.000	0.021	0.011	0.011

Table 5: Past ROE levels and the probability of financial distress

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. All explanatory variables are lagged with the lag number indicated at the top of each column. ROE is bank's return on equity. Size is the logarithm of bank's total assets. ST fund ratio is the share of market funding with a maturity of less than one year over the total liabilities of the bank. Cap ratio is the accounting capital ratio of the bank. GDP growth is the semi-annual real GDP growth. Inflation rate is the semi-annual inflation rate. 3bank asset is the share of the 3 largest commercial banks over the sector total assets. Credit to GDP is the share of private credit from deposit money banks and other financial institutions to GDP. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual except for 3bank asset and Credit to GDP where only annual data is available. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
Intercept	-7.067*** (1.846)	-7.657*** (1.603)	-5.347*** (1.557)	-2.924 (1.832)	-1.473 (1.823)	-4.069** (1.725)	-3.119 (1.932)	-6.037*** (1.958)
ROE	0.026 (0.024)	0.060 (0.043)	0.046 (0.048)	0.023 (0.031)	0.015 (0.100)	-0.496 (1.053)	1.066 (1.263)	0.115 (1.078)
Size	0.022 (0.084)	0.063 (0.078)	0.009 (0.080)	-0.010 (0.088)	-0.027 (0.094)	0.000 (0.088)	-0.040 (0.092)	-0.008 (0.101)
ST fund ratio	1.741 (1.116)	3.063*** (1.014)	1.354 (1.063)	1.452 (1.152)	0.526 (1.605)	0.770 (1.552)	-0.688 (1.565)	0.880 (1.582)
Cap ratio	-21.844*** (6.856)	-6.313 (5.168)	-8.104* (4.379)	-7.920 (5.065)	-7.507 (5.919)	-10.511** (5.155)	-16.919** (7.066)	-9.286 (5.844)
GDP growth	-23.226*** (4.177)	-11.704* (6.311)	6.998 (7.799)	15.748** (6.957)	8.805 (7.637)	-15.705** (6.420)	-7.284 (6.712)	22.038*** (6.997)
Inflation	54.628*** (8.457)	40.111*** (8.550)	10.590 (10.625)	-44.799** (17.401)	-76.523*** (19.487)	19.203 (17.793)	37.364*** (11.118)	23.547*** (8.943)
3bank asset	1.675 (1.101)	1.011 (0.908)	-0.097 (0.883)	-1.707* (0.975)	-2.175** (1.049)	0.033 (1.050)	-0.594 (1.026)	1.534 (1.002)
Credit to GDP	1.006*** (0.354)	1.020*** (0.333)	1.118*** (0.350)	1.182*** (0.405)	1.103** (0.477)	0.467 (0.426)	0.407 (0.491)	0.584 (0.558)
# obs.	2662	2408	2169	1943	1737	1538	1363	1195
Pseudo-R ²	0.1636	0.0832	0.0446	0.0616	0.0909	0.0499	0.0627	0.0724
Log-likelihood	-184.04	-194.07	-186.65	-171.92	-155.74	-151.47	-138.65	-126.61
LLR p-value	<0.0001	<0.0001	0.026	0.004	0.000	0.044	0.017	0.011

Table 6: Past Top ROA levels and the probability of financial distress

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. All explanatory variables are lagged with the lag number indicated at the top of each column. Top ROA is a dummy variable equal to 1 if a bank is in the ROA top decile at a given period and 0 otherwise. Size is the logarithm of bank's total assets. ST fund ratio is the share of market funding with a maturity of less than one year over the total liabilities of the bank. Cap ratio is the accounting capital ratio of the bank. GDP growth is the semi-annual real GDP growth. Inflation rate is the semi-annual inflation rate. 3bank asset is the share of the 3 largest commercial banks over the sector total assets. Credit to GDP is the share of private credit from deposit money banks and other financial institutions to GDP. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual except for 3bank asset and Credit to GDP where only annual data is available. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
Intercept	-7.213*** (1.839)	-7.869*** (1.520)	-5.607*** (1.513)	-3.048* (1.834)	-1.298 (1.918)	-3.783** (1.762)	-2.821 (1.867)	-6.214*** (2.008)
Top ROA	-0.550 (1.103)	-1.194 (1.061)	-1.265 (1.053)	-0.359 (0.747)	0.494 (0.713)	0.042 (0.874)	0.791 (0.663)	-0.399 (0.887)
Size	0.025 (0.083)	0.067 (0.074)	0.014 (0.078)	-0.008 (0.087)	-0.029 (0.096)	-0.016 (0.086)	-0.044 (0.091)	0.001 (0.104)
ST fund ratio	1.787 (1.108)	3.125*** (1.015)	1.463 (1.065)	1.517 (1.133)	0.416 (1.607)	0.794 (1.556)	-0.656 (1.506)	0.901 (1.586)
Cap ratio	-20.234*** (6.778)	-3.913 (4.512)	-5.359 (4.321)	-6.763 (5.404)	-9.163 (7.251)	-11.606* (6.599)	-20.506*** (7.524)	-7.726 (6.767)
GDP growth	-22.583*** (4.167)	-10.454 (6.437)	8.517 (7.799)	16.275** (6.940)	8.324 (7.645)	-16.551*** (6.147)	-6.318 (6.500)	22.343*** (7.202)
Inflation	54.640*** (8.428)	40.435*** (8.669)	11.104 (10.727)	-44.791** (17.433)	-76.798*** (19.427)	19.576 (17.932)	36.428*** (10.279)	23.663*** (8.956)
3bank asset	1.746 (1.098)	1.100 (0.909)	-0.058 (0.884)	-1.678* (0.972)	-2.237** (1.063)	-0.070 (1.026)	-0.677 (1.038)	1.561 (1.003)
Credit to GDP	0.987*** (0.354)	1.001*** (0.339)	1.130*** (0.359)	1.192*** (0.407)	1.091** (0.468)	0.447 (0.431)	0.466 (0.484)	0.584 (0.569)
# obs.	2662	2408	2169	1943	1737	1538	1363	1195
Pseudo-R ²	0.1636	0.0869	0.0496	0.0621	0.0922	0.0487	0.0653	0.0734
Log-likelihood	-184.05	-193.30	-185.68	-171.82	-155.51	-151.66	-138.27	-126.47
LLR p-value	<0.0001	<0.0001	0.013	0.004	0.000	0.050	0.013	0.010

Table 7: Past Top ROE levels and the probability of financial distress

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. All explanatory variables are lagged with the lag number indicated at the top of each column. Top ROE is a dummy variable equal to 1 if a bank is in the ROE top decile at a given period and 0 otherwise. Size is the logarithm of bank's total assets. ST fund ratio is the share of market funding with a maturity of less than one year over the total liabilities of the bank. Cap ratio is the accounting capital ratio of the bank. GDP growth is the semi-annual real GDP growth. Inflation rate is the semi-annual inflation rate. 3bank asset is the share of the 3 largest commercial banks over the sector total assets. Credit to GDP is the share of private credit from deposit money banks and other financial institutions to GDP. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual except for 3bank asset and Credit to GDP where only annual data is available. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
Intercept	-7.129*** (1.848)	-7.665*** (1.596)	-5.348*** (1.554)	-2.970 (1.838)	-1.588 (1.820)	-3.820** (1.728)	-3.222* (1.842)	-6.076*** (1.943)
Top ROE	-0.108 (0.588)	-0.430 (0.593)	-0.204 (0.527)	0.129 (0.473)	0.426 (0.508)	0.270 (0.567)	0.095 (0.571)	-0.696 (0.695)
Size	0.023 (0.084)	0.064 (0.077)	0.009 (0.079)	-0.008 (0.088)	-0.023 (0.094)	-0.015 (0.085)	-0.030 (0.087)	-0.002 (0.100)
ST fund ratio	1.783 (1.107)	3.081*** (1.016)	1.386 (1.051)	1.432 (1.162)	0.418 (1.633)	0.791 (1.554)	-0.672 (1.537)	1.007 (1.595)
Cap ratio	-21.224*** (6.751)	-6.219 (5.084)	-8.116* (4.371)	-7.678 (5.071)	-6.930 (5.715)	-11.178* (5.919)	-16.827** (6.690)	-9.637 (5.895)
GDP growth	-22.613*** (4.092)	-10.704* (6.252)	7.697 (7.876)	15.579** (6.850)	8.049 (7.495)	-16.649*** (6.030)	-5.960 (6.595)	22.821*** (6.998)
Inflation	54.322*** (8.422)	40.076*** (8.565)	10.634 (10.600)	-44.783*** (17.234)	-75.722*** (19.185)	19.018 (17.879)	37.700*** (11.218)	25.035*** (9.218)
3bank asset	1.720 (1.093)	1.029 (0.911)	-0.111 (0.891)	-1.675* (0.975)	-2.084** (1.059)	-0.068 (1.011)	-0.561 (1.029)	1.493 (1.040)
Credit to GDP	0.994*** (0.353)	1.024*** (0.335)	1.129*** (0.350)	1.167*** (0.401)	1.050** (0.471)	0.437 (0.420)	0.444 (0.481)	0.608 (0.565)
# obs.	2662	2408	2169	1943	1737	1538	1363	1195
Pseudo-R ²	0.1630	0.0839	0.0447	0.0617	0.0926	0.0494	0.0608	0.0761
Log-likelihood	-184.19	-193.93	-186.64	-171.90	-155.44	-151.55	-138.94	-126.10
LLR p-value	<0.0001	<0.0001	0.026	0.004	0.000	0.046	0.021	0.008

Table 8: Past ROA deviation from country average and the probability of financial distress

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. All explanatory variables are lagged with the lag number indicated at the top of each column. ROA DEV is the deviation between bank's return on assets and its country average at a given date. Size is the logarithm of bank's total assets. ST fund ratio is the share of market funding with a maturity of less than one year over the total liabilities of the bank. Cap ratio is the accounting capital ratio of the bank. GDP growth is the semi-annual real GDP growth. Inflation rate is the semi-annual inflation rate. 3bank asset is the share of the 3 largest commercial banks over the sector total assets. Credit to GDP is the share of private credit from deposit money banks and other financial institutions to GDP. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual except for 3bank asset and Credit to GDP where only annual data is available. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
Intercept	-7.836*** (1.814)	-7.738*** (1.595)	-5.228*** (1.568)	-2.623 (1.871)	-0.989 (1.997)	-2.920 (1.806)	-2.047 (1.875)	-6.279*** (1.930)
ROA DEV	-21.721** (10.978)	-0.500 (12.725)	9.101 (16.988)	19.177 (21.902)	25.996 (20.559)	40.506*** (14.141)	59.529*** (16.141)	-10.014 (16.595)
Size	0.058 (0.079)	0.066 (0.077)	0.003 (0.080)	-0.022 (0.088)	-0.050 (0.102)	-0.058 (0.088)	-0.083 (0.092)	0.004 (0.102)
ST fund ratio	1.808 (1.126)	3.090*** (1.012)	1.340 (1.069)	1.394 (1.167)	0.446 (1.625)	0.747 (1.541)	-0.879 (1.529)	0.937 (1.559)
Cap ratio	-18.549*** (6.642)	-5.845 (5.003)	-8.660** (4.295)	-9.472* (4.943)	-10.088 (7.029)	-16.126*** (6.078)	-24.454*** (6.904)	-8.291 (5.957)
GDP growth	-22.929*** (4.188)	-11.249* (6.224)	7.350 (7.679)	15.936** (6.932)	9.064 (7.632)	-15.866*** (6.158)	-4.853 (6.740)	22.418*** (7.091)
Inflation	53.567*** (8.374)	39.874*** (8.565)	10.520 (10.733)	-45.055*** (17.332)	-76.554*** (19.479)	20.496 (18.525)	42.389*** (10.412)	22.645** (9.193)
3bank asset	1.894* (1.098)	1.049 (0.909)	-0.114 (0.889)	-1.768* (0.994)	-2.274** (1.078)	-0.245 (1.038)	-0.835 (1.056)	1.603 (0.986)
Credit to GDP	1.018*** (0.352)	1.013*** (0.334)	1.107*** (0.354)	1.170*** (0.412)	1.101** (0.482)	0.407 (0.430)	0.381 (0.496)	0.596 (0.567)
# obs.	2662	2408	2169	1943	1737	1538	1363	1195
Pseudo-R ²	0.1683	0.0826	0.0447	0.0628	0.0934	0.0562	0.0770	0.0728
Log-likelihood	-183.02	-194.21	-186.64	-171.71	-155.31	-150.46	-136.54	-126.54
LLR p-value	<0.0001	<0.0001	0.026	0.003	<0.0001	0.022	0.004	0.011

Table 9: Past ROE deviation from country average and the probability of financial distress

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. All explanatory variables are lagged with the lag number indicated at the top of each column. ROE DEV is the deviation between bank's return on assets and its country average at a given date. Size is the logarithm of bank's total assets. ST fund ratio is the share of market funding with a maturity of less than one year over the total liabilities of the bank. Cap ratio is the accounting capital ratio of the bank. GDP growth is the semi-annual real GDP growth. Inflation rate is the semi-annual inflation rate. 3bank asset is the share of the 3 largest commercial banks over the sector total assets. Credit to GDP is the share of private credit from deposit money banks and other financial institutions to GDP. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual except for 3bank asset and Credit to GDP where only annual data is available. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
Intercept	-7.107*** (1.839)	-7.708*** (1.598)	-5.369*** (1.554)	-2.936 (1.833)	-1.502 (1.813)	-3.811** (1.727)	-3.267* (1.818)	-5.878*** (1.982)
ROE DEV	-0.064 (0.047)	-0.097 (0.078)	-0.091 (0.069)	-0.040 (0.083)	0.108 (0.124)	0.449 (1.538)	0.810 (1.461)	-2.899 (2.916)
Size	0.025 (0.084)	0.067 (0.078)	0.010 (0.080)	-0.009 (0.088)	-0.025 (0.094)	-0.014 (0.084)	-0.024 (0.085)	-0.024 (0.104)
ST fund ratio	1.731 (1.117)	3.064*** (1.013)	1.355 (1.060)	1.454 (1.150)	0.540 (1.606)	0.811 (1.544)	-0.643 (1.520)	0.799 (1.612)
Cap ratio	-21.768*** (6.796)	-6.120 (5.127)	-8.028* (4.367)	-7.875 (5.059)	-7.299 (5.809)	-11.509* (6.128)	-16.935*** (6.471)	-9.412 (5.946)
GDP growth	-23.583*** (4.264)	-11.976* (6.246)	6.763 (7.790)	15.699** (6.955)	9.188 (7.653)	-16.026*** (5.863)	-4.856 (6.337)	18.977** (8.175)
Inflation	54.850*** (8.480)	40.283*** (8.542)	10.760 (10.571)	-44.720** (17.398)	-77.013*** (19.472)	19.681 (17.740)	38.309*** (11.067)	21.653** (9.516)
3bank asset	1.656 (1.100)	0.987 (0.910)	-0.106 (0.881)	-1.707* (0.974)	-2.159** (1.052)	-0.015 (1.020)	-0.508 (1.052)	1.367 (1.031)
Credit to GDP	1.018*** (0.356)	1.031*** (0.334)	1.123*** (0.350)	1.183*** (0.405)	1.100** (0.481)	0.441 (0.430)	0.448 (0.495)	0.542 (0.554)
# obs.	2662	2408	2169	1943	1737	1538	1363	1195
Pseudo-R ²	0.1640	0.0834	0.0447	0.0616	0.0911	0.0488	0.0610	0.0754
Log-likelihood	-183.96	-194.03	-186.63	-171.92	-155.70	-151.64	-138.90	-126.20
LLR p-value	<0.0001	<0.0001	0.026	0.004	0.000	0.049	0.021	0.008

Table 10: Past top ROA deviation from country average and the probability of financial distress

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. All explanatory variables are lagged with the lag number indicated at the top of each column. Top ROA DEV is a dummy variable equal to 1 if a bank is in the ROA_DEV top decile at a given period and 0 otherwise. Size is the logarithm of bank's total assets. ST fund ratio is the share of market funding with a maturity of less than one year over the total liabilities of the bank. Cap ratio is the accounting capital ratio of the bank. GDP growth is the semi-annual real GDP growth. Inflation rate is the semi-annual inflation rate. 3bank asset is the share of the 3 largest commercial banks over the sector total assets. Credit to GDP is the share of private credit from deposit money banks and other financial institutions to GDP. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual except for 3bank asset and Credit to GDP where only annual data is available. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
Intercept	-7.158*** (1.839)	-7.695*** (1.616)	-5.338*** (1.556)	-2.785 (1.857)	-1.268 (1.895)	-3.644** (1.761)	-3.057* (1.830)	-5.589*** (1.975)
Top ROA DEV	0.168 (0.642)	0.426 (0.535)	0.295 (0.612)	0.529 (0.652)	0.723 (0.679)	0.750 (0.654)	1.064* (0.605)	1.349** (0.620)
Size	0.023 (0.083)	0.064 (0.078)	0.010 (0.080)	-0.010 (0.088)	-0.028 (0.096)	-0.019 (0.085)	-0.031 (0.087)	-0.022 (0.102)
ST fund ratio	1.796 (1.102)	3.077*** (1.006)	1.335 (1.072)	1.347 (1.197)	0.360 (1.684)	0.648 (1.566)	-0.905 (1.524)	0.505 (1.580)
Cap ratio	-21.444*** (6.661)	-7.212 (5.291)	-8.841* (4.583)	-9.869* (5.497)	-10.258 (7.139)	-14.297** (6.493)	-20.981*** (6.979)	-15.972** (6.873)
GDP growth	-22.681*** (4.078)	-11.156* (6.108)	7.341 (7.685)	15.778** (6.898)	8.846 (7.565)	-16.339*** (6.204)	-5.670 (6.709)	21.788*** (6.827)
Inflation	54.284*** (8.399)	39.992*** (8.591)	10.329 (10.573)	-45.559*** (17.282)	-77.901*** (19.399)	19.569 (18.095)	38.281*** (10.435)	25.456*** (8.951)
3bank asset	1.754 (1.114)	1.089 (0.923)	-0.077 (0.892)	-1.731* (0.988)	-2.233** (1.075)	-0.046 (1.033)	-0.568 (1.043)	1.534 (1.033)
Credit to GDP	0.989*** (0.351)	1.004*** (0.334)	1.111*** (0.352)	1.176*** (0.409)	1.112** (0.477)	0.450 (0.423)	0.473 (0.488)	0.587 (0.559)
# obs.	2662	2408	2169	1943	1737	1538	1363	1195
Pseudo-R ²	0.1631	0.0840	0.0449	0.0634	0.0944	0.0529	0.0691	0.0883
Log-likelihood	-184.17	-193.90	-186.59	-171.58	-155.13	-150.99	-137.70	-124.44
LLR p-value	<0.0001	<0.0001	0.025	0.003	<0.0001	0.031	0.009	0.002

Table 11: Past top ROE deviation from country average and the probability of financial distress

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. All explanatory variables are lagged with the lag number indicated at the top of each column. Top ROE DEV is a dummy variable equal to 1 if a bank is in the ROE_DEV top decile at a given period and 0 otherwise. Size is the logarithm of bank's total assets. ST fund ratio is the share of market funding with a maturity of less than one year over the total liabilities of the bank. Cap ratio is the accounting capital ratio of the bank. GDP growth is the semi-annual real GDP growth. Inflation rate is the semi-annual inflation rate. 3bank asset is the share of the 3 largest commercial banks over the sector total assets. Credit to GDP is the share of private credit from deposit money banks and other financial institutions to GDP. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual except for 3bank asset and Credit to GDP where only annual data is available. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
Intercept	-8.083*** (1.901)	-7.727*** (1.646)	-5.504*** (1.576)	-3.686** (1.820)	-2.221 (1.847)	-4.067** (1.639)	-3.266* (1.856)	-5.703*** (2.003)
Top ROE DEV	1.624*** (0.382)	-0.003 (0.453)	0.284 (0.438)	1.165*** (0.410)	1.041** (0.462)	0.585 (0.512)	0.128 (0.600)	-0.830 (1.006)
Size	0.025 (0.087)	0.065 (0.077)	0.012 (0.080)	0.008 (0.087)	-0.012 (0.095)	-0.017 (0.085)	-0.029 (0.087)	-0.017 (0.103)
ST fund ratio	2.000* (1.126)	3.088*** (1.012)	1.371 (1.061)	1.429 (1.199)	0.519 (1.591)	0.785 (1.542)	-0.663 (1.527)	0.843 (1.596)
Cap ratio	-17.451*** (6.593)	-5.890 (5.024)	-7.687* (4.270)	-6.638 (4.825)	-6.434 (5.558)	-11.410** (5.755)	-16.917** (6.601)	-9.746 (5.947)
GDP growth	-16.175*** (4.129)	-11.253* (6.045)	7.703 (7.406)	17.179** (6.821)	9.504 (7.721)	-16.750*** (6.286)	-5.887 (6.844)	22.056*** (7.079)
Inflation	51.446*** (8.718)	39.890*** (8.428)	10.335 (10.532)	-46.092*** (17.692)	-76.427*** (20.196)	20.611 (17.801)	38.089*** (11.032)	22.740** (8.909)
3bank asset	2.253* (1.186)	1.047 (0.932)	-0.032 (0.914)	-1.429 (1.057)	-1.843 (1.160)	0.163 (0.999)	-0.535 (1.059)	1.373 (1.001)
Credit to GDP	0.960*** (0.358)	1.013*** (0.334)	1.124*** (0.348)	1.276*** (0.407)	1.203** (0.478)	0.469 (0.422)	0.452 (0.491)	0.587 (0.565)
# obs.	2662	2408	2169	1943	1737	1538	1363	1195
Pseudo-R ²	0.2058	0.0826	0.0451	0.0803	0.1052	0.0523	0.0608	0.0754
Log-likelihood	-174.77	-194.21	-186.55	-168.49	-153.29	-151.08	-138.94	-126.20
LLR p-value	<0.0001	<0.0001	0.024	0.000	<0.0001	0.034	0.021	0.008

Table 12: Past ROA above a 2% threshold and the probability of financial distress

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. All explanatory variables are lagged with the lag number indicated at the top of each column. Top ROA2% is a dummy variable equal to 1 if a bank's return on assets is above 2% at a given period and 0 otherwise. Size is the logarithm of bank's total assets. ST fund ratio is the share of market funding with a maturity of less than one year over the total liabilities of the bank. Cap ratio is the accounting capital ratio of the bank. GDP growth is the semi-annual real GDP growth. Inflation rate is the semi-annual inflation rate. 3bank asset is the share of the 3 largest commercial banks over the sector total assets. Credit to GDP is the share of private credit from deposit money banks and other financial institutions to GDP. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual except for 3bank asset and Credit to GDP where only annual data is available. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
Intercept	-7.116*** (1.857)	-7.776*** (1.578)	-5.345*** (1.570)	-2.879 (1.857)	-1.090 (1.954)	-3.754** (1.770)	-2.457 (1.899)	-6.013*** (1.980)
Top ROA2%	0.481 (1.146)	-0.439 (1.063)	0.220 (0.757)	0.234 (0.766)	1.279* (0.738)	0.210 (1.169)	1.730** (0.743)	0.126 (0.827)
Size	0.024 (0.084)	0.065 (0.077)	0.010 (0.080)	-0.009 (0.088)	-0.028 (0.096)	-0.017 (0.086)	-0.054 (0.093)	-0.008 (0.101)
ST fund ratio	1.765 (1.099)	3.127*** (1.005)	1.330 (1.031)	1.402 (1.140)	0.111 (1.556)	0.778 (1.546)	-0.692 (1.462)	0.876 (1.597)
Cap ratio	-21.591*** (6.964)	-5.304 (5.062)	-8.357* (4.769)	-8.424 (5.502)	-11.239 (7.305)	-11.826* (6.252)	-23.464*** (7.650)	-9.693 (6.846)
GDP growth	-22.942*** (4.099)	-10.896* (6.379)	6.959 (7.830)	15.513** (6.996)	6.915 (7.603)	-16.653*** (6.153)	-8.158 (6.463)	21.953*** (6.913)
Inflation	54.011*** (8.434)	40.015*** (8.591)	10.407 (10.557)	-44.812*** (17.341)	-75.850*** (19.320)	19.478 (17.795)	35.461*** (9.743)	23.649*** (8.862)
3bank asset	1.716 (1.103)	1.062 (0.907)	-0.086 (0.886)	-1.711* (0.978)	-2.256** (1.066)	-0.077 (1.016)	-0.720 (1.066)	1.541 (1.011)
Credit to GDP	0.991*** (0.351)	1.014*** (0.334)	1.110*** (0.347)	1.171*** (0.404)	1.046** (0.470)	0.447 (0.422)	0.432 (0.454)	0.585 (0.560)
# obs.	2662	2408	2169	1943	1737	1538	1363	1195
Pseudo-R ²	0.1633	0.0830	0.0445	0.0617	0.0981	0.0488	0.0785	0.0724
Log-likelihood	-184.12	-194.11	-186.67	-171.89	-154.50	-151.64	-136.31	-126.60
LLR p-value	<0.0001	<0.0001	0.026	0.004	<0.0001	0.049	0.003	0.011

Table 13: Past ROE above a 10% threshold and the probability of financial distress

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. All explanatory variables are lagged with the lag number indicated at the top of each column. Top ROE10% is a dummy variable equal to 1 if a bank's return on equity is above 10% at a given period and 0 otherwise. Size is the logarithm of bank's total assets. ST fund ratio is the share of market funding with a maturity of less than one year over the total liabilities of the bank. Cap ratio is the accounting capital ratio of the bank. GDP growth is the semi-annual real GDP growth. Inflation rate is the semi-annual inflation rate. 3bank asset is the share of the 3 largest commercial banks over the sector total assets. Credit to GDP is the share of private credit from deposit money banks and other financial institutions to GDP. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual except for 3bank asset and Credit to GDP where only annual data is available. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
Intercept	-7.196*** (1.818)	-7.695*** (1.599)	-5.394*** (1.552)	-2.928 (1.847)	-1.498 (1.865)	-3.722** (1.754)	-3.201* (1.839)	-6.046*** (1.952)
Top ROE10%	-0.135 (0.382)	0.168 (0.356)	-0.034 (0.345)	0.218 (0.332)	0.484 (0.317)	0.539 (0.357)	0.175 (0.400)	0.037 (0.418)
Size	0.027 (0.081)	0.062 (0.077)	0.011 (0.079)	-0.014 (0.087)	-0.035 (0.096)	-0.024 (0.087)	-0.033 (0.086)	-0.007 (0.100)
ST fund ratio	1.791 (1.096)	3.089*** (1.010)	1.378 (1.052)	1.377 (1.175)	0.313 (1.671)	0.650 (1.564)	-0.703 (1.527)	0.875 (1.542)
Cap ratio	-21.159*** (6.656)	-5.789 (4.973)	-7.894* (4.327)	-7.857 (5.113)	-7.239 (5.950)	-11.158* (6.019)	-16.712** (6.775)	-9.229 (5.943)
GDP growth	-22.103*** (4.639)	-12.241* (6.507)	7.538 (8.078)	14.314** (6.907)	5.781 (7.327)	-18.725*** (5.677)	-6.643 (6.748)	21.999*** (7.196)
Inflation	54.548*** (8.256)	39.750*** (8.490)	10.445 (10.629)	-44.120** (17.464)	-74.788*** (19.659)	18.543 (17.823)	37.338*** (11.132)	23.491*** (8.947)
3bank asset	1.813 (1.154)	0.940 (0.960)	-0.068 (0.920)	-1.750* (0.976)	-2.262** (1.048)	-0.392 (1.041)	-0.648 (1.053)	1.524 (0.988)
Credit to GDP	0.983*** (0.354)	1.019*** (0.331)	1.116*** (0.351)	1.168*** (0.404)	1.059** (0.473)	0.468 (0.419)	0.450 (0.492)	0.584 (0.560)
# obs.	2662	2408	2169	1943	1737	1538	1363	1195
Pseudo-R ²	0.1632	0.0831	0.0443	0.0625	0.0955	0.0547	0.0613	0.0724
Log-likelihood	-184.14	-194.10	-186.70	-171.76	-154.95	-150.71	-138.86	-126.60
LLR p-value	<0.0001	<0.0001	0.027	0.003	<0.0001	0.026	0.020	0.011

Table 14: Marginal effects

This table reports the marginal effects of the logit regressions presented in Tables 4 to 13. We only report the results for the coefficient of the profitability measure which is displayed at the beginning of the line. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
ROA	-0.441***	-0.165	-0.184	-0.163	0.079	0.830**	0.873	0.252
ROE	0.0002	0.0007	0.0007	0.0007	0.0004	-0.009	0.027	0.007
Top ROA	0.009	0.021	0.022	0.005	0.011	0.0001	0.017	0.010
Top ROE	-0.0007	-0.006	-0.001	0.007	0.012	0.006	0.003	-0.016
ROA DEV	-0.298**	0.069	0.250	0.418	0.488	0.862***	1.334***	-0.196
ROE DEV	-0.0004	-0.0008	-0.0008	-0.0002	0.003	0.012	0.019	-0.078
Top ROA DEV	0.003	0.008	0.006	0.010	0.013	0.015	0.022*	0.031**
Top ROE DEV	0.024***	-0.0001	0.004	0.019***	0.018**	0.011	0.002	-0.019
Top ROA2%	0.007	-0.007	0.007	0.009	0.028*	0.004	0.038**	0.003
Top ROE10%	-0.003	0.002	-0.0008	0.005	0.011	0.011	0.004	0.002

Table 15: Robustness check: Without country-level control variables

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. We only report the results for the coefficient of the profitability measure which is displayed at the beginning of the line. All explanatory variables are lagged with the lag number indicated at the top of each column. Size is the logarithm of bank's total assets. ST fund ratio is the share of market funding with a maturity of less than one year over the total liabilities of the bank. Cap ratio is the accounting capital ratio of the bank. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
ROA	-34.542*** (6.364)	-12.767** (5.965)	-5.320 (14.512)	-0.056 (23.690)	-7.074 (18.138)	14.066 (28.748)	38.601 (23.755)	40.111** (15.842)
ROE	-0.015 (0.017)	0.013 (0.021)	0.061 (0.093)	0.068 (0.152)	-0.001 (0.099)	-0.929 (0.796)	1.680 (1.782)	2.616 (1.692)
Top ROA	-0.505 (1.083)	-1.228 (1.050)	-1.111 (1.084)	-0.278 (0.789)	0.187 (0.737)	-0.133 (0.843)	0.966 (0.668)	-0.095 (0.880)
Top ROE	-0.192 (0.555)	-0.383 (0.575)	0.008 (0.527)	0.334 (0.470)	0.406 (0.479)	0.235 (0.535)	0.350 (0.554)	-0.319 (0.731)
ROA DEV	-22.646** (11.294)	3.233 (15.274)	13.707 (16.807)	20.091 (19.144)	26.849 (18.111)	44.465*** (13.661)	47.676*** (14.795)	-8.102 (13.163)
ROE DEV	0.049 (0.038)	0.016 (0.047)	-0.074 (0.091)	-0.120 (0.143)	0.137 (0.140)	1.005* (0.538)	0.385 (2.606)	-8.393*** (2.677)
Top ROA DEV	0.352 (0.625)	0.487 (0.532)	0.343 (0.597)	0.484 (0.599)	0.555 (0.645)	0.787 (0.622)	1.017* (0.600)	1.276** (0.622)
Top ROE DEV	1.829*** (0.344)	0.091 (0.488)	0.172 (0.440)	1.030** (0.405)	1.037** (0.439)	0.509 (0.525)	0.024 (0.584)	-1.090 (0.947)
Top ROA2%	0.382 (1.036)	-0.491 (1.035)	0.515 (0.780)	0.539 (0.791)	1.033 (0.750)	-0.135 (1.108)	1.873*** (0.719)	0.714 (0.923)
Top ROE10%	-0.428 (0.318)	-0.007 (0.302)	0.073 (0.312)	0.324 (0.325)	0.276 (0.344)	0.175 (0.344)	0.226 (0.379)	0.612 (0.418)

Table 16: Robustness check: Without bank-level control variables

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. We only report the results for the coefficient of the profitability measure which is displayed at the beginning of the line. All explanatory variables are lagged with the lag number indicated at the top of each column. GDP growth is the semi-annual real GDP growth. Inflation rate is the semi-annual inflation rate. 3bank asset is the share of the 3 largest commercial banks over the sector total assets. Credit to GDP is the share of private credit from deposit money banks and other financial institutions to GDP. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual except for 3bank asset and Credit to GDP where only annual data is available. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
ROA	-16.147*** (5.718)	-7.264** (3.642)	-7.298* (3.779)	-5.005 (3.627)	-1.299 (4.203)	5.555 (7.896)	-0.118 (6.980)	-4.057 (4.181)
ROE	-0.013 (0.017)	0.042 (0.035)	0.034 (0.050)	0.014 (0.033)	-0.009 (0.115)	-0.720 (1.151)	1.868 (1.681)	0.511 (1.612)
Top ROA	-1.487 (1.058)	-1.543 (1.041)	-1.561 (1.022)	-0.727 (0.714)	0.021 (0.612)	-0.520 (0.777)	0.004 (0.577)	-0.731 (0.787)
Top ROE	0.139 (0.546)	-0.307 (0.593)	-0.073 (0.505)	0.282 (0.446)	0.530 (0.492)	0.385 (0.541)	0.224 (0.547)	-0.579 (0.701)
ROA DEV	-24.210** (10.137)	-5.285 (9.102)	-2.735 (11.605)	-0.028 (15.339)	4.892 (11.509)	8.257 (6.846)	9.396 (7.231)	-16.068 (12.464)
ROE DEV	-0.002 (0.036)	-0.079 (0.075)	-0.084 (0.077)	-0.040 (0.092)	0.083 (0.107)	-0.253 (0.694)	-0.249 (0.625)	-3.487 (2.855)
Top ROA DEV	-0.699 (0.630)	-0.042 (0.485)	-0.149 (0.554)	0.007 (0.567)	0.213 (0.555)	0.094 (0.573)	0.139 (0.546)	0.634 (0.540)
Top ROE DEV	1.724*** (0.339)	0.021 (0.446)	0.277 (0.454)	1.152*** (0.400)	1.035** (0.455)	0.545 (0.502)	0.031 (0.622)	-0.904 (1.014)
Top ROA2%	-0.551 (1.086)	-0.756 (1.044)	-0.212 (0.726)	-0.213 (0.727)	0.611 (0.652)	-0.426 (1.085)	0.687 (0.594)	-0.354 (0.688)
Top ROE10%	0.104 (0.382)	0.333 (0.354)	0.087 (0.350)	0.323 (0.337)	0.551* (0.319)	0.652* (0.363)	0.322 (0.403)	0.152 (0.421)

Table 17: Robustness check: With country fixed effects

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. We include country fixed effects and do not include country-level control variables. We only report the results for the coefficient of the profitability measure which is displayed at the beginning of the line. All explanatory variables are lagged with the lag number indicated at the top of each column. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
ROA	-34.784*** (7.558)	-9.812 (9.121)	-7.368 (12.233)	-5.152 (15.387)	-4.349 (11.422)	3.299 (25.573)	36.054 (28.493)	30.467 (27.821)
ROE	-0.007 (0.042)	0.014 (0.137)	0.077 (0.399)	0.064 (0.502)	-0.026 (0.291)	-1.008 (0.848)	2.200 (2.229)	3.000 (2.382)
Top ROA	-0.162 (1.801)	-0.922 (1.067)	-0.824 (1.076)	0.025 (0.828)	0.508 (0.732)	0.061 (0.869)	1.555* (0.800)	0.193 (0.905)
Top ROE	0.122 (0.594)	-0.273 (0.653)	0.098 (0.601)	0.517 (0.574)	0.661 (0.602)	0.534 (0.684)	0.857 (0.735)	-0.158 (0.896)
ROA DEV	-33.132** (0.163)	-8.049 (0.237)	2.054 (0.273)	8.534 (30.432)	21.832 (24.364)	49.097* (27.581)	56.949** (28.919)	-26.523 (40.252)
ROE DEV	0.026 (0.008)	0.003 (0.160)	-0.079 (0.330)	-0.116 (0.459)	0.213 (0.304)	0.672 (0.687)	0.521 (0.819)	-7.570* (4.460)
Top ROA DEV	-0.091 (0.670)	-0.059 (0.549)	-0.160 (0.605)	0.055 (0.624)	0.216 (0.637)	0.481 (0.691)	1.056 (0.735)	1.776** (0.753)
Top ROE DEV	1.728*** (0.378)	-0.227 (0.527)	-0.044 (0.532)	1.105** (0.456)	1.434*** (0.503)	1.162* (0.622)	0.520 (0.766)	-0.809 (1.165)
Top ROA2%	0.394 (1.117)	-0.516 (1.091)	0.549 (0.857)	0.600 (0.877)	1.159 (0.795)	-0.514 (1.152)	2.415** (1.034)	0.497 (0.996)
Top ROE10%	-0.703* (0.392)	-0.422 (0.373)	-0.325 (0.383)	-0.011 (0.389)	-0.072 (0.405)	-0.213 (0.430)	-0.075 (0.461)	0.198 (0.504)

Table 18: Robustness check: With year fixed effects

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. We include year fixed effects. We only report the results for the coefficient of the profitability measure which is displayed at the beginning of the line. All explanatory variables are lagged with the lag number indicated at the top of each column. GDP growth is the semi-annual real GDP growth. Inflation rate is the semi-annual inflation rate. 3bank asset is the share of the 3 largest commercial banks over the sector total assets. Credit to GDP is the share of private credit from deposit money banks and other financial institutions to GDP. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual except for 3bank asset and Credit to GDP where only annual data is available. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
ROA	-31.412*** (7.713)	-10.439 (13.848)	-19.038* (10.940)	-15.678 (13.105)	-10.860 (13.243)	16.881 (27.743)	26.104 (30.792)	4.745 (26.230)
ROE	0.016 (0.060)	0.091 (0.253)	0.067 (0.156)	0.017 (0.195)	-0.009 (0.240)	-0.738 (0.724)	1.427 (1.625)	0.408 (1.621)
Top ROA	-0.656 (1.071)	-1.282 (1.118)	-1.144 (1.072)	-0.156 (0.801)	0.466 (0.708)	-0.209 (0.816)	0.781 (0.674)	-0.535 (0.830)
Top ROE	-0.002 (0.551)	-0.314 (0.645)	0.042 (0.550)	0.488 (0.507)	0.737 (0.520)	0.420 (0.569)	0.413 (0.575)	-0.444 (0.765)
ROA DEV	-24.235* (0.134)	-0.251 (0.219)	19.756 (28.773)	23.655 (29.367)	33.126 (36.468)	52.441* (28.110)	68.230** (27.019)	-5.296 (23.832)
ROE DEV	-0.037 (0.092)	-0.093 (0.229)	-0.069 (0.157)	0.033 (0.323)	0.150 (0.298)	1.023 (0.680)	1.059 (2.324)	-3.808 (3.624)
Top ROA DEV	0.245 (0.666)	0.448 (0.562)	0.617 (0.599)	0.672 (0.610)	0.596 (0.611)	0.549 (0.619)	0.727 (0.649)	1.104* (0.639)
Top ROE DEV	1.941*** (0.385)	-0.244 (0.601)	0.344 (0.516)	1.298*** (0.418)	1.019** (0.456)	0.488 (0.542)	-0.213 (0.650)	-1.053 (1.053)
Top ROA2%	0.029 (1.123)	-1.055 (1.145)	0.041 (0.829)	0.238 (0.831)	1.072 (0.757)	-0.222 (1.103)	1.594** (0.731)	-0.128 (0.905)
Top ROE10%	-0.293 (0.450)	-0.004 (0.466)	-0.305 (0.448)	0.205 (0.446)	0.193 (0.448)	-0.002 (0.427)	-0.140 (0.432)	-0.244 (0.478)

Appendix: Estimations without profitability measures

This table reports the results of the logit regression of a bank financial distress on a set of explanatory variables. All explanatory variables are lagged with the lag number indicated at the top of each column. Size is the logarithm of bank's total assets. ST fund ratio is the share of market funding with a maturity of less than one year over the total liabilities of the bank. Cap ratio is the accounting capital ratio of the bank. GDP growth is the semi-annual real GDP growth. Inflation rate is the semi-annual inflation rate. 3bank asset is the share of the 3 largest commercial banks over the sector total assets. Credit to GDP is the share of private credit from deposit money banks and other financial institutions to GDP. The sample is composed of 266 European banks over the period June 2001 to December 2014. The frequency for all variables is semi-annual except for 3bank asset and Credit to GDP where only annual data is available. Clustered standard-errors at the bank level are reported into brackets. '***', '**' and '*' denote statistical significance, respectively, at the 1, 5 and 10%.

# lags of explanatory variables	Financial distress (dummy variable)							
	Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8
Intercept	-7.161*** (1.840)	-7.728*** (1.595)	-5.386*** (1.556)	-2.937 (1.833)	-1.478 (1.828)	-3.796** (1.724)	-3.218* (1.836)	-6.050*** (1.957)
Size	0.024 (0.084)	0.065 (0.077)	0.010 (0.080)	-0.009 (0.088)	-0.026 (0.094)	-0.016 (0.085)	-0.029 (0.087)	-0.007 (0.100)
ST fund ratio	1.790 (1.105)	3.088*** (1.009)	1.368 (1.061)	1.457 (1.152)	0.527 (1.603)	0.796 (1.555)	-0.661 (1.529)	0.887 (1.580)
Cap ratio	-21.033*** (6.591)	-5.887 (4.950)	-7.890* (4.331)	-7.840 (5.052)	-7.475 (5.930)	-11.486* (5.878)	-16.929** (6.599)	-9.268 (5.820)
GDP growth	-22.743*** (4.096)	-11.247* (6.223)	7.306 (7.718)	15.870** (6.936)	8.856 (7.651)	-16.536*** (6.199)	-5.870 (6.816)	22.185*** (7.129)
Inflation	54.278*** (8.376)	39.888*** (8.515)	10.440 (10.606)	-44.933*** (17.365)	-76.585*** (19.421)	19.650 (17.609)	37.896*** (11.003)	23.595*** (8.837)
3bank asset	1.730 (1.098)	1.047 (0.910)	-0.084 (0.885)	-1.703* (0.976)	-2.173** (1.051)	-0.065 (1.013)	-0.567 (1.026)	1.539 (1.007)
Credit to GDP	0.992*** (0.352)	1.013*** (0.333)	1.117*** (0.351)	1.182*** (0.406)	1.103** (0.477)	0.446 (0.423)	0.449 (0.493)	0.587 (0.562)
# obs.	2662	2408	2169	1943	1737	1538	1363	1195
Pseudo-R ²	0.1629	0.0826	0.0443	0.0615	0.0908	0.0487	0.0607	0.0724
Log-likelihood	-184.20	-194.21	-186.71	-171.93	-155.74	-151.66	-138.96	-126.61
LLR p-value	<0.0001	<0.0001	0.015	0.002	<0.0001	0.030	0.012	0.006

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