

# What is the information value of bank's stress tests? An investigation using banks' bond split ratings

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**Abstract:** Banks' activities are characterized by their inherent opacity. Bank opacity can be measured by the split ratings on banks themselves or on their bonds. In this paper, we study if the disclosure of the results of the stress tests brings valuable information to credit rating agencies. The disclosure of the results of the stress tests is supposed to bring transparency to the market participants and then may decrease the split ratings between the rating agencies. To conduct this study, we consider all the stress tests conducted in Europe (3) and in the United-States (6) between 2009 and 2015. To calculate the split rating variable, bonds' initial ratings are collected from Bloomberg database. We consider bonds jointly rated by Moody's and Standard & Poor's and issued by banks that participated to the European and US banks' stress tests. We first bring a statistical analysis by considering different measures of split ratings and second, we regress the split rating variable over some banks' financial variables from the stress test results disclosure. We find that the disclosure of the stress test results has a significant effect on the split ratings both for European and US banks. Our analysis of the split rating on the period before and after each stress test results disclosure in Europe and in the US shows that the stress tests have mixed effect on credit rating agencies. The detailed data disclosed by the stress tests could be interpreted differently by market's participants and these different interpretations may create more disagreements. This explains why, in most of the stress tests we studied, we find an increase in the split rating disagreements between Moody's and Standard & Poor's. However, we remark that in periods of distress i.e. during the European sovereign debt crisis, because of the high information need and the greater uncertainty, the stress tests results disclosure tends to decrease the split ratings.

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## 1. Introduction

Banking sector is one of the most regulated sectors in the economy in order to protect debt holders, especially depositors, and to prevent systemic risk. Arguments supporting the regulation of banks generally stem from asymmetric information which characterizes banks' activities (Santos, 2001). Because of the high bank opacity, it may be difficult for market's participants to correctly anticipate the performance and evaluate the riskiness of banks. For this reason, the role of credit rating agencies is especially crucial for banks. Financial ratings hold a key position in the financial market due to the signal they provide to investors. A strong financial rating permits to a firm to get an easier access to capital market with better conditions and is a very useful signal for depositors, debtors, regulators, etc. However, financial ratings have some inconsistencies identified in the literature (Shen et al., 2012). One of them is the fact that the same firm can receive different level of ratings from several rating agencies (Ederington, 1985; Beattie and Searle, 1992; Moon and Stotsky, 1993; Cantor and Packer, 1994) depending on how the agencies analyze public information and especially private information they manage to collect from rated firms. Contrarily to the common agents on the financial market, credit rating agencies have ability to access to private information. This ability is facilitated by the cooperation from the issuers as well as their willingness to share even confidential information. Hence, the rating disagreements or split ratings could be the results of dissimilar sets of information among rating agencies but could also reveal differences of interpretation of the various contents of these different sets of information.

Several studies show that both assets opaqueness and information asymmetry cause rating disagreements (Jewell and Livingston, 1998; Livingston et al. 2006, 2007). Morgan (2002) and Iannotta (2006) show that Moody's and Standard & Poor's have more split ratings over financial intermediaries than over non-financial firms, suggesting that banks are more difficult to rate because of the opacity of their assets and their high leverage. Even if prudential regulation tends to favor market discipline, the opaqueness of banks remains a concern for the regulatory authorities. Since the end of the 2008 financial crisis, European and American regulators, among others, have conducted different stress tests exercises in order to provide reliable information about banks and restore investors' confidence. A numerous literature tries to assess the efficiency of these tests. Petrella and Resti (2011), Morgan et al. (2014), Flannery et al. (2015) give some evidence that investors react to the information disclosed by the stress

tests meaning that there is a decrease in banks' opacity due to the transparency brought by the stress tests results.

In this paper, we aim to appreciate the informative value of stress tests by investigating the impact of the disclosure of the stress tests results on banks' bonds split ratings. To our knowledge, our paper is the first one to use bond split ratings as a measure of the effectiveness of bank stress tests assuming that a growing convergence of views on banks credit risk between rating agencies implies an improvement of market discipline.

We consider all the stress tests conducted in Europe (3) and in the United-States (6) between 2009 and 2015. During this period of time, Europe has faced the 2010 sovereign crisis which hit harder the European banks because of their high exposure to the sovereign debt. This has also created a need for higher information and transparency about banks' financial health and their resilience to the sovereign crisis. Hence, the disclosure of the European stress tests results is increasingly detailed and includes an original dataset unknown before, i.e. detailed banks' exposures to sovereign debt. Thus, in the European stress tests, besides the assessment of banks resilience in the stress tests' adverse scenario, the stress tests results bring some new information not available in the financial market. In the US banks stress tests, the type of data disclosed corresponds to general information which can be found in banks' balance sheets but data are stressed. The US banks tests have the advantage of being conducted by a single regulator contrarily to the European tests that involve contributions of multiple regulators of different countries. This permits the US to exhibit to the financial market unified remedial measures for troubled banks according to the stress tests results and, if necessary, to lead the US Treasury to take actions. Because there is no common fiscal policy in Europe, remedial measures would depend on the fiscal policy of each country affected. These differences between European and US banks stress tests make relevant a comparative analysis. The impact of information disclosure gives rise to a vibrant debate in literature. One of the benefits of the stress test results disclosure is the possibility to increase the investors' confidence about the banking sector by the transparency brought and to favor market discipline. Indeed, it should give investors better insights about the banks' risk exposure and market prices should be adjusted accordingly. Anticipating this process, banks' managers would be engaged in less risk taking. These advantages of disclosure could have a positive effect on banks and lead, thanks to the transparency provided by the stress test, to a convergence of market assessments and a reduction of disagreement among rating agencies. The banks being highly opaque, we can also

consider that the more the stress tests are repetitive over the years, the more the bank opacity may decrease.

However, more disclosure is not necessarily a synonym of transparency and it could create negative externalities. Gaballo (2016), analyzing the social value of information about the future, suggests that when news cannot be communicated without ambiguity, if information could be subject to different interpretations by financial market's participants, policymakers should not make announcements or publish information about future fundamentals unless they implement the appropriate policy. Otherwise, information disclosure could have negative impact on the social value. Furthermore, Hirshleifer (1971) shows that if too much information is disclosed, it destroys risk sharing opportunities. Goldstein and Sapra (2014) suggest that Hirshleifer effect is particularly high when disclosure unfolds during non-crisis periods. Bhojraj and Libby (2005) and Cheng et al. (2010) argue that frequent disclosure makes corporate managers become myopic. The myopic behavior means that the managers tend to sacrifice the long-term growth for the purpose of meeting the short-term goals. If a bank is stress tested, managers can have the incentives to sacrifice the bank long-term strategy and undertake short-term actions that will permit them to pass the stress test exercise. On the other hand, the banks' creditors face strong strategic complementarities i.e. their incentives to act similarly are particularly high (Chen et al. (2010)). In this case, disclosure would be beneficial only if the quality and the precision of the information being disclosed are sufficiently high. In this vein, Banerjee and Maier (2015) analyze how transparency affects coordination failure and economic efficiency. Indeed, high public disclosure reduces uncertainty about economic fundamentals but it can increase uncertainty about agents' actions. They find that granular public disclosure, which is disaggregated and precise, increases the likelihood of coordination failure and decreases economic efficiency when public information is pessimistic about future economic prospects. They also find that this negative effect of granularity is stronger when strategic complementarity <sup>2</sup> is high.

These theoretical studies suggest that the release of information is not necessarily beneficial for the market particularly if the information could be subject to a subjective interpretation by the financial market's participants. The disclosure of the stress tests information may increase the transparency of banks' assets and the confidence of the market's participants in the banking

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<sup>2</sup> Strategy complementarity is the fact that the incentives of an agent to act increase as other agents take the same action.

system and this increase of confidence would, in turn, affect positively the real economy. In this case and in the absence of any externalities related to disclosure, disagreements between rating agencies should decrease. But if stress tests are not properly designed, the disclosure may create more panic in the financial market and thereby lower the confidence in the banking sector. Furthermore, Goldstein and Sapra (2014) suggest that there is an endogenous cost associated to the disclosure of stress test and explain how this cost could be minimized via the design of the stress test and the nature of disclosure. The authors also argue that because banks operate in a *second-best* environment i.e., environments with market and informational frictions, the conventional wisdom that more disclosure leads to better market discipline of banks due to an increase in transparency does not hold.

Ismail et al. (2015) using various proxies of asymmetric information (debt-to-equity ratio, price-to-earnings ratio, price-to-book ratio, standard deviation of forecasted Earning Per Share) and data from advanced and emerging bond markets, find evidence that split ratings on bonds issued by firms are caused by asymmetric information between firms and credit rating agencies. Shen et al. (2012) analyzing banks' financial information and country information level find also that the effects of financial ratios on ratings are significantly affected by information asymmetries. Haggard et al. (2008), analyzing the impact of firms' voluntary disclosure on firms' stock price movements, find that the disclosure of firm specific information contributes to more informative stock prices and reduces the uncertainty about firms to less split rating on firms' securities. Healy and Palepu (2001) has noted in prior research that a credible and expanded disclosure represents an important mechanism through which insiders disclose firm-specific private information. By analyzing a large sample of firm-year observations, Bowe and Larik (2014) find that large, profitable companies with enhanced interest coverage, a greater percentage of independent directors and more institutional investment are less likely to receive rating splits.

So, more disclosure could as well increase transparency or increase uncertainty and, in the case we focus on, give ambiguous results on split rating between agencies. Our contribution tries to provide some answers from a statistical and econometrical analysis. We first consider bonds jointly rated by Moody's and Standard & Poor's for banks participating to the European and US banks stress tests. First, we statistically analyze bonds' ratings before and after each stress test to establish if the results disclosure has an impact on the disagreements between agencies, i.e. if the information provided leads to a reduction of split ratings, what would be logical from the typical expected effect of a greater and shared information, or if it leads to an increase of

split ratings, what would on the opposite give weight to all counterintuitive interpretations identified both in theoretical and empirical literature. Second, we estimate an econometrical model relating a specific measure of the split rating change to key data from the stress test results trying to analyze if and how the stress variables explain why Moody's and Standard & Poor's agree or disagree more after than before the disclosure. For each stress test, we select the more representative variables of the disclosed results, those indicating the expected strengths or weaknesses of a bank (banks' credit exposure, banks' capital, banks' profitability...).

Our results suggest that the disclosure of stress tests results has mixed effect on split ratings. Looking at the successive tests, we can clearly identify the first European (2010) and two first American (2009, 2011) tests, those following the global financial crisis, and the 2014 tests both in EU and the US, as those that best correspond to a counterintuitive and maybe counterproductive impact of information disclosure since they reveal a higher divergence of the two rating agencies in the post stress test periods. This mixed effect of stress tests is confirmed by the regressions relating the split ratings to data from the stress tests results disclosure. The stressed risk, capital and profitability variables impact significantly or not, sometime in opposite way, the change in average absolute rating gap around each stress test. Credibility of the stress tests, the period of disclosure (crisis or non-crisis period), the backstops measures proposed by the regulators, the individual stress test analysis of each agents and other externalities related to disclosure, could lead to different perceptions of stress test between market's participants and could contribute to explain this mixed effect of disclosure. Our finding suggests a frequent divergence of interpretation of the stress test results between the two rating agencies meaning that information would not be as relevant as hoped by regulators, market players certainly could not extract an unambiguous signal of all the results disclosed by the stress tests. The rest of the paper is organized as follows: section 2 presents key features of Europe and US stress tests, section 3 the sample and the methodology of our empirical analysis, section 4 the results and section 5 concludes.

## **2. Key features of the stress tests in the US and Europe:**

Since the end of the 2008 financial crisis, regulators have conducted different stress test exercises to provide information on banks with the hope to restore investors' confidence. Stress tests in the United-States and in Europe differ in their governance but also in the granularity of their results disclosed. The first stress test or SCAP (Supervisory Capital Assessment Program)

was conducted in the US in 2009 in order to respond to the market participant's concerns about US banks financial health at the end of the 2008 financial crisis. This first US stress test required the 19 largest US Banks Holding Companies (BHCs)<sup>3</sup> to simultaneously undergo a forward-looking exam in order to determine if they have enough capital to support lending in the event of an unexpected severe recession. In the case that the banks' capital is inadequate, they would be bailout by public funds through the Capital Assistance Plan (CAP) announced on the same day as the stress test results. Since 2011, the Comprehensive Capital Analysis and Review (CCAR) is the regulatory framework of the Federal Reserve. Unlike a simple stress test, the CCAR has two steps. First, in a quantitative assessment or stress test, the Federal Reserve evaluates each BHC's ability to maintain post-stress capital ratios above a minimum threshold of tier 1 common capital ratio during each quarter of the planning. Second, a qualitative assessment covers all key areas of BHCs' capital planning processes and involves a large number of experts from the Federal Reserve System. Since 2013, the Dodd-Frank Act has required the Federal Reserve to conduct every year a stress test in addition to the CCAR. The Dodd-Frank Act stress test (DFAST) has only the quantitative approach. The main difference between the Dodd-Frank Act stress test and the CCAR quantitative assessment is the fact that the DFAST is conducted on a static balance sheet basis while the CCAR quantitative assessment is conducted on a dynamic balance sheet basis. However, the BHCs sample is the same for both tests.

In Europe, the European Banking Authority (EBA) conducted a stress test in 2010 based on 91 banks and another in 2011 based on 90 banks to reassure financial markets on the banks' resilience to the sovereign debt crisis but also to bring more transparency about banks' statements. The European stress tests are generally implemented by banks themselves following the methodology defined by the EBA and results are transmitted to the central regulators by national supervisors. In 2014 in order to prepare the Single Supervisory Mechanism (SSM), the European Central Bank in close cooperation with the EBA conducted another stress test based on 130 banks which was more global and included asset quality review (AQR). The AQR is an assessment of the accuracy of the carrying value of banks' assets at December 31, 2013 which is the starting point of the stress test.

Both Europe and US stress tests evaluate the ability of the different banks to maintain post-stress test capital ratios that are above the minimum required during the adverse scenarios.

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<sup>3</sup> 19 BHCs participated in the 2009, 2011 and 2012 stress tests, 18 in 2014 and 31 in 2015.

Banks that do not reach the minimum capital required are considered as failing the stress test exercise. The amount of data disclosed is greater in the European tests and more granular than in the US tests. The purpose of any stress test is to identify the troubled banks and to inform the market about the backstop measures to be taken to solve the identified problems of banks. Compared to the US, we can emphasize two main differences related to Europe in conducting stress tests. The first one is the fact that in Europe there are multiple banking supervisors belonging to each country. There is not a common policy for banks bailout and this could make the backstops measures less reassuring for the financial market. This is why the ECB started to take the role of a single supervisor in the Eurozone area. Second, even if there is now a single supervisor for major banks, European countries still do not have a single fiscal policy, which limits the powers of the banking union supervision initiated by the ECB. Orphanided (2014) argues that a true banking union must include supervision, common deposit guarantees and common resolution mechanism. While this is not the case for the European countries for now, it is the features in the US where the only banking supervisor is the Federal Reserve and the fiscal policy is common for all the states of the Union. In Table 1, we present the disclosure dates of the different stress tests conducted in Europe and in the United-States. Note that for the United-States, starting in 2013, the Federal Reserve conducts at the same time both DFAST and CCAR and discloses first the DFAST's results, one week before the CCAR's results. In our study, we consider the disclosure date and the results of the first chronological event, which is DFAST.

[Insert Table 1 here]

## **Sample & Methodology**

### **3.1. Bond ratings collection**

To conduct this study, we collect data from Bloomberg database. For each stress test, we analyze the period of 127 days (six months) before and 127 days after the results disclosure. So, when we extract bonds from Bloomberg, we ensure to collect data of all bonds issued in the period between six month before the first stress test and six months after the last stress test in order to cover the whole period we study. As the first European stress test results are disclosed

on July 23, 2010 and the last ones on October 26, 2014, we collect the ratings of bonds issued by European banks on the period between February 2010 and April 2015. In the case of the United-States, the first stress test results are released on May 07, 2009 and the last ones on March 05, 2015. We thus collect for US banks the ratings of bonds issued on the period between November 2008 and September 2015. We consider only bonds jointly rated by Moody's and Standard & Poor's. We also collect the maturity and the amount issued of each issue. The bonds' ratings collected are the initial ratings on each bond, so none observed disagreement is due simply to asynchronous changes in ratings over time. The letter ratings of the two agencies are mapped to a common numerical scale, with better letter ratings corresponding to lower numbers: Aaa = AAA = 1, Aa1 = AA+ = 2 ... Caa3 = CCC- = 19. The global data set contains 4387 bonds issued by 98 European banks and 9,559 bonds issued by 301 banks in the reported period. For each stress test, we keep only the bonds issued by banks participating to the stress exercise and jointly rated by Moody's and Standard & Poor's. Our sample includes 960 bonds issued by 38 European tested banks and 1,932 bonds issued by 16 US tested banks.

The summarized statistics presented in Table 2 give some insights on bonds' ratings and bonds' issue characteristics for European and US tested banks. Average ratings in our numerical scale tend to increase over the entire period meaning that the quality of bonds' ratings declines from 2009 to 2015<sup>4</sup>. Bonds maturities are longer in the US but amount issued are higher in Europe. There are fewer banks participating to the stress tests in the US but on average larger (all banks tested are Bank Holding Companies) than the banks involved in the European stress tests.

[Insert Table 2 here]

### **3.2. Measures of rating disagreement**

With the ratings collected, we build different statistics measures of disagreement between the rating agencies, as the correlation between the ratings, the percentage of disagreement, the mean average absolute gap (defined as the mean of the absolute values of the rating differences between the two agencies) based on notch or category rating split. Moody's and Standard & Poor's introduced notch level ratings in 1982 and 1974, respectively. Notch ratings are given plus and minus symbols by Standard & Poor's, and numerical 1, 2, and 3 in the case of Moody's.

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<sup>4</sup> We remind the lector that the notch scale is different from the category scale, see Table A1

Hence, for example using Standard & Poor's notation, a category level split differentiates AA from A but not AA+ from AA and a notch level split differentiates, for example, A from AA but also AA+ from AA. Table A1 in appendix presents the different ratings classes for Moody's and Standard & Poor's and the common numerical scale generally used in the literature.

### **3.3. Explanatory model of split ratings**

To check how data disclosed in each stress test play a role in the banks' bonds split ratings, we run a linear model relating the rating absolute gap change to key data variables disclosed in the stress test results. For each stress test, the regression is run by considering the data available on the period of 127 days after the stress test results disclosure date. We adjust the rating absolute gap for a given bond of a given bank on the 127-day period after the disclosure by subtracting the mean of the rating absolute gap for all the bonds issued by this bank on the 127-day period before the disclosure. Doing that, we construct an indicator of the impact of the test results on the variation of the rating gap, even if we have to consider a mean rating gap at the bank level before the disclosure, as we cannot associate with each bond issue "after" a similar bond issue "before". Stress test results<sup>5</sup> provide information about banks' credit exposure, banks' capital and banks' revenue on the financial market. For each stress test, we select the more representative variables of the disclosed results, those indicating the expected strengths or weaknesses of a bank. In the case of Europe, the key variables we considered are sovereign debt exposure, risk weighted assets, capital ratio and net income resulting from adverse scenario. The adverse scenario of the first stress test covers only one period (1 year), the second two periods (2 years) and the third three periods (3 years). The values of the stressed variables are disclosed for each period of the scenario. We choose to build the explanatory variables as the differences between the adverse scenario value and the current value published in the stress tests results. For each variable, we consider either the value on the first period or the value on the last period of the scenario. One can think that the resilience of a bank will be different on the first and on the last period of the scenario. The fact that we use the difference of the variables permits us to capture the actual impact of the stress test variables on the split rating. Even if the European stress tests met some critics from analysts, important information unknown before

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<sup>5</sup> For European banks, we get the stress tests results from the website of European Bank Authority (<https://www.eba.europa.eu/>) while for US banks, the stress tests results are collected from the website of Federal Reserve (<https://www.federalreserve.gov/>)

the first test, is the detailed banks' sovereign debt exposure. Because PIIGS<sup>6</sup> are the countries the most affected by the sovereign debt crisis, we consider in all stress tests only the banks' PIIGS countries exposure which is the riskier sovereign debt.

In the US case, the key variables we consider are the capital gap from SCAP, the total loan loss, the tier 1 capital, the leverage ratio and the net income. The US stress test adverse scenarios have generally a time horizon of nine quarters but data are only available for the last period of the adverse scenarios. We then calculate the difference variables using the values on this last period of the adverse scenario (if available) and the current values published in the stress test results<sup>7</sup>. 7 banks of our sample failed the first US stress test. To control for this, we introduce a dummy variable *Failed\_dummy* indicating if a bank failed or not the stress test. Nevertheless, no other bank has failed neither in other US tests nor in the EU tests. As in Morgan (2002), the regression controls also for the issue characteristic such as the average rating of Moody's and Standard & Poor's for each bond, the maturity of bond and the logarithm of bond's amount issued both for European and US banks. The estimated model is the following:

$$\Delta Gap_{k,i,j} = \alpha_k + \beta_k Bank\_stress\_results_j + \gamma_k Bond\_controls_i + \varepsilon_{k,i,j} \quad (1)$$

where  $\Delta Gap_{k,i,j}$  is the difference between the rating absolute gap of the bond  $i$  issued by the bank  $j$  on the 127-day period after a stress test results disclosure and the mean of the rating absolute gap of all bonds issued by the bank  $j$  on the 127-day period before this stress test results disclosure, the gap being measured at the notch level for  $k=1$  and at the category level for  $k=2$ .  $Bank\_stress\_results_j$  is a vector of variables built from the stress tests results disclosed for the bank  $j$ ,  $Controls_i$  is a vector of characteristics related to the issue of bond  $i$ <sup>8</sup>,  $\varepsilon$  is the error term. The definitions of variables are presented in Table 3.

[Insert Table 3 here]

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<sup>6</sup> PIIGS is acronym for Portugal, Ireland, Italy, Greece and Spain.

<sup>7</sup> The results data of the second US stress tests conducted in 2011 were not released by Federal Reserve. Thus in the regression we do not consider the 2011 stress test.

<sup>8</sup> In line with the literature, we consider several variables. We use the natural logarithm of the amount of bond issue ( $\ln\_amount\_issued$ ). Indeed, Morgan (2002) finds positive correlation between bank's size and the amount of issue suggesting that a negative relation would be expected with rating disagreement because larger banks present less uncertainty. We also consider the maturity of the bond ( $Maturity$ ) expressed in years. Longer term issuances may create more uncertainty and then generate more disagreement on bond ratings. Furthermore, we calculate the average rating given by the two agencies ( $Average\_rating$ ). A higher average rating would indicate greater uncertainty (higher risk) of the bond and would increase the disagreements.

## 4. Results

Literature on information disclosure effects provides mixed results. Stress testing exercises provide a natural experiment that we exploit to focus on the impacts on bond split ratings. We first identify how the disagreement between rating agencies evolves, before and after the stress test results. The statistical analysis confirms that stress tests rarely lead to a greater convergence of views of agencies in the short term, some measures of disagreement showing even the opposite effect. We then investigate how these evolutions are linked to the nature of information disclosed about key variables of stressed bank performance and risk.

### 4.1. Highlighting the impact of stress tests on split rating

Table 4 presents various measures of disagreements as the average rating by rating agency, the correlation between the two ratings, the percentage of disagreement and the average absolute gap between the ratings of Moody's and Standard & Poor's for each period of 127 days before and after each EU and US banks stress test. Furthermore, we break down the percentage of disagreements according to the extent of the split rating, difference of 1 degree (GAP=1), 2 degrees (GAP=2), 3 degrees or more (GAP=3+), for both notch and category ratings<sup>9</sup>. Higher correlation between the ratings of the two agencies may indicate convergence of their appraisal (usually but not necessarily less split rating).<sup>10</sup> The correlation, either notch or category rating, is always weaker after the stress test disclosure for European bonds but this finding only applies to half of the US tests. The percentage of disagreement is high both for European and US banks. This measure shows a higher disagreement after the stress tests in one out of three tests (notch) or two out of three tests (category) for European bonds and a perfectly balanced outcome for US bonds. It is worth noting that the average absolute gap gives quite the same insights for both European and US cases. Examining the rating gap distribution, the proportion of the largest gaps (3 + for notch rating or 2 for category rating), is consistently higher after the European stress tests than before. However, in the US case, this increased disagreement is observed only for the largest notch gaps (2 notches differentials) and only in half of the tests.

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<sup>9</sup> These gaps are built in absolute values. For a given difference of ratings (numerical values) a gap is the same regardless of the agency that gave the highest rating.

<sup>10</sup> If the two agencies do not refer to the same scale because one is more conservative than the other, and systematically gives a rating one notch (or category) under the other, we should observe a perfect correlation and a full disagreement. It is obviously an extreme hypothesis not verified in our sample, but we can observe some disagreements between these two measures of disagreement

[Insert Table 4 here]

Looking at the successive tests, we can clearly identify the first European (2010) and two first American (2009, 2011) tests, those following the global financial crisis, and the 2014 tests both in EU and the US, as those that best correspond to a counterintuitive and maybe counterproductive impact of information disclosure since they reveal a higher divergence of the two rating agencies in the post stress test periods. However, these short-term impacts should not hide the fact that on the whole period of European stress tests, there is a convergence trend in the opinions of rating agencies, whatever the measures selected. Even if it does not necessarily mean a favorable long-term impact of repeated stress tests insofar as many other parameters can explain a decrease of the European banking sector uncertainty in a less troubled period after the Global Financial Crisis and the Debt Crisis, we cannot dismiss this possibility. Nonetheless, this is not a trend observed over the period of the six US stress tests.<sup>11</sup>

In order to avoid a possible selection bias related to the fact that some banks should decide to issue bonds either before or after the stress test results (according to their expectations of their own results), we now focus on split rating measures built on a restricted sample where we retain for each test only banks having issues both on the periods of 127 days before and 127 days after the results disclosure. Table A2 and table A3 provide the measures of disagreement relative to this restrained sample of same bank bonds issues around each test. We can draw conclusions very similar to those obtained in the overall sample as most measures give the same indications. Indeed, regardless of the sample we use, we find the same tests leading to a substantial increase in the divergence between Moody's and S&P ratings, i.e. 2010 and 2014 EU stress tests, 2009, 2011 and 2014 US stress tests<sup>12</sup>.

In Table 5 and table 6, we present more detailed information on an individual basis and tabulate the average absolute gap for each bank of the restricted sample respectively for Europe and for the US. For each bank, we compute the mean rating absolute gap (for both notch and category splits) for all the bonds issued by this bank both before and after the stress test disclosure.

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<sup>11</sup> The overall mean average absolute gap is quite the same for UE and US bank bonds (around 0.9 for the notch rating, 0.3 for the category rating) but the time profile is very different, a downward trend in Europe, a high volatility in the US. Furthermore, in the US case, there is virtually no Gap 3+ for notch rating and only GAP 1 for category rating.

<sup>12</sup> We present in Appendix A4 to A7 the measures of split rating disagreements between Moody's and Fitch and also between Fitch and Standard & Poor's. Findings are quite similar as in the case of the disagreements between Moody's and Standard & Poor's.

[Insert Table 5 here]

[Insert Table 6 here]

A majority of banks have split rating different from zero on both periods. We then do the difference of these two mean rating absolute gaps (mean after minus mean before) to identify which banks experiment an increase (positive differential) or a decrease (negative differential) in the disagreement on their bonds on the period after the disclosure of the stress test. For most of the European banks, these mean differences are negative on the two first tests but positive on the 2014 test. For US banks, these differences are generally lower compared to European banks, and putting the focus only on the most settled cases, mostly negative for the 2015 test but mostly positive for the 2009, 2011 and 2014 tests.

We also provide mean difference tests at bond level (table 7) and bank level (table 8). Differences appear globally not significant for European bonds except for a positive and significant (5% level) difference for the 2014 test (notch gap). For US bonds, differences are positive and significant for the 2009, 2011 and 2014 tests (with a higher significance for notch gaps (1% level) than category gaps (5% level)). Looking at the bank level<sup>13</sup>, we do not find any significance for any European test, but a positive and significant difference both for the 2009 and the 2014 US tests when rating gaps are computed on the notch basis (with a higher significance in 2014 (1% level) than in 2009 (5%)). Overall, it has to be said that there is only one result of these difference tests showing the generally expected favorable effect of stress test disclosure as we find a negative and significant (1% level) decrease of disagreement between Moody's and S&P ratings only once, for the last 2015 US test and only at the bond level (both for notch and category ratings).

[Insert Table 7 here]

[Insert Table 8 here]

According to all our different measures of disagreement (correlation, rating absolute gap, percentage of disagreement), we can postulate that the second 2011 Europe stress test shows a

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<sup>13</sup> We can now run paired difference tests.

higher decrease in disagreements after the disclosure while, on the whole, it is the opposite after the results publication of the first 2010 and the third 2014 stress test. The first European banks stress test being disclosed in 2010, this period represents the beginning of the European sovereign debt crisis. There was an increasing of uncertainty about banks' exposure to the sovereign debt. The risk of Greece bankruptcy caused also higher financial distress. The turmoil brought by the sovereign debt crisis may explain the increase of split rating after the first European stress test disclosure. Compared to the first stress test, the second European stress test conducted in 2011 has more detailed data disclosed and the scenarios are improved in response to the critics addressed to the 2010 stress tests. This may explain the decrease of split rating percentage observed during the period after this second stress test (Table 4). This confirms also that, as highlighted in previous studies, the opacity decreased after the 2011 stress test and the market reacted in this sense. Furthermore, Goldstein and Sapra (2014), Schuermann (2013) support the fact that the disclosure is more beneficial during crisis period when the financial market has a high information need. The third European stress test whose results are disclosed on October 26, 2014, is conducted both by the EBA and the ECB. The novelty in this 2014 stress test is the fact that before the stress test realization, the ECB conducted an assets quality review in the context of the implementation of the single supervisory mechanism. Ong and Pazarbasioglu (2014) argue that additional steps to stress test such as asset quality review comprising audits and expert valuations of banks portfolios are crucial for an effective and credible stress test. Even if on the period, the rating divergence seems to increase after the third European stress test, most of splits are only single notch or single category differentials, reflecting the previously mentioned long-term trend of diminishing opacity despite the short-term opposite effect.

In the US, our measures provide mixed results across the successive tests, alternating positive and negative effects of stress test results disclosure on disagreement between the two rating agencies. A possible explanation of the decrease in the percentage of disagreement after the 2012 third and 2013 fourth stress tests (Table 4) may be put forward in connection with the changing pattern of the US stress tests that become more severe, comprehensive and rigorous compared to the previous ones. At the fourth stress test, it is also the first time that both CCAR and DFAST are conducted at the same time by the Federal Reserve. The decrease of disagreement may be explained by these new resolutions taken.

Overall, our findings suggest that the impact of stress test results disclosure is mixed both for US and European bank bond split rating, but underline many episodes where information

disclosure increases the immediate disagreement between rating agencies. To go further in the analysis, we then try to identify which results disclosed after each stress test are more likely to explain the evolution of split ratings before and after the disclosure in order to understand which information could lead to a convergence and which information could lead to a divergence between Moody's and S&P ratings.

**4.2. Identifying relevant stress test variables in the explanation of split rating changes**

We select the rating absolute gap change ( $\Delta Gap$ ) as a specific and tractable measure of disagreement evolution between rating agencies. We then regress this measure over some specific variables extracted from the disclosed results of each stress test. The econometric model (equation 1) is very simple and allows us to determine which results might explain the observed changes in split rating in pre/post disclosure periods. Table 9 (Europe) and Table 10 (US) present statistics of independent and explanatory variables of the model. Table 11 gather the results for European tests and Table 12 for US tests.

[Insert Table 9 here]

[Insert Table 10 here]

[Insert Table 11 here]

[Insert Table 12 here]

There are two panels of results (*First period* and *Last period*) for Europe depending on the specification of the stress test variables, either using values from the first period of the 2011 and 2014 stress test adverse scenarios or using values from the last period of these stress test adverse scenarios (Table 11<sup>14</sup>)<sup>15</sup>. Given the context that prevailed during the first implementation of the European stress tests, we, first of all, focus on the PIIGS exposure. Banks' sovereign exposure were not reported in detailed in the banks' balance sheet, then

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<sup>14</sup> There is only a one-year horizon in the 2010 European test.

<sup>15</sup> Given the strong correlation between the capitalization variables and the risk weighted assets variable, we do not include them simultaneously in our regressions.

market's participants could not get a clear vision about these exposures before they were disclosed by EBA tests. We find that banks' PIIGS debt exposure increases the rating disagreement between Moody's and S&P for the first stress test conducted in 2010, with the higher significance of all the explanatory variables. The impact of the PIIGS exposure variable is positive both for notch and category GAP Uncertainty about PIIGS sovereign debts and the difficulty to evaluate their actual risk make the PIIGS global exposure cause and increase the split rating. Before the European sovereign crisis, sovereign debts were considered quite completely safe. With the outbreak of the Debt crisis, the question of sovereign credit risk arose in financial markets and gave rise to multiple views and prospects on the future of PIIGS solvability. Contrary to its impact in the first stress test, we find that the PIIGS countries debt exposure decreases the split rating both for notch and category gaps on the 2011 test and a similar but weaker effect only for category gap on the 2014 test. Furthermore PIIGS exposure has a stronger impact for 2011 in the regressions using the values of the last period of the adverse scenario, i.e. two-year horizon stressed variables, than using values of the first period of the adverse scenario, i.e. one-year horizon stressed variables<sup>17</sup>. The second and the third European test compared to the first one provided more detailed information on bank's resilience and the methodology was improved and scenarios more severe in order to increase the credibility of the stress test. These improvements, the strengthened transparency about sovereign exposure gradually reduced for many banks, more consensual mid-term views, could explain this negative impact on disagreements, and so a higher convergence of appraisal for those banks who remain with high PIIGS exposure after the second and, in a lesser extent, after the third stress test results disclosure. Indeed, the European sovereign crisis reached its peak and the financial market its highest uncertainty at the time of the 2011 test exercise. This situation created high need of information and transparency about banks' financial health that the 2011 test partly addressed while bringing relevant information to the market participants and reducing banks opacity (Petrella and Resti (2011)).

Risk weighted assets (RWA) are a wider indicator of banks credit risk. We can use the difference between the adverse scenario risk weighted assets (divided by the total assets) and the current ones as another (inverse) indicator of the expected resilience of the bank in the

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<sup>17</sup> PIIGS exposure depicts the same variable in table 11 but the stressed variables differ due to different choices of the time horizon of the scenario. In the EU 2011 tests, an increase in a bank PIIGS exposure along with the two-year horizon stressed variables appears to lead to a stronger impact than the same increase along with the one-year horizon stressed variables. That is why we may interpret this result as a mid-term impact of PIIGS exposure as it depends on mid-term views on others explanatory variables, leading to a stronger convergence of the ratings of the two agencies for high exposure.

adverse scenario. Higher RWA has an impact on the split rating only after the disclosure of the 2010 results and leads to the same result as PIIGS exposure, both for notch and category splits, greater expected risks increase uncertainty and differences of opinion. One year later, in 2011, in a period marked by higher volatility, even if information on the bank difficulties that may occur on a one-year or two-year horizon should be more credible given the improvement of the test exercise and thus allowing markets and specifically agencies to converge towards common views, RWA variable shows no effect at all. In fact, the 2011 stress test brings more detailed information about banks' sovereign exposure which have certainly been the focal point of rating analysis, explaining the non-significance of a broader measure of weighted risks.

We now consider capital ratio variables which are of course major indicators to analyze the resistance of banks to extreme events. The difference between the stressed capital and the current one should indicate the resilience of the bank. And we could expect that a higher resilience (i.e. a higher difference meaning most often a lower decrease of Tier1) leads to a convergence of agency feelings about the solvability of the bank. It is indeed the result we find but only for the 2014 stress test (notch gaps). Noticeably, this result appears weaker when we use the final year of the adverse scenario as compared to the first year (table 11). An explanation may be found in a weaker confidence of markets participants at the height of the Debt Crisis in the true capacity of banks capital to withstand two years of adverse economic downturn.

Finally, the stressed net income compared to the current one has only one impact in 2014 for the category gaps at the two-year horizon meaning that agencies diverge on their assessment of a stronger resilience of the banking profit to extreme shocks.

The results for the US tests are shown in Table 12<sup>18</sup>. A higher capital shortfall from SCAP conducted in 2009 has a negative impact on the rating disagreement. This impact is mainly for notch split while the significance for the category split is low, the failed dummy becoming in this case the most powerful indicator of an improved agreement of agencies. On the other US stress tests the capital shortfall is not a data put forward in the results, thus, we consider the difference between the capital from the adverse scenario and the current capital. For the 2012 and 2015 US stress tests, the results show that there is an increase of disagreement rating for the more resilient banks (notch and category split) while during the 2014 stress test, the split rating decreases for these banks (only for notch split). Morgan et al. (2013) argue that before

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<sup>18</sup> We remind that there is only one stressed value available, at the end of the scenario, usually 9 quarters ahead.

the disclosure of the 2009 stress test, financial market's participants are able to make difference between the good and bad banks but what they ignored is the extent of the capital shortfall. So, the disclosure of stress test results brought information which permits rating agencies to make less disagreement about banks' rating. For the 2012 US stress test, the positive impact of the capital on the split rating may be explained by the fact that four of the 19 BHCs participating to the stress test have one or more projected regulatory capital ratios that fall below regulatory capital minimum levels at some points over the stress scenario horizon. So, this may create doubt on the other banks having enough level of capital on their effective resilience to the adverse scenario. At the 2015 US stress test, some analysts suggest that few banks that heavily trade in the capital markets have post-stress minimum capital ratios close to the 8% requirement. The high positive impact on the notch and category split on the period after the disclosure of the 2015 stress test may be due to a lack of confidence in the way some banks have passed the test. Unlike other tests that indicate that worse news about the capital coverage tend to align the views of agencies, the 2014 US test shows a decrease in the notch split rating for the post-stress best capitalized banks. Nevertheless, the simple leverage ratio (calculated as the capital divided by total assets) has in this same test (and only for this one) an opposite effect and, as the other indicators in the others tests, increases disagreement in case of better news.

Total loan losses and Net Income ratio provide quite different results depending on the test. We find that agencies agree more in their interpretation of comparative bad results (disagree more for comparative good results) in 2012 for both variables. However, this stresses values have no impact at all in 2013 and provide exactly separate and opposite effects in 2014 and 2015 (agency views converge with increased loans losses and higher income in 2014, with reduced loan losses and weaker income in 2015).

Our global findings indicate the diversity of determinants of split rating changes both in the case of Europe and the US stress tests, without providing a clear vision of what could explain, in reference to our first statistical analysis, why certain tests lead and others not to a convergence of opinion of agencies. The mixed findings drawn over the different stress tests underline that several other factors could influence the interpretation of the rating agencies i.e. the credibility of the stress test, the backstops measures, the economic climate, etc. Because of the large panel of data disclosed by a stress test results disclosure, the information highly submitted to a subjective perception and analysis of the news by the rating agencies as well as the different market's participants.

## 5. Conclusion

In this paper, we study the information value of banks' stress tests using banks' bond split ratings as an indicator of the efficiency of the disclosure of the stress test results. We consider ratings at issuance of bonds jointly rated by Moody's and Standard & Poor's and issued by banks participating to the European and US banks' stress tests conducted between 2009 and 2015. We first bring a statistical investigation analyzing the split ratings before and after each stress test results disclosure. Second, we run a linear model considering a split rating measure as the dependent variable and key results disclosed in the different stress tests conducted in Europe and in the United-States as explanatory variables.

Previous studies emphasized opposite effects of information disclosure suggesting that stress tests could as well decrease or increase uncertainty about banks' statements. Overall, our findings suggest that the impact of the stress test results disclosure is mixed both on the US and European banks' bond split ratings. Indeed, we underline many episodes where information disclosure increases the disagreements between rating agencies. Market participants could parse differently the detailed data disclosed by the stress tests and these differing interpretations may create more disagreements among different agents and, in our case, between rating agencies. However, in a period of turmoil as the European sovereign Debt Crisis, when the market faces a lot of fear and uncertainty and when information is highly needed, the disclosure of the stress tests results leads to a greater convergence of views of rating agencies.

Our econometrical investigation tries to determine which results might explain the observed changes in split ratings in pre/post disclosure periods and enlighten why some stress tests increase and others decrease split ratings. We focus on crucial disclosed information regarding to risk, capital and profitability of tested banks and find no clear-cut results that would allow us to clearly identify the causal factors of the change in absolute rating gaps around each stress test. The credibility of the testing procedure, the severity of the scenarios, crisis or non-crisis time, the regulatory backstops measures and the externalities related to disclosure could impact market participants' own perceptions of the stress tests and explain the mixed effects of disclosure. A deeper study would be needed to understand the exact reasons for these different and often opposite results, which would require a thorough individual analysis of each bank tested beyond the scope of this paper

This notwithstanding, supervisors may implement methods which may combine quantitative and qualitative assessments in order to provide unambiguous signals to the market, increasing the efficiency of the stress tests by a higher reliability in the results disclosed. An effective stress test may reach its objective of transparency by decreasing each bank's opacity but also by diminishing global sector uncertainty. This may be a big challenge to the extent that the tests are based on extreme events scenarios that are obviously not the most probable cases. Market actors like rating agencies interpret not only the thoroughness of the disclosed information but also the relevance of the assumptions made by supervisors, with possible own subjective and divergent interpretations but also high incentives to act in the same direction in distress periods.

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**Table 1: Results announcement dates for stress tests conducted in Europe and in the United-States**

<u>Dates of stress tests results disclosure</u>	
<u>Europe</u>	<u>United-States</u>
	<u>May 07, 2009</u>
<u>July 23, 2010</u>	<u>March 18, 2011</u>
<u>July 15, 2011</u>	<u>March 13, 2012</u>
	<u>March 07, 2013</u>
	<u>March 20, 2014</u>
<u>October 26, 2014</u>	<u>March 05, 2015</u>
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**Table 2: Moody's and S&P European and United-States banks' bonds rating and bonds characteristics, by issue period.**

This table reports mean rating and characteristics of bonds issued by European banks and United-States tested banks around each stress test. Statistics are computed and reported on the 127-day-period before and 127-day period after each stress test results disclosure date. Issues/Issuers indicates respectively the number of bonds issued and the number of issuers on the period considered. Average rating is the average of Moody's and Standard & Poor's ratings, computed on a notch basis or on a category basis (higher value of Average rating indicates higher risk). Maturity is expressed in years. Amount issued is the total amount of the bond's issue.

Issue period	Issues/Issuers		Average category rating	Maturity (mean, years)	Amount issued (mean, EUR millions)
	(number)	Average notch rating			
<b>Europe</b>					(mean, EUR millions)
<b>Tested Banks - all sample period</b>	<b>960/38</b>	<b>5.81</b>	<b>2.92</b>	<b>5.86</b>	<b>561.89</b>
127 days before the 2010 stress test	79/21	4.18	2.32	7.07	625.02
127 days after the 2010 stress test	88/21	4.22	2.37	5.41	647.68
127 days before the 2011 stress test	120/27	4.57	2.48	5.70	643.15
127 days after the 2011 stress test	40/19	5.50	2.79	5.66	399.87
127 days before the 2014 stress test	64/18	6.95	3.27	5.63	547.32
127 days after the 2014 stress test	60/18	7.49	3.53	5.77	666.80
<b>United-States</b>					(mean, USD millions)
<b>Tested Banks - all sample period</b>	<b>1932/16</b>	<b>6.28</b>	<b>3.08</b>	<b>9.41</b>	<b>429.67</b>
127 days before the 2009 stress test	39/10	1.87	1.40	3.93	1888.42
127 days after the 2009 stress test	62/10	5.50	2.91	6.46	752.24
127 days before the 2011 stress test	257/8	5.75	2.95	9.60	299.40
127 days after the 2011 stress test	200/7	5.77	2.95	11.35	266.51
127 days before the 2012 stress test	121/6	5.99	3.00	8.20	279.49
127 days after the 2012 stress test	105/6	6.47	3.11	8.42	259.57
127 days before the 2013 stress test	170/8	7.24	3.33	9.15	460.89
127 days after the 2013 stress test	154/9	7.13	3.29	9.86	266.83
127 days before the 2014 stress test	112/8	7.31	3.36	11.13	568.64
127 days after the 2014 stress test	127/9	7.41	3.42	10.69	514.09
127 days before the 2015 stress test	95/9	7.63	3.49	11.13	538.57
127 days after the 2015 stress test	72/8	7.08	3.31	9.03	990.51

**Table 3: Explanatory variable definitions**

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PIIGS exposure	PIIGS <sup>19</sup> countries sovereign debt exposure from the EBA stress test results disclosure for a specific bank divided by the Tier 1 capital for the 2010 stress test and divided by Core tier 1 capital for the 2011 and 2014 stress test.
$\Delta$ RWA	Difference between the risk weighted assets from adverse scenario of the EBA stress test divided and the actual risk weighted assets divided by total assets.
$\Delta$ (C)Tier1	Difference between the tier 1 ratio in the case of the 2010 stress test and Core tier 1 ratio for the 2010 and 2011 stress test from adverse scenario of the EBA stress test and the actual tier 1 (Core tier 1) capital ratio.
$\Delta$ Net Income	Difference between the net income from adverse scenario of the EBA stress test results disclosure and the actual net income divided by total assets.
Gap_to_Asset	Capital GAP from 2009 US stress test results disclosure on 07/05/2009 for a specific bank divided by the total assets.
$\Delta$ Tier1	Difference between the tier 1 capital ratio from the adverse scenario of the US stress test and the actual tier 1 capital ratio.
$\Delta$ Leverage	Difference between the leverage ratio from the adverse scenario of the US stress test and the actual leverage ratio.
Net income	Net income ratio over the period of the stress test adverse scenario of the US stress test.
Total_loss_loan	Loan losses over the periods of the adverse scenario of US stress test divided by total loans.
Failed_dummy	Dummy variable equals to 1 when the bank failed to the stress test and equals to 0 otherwise.
Average_rating	Average notch rating of the Moody's and S&P bonds issue rating
Ln_amount_issued	Logarithm of bond issue amount
Maturity	Bond maturity in years

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<sup>19</sup> PIIGS is an acronym used to refer to the five countries : Portugal, Ireland, Italy, Greece and Spain

**Table 4: Measures of disagreement between Moody's and S&P for European and United-States banks' bonds ratings.**

This table reports different bonds disagreement measures between Moody's and Standard & Poor's. Correlation is the correlation index between their ratings. Moody's <> S&P indicates the percentage of their disagreements. Absolute gap is the absolute difference between Moody's and Standard & Poor's ratings. Rating gap distribution represents the percentage of Gap= 1, Gap= 2 or Gap = 3 and more in the total number of disagreements.

Issue period	Average ratings				Rating gap distribution (%)		
	(Moody's/S&P)	Correlation between ratings	Moody's <> S&P (%)	Average absolute gap	Gap=1	Gap=2	Gap=3+
<b>Europe</b>							
Notch rating							
<b>Tested Banks - all sample period</b>	<b>5.69/5.92</b>	<b>0.85</b>	<b>57.8</b>	<b>0.89</b>	<b>66.3</b>	<b>23.2</b>	<b>10.5</b>
127 days before the 2010 stress test	3.59/4.76	0.69	79.7	1.42	49.2	39.7	11.1
127 days after the 2010 stress test	3.53/4.91	0.63	77.3	1.60	35.3	47.1	17.6
127 days before the 2011 stress test	4.16/4.98	0.73	58.3	1.09	48.6	31.4	20.0
127 days after the 2011 stress test	5.2/5.8	0.61	45.0	1.05	61.1	0.0	38.9
127 days before the 2014 stress test	7.13/6.77	0.97	34.4	0.45	68.2	31.8	0.0
127 days after the 2014 stress test	7.53/7.45	0.91	56.7	0.75	79.4	11.8	8.8
Category rating							
<b>Tested Banks - all sample period</b>	<b>2.87/2.96</b>	<b>0.79</b>	<b>27.1</b>	<b>0.30</b>	<b>90.4</b>	<b>9.6</b>	<b>0.0</b>
127 days before the 2010 stress test	2.11/2.52	0.60	43.0	0.48	88.2	11.8	0.0
127 days after the 2010 stress test	2.14/2.6	0.55	50.0	0.58	84.1	15.9	0.0
127 days before the 2011 stress test	2.36/2.61	0.64	31.7	0.37	84.2	15.8	0.0
127 days after the 2011 stress test	2.67/2.9	0.59	22.5	0.32	55.6	44.4	0.0
127 days before the 2014 stress test	3.34/3.19	0.89	18.8	0.19	100.0	0.0	0.0
127 days after the 2014 stress test	3.53/3.53	0.80	26.7	0.27	100.0	0.0	0.0
<b>United-States</b>							
Notch rating							
<b>Tested Banks - all sample period</b>	<b>6.29/6.28</b>	<b>0.79</b>	<b>69.7</b>	<b>0.88</b>	<b>73.6</b>	<b>26.0</b>	<b>0.4</b>
127 days before the 2009 stress test	1.79/1.95	0.99	15.4	0.15	100.0	0.0	0.0
127 days after the 2009 stress test	5.21/5.79	0.86	64.5	0.65	100.0	0.0	0.0
127 days before the 2011 stress test	5.42/6.08	0.73	65.8	0.77	82.2	17.8	0.0
127 days after the 2011 stress test	5.53/6.02	0.74	79.5	0.98	77.4	22.6	0.0
127 days before the 2012 stress test	5.68/6.31	0.35	93.4	1.42	47.8	52.2	0.0
127 days after the 2012 stress test	6.19/6.75	0.57	83.8	1.29	46.6	53.4	0.0
127 days before the 2013 stress test	7.5/6.98	0.86	57.6	0.64	89.8	10.2	0.0
127 days after the 2013 stress test	7.36/6.9	0.88	51.3	0.55	93.7	6.3	0.0
127 days before the 2014 stress test	7.86/6.76	0.90	87.5	1.12	72.4	27.6	0.0
127 days after the 2014 stress test	8.13/6.69	0.86	98.4	1.47	50.4	49.6	0.0
127 days before the 2015 stress test	8.37/6.88	0.96	98.9	1.48	50.0	50.0	0.0
127 days after the 2015 stress test	7.56/6.6	0.85	72.2	0.96	67.3	32.7	0.0
Category rating							
<b>Tested Banks - all sample period</b>	<b>3.16/2.99</b>	<b>0.63</b>	<b>31.6</b>	<b>0.32</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>
127 days before the 2009 stress test	1.38/1.41	0.98	2.6	0.03	100.0	0.0	0.0
127 days after the 2009 stress test	2.87/2.95	0.64	14.5	0.15	100.0	0.0	0.0
127 days before the 2011 stress test	2.89/3.01	0.47	18.3	0.18	100.0	0.0	0.0
127 days after the 2011 stress test	2.96/2.95	0.58	26.0	0.26	100.0	0.0	0.0
127 days before the 2012 stress test	3.03/2.97	0.37	29.8	0.30	100.0	0.0	0.0
127 days after the 2012 stress test	3.17/3.06	0.70	17.1	0.17	100.0	0.0	0.0
127 days before the 2013 stress test	3.52/3.14	0.50	47.6	0.48	100.0	0.0	0.0
127 days after the 2013 stress test	3.48/3.1	0.57	40.3	0.40	100.0	0.0	0.0
127 days before the 2014 stress test	3.63/3.08	0.61	55.4	0.55	100.0	0.0	0.0
127 days after the 2014 stress test	3.76/3.08	0.16	68.5	0.69	100.0	0.0	0.0
127 days before the 2015 stress test	3.87/3.11	0.71	76.8	0.77	100.0	0.0	0.0
127 days after the 2015 stress test	3.51/3.1	0.32	41.7	0.42	100.0	0.0	0.0

**Table 5: European banks' bond rating absolute gap: mean on the 127-day period before, mean on the 127-day period after stress test disclosure and difference between the mean after and the mean before.**

This table reports the mean absolute rating gap between Moody's and Standard & Poor's for each bank on the 127-day-period before and 127-day period after each stress test results disclosure date. The table reports also the difference of the mean after and the mean before the stress test.

Bank	Notch rating absolute gap						Category rating absolute gap					
	Before		After		difference mean after - mean before		Before		After		difference mean after - mean before	
	Obs.	Mean	Obs.	Mean	Negative	Positive	Obs.	Mean	Obs.	Mean	Negative	Positive
EU 2010 stress test												
BBVA SA	1	0	4	6		6	1	0	4	2		2
Banco BPI SA	1	5	1	0	-5		1	1	1	0	-1	
Banco Popolare SC	2	1	3	0.67	-0.33		2	0.5	3	0.33	-0.17	
Banco Popolar Espanol SA	1	0	2	0		0	1	0	2	0		0
Bank of Ireland	10	1.6	8	1.63		0.02	10	0.5	8	0.5		0
Bankia SA	4	2.5	2	2	-0.5		4	1	2	0.5	-0.5	
Bankinter SA	2	3	3	3.67		0.67	2	1	3	1.33		0.33
BNP Paribas SA	2	0	6	0		0	2	0	6	0		0
Commerzbank AG	8	2	8	1.5	-0.5		8	1	8	0.75	-0.25	
Danske Bank A/S	8	0.75	2	0	-0.75		8	0.38	2	0	-0.38	
Intesa Sanpaolo SpA	9	1.33	6	2.83		1.5	9	0.22	6	1		0.78
Nordea Bank AB	5	1.2	10	1	-0.2		5	0.2	10	0.1	-0.1	
Pohjola Bank PLC	1	1	2	1		0	1	0	2	0		0
Societe Generale SA	4	2	17	2		0	4	1	17	1		0
Swedbank AB	4	0	1	0		0	4	0	1	0		0
UniCredit Bank AG	2	1.5	6	0.5	-1		2	0.5	6	0.17	-0.33	
<b>Mean</b>						<b>-0.01</b>						<b>0.02</b>
EU 2011 stress test												
BBVA SA	2	6	1	0	-6		2	2	1	0	-2	
Banco BPI SA	1	3	1	5		2	1	1	1	1		0
Banco Popolare SC	3	0.67	1	0	-0.67		3	0.33	1	0	-0.33	
Bankinter SA	1	5	3	5		0	1	2	3	2		0
BNP Paribas SA	11	0	1	0		0	11	0	1	0		0
Commerzbank AG	21	0.29	11	0	-0.29		21	0.1	11	0	-0.1	
Credit Agricole SA	2	2.5	1	3		0.5	2	0.5	1	1		0.5
HSBC Holdings PLC	2	1	2	1		0	2	0	2	0		0
Intesa Sanpaolo SpA	13	2.46	4	0	-2.46		13	1	4	0	-1	
Nordea Bank AB	6	1	1	1		0	6	0.33	1	0	-0.33	
Pohjola Bank PLC	2	1	1	1		0	2	0.5	1	1		0.5
Skandinaviska Enskilda Banken AB	2	1	1	5		4	2	0	1	2		2
Svenska Handelsbanken AB	3	1	1	1		0	3	0	1	0		0
Swedbank AB	8	0	4	0.5		0.5	8	0	4	0		0
UniCredit Bank AG	7	0.86	2	0.5	-0.36		7	0.29	2	0	-0.29	
Unione di Banche Italiane SpA	4	1	1	0	-1		4	0	1	0		0
<b>Mean</b>						<b>-0.24</b>						<b>-0.07</b>
EU 2014 stress test												
Bank of Ireland	1	2	1	0	-2		1	0	1	0		0
Bankia SA	3	1	1	4		3	3	0	1	1		1
Bankinter SA	2	1.5	2	3		1.5	2	0.5	2	1		0.5
Barclays PLC	2	0.5	3	1.33		0.83	2	0.5	3	0.67		0.17
BNP Paribas SA	9	0	6	0		0	9	0	6	0		0
Commerzbank AG	3	1	3	1		0	3	1	3	1		0
Danske Bank A/S	4	2	2	1	-1		4	1	2	0.5	-0.5	
Deutsche Bank AG	4	0.75	4	1		0.25	4	0	4	0.5		0.5
Intesa Sanpaolo SpA	6	0.5	5	1		0.5	6	0.5	5	0	-0.5	
Nordea Bank AB	3	0	1	0		0	3	0	1	0		0
Raiffeisen Bank International AG	3	0	1	2		2	3	0	1	1		1
Societe Generale SA	6	0	3	0.67		0.67	6	0	3	0		0
Swedbank AB	4	0	12	0.25		0.25	4	0	12	0.25		0.25
UniCredit Bank AG	2	0	2	0.5		0.5	2	0	2	0		0
<b>Mean</b>						<b>0.46</b>						<b>0.17</b>

**Table 6: US banks' bond rating absolute gap: mean on the 127 day-period before, on the 127 day-period after stress test disclosure and difference between the mean after and the mean before.**

This table reports the mean absolute rating gap between Moody's and Standard & Poor's for each bank on the 127-day-period before and 127-day period after each stress test results disclosure date. The table reports also the difference of the mean after and the mean before the stress test.

Bank	Notch rating absolute gap						Category rating absolute gap					
	Before		After		difference mean after - mean before		Before		After		difference mean after - mean before	
	Obs.	Mean	Obs.	Mean	Negative	Positive	Obs.	Mean	Obs.	Mean	Negative	Positive
US 2009 stress test												
Bank of America Corp	3	0	15	0		0	15	0	3	0		0
BB&T Corp	2	0	3	1		1	3	0	2	0		0
Goldman Sachs Group Inc/The	11	0.45	27	1		0.55	27	0	11	0		0
JPMorgan Chase & Co	8	0.13	2	1		0.88	2	1	8	0.13		0.88
Morgan Stanley	7	0	4	0.25		0.25	4	0	7	0		0
State Street Corp	2	0	2	0		0	2	0	2	0		0
US Bancorp/MN	2	0	3	0.67		0.67	3	0.67	2	0		0.67
Wells Fargo & Co	2	0	2	1		1	2	1	2	0		1
<b>Mean</b>						<b>0.54</b>						<b>0.32</b>
US 2011 stress test												
Ally Financial Inc	10	1	4	0.75	-0.25		4	0	10	0		0
Bank of America Corp	70	0	20	0.2		0.2	20	0.1	70	0		0.1
Goldman Sachs Group Inc/The	90	1	80	1		0	80	0	90	0		0
JPMorgan Chase & Co	35	1.6	25	1.56	-0.04		25	1	35	1		0
Morgan Stanley	43	0.7	46	0.54	-0.15		46	0.02	43	0		0.02
Wells Fargo & Co	8	1.75	24	1.83		0.08	24	1	8	1		0
<b>Mean</b>						<b>-0.03</b>						<b>0.02</b>
US 2012 stress test												
Ally Financial Inc	1	0	2	0		0	2	0	1	0		0
Bank of America Corp	14	1.57	7	1.86		0.29	7	1	14	1		0
Goldman Sachs Group Inc/The	49	1.67	51	1.49	-0.18		51	0	49	0		0
JPMorgan Chase & Co	14	1.79	6	1	-0.79		6	0.5	14	1	-0.5	
Morgan Stanley	25	0.72	23	1		0.28	23	0.35	25	0.04		0.31
Wells Fargo & Co	18	1.39	17	1	-0.39		17	0	18	0.39	-0.39	
<b>Mean</b>						<b>-0.13</b>						<b>-0.1</b>
US 2013 stress test												
Ally Financial Inc	4	0	3	0		0	3	0	4	0		0
American Express Co	8	1	2	1		0	2	1	8	1		0
Bank of America Corp	10	2	5	2		0	5	1	10	1		0
Goldman Sachs Group Inc/The	51	0	48	0.04		0.04	48	0.04	51	0		0.04
JPMorgan Chase & Co	17	0	23	0.04		0.04	23	0	17	0		0
Morgan Stanley	64	1	54	1		0	54	0.98	64	0.98		0
SunTrust Banks Inc	2	1	4	1		0	4	0	2	0		0
Wells Fargo & Co	14	1	11	1		0	11	0	14	0		0
<b>Mean</b>						<b>0.01</b>						<b>0.01</b>
US 2014 stress test												
Bank of America Corp	8	2	26	2		0	26	0.96	8	1	-0.04	
Goldman Sachs Group Inc/The	39	0.79	29	1		0.21	29	1	39	0.79		0.21
JPMorgan Chase & Co	18	0.89	9	1		0.11	9	0.22	18	0		0.22
Morgan Stanley	22	1.77	20	2		0.23	20	0.95	22	0.95		0
SunTrust Banks Inc	1	1	2	1		0	2	0	1	0		0
Wells Fargo & Co	20	0.9	15	1		0.1	15	0	20	0		0
<b>Mean</b>						<b>0.11</b>						<b>0.06</b>
US 2015 stress test												
Bank of America Corp	14	2	7	1.71	-0.29		7	0.71	14	0.86	-0.14	
Citigroup Inc	11	2	13	1.62	-0.38		13	0.77	11	1	-0.23	
Goldman Sachs Group Inc/The	27	1	16	0.75	-0.25		16	0.69	27	1	-0.31	
HSBC USA Inc	6	1	8	0	-1		8	0	6	0		0
JPMorgan Chase & Co	6	1	2	1		0	2	0.5	6	0.17		0.33
Morgan Stanley	18	2	12	0.67	-1.33		12	0.25	18	1	-0.75	
State Street Corp	1	0	3	1		1	3	0	1	0		0
Wells Fargo & Co	8	1	11	1		0	11	0	8	0		0
<b>Mean</b>						<b>-0.28</b>						<b>-0.14</b>

**Table 7: Mean difference tests for rating absolute rating gap at bond level on the periods before and after stress test for Europe and United-States banks' bonds.**

	Mean difference test: 127 days after - 127 days before		Mean difference test: 127 days after - 127 days before	
	Bond notch rating absolute gap	P-value	Bond category rating absolute gap	P-value
<b>EUROPE</b>				
2010 stress test	0.19	0.38	0.1	0.31
2011 stress test	-0.042	0.87	-0.04	0.7
2014 stress test	0.3**	0.04	0.08	0.3
<b>UNITED-STATES</b>				
2009 stress test	0.49***	0.00	0.12**	0.05
2011 stress test	0.2***	0.00	0.08**	0.05
2012 stress test	-0.14	0.13	-0.13**	0.03
2013 stress test	-0.09	0.16	-0.07	0.91
2014 stress test	0.36***	0.00	0.13**	0.02
2015 stress test	-0.53***	0.00	-0.35***	0.00

**Table 8: Mean difference test for rating absolute gap at bank level on the periods before and after stress test for Europe and United-States banks' bonds.**

	mean difference test: 127 days after - 127 days before				
	Obs.	Notch rating absolute gap	P-val	Category rating absolute gap	P-val
<b>EUROPE</b>					
2010 stress test	16	-0.006	0.99	0.024	0.9
2011 stress test	16	-0.24	0.65	-0.07	0.8
2014 stress test	14	0.46	0.17	0.17	0.28
<b>UNITED-STATES</b>					
2009 stress test	8	0.54***	0.01	0.32*	0.08
2011 stress test	6	-0.027	0.7	0.02	0.95
2012 stress test	6	-0.13	0.47	-0.097	0.71
2013 stress test	8	0.011	0.17	0.005	0.99
2014 stress test	6	0.11**	0.04	0.06	0.83
2015 stress test	8	-0.28	0.29	-0.14	0.53

The mean difference test reported is paired. We have the same issuer of banks during the period before and after the stress test but the number of issue is different. To get paired sample, we did the mean of the rating absolute gap of each individual bank in each period before and after the stress test.

**Table 9: Statistics of dependent and explanatory variables on the 127-day period after each stress test results disclosure, European banks.**

For each bond issued on the 127-day period after the stress test disclosure,  $\Delta\text{Gap1}$  is the difference between its notch rating absolute gap and the mean notch rating absolute gap computed for all bonds of the same issuing bank issued on the 127 day-period before the stress test disclosure date.  $\Delta\text{Gap2}$  is the same indicator built for category rating. The rating absolute gap is the absolute difference between Moody's and Standard & Poor's bonds' ratings. PIIGS exposure is the PIIGS countries sovereign debt exposure of a bank( disclosed in the EBA stress test results), divided by its Tier 1 capital for the 2010 stress test and Core Tier 1 capital for the 2011 and 2014 stress tests.  $\Delta(\text{C})\text{Tier1}$  is the difference between the stressed value (on the first or on the last period of the adverse scenario) of the Tier 1 ratio in the case of the 2010 stress test or the Core Tier 1 ratio for the 2011 and 2014 stress tests and the current Tier 1 (Core tier 1) capital ratio.  $\Delta\text{RWA}$  is the difference between the stressed risk weighted assets (on the first or on the last period of the adverse scenario) and the current risk weighted assets divided by total assets.  $\Delta\text{Net Income}$  is the difference between the stressed net income (on the first or on the last period of the adverse scenario) and the current net income divided by total assets. Controls stands for the following variables: Average\_rating, Ln\_amount\_issued EUR), Maturity (see table 3).

		$\Delta\text{Gap1}$	$\Delta\text{Gap2}$	PIIGS exposure	$\Delta(\text{C})\text{Tier1}$	$\Delta\text{RWA}$	$\Delta\text{Net Income}$		Average_rating	Ln_amount_issued	Maturity		
EU 2010	Obs.	71	71	71	71	71			71	71	71		
Stress test	Mean	0.218	0.090	0.636	-0.003	0.027			3.965	19.628	5.540		
	Median	0.000	0.000	0.321	-0.004	0.031			4.000	20.314	4.999		
	Maximum	6.000	2.000	2.833	0.018	0.063			10.000	21.701	14.995		
	Minimum	-5.000	-1.000	0.000	-0.016	-0.009			1.000	15.425	1.251		
	Std. Dev.	1.732	0.639	0.780	0.006	0.013			1.527	1.454	2.935		
					<i>First period</i>	<i>Last period</i>	<i>First period</i>	<i>Last period</i>	<i>First period</i>	<i>Last period</i>			
EU 2011	Obs.	36	36	36	36	36	36	36	36	36	36		
Stress test	Mean	-0.357	-0.147	1.013	-0.009	0.011	0.039	-0.056	-0.004	0.004	5.306	18.296	5.932
	Median	-0.286	-0.095	0.741	-0.005	0.009	0.036	-0.047	-0.004	0.003	6.000	17.956	4.463
	Maximum	4.000	2.000	2.567	0.007	0.025	0.099	0.008	-0.001	0.008	10.000	21.416	30.160
	Minimum	-6.000	-2.000	0.000	-0.022	-0.012	-0.003	-0.130	-0.006	0.002	1.000	14.914	1.500
	Std. Dev.	1.521	0.591	0.876	0.010	0.013	0.030	0.045	0.002	0.002	1.614	1.855	5.570
EU 2014	Obs.	44	44	44	44	44	44	44	44	44	44		
Stress test	Mean	0.341	0.091	11.910	0.013	0.025	-0.025	-0.034	0.001	0.001	6.750	19.565	5.657
	Median	0.000	0.000	0.298	0.011	0.025	-0.018	-0.029	0.003	0.002	6.250	19.811	4.999
	Maximum	2.000	1.000	54.537	0.024	0.045	-0.004	-0.007	0.007	0.005	10.500	21.416	12.006
	Minimum	-2.000	-1.000	0.000	0.006	0.007	-0.048	-0.073	-0.014	-0.016	4.000	17.034	1.213
	Std. Dev.	0.676	0.461	18.622	0.005	0.009	0.013	0.018	0.004	0.005	2.059	1.476	3.046

**Table 10: Statistics of dependent and explanatory variables on the 127-days period after each stress test results disclosure, United-States banks.**

For each bond issued on the 127-day period after the stress test disclosure,  $\Delta\text{Gap1}$  is the difference between its notch rating absolute gap and the mean notch rating absolute gap computed for all bonds of the same issuing bank issued on the 127 day-period before the stress test disclosure date.  $\Delta\text{Gap2}$  is the same indicator built for category rating. The rating absolute gap is the absolute difference between Moody's and Standard & Poor's bonds' ratings..  $\text{GAP\_to\_Assets}$  is capital GAP from 2009 US stress test results for a specific bank divided by its total assets. .  $\Delta\text{Tier1}$  is the difference between the Tier 1 capital ratio from the adverse scenario of the US stress test and the current tier 1 capital ratio. Net income is the net income rate over the period of the stress test adverse scenario of the US stress test.  $\text{Total\_loss\_loan}$  is the losses on total loans over the periods of the adverse scenario of US stress test divided by total loans.  $\Delta\text{Leverage}$  is the difference between the leverage ratio from the adverse scenario of the US stress test and the current leverage ratio.  $\text{Failed\_dummy}$  is a dummy variable equals to 1 when the bank failed the stress test and equals to 0 otherwise. Controls stands for the following variables:  $\text{Average\_rating}$ ,  $\text{Ln\_amount\_issued}$  (USD),  $\text{Maturity}$  (see table 3).

		$\Delta\text{Gap1}$	$\Delta\text{Gap2}$	$\text{Gap\_to\_Asset}$	$\Delta\text{Tier1}(\%)$	$\Delta\text{Leverage}(\%)$	$\text{Total\_loss\_loan}(\%)$	$\text{Net income}(\%)$	$\text{Average\_rating}$	$\text{Ln\_amount\_issued}$	$\text{Maturity}$
2009 US Stress test	Obs.	55	55	55			55		55	55	55
	Mean	0.409	0.068	0.458			4.5		5.591	18.327	6.550
	Median	0.545	0.000	0.000			0.9		5.500	17.439	6.031
	Maximum	1.000	1.000	1.460			10		6.500	21.956	10.010
	Minimum	0.000	0.000	0.000			0.4		4.500	13.816	1.999
	Std. Dev.	0.344	0.246	0.653			4.3		0.420	2.133	2.015
2012 US Stress test	Obs.	105	105		105		105	105	105	105	105
	Mean	-0.101	-0.024		-4.247		3.186	-5.164	6.471	17.099	8.422
	Median	0.280	0.000		-4.400		1.600	-2.600	6.000	16.530	6.015
	Maximum	0.429	0.960		-2.500		8.300	-2.500	14.000	21.640	29.999
	Minimum	-1.786	-1.000		-4.900		0.900	-15.000	5.000	14.771	1.999
	Std. Dev.	0.708	0.352		0.825		3.214	4.677	1.286	1.895	6.546
2013 US Stress test	Obs.	150	150		150	150	150	150	150	150	150
	Mean	0.020	0.012		-5.384	-1.999	5.135	-2.457	7.173	16.423	9.920
	Median	0.000	0.000		-4.900	-2.100	5.200	-2.400	7.000	15.734	9.473
	Maximum	1.000	1.000		-1.400	-1.200	11.200	0.600	14.000	21.640	29.985
	Minimum	0.000	-0.984		-7.500	-2.400	3.100	-7.100	5.500	12.780	1.500
	Std. Dev.	0.140	0.141		1.764	0.325	1.856	0.911	1.204	2.468	6.377
2014 US Stress test	Obs.	101	101		101	101	101	101	101	101	101
	Mean	0.129	0.068		-4.451	-2.811	4.729	-2.047	7.411	17.420	11.068
	Median	0.111	0.000		-5.000	-2.700	4.600	-2.300	7.500	16.338	10.001
	Maximum	0.227	1.000		-0.900	-1.700	7.300	-0.700	9.000	21.822	30.001
	Minimum	0.000	-1.000		-5.100	-3.400	3.000	-2.500	5.500	13.891	2.998
	Std. Dev.	0.092	0.217		1.086	0.392	1.704	0.473	0.898	2.577	6.850
2015 US Stress test	Obs.	72	72		72	72	72	72	72	72	72
	Mean	-0.444	-0.241		-4.690	-3.279	5.311	-2.196	7.076	19.459	9.034
	Median	0.000	0.000		-5.200	-3.200	4.900	-2.500	7.500	20.419	5.002
	Maximum	1.000	0.833		0.400	-1.000	8.600	1.200	9.000	21.976	30.010
	Minimum	-2.000	-1.000		-6.200	-4.300	3.200	-3.100	5.500	13.629	1.996
	Std. Dev.	0.748	0.461		1.428	0.667	1.851	0.846	1.057	2.303	7.690

**Table 11: Regression results for the Europe all banks sample**

For each bond issued on the 127-day period after the stress test disclosure,  $\Delta\text{Gap1}$  is the difference between its notch rating absolute gap and the mean notch rating absolute gap computed for all bonds of the same issuing bank issued on the 127 day-period before the stress test disclosure date.  $\Delta\text{Gap2}$  is the same indicator built for category rating. The rating absolute gap is the absolute difference between Moody's and Standard & Poor's bonds' ratings. PIIGS exposure is the PIIGS countries sovereign debt exposure of a bank( disclosed in the EBA stress test results), divided by its Tier 1 capital for the 2010 stress test and Core Tier 1 capital for the 2011 and 2014 stress tests.  $\Delta(\text{C})\text{Tier1}$  is the difference between the stressed value of the Tier 1 ratio in the case of the 2010 stress test or the Core Tier 1 ratio for the 2011 and 2014 stress tests t and the current Tier 1 (Core tier 1) capital ratio.  $\Delta\text{RWA}$  is the difference between the stressed risk weighted assets and the current risk weighted assets divided by total assets.  $\Delta\text{Net Income}$  is the difference between the stressed net income and the current net income divided by total assets. Controls stands for the following variables: Average\_rating,, Ln\_amount\_issued (iEUR), Maturity (see table 2).

<i>First period</i>												
VARIABLES	EU 2010				EU 2011				EU 2014			
	$\Delta\text{Gap1}$ (1)	$\Delta\text{Gap2}$ (2)	$\Delta\text{Gap1}$ (3)	$\Delta\text{Gap2}$ (4)	$\Delta\text{Gap1}$ (5)	$\Delta\text{Gap2}$ (6)	$\Delta\text{Gap1}$ (7)	$\Delta\text{Gap2}$ (8)	$\Delta\text{Gap1}$ (9)	$\Delta\text{Gap2}$ (10)	$\Delta\text{Gap1}$ (11)	$\Delta\text{Gap2}$ (12)
PIIGS exposure	1.271*** (0.437)	0.523*** (0.127)	1.062*** (0.400)	0.435*** (0.123)	-0.900*** (0.273)	-0.371*** (0.0876)	-0.772** (0.292)	-0.351*** (0.0922)	-0.00418 (0.00534)	-0.00836*** (0.00300)	0.00359 (0.00555)	-0.00680* (0.00369)
$\Delta\text{RWA}$	54.94** (21.65)	16.30** (7.579)			-10.28 (12.48)	-6.538 (4.596)			1.039 (13.67)	-2.146 (7.104)		
$\Delta(\text{C})\text{Tier1}$			-31.89 (47.29)	-7.499 (17.00)			-26.79 (53.17)	1.895 (17.84)			-80.75** (35.20)	-11.54 (22.92)
$\Delta\text{Net Income}$					-65.19 (138.9)	-74.56 (47.31)	147.3 (232.2)	-16.93 (75.42)	11.20 (40.13)	23.27 (19.55)	11.40 (32.42)	22.76 (18.65)
Constant	-0.877 (2.683)	-0.868 (1.164)	-4.522 (2.727)	-2.245* (1.159)	1.764 (4.578)	1.120 (1.504)	1.785 (4.687)	1.057 (1.586)	-1.203 (1.583)	-0.384 (0.947)	-0.849 (1.209)	-0.290 (0.841)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	71	71	71	71	36	36	36	36	44	44	44	44
R-squared	0.360	0.413	0.232	0.304	0.339	0.482	0.328	0.425	0.063	0.137	0.256	0.143
<i>Last period</i>												
VARIABLES					EU 2011				EU 2014			
					$\Delta\text{Gap1}$ (13)	$\Delta\text{Gap2}$ (14)	$\Delta\text{Gap1}$ (15)	$\Delta\text{Gap2}$ (16)	$\Delta\text{Gap1}$ (17)	$\Delta\text{Gap2}$ (18)	$\Delta\text{Gap1}$ (19)	$\Delta\text{Gap2}$ (20)
PIIGS exposure					-1.532** (0.608)	-0.549*** (0.155)	-1.503** (0.553)	-0.539*** (0.133)	-0.00384 (0.00509)	-0.00920*** (0.00281)	0.00609 (0.00430)	-0.0107*** (0.00368)
$\Delta\text{RWA}$					3.907 (4.492)	1.507 (1.790)			3.330 (9.411)	-5.068 (5.214)		
$\Delta(\text{C})\text{Tier1}$							12.19 (16.88)	4.230 (5.383)			-43.75** (16.83)	10.70 (12.46)
$\Delta\text{Net Income}$					497.9 (368.2)	159.2** (77.33)	465.5 (349.9)	147.9** (66.64)	4.822 (31.78)	26.67 (17.93)	3.409 (28.43)	27.44 (17.54)
Constant					0.853 (3.505)	1.102 (1.280)	-0.478 (3.424)	0.610 (1.211)	-1.184 (1.495)	-0.373 (0.879)	-0.526 (1.403)	-0.549 (0.972)
Controls					Yes							
Observations					36	36	36	36	44	44	44	44
R-squared					0.446	0.515	0.443	0.511	0.066	0.180	0.190	0.169

Robust standard errors in parentheses

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

**Table 12: Regression results for the US all banks sample**

For each bond issued on the 127-day period after the stress test disclosure,  $\Delta\text{Gap1}$  is the difference between its notch rating absolute gap and the mean notch rating absolute gap computed for all bonds of the same issuing bank issued on the 127 day-period before the stress test disclosure date.  $\Delta\text{Gap2}$  is the same indicator built for category rating. The rating absolute gap is the absolute difference between Moody's and Standard & Poor's bonds' ratings..  $\text{GAP\_to\_Assets}$  is capital GAP from 2009 US stress test results for a specific bank divided by its total assets. .  $\Delta\text{Tier1}$  is the difference between the Tier 1 capital ratio from the adverse scenario of the US stress test and the current tier 1 capital ratio. Net income is the net income rate over the period of the stress test adverse scenario of the US stress test.  $\text{Total\_loss\_loan}$  is the losses on total loans over the periods of the adverse scenario of US stress test divided by total loans.  $\Delta\text{Leverage}$  is the difference between the leverage ratio from the adverse scenario of the US stress test and the current leverage ratio. Failed\_dummy is a dummy variable equals to 1 when the bank failed the stress test and equals to 0 otherwise. Controls stands for the following variables: Average\_rating, Ln\_amount\_issued (USD), Maturity (see table 2).

VARIABLES	US 2009		US 2012				US 2013				US 2014				US 2015			
	$\Delta\text{Gap1}$ (1)	$\Delta\text{Gap2}$ (2)	$\Delta\text{Gap1}$ (3)	$\Delta\text{Gap2}$ (4)	$\Delta\text{Gap1}$ (5)	$\Delta\text{Gap2}$ (6)	$\Delta\text{Gap1}$ (7)	$\Delta\text{Gap2}$ (8)	$\Delta\text{Gap1}$ (9)	$\Delta\text{Gap2}$ (10)	$\Delta\text{Gap1}$ (11)	$\Delta\text{Gap2}$ (12)	$\Delta\text{Gap1}$ (13)	$\Delta\text{Gap2}$ (14)	$\Delta\text{Gap1}$ (15)	$\Delta\text{Gap2}$ (16)	$\Delta\text{Gap1}$ (17)	$\Delta\text{Gap2}$ (18)
Gap_to_Asset	-0.605** (0.242)	-0.179* (0.091)																
$\Delta\text{Tier1}$			1.247*** (0.357)	0.334* (0.177)			0.001 (0.014)	0.008 (0.011)			-0.039*** (0.008)	-0.103** (0.043)			0.516*** (0.067)	0.110* (0.056)		
$\Delta\text{Leverage}$							0.036 (0.043)	0.056 (0.040)	0.0271 (0.049)	0.069 (0.047)	0.110*** (0.008)	0.287* (0.155)	0.074*** (0.019)	0.348** (0.147)	-0.152 (0.183)	0.066 (0.154)	0.356* (0.212)	0.230 (0.144)
Net income					0.069*** (0.018)	0.0184** (0.008)			0.029 (0.029)	-0.021 (0.038)			-0.013 (0.028)	-0.296*** (0.083)			0.463*** (0.132)	0.037 (0.090)
Total_loss_loan	2.493 (1.518)	1.099 (0.760)	-0.351*** (0.0910)	-0.132*** (0.0482)	0.0297 (0.0330)	-0.0299** (0.0130)	0.004 (0.0128)	0.003 (0.011)	-0.001 (0.003)	0.014 (0.016)	-0.040*** (0.002)	0.022 (0.040)	-0.049*** (0.005)	0.042 (0.041)	-0.001 (0.054)	0.106** (0.046)	0.168*** (0.063)	0.143*** (0.043)
Failed_dummy	-0.326 (0.305)	-0.499*** (0.093)																
Constant	2.798** (1.172)	4.037*** (0.151)	6.932*** (1.928)	1.700* (1.020)	0.742 (0.691)	0.0422 (0.431)	0.054 (0.266)	0.373 (0.235)	0.011 (0.187)	0.339 (0.208)	0.815*** (0.037)	0.912* (0.522)	0.802*** (0.045)	0.537 (0.584)	0.457 (0.643)	0.797 (0.538)	0.901 (0.817)	0.859 (0.554)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes									
Observations	55	55	105	105	105	105	150	150	150	150	101	101	101	101	72	72	72	72
R-squared	0.618	0.888	0.222	0.395	0.096	0.358	0.012	0.056	0.017	0.058	0.929	0.225	0.875	0.269	0.606	0.274	0.367	0.233

**Table 13: Correlation matrix of explanatory variables for Europe banks**

Panel A : EU 2010

	PIIGS exposure	$\Delta$ Tier1	$\Delta$ RWA	Average_rating	Ln_amount_issued	Maturity
PIIGS exposure	1.000					
$\Delta$ Tier1	0.402	1.000				
$\Delta$ RWA	-0.173	-0.449	1.000			
Average_rating	0.243	-0.085	-0.120	1.000		
Ln_amount_issued	0.150	0.228	0.095	0.091	1.000	
Maturity	0.073	0.072	0.165	-0.060	-0.132	1.000

Panel B : EU 2011

*First period*

	PIIGS exposure	$\Delta$ CTier1	$\Delta$ RWA	$\Delta$ Net Income	Average_rating	Ln_amount_issued	Maturity
PIIGS exposure	1.000						
$\Delta$ CTier1	-0.126	1.000					
$\Delta$ RWA	0.036	-0.757	1.000				
$\Delta$ Net Income	0.163	0.258	0.041	1.000			
Average_rating	0.084	-0.306	0.258	-0.101	1.000		
Ln_amount_issued	0.152	0.173	-0.128	0.187	-0.033	1.000	
Maturity	0.023	-0.085	0.186	0.095	-0.192	0.194	1.000

*Last period*

	PIIGS exposure	$\Delta$ CTier1	$\Delta$ RWA	$\Delta$ Net Income	Average_rating	Ln_amount_issued	Maturity
PIIGS exposure	1.000						
$\Delta$ CTier1	0.219	1.000					
$\Delta$ RWA	-0.056	-0.638	1.000				
$\Delta$ Net Income	-0.170	-0.136	0.119	1.000			
Average_rating	0.084	0.332	-0.266	0.037	1.000		
Ln_amount_issued	0.152	-0.111	0.133	-0.064	-0.033	1.000	
Maturity	0.023	0.049	-0.174	-0.095	-0.192	0.194	1.000

Panel C : EU 2014

*First period*

	PIIGS exposure	$\Delta$ CTier1	$\Delta$ RWA	$\Delta$ Net Income	Average_rating	Ln_amount_issued	Maturity
PIIGS exposure	1.000						
$\Delta$ CTier1	0.399	1.000					
$\Delta$ RWA	-0.322	-0.536	1.000				
$\Delta$ Net Income	-0.330	-0.189	0.120	1.000			
Average_rating	0.194	0.186	-0.131	-0.157	1.000		
Ln_amount_issued	0.028	-0.019	0.008	0.080	0.183	1.000	
Maturity	0.088	0.125	-0.228	-0.054	0.011	0.095	1.000

*Last period*

	PIIGS exposure	$\Delta$ CTier1	$\Delta$ RWA	$\Delta$ Net Income	Average_rating	Ln_amount_issued	Maturity
PIIGS exposure	1.000						
$\Delta$ CTier1	0.421	1.000					
$\Delta$ RWA	-0.123	-0.129	1.000				
$\Delta$ Net Income	-0.326	-0.343	-0.131	1.000			
Average_rating	0.194	0.339	0.077	-0.184	1.000		
Ln_amount_issued	0.028	-0.025	-0.133	0.050	0.183	1.000	
Maturity	0.088	0.080	-0.174	-0.053	0.011	0.095	1.000

**Table 14: Correlation matrix of explanatory variables for US banks****Panel A: US 2009**

	Gap_to_Asset	Total_loss_loan	Failed_dummy	Average_rating	Ln_amount_issued	Maturity
Gap_to_Asset	1.000					
Total_loss_loan	0.437	1.000				
Failed_dummy	-0.310	-0.371	1.000			
Average_rating	0.017	-0.043	-0.237	1.000		
Ln_amount_issued	0.078	0.276	-0.053	-0.291	1.000	
Maturity	-0.104	-0.147	0.187	0.232	-0.050	1.000

**Panel B: US 2012**

	$\Delta$ Tier1	Net income	Total_loss_loan	Average_rating	Ln_amount_issued	Maturity
$\Delta$ Tier1	1.000					
Net income	-0.224	1.000				
Total_loss_loan	0.156	-0.308	1.000			
Average_rating	-0.061	0.183	-0.022	1.000		
Ln_amount_issued	0.153	-0.143	0.243	-0.121	1.000	
Maturity	-0.038	0.089	-0.167	0.196	-0.213	1.000

**Panel C: US 2013**

	$\Delta$ Tier1	$\Delta$ Leverage	Net income	Total_loss_loan	Average_rating	Ln_amount_issued	Maturity
$\Delta$ Tier1	1.000						
$\Delta$ Leverage	0.035	1.000					
Net income	0.564	0.276	1.000				
Total_loss_loan	0.301	-0.298	0.372	1.000			
Average_rating	-0.227	-0.038	-0.541	-0.038	1.000		
Ln_amount_issued	0.211	-0.085	0.064	0.201	-0.284	1.000	
Maturity	-0.006	0.120	0.011	-0.057	0.302	-0.173	1.000

**Panel D: US 2014**

	$\Delta$ Tier1	$\Delta$ Leverage	Net income	Total_loss_loan	Average_rating	Ln_amount_issued	Maturity
$\Delta$ Tier1	1.000						
$\Delta$ Leverage	0.305	1.000					
Net income	0.853	0.370	1.000				
Total_loss_loan	0.162	0.065	0.278	1.000			
Average_rating	0.102	-0.333	-0.011	0.035	1.000		
Ln_amount_issued	0.288	0.023	0.287	0.299	-0.311	1.000	
Maturity	-0.044	0.063	-0.059	-0.144	0.190	-0.142	1.000

**Panel E: US 2015**

	$\Delta$ Tier1	$\Delta$ Leverage	Net income	Total_loss_loan	Average_rating	Ln_amount_issued	Maturity
$\Delta$ Tier1	1.000						
$\Delta$ Leverage	0.346	1.000					
Net income	0.804	0.303	1.000				
Total_loss_loan	0.422	-0.020	0.403	1.000			
Average_rating	0.096	0.062	0.094	0.096	1.000		
Ln_amount_issued	0.342	0.191	0.269	0.312	-0.072	1.000	
Maturity	-0.054	0.049	-0.040	-0.170	0.314	-0.133	1.000

**Appendix:**

Table A1: Rating class and rating numerical scales

Common category rating numerical scale	Common notch rating numerical scale	Agency rating scales	
		Moody's	Standard & Poor's
1	1	Aaa	AAA
2	2	Aa1	AA+
	3	Aa2	AA
	4	Aa3	AA-
3	5	A1	A+
	6	A2	A
	7	A3	A-
4	8	Baa1	BBB+
	9	Baa2	BBB
	10	Baa3	BBB-
5	11	Ba1	BB+
	12	Ba2	BB
	13	Ba3	BB-
6	14	B1	B+
	15	B2	B
	16	B3	B-
7	17	Caa1	CCC+
	18	Caa2	CCC
	19	Caa3	CCC-

Table A2: **Moody's and S&P** European and United-States banks' bonds rating and bonds characteristics, by issue period (same issuing banks before and after each stress test).

This table reports mean rating and characteristics of bonds issued by European tested banks and United-States tested banks for each stress test, with a sample restricted for a given test to the banks having issued bonds both in the 127-day-period before and in the 127-day period after this test. Statistics are computed and reported on the each stress test results disclosure date. Issues/Issuers indicates respectively the number of bonds issued and the number of issuers on the period considered. Average rating is the average of Moody's and Standard & Poor's ratings, computed on a notch basis or on a category basis (higher value of Average rating indicates higher risk). Maturity is expressed in years. Amount issued is the total amount of the bond's issue.

Issue period	Issues/Issuers		Average category rating	Maturity (mean, years)	Amount issued (mean, EUR millions)
	(number)	Average notch rating			
<b>Europe</b>					(mean, EUR millions)
<b>Tested Banks - all sample period</b>	<b>886/24</b>	<b>5.57</b>	<b>2.83</b>	<b>5.83</b>	<b>560.50</b>
127 days before the 2010 stress test	64/16	4.05	2.32	6.40	608.48
127 days after the 2010 stress test	81/16	4.06	2.37	5.19	626.89
127 days before the 2011 stress test	88/16	4.80	2.48	5.71	562.62
127 days after the 2011 stress test	36/16	5.31	2.79	5.93	364.29
127 days before the 2014 stress test	52/14	6.96	3.27	5.78	540.22
127 days after the 2014 stress test	46/14	6.87	3.53	5.75	677.13
<b>United-States</b>					(mean, USD millions)
<b>Tested Banks - all sample period</b>	<b>1918/13</b>	<b>6.27</b>	<b>3.07</b>	<b>9.42</b>	<b>429.06</b>
127 days before the 2009 stress test	37/8	1.92	1.42	3.97	1963.11
127 days after the 2009 stress test	59/8	5.40	2.88	6.36	709.99
127 days before the 2011 stress test	248/6	5.74	2.94	9.73	284.94
127 days after the 2011 stress test	199/6	5.76	2.94	11.36	262.83
127 days before the 2012 stress test	121/6	5.99	3.00	8.20	279.49
127 days after the 2012 stress test	105/6	6.47	3.11	8.42	259.57
127 days before the 2013 stress test	170/8	7.24	3.33	9.15	460.89
127 days after the 2013 stress test	150/8	7.17	3.30	9.92	253.95
127 days before the 2014 stress test	108/6	7.16	3.30	11.33	557.29
127 days after the 2014 stress test	125/6	7.40	3.41	10.67	518.32
127 days before the 2015 stress test	91/8	7.39	3.40	11.31	534.77
127 days after the 2015 stress test	72/8	7.08	3.31	9.03	990.51

Table A3: Measures of disagreement between **Moody's and S&P** for European and United-States banks' bonds ratings (same issuing banks before and after each stress test).

This table reports different bonds disagreement measures between Moody's and Standard & Poor's. Correlation is the correlation index between their ratings. Moody's <> S&P indicates the percentage of their disagreements. Absolute gap is the absolute difference between Moody's and Standard & Poor's ratings. Rating gap distribution represents the percentage of Gap= 1, Gap= 2 or Gap = 3 and more in the total number of disagreements.

Issue period	Average ratings				Rating gap distribution (%)		
	(Moody's/S&P)	Correlation between ratings	Moody's <> S&P (%)	Average absolute gap	Gap=1	Gap=2	Gap=3+
<b>Europe</b>							
Notch rating							
<b>Tested Banks - all sample period</b>	<b>5.43/5.7</b>	<b>0.83</b>	<b>55.4</b>	<b>0.88</b>	<b>64.2</b>	<b>24.6</b>	<b>11.2</b>
127 days before the 2010 stress test	3.42/4.69	0.71	76.6	1.42	42.9	44.9	12.2
127 days after the 2010 stress test	3.37/4.75	0.54	76.5	1.63	33.9	46.8	19.4
127 days before the 2011 stress test	4.31/5.28	0.75	53.4	1.02	48.9	27.7	23.4
127 days after the 2011 stress test	5/5.61	0.55	38.9	1.00	57.1	0.0	42.9
127 days before the 2014 stress test	7.15/6.77	0.94	38.5	0.50	70.0	30.0	0.0
127 days after the 2014 stress test	6.85/6.89	0.85	54.3	0.78	72.0	16.0	12.0
Category rating							
<b>Tested Banks - all sample period</b>	<b>2.77/2.89</b>	<b>0.77</b>	<b>25.08</b>	<b>0.29</b>	<b>89.5</b>	<b>10.5</b>	<b>0.0</b>
127 days before the 2010 stress test	2.04/2.47	0.63	41.1	0.45	90.0	10.0	0.0
127 days after the 2010 stress test	2.07/2.55	0.45	51.2	0.60	83.7	16.3	0.0
127 days before the 2011 stress test	2.34/2.6	0.64	33.0	0.38	84.2	15.8	0.0
127 days after the 2011 stress test	2.58/2.83	0.52	19.4	0.31	42.9	57.1	0.0
127 days before the 2014 stress test	3.28/3.11	0.88	19.7	0.20	100.0	0.0	0.0
127 days after the 2014 stress test	3.36/3.34	0.71	28.3	0.28	100.0	0.0	0.0
<b>United-States</b>							
Notch rating							
<b>Tested Banks - all sample period</b>	<b>6.27/6.27</b>	<b>0.79</b>	<b>70.1</b>	<b>0.89</b>	<b>73.6</b>	<b>26.0</b>	<b>0.4</b>
127 days before the 2009 stress test	1.84/2	0.99	16.2	0.16	100.0	0.0	0.0
127 days after the 2009 stress test	5.12/5.68	0.84	62.7	0.63	100.0	0.0	0.0
127 days before the 2011 stress test	5.41/6.07	0.73	66.5	0.77	83.6	16.4	0.0
127 days after the 2011 stress test	5.52/6.01	0.74	79.9	0.98	77.4	22.6	0.0
127 days before the 2012 stress test	5.68/6.31	0.35	93.4	1.42	47.8	52.2	0.0
127 days after the 2012 stress test	6.19/6.75	0.57	83.8	1.29	46.6	53.4	0.0
127 days before the 2013 stress test	7.5/6.98	0.86	57.6	0.64	89.8	10.2	0.0
127 days after the 2013 stress test	7.41/6.93	0.87	52.7	0.56	93.7	6.3	0.0
127 days before the 2014 stress test	7.71/6.61	0.77	88.9	1.12	74.0	26.0	0.0
127 days after the 2014 stress test	8.13/6.66	0.88	100.0	1.50	50.4	49.6	0.0
127 days before the 2015 stress test	8.12/6.66	0.92	98.9	1.46	52.2	47.8	0.0
127 days after the 2015 stress test	7.56/6.6	0.85	72.2	0.96	67.3	32.7	0.0
Category rating							
<b>Tested Banks - all sample period</b>	<b>3.16/2.99</b>	<b>0.63</b>	<b>31.9</b>	<b>0.32</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>
127 days before the 2009 stress test	1.41/1.43	0.98	2.7	0.03	100.0	0.0	0.0
127 days after the 2009 stress test	2.86/2.9	0.71	10.2	0.10	100.0	0.0	0.0
127 days before the 2011 stress test	2.88/2.99	0.49	17.3	0.17	100.0	0.0	0.0
127 days after the 2011 stress test	2.95/2.94	0.58	26.1	0.26	100.0	0.0	0.0
127 days before the 2012 stress test	3.03/2.97	0.37	29.8	0.30	100.0	0.0	0.0
127 days after the 2012 stress test	3.17/3.06	0.70	17.1	0.17	100.0	0.0	0.0
127 days before the 2013 stress test	3.52/3.14	0.50	47.6	0.48	100.0	0.0	0.0
127 days after the 2013 stress test	3.49/3.11	0.57	41.3	0.41	100.0	0.0	0.0
127 days before the 2014 stress test	3.57/3.02	0.12	55.6	0.56	100.0	0.0	0.0
127 days after the 2014 stress test	3.76/3.06	0.15	69.6	0.70	100.0	0.0	0.0
127 days before the 2015 stress test	3.78/3.02	0.08	75.8	0.76	100.0	0.0	0.0
127 days after the 2015 stress test	3.51/3.1	0.32	41.7	0.42	100.0	0.0	0.0

Table A4: **Moody's and Fitch** European and United-States banks' bonds rating and bonds characteristics, by issue period.

This table reports mean rating and characteristics of bonds issued by European banks and United-States tested banks around each stress test. Statistics are computed and reported on the 127-day-period before and 127-day period after each stress test results disclosure date. Issues/Issuers indicates respectively the number of bonds issued and the number of issuers on the period considered. Average rating is the average of Moody's and Fitch ratings, computed on a notch basis or on a category basis (higher value of Average rating indicates higher risk). Maturity is expressed in years. Amount issued is the total amount of the bond's issue.

Issue period	Issues/Issuers (number)	Average notch rating	Average category rating	Maturity (mean, years)	Amount issued (mean, EUR millions)
<b>Europe</b>					(mean, EUR millions)
<b>Tested Banks - all sample period</b>	<b>721/36</b>	<b>5.61</b>	<b>2.88</b>	<b>6.02</b>	<b>648.72</b>
127 days before the 2010 stress test	53/19	4.08	2.27	7.63	779.17
127 days after the 2010 stress test	54/14	4.16	2.37	5.47	834.02
127 days before the 2011 stress test	86/21	4.40	2.44	6.07	737.48
127 days after the 2011 stress test	25/14	5.10	2.70	5.73	329.66
127 days before the 2014 stress test	55/15	6.58	3.23	5.80	609.25
127 days after the 2014 stress test	48/14	6.65	3.29	6.20	746.79
<b>United-States</b>					(mean, USD millions)
<b>Tested Banks - all sample period</b>	<b>1421/16</b>	<b>5.62</b>	<b>2.95</b>	<b>8.83</b>	<b>582.13</b>
127 days before the 2009 stress test	39/10	1.77	1.36	3.93	1895.00
127 days after the 2009 stress test	51/10	4.99	2.82	6.32	912.02
127 days before the 2011 stress test	247/8	5.26	2.87	9.73	313.08
127 days after the 2011 stress test	171/7	5.52	2.93	11.84	309.14
127 days before the 2012 stress test	85/6	5.78	2.96	8.62	376.69
127 days after the 2012 stress test	64/6	5.88	3.01	8.20	412.52
127 days before the 2013 stress test	85/7	6.74	3.31	7.66	925.16
127 days after the 2013 stress test	68/9	6.87	3.37	7.67	598.61
127 days before the 2014 stress test	46/7	6.83	3.29	10.22	1377.77
127 days after the 2014 stress test	59/9	6.72	3.19	7.66	1103.01
127 days before the 2015 stress test	45/9	7.12	3.39	7.32	1122.71
127 days after the 2015 stress test	64/8	6.47	3.09	8.74	1117.70

Table A5: Measures of disagreement between **Moody's and Fitch** for European and United-States banks' bonds ratings.

This table reports different bonds disagreement measures between Moody's and Fitch. Correlation is the correlation index between their ratings. Moody's <> Fitch indicates the percentage of their disagreements. Absolute gap is the absolute difference between Moody's and Fitch ratings. Rating gap distribution represents the percentage of Gap= 1, Gap= 2 or Gap = 3 and more in the total number of disagreements.

Issue period	Average ratings				Rating gap distribution (%)		
	(Moody's/Fitch)	Correlation between ratings	Moody's <> Fitch (%)	Average absolute gap	Gap=1	Gap=2	Gap=3+
<b>Europe</b>							
<b>Notch rating</b>							
<b>Tested Banks - all sample period</b>	<b>5.73/5.48</b>	<b>0.86</b>	<b>64.4</b>	<b>0.97</b>	<b>67.9</b>	<b>19.8</b>	<b>12.3</b>
127 days before the 2010 stress test	3.74/4.42	0.83	73.6	1.02	69.2	25.6	5.1
127 days after the 2010 stress test	3.56/4.76	0.83	85.2	1.31	58.7	37.0	4.3
127 days before the 2011 stress test	4.05/4.74	0.78	66.3	1.00	66.7	24.6	8.8
127 days after the 2011 stress test	5.16/5.04	0.82	68.0	0.84	76.5	23.5	0.0
127 days before the 2014 stress test	7.05/6.11	0.93	50.9	0.98	35.7	42.9	21.4
127 days after the 2014 stress test	7.15/6.15	0.88	56.3	1.13	48.1	14.8	37.0
<b>Category rating</b>							
<b>Tested Banks - all sample period</b>	<b>2.89/2.87</b>	<b>0.81</b>	<b>25.0</b>	<b>0.26</b>	<b>95.0</b>	<b>5.0</b>	<b>0.0</b>
127 days before the 2010 stress test	2.15/2.4	0.71	37.7	0.40	95.0	5.0	0.0
127 days after the 2010 stress test	2.17/2.57	0.72	40.7	0.44	90.9	9.1	0.0
127 days before the 2011 stress test	2.34/2.55	0.76	23.3	0.26	90.0	10.0	0.0
127 days after the 2011 stress test	2.68/2.72	0.70	28.0	0.28	100.0	0.0	0.0
127 days before the 2014 stress test	3.36/3.09	0.90	25.5	0.27	92.9	7.1	0.0
127 days after the 2014 stress test	3.4/3.19	0.55	29.2	0.33	85.7	14.3	0.0
<b>United-States</b>							
<b>Notch rating</b>							
<b>Tested Banks - all sample period</b>	<b>5.99/5.25</b>	<b>0.82</b>	<b>58.5</b>	<b>0.93</b>	<b>51.0</b>	<b>38.6</b>	<b>10.3</b>
127 days before the 2009 stress test	1.79/1.74	0.99	5.1	0.05	100.0	0.0	0.0
127 days after the 2009 stress test	5.18/4.8	0.84	31.4	0.37	81.3	18.8	0.0
127 days before the 2011 stress test	5.43/5.08	0.86	32.0	0.35	89.9	10.1	0.0
127 days after the 2011 stress test	5.62/5.43	0.78	45.6	0.60	67.9	32.1	0.0
127 days before the 2012 stress test	5.91/5.66	0.55	65.9	0.95	55.4	44.6	0.0
127 days after the 2012 stress test	6/5.77	0.68	79.7	1.14	62.7	31.4	5.9
127 days before the 2013 stress test	7.64/5.84	0.92	100.0	1.80	31.8	56.5	11.8
127 days after the 2013 stress test	7.69/6.04	0.91	91.2	1.65	25.8	67.7	6.5
127 days before the 2014 stress test	7.89/5.76	0.96	97.8	2.13	2.2	77.8	20.0
127 days after the 2014 stress test	7.9/5.54	0.88	96.6	2.36	3.5	49.1	47.4
127 days before the 2015 stress test	8.33/5.91	0.98	100.0	2.42	2.2	53.3	44.4
127 days after the 2015 stress test	7.48/5.45	0.87	100.0	2.03	18.8	60.9	20.3
<b>Category rating</b>							
<b>Tested Banks - all sample period</b>	<b>3.07/2.82</b>	<b>0.76</b>	<b>26.9</b>	<b>0.27</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>
127 days before the 2009 stress test	1.38/1.33	0.96	5.1	0.05	100.0	0.0	0.0
127 days after the 2009 stress test	2.84/2.8	0.92	3.9	0.04	100.0	0.0	0.0
127 days before the 2011 stress test	2.89/2.85	0.90	4.0	0.04	100.0	0.0	0.0
127 days after the 2011 stress test	3.02/2.84	0.74	17.5	0.18	100.0	0.0	0.0
127 days before the 2012 stress test	3.12/2.81	0.59	30.6	0.31	100.0	0.0	0.0
127 days after the 2012 stress test	3.17/2.84	0.69	32.8	0.33	100.0	0.0	0.0
127 days before the 2013 stress test	3.61/3	0.69	61.2	0.61	100.0	0.0	0.0
127 days after the 2013 stress test	3.71/3.03	0.74	67.6	0.68	100.0	0.0	0.0
127 days before the 2014 stress test	3.54/3.04	0.78	50.0	0.50	100.0	0.0	0.0
127 days after the 2014 stress test	3.63/2.75	0.82	88.1	0.88	100.0	0.0	0.0
127 days before the 2015 stress test	3.8/2.98	0.89	82.2	0.82	100.0	0.0	0.0
127 days after the 2015 stress test	3.47/2.7	0.63	76.6	0.77	100.0	0.0	0.0

Table A6: **Fitch and S&P** European and United-States banks' bonds rating and bonds characteristics, by issue period.

This table reports mean rating and characteristics of bonds issued by European banks and United-States tested banks around each stress test. Statistics are computed and reported on the 127-day-period before and 127-day period after each stress test results disclosure date. Issues/Issuers indicates respectively the number of bonds issued and the number of issuers on the period considered. Average rating is the average of Fitch and Standard & Poor's ratings, computed on a notch basis or on a category basis (higher value of Average rating indicates higher risk). Maturity is expressed in years. Amount issued is the total amount of the bond's issue.

Issue period	Issues/Issuers (number)	Average notch rating	Average category rating	Maturity (mean, years)	Amount issued (mean, EUR millions)
<b>Europe</b>					(mean, EUR millions)
<b>Tested Banks - all sample period</b>	<b>721/36</b>	<b>5.67</b>	<b>2.92</b>	<b>6.02</b>	<b>648.72</b>
127 days before the 2010 stress test	53/19	4.63	2.47	7.63	779.17
127 days after the 2010 stress test	54/14	4.72	2.56	5.47	834.02
127 days before the 2011 stress test	86/21	4.81	2.57	6.07	737.48
127 days after the 2011 stress test	25/14	5.14	2.72	5.73	329.66
127 days before the 2014 stress test	55/15	6.37	3.14	5.80	609.25
127 days after the 2014 stress test	48/14	6.63	3.30	6.20	746.79
<b>United-States</b>					(mean, USD millions)
<b>Tested Banks - all sample period</b>	<b>1421/16</b>	<b>5.69</b>	<b>2.91</b>	<b>8.83</b>	<b>582.13</b>
127 days before the 2009 stress test	39/10	1.85	1.37	3.93	1895.00
127 days after the 2009 stress test	51/10	5.27	2.87	6.32	912.02
127 days before the 2011 stress test	247/8	5.58	2.93	9.73	313.08
127 days after the 2011 stress test	171/7	5.73	2.89	11.84	309.14
127 days before the 2012 stress test	85/6	6.04	2.90	8.62	376.69
127 days after the 2012 stress test	64/6	6.28	2.97	8.20	412.52
127 days before the 2013 stress test	85/7	6.42	3.11	7.66	925.16
127 days after the 2013 stress test	68/9	6.53	3.12	7.67	598.61
127 days before the 2014 stress test	46/7	6.24	3.11	10.22	1377.77
127 days after the 2014 stress test	59/9	6.03	2.96	7.66	1103.01
127 days before the 2015 stress test	45/9	6.39	3.10	7.32	1122.71
127 days after the 2015 stress test	64/8	6.02	2.91	8.74	1117.70

Table A7: Measures of disagreement between **Fitch and S&P** for European and United-States banks' bonds ratings.

This table reports different bonds disagreement measures between Fitch and Standard & Poor's. Correlation is the correlation index between their ratings. Fitch <> S&P indicates the percentage of their disagreements. Absolute gap is the absolute difference between and Standard & Poor's ratings. Rating gap distribution represents the percentage of Gap= 1, Gap= 2 or Gap = 3 and more in the total number of disagreements.

Issue period	Average ratings			Average absolute gap	Rating gap distribution (%)		
	(Fitch/S&P)	Correlation between ratings	Fitch <> S&P (%)		Gap=1	Gap=2	Gap=3+
<b>Europe</b>							
<b>Notch rating</b>							
<b>Tested Banks - all sample period</b>	<b>5.48/5.86</b>	<b>0.85</b>	<b>45.1</b>	<b>0.74</b>	<b>60.3</b>	<b>22.8</b>	<b>16.9</b>
127 days before the 2010 stress test	4.42/4.85	0.79	37.7	0.66	65.0	20.0	15.0
127 days after the 2010 stress test	4.76/4.69	0.80	35.2	0.59	63.2	21.1	15.8
127 days before the 2011 stress test	4.74/4.88	0.71	48.8	0.81	64.3	19.0	16.7
127 days after the 2011 stress test	5.04/5.24	0.61	72.0	1.00	72.2	22.2	5.6
127 days before the 2014 stress test	6.11/6.64	0.94	41.8	0.60	73.9	13.0	13.0
127 days after the 2014 stress test	6.15/7.1	0.89	47.9	1.04	13.0	56.5	30.4
<b>Category rating</b>							
<b>Tested Banks - all sample period</b>	<b>2.87/2.97</b>	<b>0.81</b>	<b>21.5</b>	<b>0.23</b>	<b>92.9</b>	<b>7.1</b>	<b>0.0</b>
127 days before the 2010 stress test	2.4/2.55	0.83	9.4	0.15	40.0	60.0	0.0
127 days after the 2010 stress test	2.57/2.56	0.73	18.5	0.24	70.0	30.0	0.0
127 days before the 2011 stress test	2.55/2.59	0.65	23.3	0.28	80.0	20.0	0.0
127 days after the 2011 stress test	2.72/2.72	0.63	32.0	0.32	100.0	0.0	0.0
127 days before the 2014 stress test	3.09/3.18	0.93	12.7	0.13	100.0	0.0	0.0
127 days after the 2014 stress test	3.19/3.42	0.64	27.1	0.27	100.0	0.0	0.0
<b>United-States</b>							
<b>Notch rating</b>							
<b>Tested Banks - all sample period</b>	<b>5.25/6.14</b>	<b>0.93</b>	<b>83.3</b>	<b>0.92</b>	<b>91.7</b>	<b>6.4</b>	<b>1.9</b>
127 days before the 2009 stress test	1.74/1.95	1.00	20.5	0.21	100.0	0.0	0.0
127 days after the 2009 stress test	4.8/5.75	0.86	82.4	0.94	92.9	0.0	7.1
127 days before the 2011 stress test	5.08/6.09	0.88	89.5	1.00	88.7	10.4	0.9
127 days after the 2011 stress test	5.43/6.02	0.91	51.5	0.60	87.5	9.1	3.4
127 days before the 2012 stress test	5.66/6.42	0.89	70.6	0.76	91.7	8.3	0.0
127 days after the 2012 stress test	5.77/6.8	0.99	100.0	1.03	96.9	3.1	0.0
127 days before the 2013 stress test	5.84/7.01	0.92	98.8	1.18	90.5	0.0	9.5
127 days after the 2013 stress test	6.04/7.01	0.97	91.2	0.97	96.8	0.0	3.2
127 days before the 2014 stress test	5.76/6.72	0.98	91.3	0.96	95.2	4.8	0.0
127 days after the 2014 stress test	5.54/6.51	0.99	96.6	0.97	100.0	0.0	0.0
127 days before the 2015 stress test	5.91/6.87	0.99	95.6	0.96	100.0	0.0	0.0
127 days after the 2015 stress test	5.45/6.58	0.94	98.4	1.13	85.7	14.3	0.0
<b>Category rating</b>							
<b>Tested Banks - all sample period</b>	<b>2.82/2.99</b>	<b>0.76</b>	<b>18.0</b>	<b>0.18</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>
127 days before the 2009 stress test	1.33/1.41	0.95	7.7	0.08	100.0	0.0	0.0
127 days after the 2009 stress test	2.8/2.94	0.76	13.7	0.14	100.0	0.0	0.0
127 days before the 2011 stress test	2.85/3.01	0.56	16.2	0.16	100.0	0.0	0.0
127 days after the 2011 stress test	2.84/2.94	0.87	9.4	0.09	100.0	0.0	0.0
127 days before the 2012 stress test	2.81/2.99	0.62	17.6	0.18	100.0	0.0	0.0
127 days after the 2012 stress test	2.84/3.09	0.69	25.0	0.25	100.0	0.0	0.0
127 days before the 2013 stress test	3/3.21	0.75	21.2	0.21	100.0	0.0	0.0
127 days after the 2013 stress test	3.03/3.21	0.81	17.6	0.18	100.0	0.0	0.0
127 days before the 2014 stress test	3.04/3.17	0.85	13.0	0.13	100.0	0.0	0.0
127 days after the 2014 stress test	2.75/3.17	0.52	42.4	0.42	100.0	0.0	0.0
127 days before the 2015 stress test	2.98/3.22	0.85	24.4	0.24	100.0	0.0	0.0
127 days after the 2015 stress test	2.7/3.11	0.31	40.6	0.41	100.0	0.0	0.0