Mandatory supervisory disclosure, voluntary disclosure, and risk-taking of financial institutions: Evidence from the EU-wide stress-testing exercises [*]

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August 15, 2012

[*] We wish to thank Ulf Brüggemann, Miles Gietzmann (discussant), Martin Glaum (discussant), Luzi Hail, Mirko Heinle, Konrad Lang, Christian Leuz, Scott Richardson, Doug Skinner, Johannes Voget, and workshop participants at the JAR/NY Fed Pre-Conference in Chicago, Workshop on Accounting and Economics in Segovia, Annual Meeting of the Accounting Research Committee of the Verein fuer Socialpolitik in Bayreuth, DFG Priority Programme Conference in Mannheim, Goethe University Frankfurt, University of Mannheim and University of Tuebingen for helpful comments on preliminary versions of this paper. The research project is part of the Priority Programme 1578 "Financial Market Imperfections and Macroeconomic Performance" by the German Research Foundation (DFG). For further details see: http://www.dfg-spp1578.de. Part of this research was carried out while Holger Daske was visiting the London Business School.
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Mandatory supervisory disclosure, voluntary disclosure, and risk-taking of financial institutions: Evidence from the EU-wide stress-testing exercises

We use the EU-wide stress-testing exercises and the concurrent Eurozone sovereign debt crisis as a setting to study consequences of supervisory disclosure of proprietary bank-specific information (i.e., credit risk exposures and stress-test simulations). First, we analyze how one-time supervisory disclosures interact with banks' subsequent voluntary disclosures and, thus, bank opaqueness. Second, we analyze whether stress-test disclosures may induce a change in banks' risk-taking behavior, thus mitigating industry-wide risk exposure and uncertainty in financial markets. We find a substantial and relative increase in stress-test participants' voluntary disclosure of sovereign credit risk exposures subsequent to the mandated release of credit risk related disclosures. Such a commitment to increased disclosure is accompanied by a decline in bank opaqueness, as measured by the bid-ask spread. Our findings further show that negative stress-test results are associated with a subsequent reduction in sovereign risk-taking. The latter finding highlights that the efficacy of supervisory disclosure as a macro-prudential tool hinges on whether it indirectly contributes to a decrease in financial market uncertainty by providing disciplining incentives for banks to reduce their level of exposure.

1. Introduction

Stress-testing is a standard tool of banking supervision in all advanced economies. The controversial question that arose during the recent crisis is whether bank-specific stress-test results and risk exposures should be mandatorily made public. This controversy addresses the role of supplementary bank disclosures during a financial crisis that has long since been debated by both regulators and academics (e.g., Flannery [2001]; Mishkin [2001]). On the one hand, financial market uncertainty may increase when disclosed news is unexpectedly negative (for example, when risk positions turn out to be excessive). On the other hand, potentially adverse effects of mandatory disclosure may discipline bank managers to reduce excessive risk-taking or to expand voluntary risk reporting. In this paper, we use the recent series of bank stress-tests in Europe and the concurrent Eurozone sovereign debt crisis as a setting to study potential feedback effects of stress-test disclosures on banks' behavior. Specifically, we analyze how mandatory stress-test disclosures interact with voluntary risk reporting and risk-taking behavior at the firm level.

We study the detailed supervisory disclosures of banks' sovereign credit risk exposures and capital simulations as key features of the EU-wide stress-tests, which have been conducted jointly by the European Banking Authority (EBA), the European Central Bank (ECB) and national supervisory bodies. The publication of individual stress-test results (i.e., the simulated capital buffer under adverse economic conditions) for each bank in July 2010 and July 2011, as well as the capital exercise outcomes in December 2011, were accompanied by an increasingly extensive level of information on credit risk exposures to sovereigns (central and local governments). According to IMF judgments, the level of detail of the supervisory disclosures greatly exceeds the minimum credit risk disclosures required by IFRS 7 and Basle II Pillar 3 (IMF Press Release, July 15, 2011).

Compared with the U.S. Federal Reserve System's stress-tests, which were conducted as part of the Supervisory Capital Assessment Program in 2009 and the Comprehensive Capital Analysis and Review in 2011 and 2012, the European setting has two main advantages which aid our attempts to grasp the disclosure effects of stress-testing. First, the U.S. stress-tests were more directly accompanied by mandatory capital injections (Capital Assistance Program) and restrictions on capital planning. Thus, the simultaneous announcement of these regulatory measures substantially aggravates the identification of the disclosure effects. Second, the international setting provides larger cross-sectional variation in the expected disclosure effects, thus facilitating our identification strategy. While sovereign risk disclosures of U.S. firms are largely uniform as a consequence of the S.E.C. enforcement of CF Disclosure Guidance: Topic No. 4 from January 2012, IFRS 7 and Basle II Pillar 3 do not provide a standardized reporting format for credit risk disclosures. Thus, disclosure choices differ substantially across international firms not least due to the lack of a similarly powerful authority such as the S.E.C. (e.g., KPMG [2009]).

Our research proceeds in two stages. In the first step, we assess whether the supervisory disclosures affect the subsequent reporting behavior of banks relative to non-participating financial firms, i.e. how the mandated stress-test disclosures interact with banks' own disclosure channels (such as IFRS financial statements or supervisory Pillar 3 reports). More precisely, our analysis aims at testing whether the supervisory disclosures during the stress-tests qualify as a triggering event for expanded risk reporting by the affected firms. The identification of this effect builds on both the different *timing* and the different *content* of the three mandatory disclosure events in July 2010, July 2011, and December 2011. The specific disclosure items that we exploit in our analysis are aggregate country-wise sovereign exposures at default for the 2010 stress-test, accounting classification and maturities of these exposures as well as country-level non-sovereign

exposures at default for the July 2011 stress-test, and indirect sovereign exposures from CDS contracts and similar credit derivatives for the December 2011 capital exercise. We code the voluntary reporting of these disclosure items in all IFRS reports, Pillar 3 reports, conference calls, and investor presentations for a total of 2,012 reporting periods (quarters or half-years) of our sample firms during the testing period from 2009 to 2011.

We apply discrete-time logistic hazard models with and without frailty to implement a difference-in-differences design testing the change in the voluntary reporting of the specific stress-test items during the reporting period immediately following the mandatory disclosures. In linking the content and the timing of the voluntary disclosures to the mandatory disclosure events, we attempt to mitigate severely confounding effects from the general increase in market demand for information on banks' sovereign debt holdings over our investigation period and from potential regulatory interventions in the reporting process beyond the stress-testing exercises. In addition, we estimate a Cox proportional hazard model to compare the time until first-time sovereign risk disclosures between stress-test participants and benchmark firms and to provide evidence on incentives for early voluntary risk disclosure. We complement this analysis by assessing the economic consequences of increased sovereign risk disclosures. Specifically, we compare relative changes in bid-ask spreads during our investigation period between stress-test participants and non-participants as well as between disclosure firms and non-disclosure firms.

In the second step, we assess potential disciplining effects of the stress-test disclosures by analyzing whether the mandatory disclosure of simulation results is accompanied by a change in banks' risk-taking behavior. Since it is notoriously difficult to estimate a bank's risk-taking, we use two alternative research designs. First, we measure a change in risk-taking by calculating the differences between the sovereign risk exposures at default to PIIGS countries as of September 30, 2011, disclosed in the EBA's December 2011 capital exercise, the exposures as of December

31, 2010, disclosed in the July 2011 stress-test, and the exposures as of May 31, 2010, disclosed in the July 2010 stress-test. The advantage of this design is that the measurement error is relatively small due to the standardization of the disclosed amounts. The downside is the lack of standardized disclosures for the control group. Therefore, this analysis is confined to cross-sectional differences within the treatment group. We estimate the association of the reported simulation results with the change in risk-taking behavior. In an alternative design, we measure risk-taking by estimating the market price sensitivities of a firm's stock to changes in sovereign CDS spreads. The advantage of this measure is the availability of data for the benchmark group of financial institutions that did not participate in the stress-test. Therefore, we can control for a general time trend in risk-taking that might be unrelated to the stress-testing exercise. We estimate the price sensitivities for the time windows before and after the announcement of the July 2011 stress-test and compare the difference in the sensitivities between stress-test participants and benchmark firms.

Overall, we observe a substantial rise in voluntary disclosure of sovereign credit risk exposures by all our sample firms over the investigation period. This finding suggests that the general pressure from third parties such as investors, auditors, or regulators on firms to provide these kinds of disclosures increased with the severity of the Eurozone debt crisis. For stress-test participants, we find that the likelihood of a change in disclosure behavior was significantly greater (relative to the control group) during the reporting periods immediately after the stress-tests. Moreover, the change in the disclosure behavior of stress-test participants during these periods can be assigned to the specific content of the mandatory disclosure in the previous period. For example, we find that the likelihood of a change in the disclosure of indirect sovereign exposures from CDS contracts is greatest (relative to the control group) in the fourth quarter reports of 2011, i.e. the reporting period immediately after the respective stress-test disclosures in

early December 2011. In contrast, the likelihood of a change in the disclosure of the accounting classification of sovereign exposures, which was part of the July 2011 stress-test disclosures, is greatest in the second quarter reports of 2011. Similar patterns of voluntary disclosure do not emerge among untreated benchmark firms.

These finding are consistent with a one-time mandated disclosure lowering a firm's threshold for a commitment to voluntary disclosure and ultimately resulting in a higher level or earlier timing of risk disclosures. A commitment to increased disclosure of sovereign risk exposures is accompanied by a decline in the bid-ask spread as a measure of information asymmetry, thus decreasing bank opaqueness. In the two quarters following the stress-tests, the association between voluntary disclosure and the bid-ask spread is largely independent of the participation in the one-time mandatory stress-test disclosures. Thus, the results suggest that the stress-test disclosure did not directly mitigate bank opaqueness. Yet, an indirect effect might be attributed to the stress-testing exercise if the observed shift in the voluntary disclosure equilibrium was partially induced (or at least accelerated) by the one-time mandatory disclosures, as our results imply.

The analysis of the supervisory disclosures further documents that banks with the most negative stress-test simulation results substantially reduced their exposure to sovereign credit risk not only in absolute terms, but also relative to other stress-test participants and to non-participating financial institutions. Given all the regulatory efforts that were occurring simultaneously during that time period, the greatest limitation of our setting is that it does not allow for a clean identification of the relative contribution of the disclosure of these results (either through fostering market discipline or through limiting regulatory forbearance of national banking regulators in the EU). Nonetheless, our findings show that disclosed simulation results did have a predictable impact on banks' risk-taking behavior and are consistent with the view that

stress-test outcomes might indirectly contribute to a decrease in market-wide uncertainty by fostering disciplining incentives to weak banks (due to pressures from markets and/or regulators).

Our results contribute to several streams in the accounting, banking, and economics literature. A first related literature examines initial market reactions to supervisory bank disclosures from the revision of market expectations. For example, Peristiani et al. [2010] and Ellahie [2012] use event-study designs to assess short-term market reactions to the U.S. and the European stress-tests, respectively. In a similar vein, Jordan et al. [2000] analyze share price reactions around the announcement of formal supervisory actions taken against a bank. We add to this literature by examining the feedback effects of supervisory disclosure on bank behavior, which are not necessarily incorporated in short-term market reactions, in a longer-term window. A second related literature assesses the effect of disclosure regulation on corporate reporting behavior (see Beyer et al. [2010]; Bushman and Landsman [2010]; Leuz and Wysocki [2008] for overviews). Specifically, we examine how voluntary disclosure choices in financial reports react to one-time supervisory disclosures. In this respect, our research also relates to the institutional accounting literature (Ball [2001]; Holthausen [2009]; Wysocki [2011]). Most importantly, the supervisory stress-test disclosures by EBA yield insights into the interaction between different regulatory regimes governing disclosure (i.e., IFRS reporting and prudential supervision). Finally, the study contributes to the literature on market discipline and the real effects of accounting. For the banking industry, Bushman and Williams [2012] document an effect from the transparency of a bank's loan-loss provisioning on the level of risk-taking. We complement these results by studying the association between stress-test-related disclosures and risk-taking.

The paper is structured as follows: In the next section, we will outline the institutional background of the mandatory stress-test disclosures as well as credit risk disclosures required by IFRS and Basel II Pillar 3 during the Eurozone debt crisis. In Section 3, we summarize the

related literature. In Section 4, we develop our hypotheses. Section 5 describes the research design. Section 6 presents results. Section 7 concludes.

2. Stress-Test Disclosures during the Eurozone Debt Crisis

The primary objective of the EU's stress-testing exercises of its banking sector is the assessment of whether banks will maintain an adequate level of capitalization even in a situation of crisis. To this end, the magnitude of banks' core capital is simulated under adverse economic conditions. The first such exercise was conducted in 2009 on a sample of 22 banks by the Committee of European Banking Supervisors (CEBS, the predecessor institution of the EBA). Neither the identity of the participants nor the individual simulation results were disclosed. The CEBS announced on October 1, 2009 that all participating banks had passed this exercise. The second stress-test in 2010 involved 91 banks. The CEBS published firm-level information about the simulation results on July 23. The exercise was re-conducted in 2011 with the results being publicly released on July 15. However, the third stress-test differed from the previous exercise in that the EBA not only issued information about each of the 90 participating banks' capital simulation outcomes, but also about exposures to financial institutions, corporations, commercial real estate firms, retail customers, and sovereigns.[1] Eventually, the stress-tests were complemented by a capital exercise for 64 European banks in December 2011. This exercise did not include any simulations but simply deducted a sovereign capital buffer from regulatory capital as of September 30, 2011. Banks that failed to meet a tier 1 ratio of 9% after the deduction of this buffer were mandated to raise additional capital. The capital exercise was also accompanied by firm-level disclosures of sovereign credit risk exposures.[2]

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1 See http://www.eba.europa.eu/EU-wide-stress-testing.aspx for institutional details on the stress-tests.

2 See http://www.eba.europa.eu/capitalexercise/2011/2011-EU-Capital-Exercise.aspx for institutional details on the capital exercise.

Overall, the series of supervisory stress-test disclosures introduced two different types of bank-specific information: (1) simulation results and (2) credit risk exposures.

2.1. Simulation Results

The simulation of banks' core capital is based on standardized assumptions about future economic scenarios provided by the CEBS and the EBA, respectively. For the 2010 CEBS stress-test, banks were required to estimate their core capital at December 31, 2011 under three different scenarios: a benchmark scenario, an adverse scenario and an adverse scenario with additional sovereign shock. According to the CEBS definition, a bank was considered to have failed the stress-test if its tier 1 capital under the adverse scenario with an additional sovereign shock fell below the threshold of 6%. Seven banks did not meet this requirement. The average tier 1 ratio under the adverse scenario amounted to 9.34%.

The design of the 2011 EBA stress-test was similar in concept but based on more restrictive and unfavorable assumptions about the most adverse economic scenario. Banks had to estimate their core capital at December 31, 2011 and December 31, 2012 under both a benchmark and an adverse scenario. In addition, mitigating measures such as fully committed restructuring plans, equity raisings or government support could be considered in the estimation. The capital threshold was set at 5%. Before taking into account mitigating measures, 21 banks failed to meet this requirement under the adverse scenario for 2012 with the average tier 1 ratio of all participating banks amounting to 6.84%. After adjustments for all mitigating measures, the average tier 1 ratio increased by more than one percentage point to 7.86% and only eight banks failed to comply with the minimum threshold.

2.2. Sovereign Credit Risk

Voluntary and Mandatory Supervisory Disclosures

When the CEBS published firm-level information about the simulation results of the second stress-test on July 23, 2010, the regulator simultaneously encouraged all participating banks to individually disclose detailed information on exposures to EU/EEA central and local government debt. This request for public disclosure of sovereign credit risk exposures was met by most participants. The participating banks publicly released short and separate quasi-mandatory statements listing their aggregate exposures at default to governments of all EU and EEA countries in the trading book as well as in the banking book (see Appendix A1 for the example of the German Commerzbank).

The third stress-test in 2011 made the public release of additional details about credit risk exposures beyond the aggregate sovereign exposures at default mandatory. On July 15, the EBA itself issued standardized disclosure templates containing information about each of the participating banks' exposures to financial institutions, corporations, commercial real estate firms, retail customers, and sovereigns. The sovereign exposures were broken down into country of origin, maturity and accounting classification (see Appendix A2 for an excerpt from the EBA's report about the German Commerzbank). The extensive disclosure was largely a response to the criticism of the alleged laxness of the previous supervisory simulations (e.g., Wall Street Journal, July 14, 2011) and was intended to enable market participants to conduct simulations at their own discretion using potentially more adverse assumptions. The EBA, however, did not commit to any regular pattern for future disclosures.

The repeated disclosure of sovereign credit risk exposures as part of the December 2011 capital exercise was added at very short notice, and primarily a response to a political decision

made at the European Council on October 26. Most importantly, the disclosure was neither planned nor publicly announced in July 2011. The content of the December 2011 disclosure differed from the July 2011 disclosure in two respects. On the one hand, non-sovereign exposures were not reported on the official templates. On the other hand, the templates were amended by information on indirect sovereign risk exposures from both long and short positions in CDS contracts and similar credit derivatives.

IFRS 7 and Basel II Pillar 3

The stress-test is not the only source of information about European banks' credit risk exposures. Credit risk disclosures of European banks are regulated by IFRS 7 and the legislative implementation of Basel II Pillar 3 at the country-level. However, neither standard introduces a specific disclosure format for sovereign credit risk exposures. IFRS 7 requires the disclosure of credit risk exposure by classes of financial instruments (para. 36) without exactly specifying the type of classes and the geographical detail of disclosure. Conversely, Basel II Pillar 3 generally requires information about the types and geographical distribution of credit risk exposures (para. 825, Table 4(b) and (c); para. 826, Table 7(d)). Both standards, thus, leave management with a substantial degree of discretion as to the exact content of credit risk disclosures. Bank supervisors and auditors frequently document that this approach results in a significant variety of disclosure practices among international financial institutions (e.g., Basel Committee on Banking Supervision [2003]; European Banking Authority [2011]; KPMG [2009]).

This holds true despite the two statements the European Securities and Markets Authority (ESMA) issued in July 2011 and November 2011 in an attempt to harmonize IFRS application in Europe. The statements were supposed to encourage European firms to provide country-by-

country information on exposures to sovereign debt similar to the EBA stress-test disclosures. However, these statements are non-binding for firms and the ESMA does not have enforcement power since IFRS enforcement is primarily carried out at the national level. Therefore, disclosure of information about sovereign credit risk exposure can be considered a voluntary reporting choice of financial institutions.[3] Consistent with this notion, we observe that (1) only 4.1% (6.8%) of the European firms in our sample separately disclose information about their sovereign exposure to the five heavily-indebted PIIGS countries (to Greece only) in their 2009 financial reports, i.e. in the last annual statement before the 2010 stress-testing exercise, and (2) 37.9% of our sample firms still do not provide any disclosures on sovereign debt holdings in the most recent 2011 financial reports that were issued subsequent to the ESMA statements.

Compared with the accounting regulation, the type of supervisory credit risk disclosure included as part of the stress-testing exercises is unique in at least two ways. First, the level of detail of the disclosures significantly exceeds the minimum credit risk disclosures required by IFRS 7 and Basle II Pillar 3 (see also IMF Press Release, July 15, 2011). Second, the standardization of the tabular disclosure overcomes the heterogeneity frequently observed in the risk disclosure format of international financial institutions (e.g., Bischof [2009]; Woods et al. [2008]).

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[3] One notable exception is Italy where CONSOB (the national securities and exchange commission) issued a statement on August 5, 2011, emphasizing the need for additional sovereign risk disclosures as proposed by the ESMA statement (Statement No. DEM/11070007). A substantial number of Italian firms explicitly refer to this statement when subsequently including sovereign credit risk disclosures in their financial reports. We consider this confounding regulation in our analysis. We screened the homepages of all national regulators included in the most recent ESMA Activity Report (source: http://www.esma.europa.eu/system/files/2012-412.pdf) and did not find evidence of similar statements in other countries.

3. Related Literature

Our research relates to several streams in the accounting, banking, and economics literature. The first related literature examines the information content of supervisory bank disclosures by studying initial market reactions around the announcement dates. These initial reactions provide an indication of whether or not the content of supervisory disclosure enables a revision or an update of previous market expectations. For the U.S. stress-test in 2009, Peristiani et al. [2010] report a negative association between abnormal returns and the size of the disclosed capital gap suggesting that the U.S. stress-test had information content. In contrast, Ellahie [2012] finds that bond and equity bid-ask spreads of banks participating in the 2010 and 2011 European stress-tests did not experience a significant decline in the 4-day windows immediately surrounding each supervisory announcement. However, the study points to the information value of the accompanying sovereign risk disclosures that permitted directional predictions about spread changes. In a related setting, Jordan et al. [2000] document a decline in share prices around the announcement of formal supervisory actions taken against a bank that varies in the quality and timeliness of the bank's previous disclosures. We add to this literature by examining feedback effects of supervisory disclosure on bank behavior, which may not necessarily be incorporated in short-term market reactions, in a longer-term window.

The analysis of banks' disclosure behavior in response to a mandatory disclosure mechanism is related to the large stream of literature assessing the effect of disclosure regulation (see Beyer et al. [2010]; Bushman and Landsman [2010]; Leuz and Wysocki [2008] for overviews). Specifically, we examine how voluntary risk disclosure choices in financial reports react to one-time supervisory disclosures of the specific risk exposure. In this respect, our research relates both to studies on the determinants of voluntary disclosure behavior (e.g., Lang and Lundholm [1993]) and to the institutional accounting literature (Ball [2001]; Holthausen

[2009]; Wysocki [2011]). More importantly, the supervisory stress-test disclosures by EBA yield insights into the interaction between different regulatory regimes which govern disclosure (i.e., IFRS reporting and prudential supervision).

The analysis of banks' risk-taking behavior subsequent to the mandatory stress-test disclosure relates to the literature examining the effects of regulation and transparency on market discipline, banks' risk-taking behavior, and financial stability. There is a strong theory which establishes a disciplining mechanism of transparency on banks' risk-taking either through market monitoring and pricing or through limiting regulatory forbearance of captured regulators (see Flannery [2001] for an overview). Most empirical work in this area addresses market monitoring and studies the sensitivity of banks' cost of financing to risk-taking. At least some of this evidence supports the notion of market discipline (e.g., Demirgüç-Kunt and Huizinga [2004]; Flannery and Sorescu [1996]). Despite prudential supervisors' long-time promotion of public disclosure as a third pillar to financial stability [e.g. Basle 1999], there is remarkably little empirical evidence on how the transparency of a bank's risk-taking interferes with market discipline. One recent exception is Bushman and Williams (2012) who exploit varying discretion in banks' loan loss provisioning across countries and report a positive association between the transparency of loan-loss reporting and the discipline of banks' risk-taking. Baumann and Nier (2006) find a positive association between disclosure quality and capital buffer of banks. More indirectly, Tadesse (2009) shows that banking crises are less likely to occur in countries with greater regulated disclosure. Our study adds to this literature by exploring the association between the content of disclosed stress-tests results and banks' risk-taking behavior.

4. Hypotheses Development

This study focuses on two interrelated ways how the mandatory EBA stress-test disclosures may affect economic outcomes. First, mandatory risk disclosure may alter voluntary disclosure strategies of firms, thus reducing information asymmetry about the magnitude of risk exposures of individual firms. Second, the additional risk disclosure may induce a change in firms' risk-taking behavior. In the following subsections, we elaborate on both effects in more detail.

4.1. The Effect of Supervisory Disclosures on Banks' Reporting Behavior

Interaction between One-Time Mandatory Risk Disclosure and Voluntary Reporting Behavior

In the first step of our analyses, we examine the effect of the supervisory credit risk disclosures on the voluntary disclosure equilibrium. Credit risk exposure is proprietary information of banks that is derived from internal risk management (e.g., Diamond [1984]). Consistent with banks bearing net costs when disclosing proprietary information (e.g., Verrecchia [1983]; Dye [1985]), pre-stress-test disclosures of sovereign credit risk exposures are considerably opaque (see above, Section 2). A priori, it is unclear whether an increase in these voluntary disclosures around the stress-testing exercises can be directly attributed to the supervisory intervention. It is rather likely that the simultaneous increase in public attention devoted to sovereign credit risk during the Eurozone debt crisis creates sufficient market demand for this type of disclosure. However, we predict that banks affected by the supervisory disclosure are more likely to alter their disclosure practice than institutions which have similar exposures but are unaffected by the mandate, i.e. that a one-time supervisory disclosure shifts firms' voluntary disclosure equilibrium.

Theory on corporate risk disclosure is scarce (Jorgensen and Kirschenheiter [2003]). Therefore, our prediction is largely based on theory of the interaction between mandatory and voluntary disclosure. If a signal is correlated with a previous signal, as is likely to be the case for a firm's time series of sovereign risk exposures, Einhorn [2005] shows that the probability of a voluntary disclosure of the signal is crucially affected by mandatory disclosure of the previous signal. Similarly, it seems plausible that sovereign risk exposures covary across financial firms. Hence, externalities of stress-test participants' risk disclosures might exist such that investors' beliefs about the sovereign risk exposures of non-affected firms are altered (Foster [1981]; Dye [1990]; Dye and Sridhar [1995]; Admati and Pfleiderer [2000]), thus providing this group of firms with similar incentives to release voluntary disclosures. Therefore, we need to motivate why stress-test participants change their disclosure practice *relative to* non-affected institutions and why heterogeneous disclosure strategies will persist *within* both groups of firms after the mandatory stress-test disclosures. Disclosure theory offers explanations as to why we should still observe a larger reaction of regulated firms' subsequent voluntary disclosures to a one-time mandatory disclosure.

Most importantly, the theory of intertemporal disclosure choices suggests that the economic costs for the initial voluntary disclosure of a signal are higher than for subsequent disclosures of the signal (Einhorn and Ziv [2008]). The notion that a one-time disclosure alters subsequent (or simultaneous) voluntary reporting choices is supported by empirical evidence. For example, Botosan and Harris [2000] report that an initial disclosure of a segment report significantly increases the probability of subsequent voluntary segment reports. A similar observation has been made for voluntary management forecasts which are used by many firms to establish a credible disclosure reputation, i.e. a series of voluntary disclosures is supposed to signal a commitment to disclosure (see Hirst et al. [2008] for an overview).

In our setting, stress-test participants are mandated to incur the economic costs for the initial signal. Therefore, subsequent voluntary disclosures of this signal are, ceteris paribus, less costly for stress-test participants than for non-treated firms, triggering a shift in the voluntary disclosure equilibrium. More specifically, the cost of sovereign risk disclosure may comprise the fixed operating costs of implementing the internal reporting system necessary for completing the stress-test templates and proprietary costs. The operating cost is likely to be fairly homogeneous for all firms.

Heterogeneous disclosure behavior among both stress-test participants and non-participants can only be explained when there is sufficient variation in either the proprietary cost of disclosure or in the cost of non-disclosure. Both types of costs depend on the type of signal being disclosed or withheld. Disclosure of bad news is likely to induce greater proprietary costs (for example, money market funding becomes less easily accessible when sovereign debt holdings appear to be excessive).[4] A firm's cost of non-disclosure particularly stems from the withholding of information being interpreted as a negative signal by investors and the subsequent downward revision of investors' expectations (Grossman and Stiglitz [1980]; Grossman [1981]; Verrecchia [1983]).[5] Naturally, the magnitude of this cost is lower when the signal conveys bad news (e.g., unexpectedly excessive risk positions). Therefore, economic analysis suggests there to be a threshold of unexpected risk exposure where the costs of non-disclosing are outweighed by the costs of disclosing, thus giving rise to an equilibrium of heterogeneous disclosure strategies. A related explanation is provided by Bagnoli and Watts [2007] who suggest that the likelihood of supplemental voluntary disclosure is increasing with the difference between the supplementary

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4 See for example the case of French banks' difficulties to access the U.S. dollar money market due to their high level of sovereign exposures to PIIGS countries in summer 2011 (e.g., Wall Street Journal, September 14, 2011).

5 Litigation risk which is generally viewed as another major cost of not disclosing bad news (e.g., Skinner [1994]) is of substantially lower relevance in our European setting (e.g. Coffee [2005]).

information and the information that had previously been disclosed mandatorily. In our setting, we would expect an increase in the likelihood of voluntary disclosure when a firm's risk-taking has been substantially reduced subsequent to the date of the stress-test information.

Taken together, systematic differences in the voluntary sovereign risk disclosure between stress-test participants and non-participants may be explained by differences in the cost of the initial voluntary disclosure which is lower for stress-test participants. Within-group differences among both stress-test participants and non-participants may be explained by differences in the type of news potentially being conveyed through voluntary risk disclosures. More precisely, the revelation of good news is expected to occur with a greater likelihood and on a timelier basis than that of bad news.

Effect on Bank Opaqueness

To assess the economic relevance of increased sovereign risk disclosures, we examine the extent to which the disclosures are associated with measures of bank opaqueness. The banking industry is frequently viewed as a particularly opaque industry (e.g., Morgan [2002]) with opaqueness substantially increasing during the recent financial crisis (Flannery et al. [2010]). Opaqueness is a function of the bank's asset composition and particularly driven by uncertainty about the credit quality of the bank's portfolio (Flannery et al. [2004]). Therefore, additional stress-test disclosures about regulatory capital at risk and sovereign exposures at default have the potential to reduce opaqueness by decreasing existing information asymmetries between market participants.

However, the theory only predicts a decrease in information asymmetry if a firm (or similarly, a regulator) credibly commits to maintaining an increased level of transparency (e.g., Verrecchia [2001]; Lambert et al. [2007]). This notion is supported by empirical evidence on the capital market effects of, for example, voluntary IFRS adoption or U.S. cross-listings (e.g., Leuz and Verrecchia [2000]; Hail and Leuz [2009]; Daske et al. [2008, 2012]). Therefore, a one-time disclosure shock without any future commitment, such as the EBA's credit risk disclosure, is unlikely to have a persistent impact on measures of information asymmetry. We rather predict an indirect effect of the supervisory action because a change in a firm's credit risk disclosure practice as a response to the one-time mandatory disclosure (as described above) can be interpreted as a credible commitment to increased transparency. Specifically, we conjecture that the mandatory disclosure of sovereign credit risk exposures only mitigates information asymmetry and adverse selection if the supervisory disclosure is accompanied by a change in the bank's voluntary reporting behavior.

4.2. The Effect of Expanded Risk Disclosures on Banks' Risk-Taking Behavior

Interaction between Risk Disclosure and Risk-Taking

The shift of the voluntary disclosure equilibrium is not costless for a bank, especially if the disclosure reveals negative news. For example, the disclosure of an unexpectedly excessive risk position may result in increased costs of funding, either directly through a higher risk premium on market-based funding or indirectly through a loss of customer deposits. In a similar way, the first-time disclosure of sovereign credit risk as part of the European stress-tests is likely to impose some kind of costs on the participating banks. Economic theory suggests that banks rationally anticipate these costs and adjust their investment decisions accordingly (e.g., Goldstein

and Sapra [2012]). Therefore, our third research question addresses the potential feedback effect of the EBA's stress-test disclosures on banks' risk-taking. Specifically, we predict that those banks for which the stress-test reveals an excessive risk position, e.g. a shortfall of regulatory capital under the most adverse simulation scenario, reduce their risk exposure. Such a change in behavior can be interpreted as the disciplining effect of supervisory intervention (e.g. Flannery [2001]).

A key question for the efficacy of the disclosure of the stress-testing exercise is whether such a change in a bank's risk-taking can be induced by the announcement of mandatory supervisory disclosures, i.e. whether supervisory disclosure has a disciplining effect on risk-taking and thus an indirect effect on market-wide uncertainty. There is a strong theory establishing such a market-disciplining mechanism on banks' risk-taking (see Flannery [2001] for an overview) and at least some empirical evidence to support this notion (e.g., Demirgüç-Kunt and Huizinga [2004]; Flannery and Sorescu [1996]). In addition, disclosure of EU-wide stress-test results may have the effect of disciplining national banking regulators by limiting regulatory forbearance and increasing the likelihood of intervention in case of adverse stress-test results.

5. Data and Research Design

5.1. Sample Selection and Data Collection

The sample is described in Table 1 and includes observations for 82 banks that participated in either the 2010 CEBS stress-test (76 out of 91 banks), the 2011 EBA stress-test (80 out of 90 banks), or the 2011 EBA capital exercise (65 out of 65 banks). 15 stress-test participants are

excluded because financial reports in English language are not publicly available at the time of this study.[6] This treatment group covers 65% of the market capitalization of EU/EEA banks. We introduce two benchmark groups for which supervisory stress-test disclosures did not become publicly available. The first control group consists of banks drawn from the remaining 35% of the market capitalization (source: Thomson Reuters Datastream). These banks did not participate in any European stress-test. Since voluntary sovereign credit risk disclosures are not included in any commercial database, we hand-collect the disclosure data from the firms' financial reports and, therefore, eliminate all banks for which reports from the period 2009 to 2011 are not publicly available in English language. We arrive at a number of 104 banks in this control group.

Since participation in the stress-test was not randomly assigned by the European banking supervision, reporting incentives for this control group are likely to systematically differ from the treatment group (for example, due to differences in size). Although we attempt to control for the most important differences in our research design, this might still severely bias our results. Therefore, we add the 87 life and non-life insurance companies from EU/EEA member states for which market data from Thomson Reuters Datastream and financial reports are publicly available for the investigation period as a second control group. Insurance companies are similarly affected by certain types of credit risk (by sovereign exposures in particular), but the results of the EU stress-test in the insurance sector are only published in aggregate form, i.e. sovereign credit risk exposures are not disclosed at the firm level (EIOPA, 2011). The final sample, thus, comprises 273 financial institutions. The regional composition of the sample is summarized in Table 1. The largest number of firms comes from the United Kingdom (37), Germany (32), and Italy (28).

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[6] 14 of these banks are Spanish savings institutions ("Caixa" / "Caja") that ceased to exist during the sample period due to often mandatory merger activities. One bank is the Raiffeisen Group from Luxembourg that reports exclusively in French language.

The data collection involves several steps. In the first step, we collect all financial disclosures (IFRS annual, interim and supervisory Pillar 3 reports, investor presentations, conference calls) of our sample banks during the investigation period 2009 (fourth quarter) to 2011 (fourth quarter). We then code the voluntary sovereign credit risk disclosures in 2,012 available reports. Specifically, we inspect whether the following items are separately disclosed: (1) aggregate sovereign exposures at default for each of the five PIIGS countries (Portugal, Ireland, Italy, Greece, and Spain), (2) country-wise accounting classification (fair value option, available for sale, held to maturity) of the exposures, (3) country-wise maturities of the exposures, (4) aggregate non-sovereign exposures at default for each of the five PIIGS countries, (5) country-wise indirect sovereign exposures from CDS contracts and similar credit derivatives. The initial mandatory disclosure of item (1) was part of the 2010 CEBS stress-test. Appendix A3 contains an example from the 2011 interim statement of the German Commerzbank. In this example, the bank's sovereign exposures at default are separately reported for all five countries. The initial mandatory disclosure of items (2) to (4) was part of the 2011 EBA stress-test. Appendices A4 to A6 contain examples from the 2011 financial statements of Intesa Sanpaolo (Italy), Groupe BPCE (France), and HSBC (UK) for the disclosure of these items. Item (5) was mandatorily disclosed as part of the 2011 EBA capital exercise. Appendix A7 contains an example from the 2011 financial statement of the French BNP Paribas.

In the next step, the disclosure data is matched with capital market data from Thomson Reuters Datastream for the 253 sample firms that have publicly-traded equity securities. In the final step, we include the banks' sovereign exposures to each of the five PIIGS countries in the dataset. These exposures were reported during the 2010 and the 2011 stress-testing and capital exercises in order to obtain a proxy for the *change* in risk-taking of stress-test participants.

5.2. Research Design

Interaction between Mandatory and Voluntary Risk Disclosure

In the first set of analyses, we test our prediction on the interaction between mandatory supervisory disclosures and voluntary risk reporting choices. The identification of this effect exploits both the differences in *timing* and the differences in *content* of the three mandatory disclosure events in July 2010, July 2011, and December 2011. This strategy is supposed to control for confounding effects from simultaneous changes in market demand for sovereign risk disclosures that have most likely occurred during the Eurozone debt crisis. Since it is implausible that these changes in market demand systematically differ for the different exposure details (for example, that demand for accounting classification of sovereign exposures changes in a different period than demand for aggregate exposures at default), we test whether the first-time disclosure of these exposures details in banks' financial reports varies across time and has a greater likelihood of occurrence in the period immediately following the initial mandatory inclusion of the respective detail in the supervisory disclosure templates. Our analysis uses the five different disclosure items described above (Section 5.1): aggregate country-level sovereign exposures at default as introduced by the 2010 stress-test, accounting classification and maturities of these exposures as well as country-level non-sovereign exposures at default as introduced by the July 2011 stress-test, and indirect sovereign credit risk from CDS exposures as introduced by the December 2011 capital exercise.

We apply survival analysis methodology because we are mainly concerned with the time until the occurrence of the first-time voluntary disclosure. As a baseline specification, we estimate a Cox proportional hazard model (Cox [1972]) to compare the differences in time until first-time disclosure of the specific disclosure items between stress-test participants and

benchmark firms. Time until first-time disclosure is counted after the initial mandatory disclosure of the respective item, i.e. all firms that voluntarily disclose the item before the mandatory disclosure drop out of the analysis because the disclosure incentives of these firms are obviously unrelated to the mandatory disclosure event. However, the Cox model has several disadvantages in our specific setting with the greatest being its difficulty in handling spells of exactly the same length (of which there are many due to the relatively small number of financial quarters under observation). Moreover, the Cox model does not enable us to analyze the exact timing of the disclosure. Therefore, we exploit the fact that our observations are grouped into discrete time intervals (financial-year quarters) and apply discrete-time logistic hazard models (with and without frailty). Discrete-time survival analysis permits the implementation of a difference-in-differences design (e.g., Clotfelter et al. [2008]) that tests for the likelihood of a change in the voluntary reporting of the specific stress-test items during the reporting period immediately after the mandatory disclosures. Specifically, we estimate the following logistic regression:

$$\begin{aligned} Disclosure_{sit} = \quad & \beta_0 + \beta_1\, Post\text{-}Stress\ Test_{st} + \beta_2\, Stress\text{-}Test\ Participation_{si} \\ & + \beta_3\, Post\text{-}Stress\ Test_{st} * Stress\text{-}Test\ Participation_{si} \\ & + \Sigma\, \beta_j\, Control_j + \varepsilon \end{aligned} \tag{1}$$

where $Disclosure_{sit}$ denotes firm i's choice whether to disclose the specific disclosure item from stress-test s in quarter t; it takes a value of 1 if the specific item is disclosed for the first time and 0 otherwise.[7] All firm-quarter observations after firm i's first-time disclosure of this item are eliminated from the analysis because they would mechanically take a value of 0 and thus inflate our test statistics. $Post\text{-}Stress\ Test_{st}$ and $Stress\text{-}Test\ Participation_{si}$ are dummy variables taking values of 1 for the disclosure period t immediately following stress-test s and for firm i's

[7] For the 2011 EBA stress-test that introduces three different new disclosure items (accounting classification, maturity, and non-sovereign exposure), the variable takes a value of 1 in the first period in which one of these three details is disclosed.

participation in stress-test s, respectively. The interaction term between these two variables is our variable of interest. In accordance with our predictions, we should observe a positive coefficient for β_3. We control for several differences in the reporting incentives across our sample firms and over the time period. Perhaps most importantly, we control for the absolute level of sovereign default risk (*PIIGS Default Risk*) because intertemporal changes in voluntary disclosure could simply be due to increased attention from investors during the sovereign debt crisis. The variable captures the log-transformed average level of a self-constructed PIIGS CDS index during a quarter. Also, disclosures are more likely to be found in interim and annual statements than in quarterly statements due to different space restrictions in the reports (*Quarterly Report*). Finally, differences in market demand for disclosure might also arise due to the differences in firms' reporting environments. We control for these differences by including firm characteristics such as size, share turnover, profitability, and capitalization. The model is estimated separately for the three stress-testing exercises s (with the respective disclosure items).

In the first alternative specification, we replace the time-variant *PIIGS Default Risk* variable by quarter dummies to more generally capture any time-fixed effects. In the second alternative specification, we control for time-invariant differences between firms by using a fixed-effects (conditional) logit model. This design also corrects for the problem of right-censoring in the basic logit specification because all firms that do not change their disclosure behavior during the investigation period (i.e., for which *Disclosure* takes a value of 0 in all nine quarters or a value of 1 in the very first quarter) drop out of the analysis.

We run additional tests to provide evidence on the heterogeneous disclosure incentives within the group of stress-test participants. For this group of firms, we can use the standardized data on sovereign risk exposures from the supervisory disclosure templates and are thus able to construct three different proxies for good news versus bad news even if a firm did not voluntarily

disclose:[8] a below-median level of absolute exposure at default to PIIGS countries, a decrease in the aggregate exposure at default to all five PIIGS countries and to Greece only. We use these proxies as independent variables in Cox model regressions of stress-test participants' time until first-time voluntary disclosure of aggregate sovereign exposure (i.e., the disclosure item from the 2010 stress-test) *after* the initial mandatory disclosure in July 2010.

Supervisory Disclosures and Bank Opaqueness

In the second set of analyses, we examine whether the change in the firms' disclosure behavior is associated with bank opaqueness, i.e. information asymmetry between market participants about a bank's exposure at default. In accordance with prior literature, we use the bid-ask spread as a proxy for bank opaqueness (e.g., Flannery et al. [2004]). We implement the following difference-in-differences design to assess the effect on the bid-ask spread:

$$\begin{aligned} &\textit{Log(Bid-Ask Spread)}_{it} = \beta_0 + \beta_1\, \textit{Post-Stress Test}_{st} \\ &+ \beta_2\, \textit{Post-Stress Test}_{st} * \textit{Stress-Test Participation}_{si} \\ &+ \beta_3\, \textit{Post-Stress Test}_{t} * \textit{Disclosure Commitment}_{is} \\ &+ \beta_4\, \textit{Post-Stress Test}_{st} * \textit{Stress-Test Participation}_{si} * \textit{Disclosure Commitment}_{is} \\ &+ \Sigma\, \beta_j\, \textit{Control}_j + \varepsilon \end{aligned} \qquad (2)$$

[8] Specifically, we exploit the fact that the level of a firm's sovereign risk exposure at September 30, 2011 and, accordingly, the change between May 31, 2010 and September 30, 2011 were disclosed *ex post* as part of the December 2011 capital exercise. This yields a proxy for the content of potential voluntary risk disclosures in the interim reports of the year. Admittedly, this analysis rests on the assumption that stress-test participants could not predict the content of the mandatory disclosure in upcoming stress-tests at the time at which they made the decision about voluntary disclosure. However, all that we learned about this setting from the business press and from interviews with bank managers confirms that the announcement of the mandatory disclosures came at short notice and hit many banks by surprise.

where Log(*Bid-Ask Spread*)$_{it}$ is the log-transformed median of firm i's bid-ask spread during quarter t. The regression is estimated for the two quarters before and the two quarters after the stress-testing exercises in July 2010 and July 2011, respectively, and based on firm-quarter observations. *Post-Stress Test* and *Stress-Test Participation* are defined in accordance with equation (1). *Disclosure Commitment*$_{is}$ takes a value of 1 if a firm has voluntarily changed its sovereign credit risk reporting in a period prior to or immediately after the stress-testing exercise s, and 0 otherwise. *Post-Stress Test* takes the role of a time-fixed effect. In alternative specification [4], we replace the basic term by time dummies for each quarter. In addition, we use firm-fixed effects in the basic specifications. Therefore, we only include the terms for time-invariant firm characteristics (stress-test participation and disclosure commitment) in alternative specification [5] that does not include firm-fixed effects. The following control variables are commonly used in the literature on market microstructure (e.g., Huang and Stoll [1997]) and included in our analysis: size (market value of equity), share turnover (as percentage of free float), and return variability. For all three control variables, we use the natural logarithm of the lagged quarterly median because the raw values are highly skewed. In addition, we include the Fog index to control for changes in the general reporting strategies of our sample firms during the investigation period (Li [2008]).

The basic treatment effect of the stress-test is captured by the coefficient estimate for β_2. Consistent with our hypotheses, we predict a negative coefficient for the three-way interaction term β_4 capturing those stress-test participants that commit to increased voluntary credit risk disclosures.

Disclosed Stress-Test Results and Banks' Risk-Taking Behavior

The third set of analyses pertains to the association between the disclosed stress-test results and banks' risk-taking behavior. Since it is notoriously difficult to estimate a bank's risk-taking, we use two alternative research designs. First, we measure a change in risk-taking by calculating the difference between the sovereign risk exposures to PIIGS countries as of September 30, 2011, as disclosed in the EBA's December 2011 capital exercise, and the exposures as of December 31, 2010, as disclosed in the July 2011 stress-test (scaled by a bank's tier 1 capital). The advantage of this design is that the measurement error is relatively small due to the standardization of the disclosed nominal amounts. The downside is the lack of standardized disclosures for the control group. Therefore, our first analysis is confined to cross-sectional differences within the treatment group. We exploit the reported simulation results to estimate the association between stress-test disclosures and risk-taking behavior. Specifically, we choose three alternative proxies for the stress-test result. *Simulation Gap* is the difference between the current tier 1 ratio and the estimated tier 1 ratio under the most adverse simulation scenario for 2012. We use several alternative dummy variables which partition the sample based on the magnitude of the simulation gap (14.38% [median], 20.0%, 30.0%, 40.0%, and 50.0%). *Conditional Fail* is a dummy variable taking a value of 1 if the 5% threshold for tier 1 capital is not met in the July 2011 EBA stress-test (before restructuring or recapitalization activities), and 0 otherwise. *Restructuring* takes a value of 1 if the necessity for a restructuring or a recapitalization plan is announced in the July 2011 EBA stress-test. We apply the following cross-sectional OLS regression:

$$\Delta \textit{ Reported PIIGS Sovereign Risk Exposure}_i = \beta_0 + \beta_1 \textit{ Stress-Test Result}_i + \beta_2 \Delta \textit{ Cost of Funding}_i + \Sigma \beta_j \textit{ Control}_j + \varepsilon \quad (3)$$

where *Stress-Test Result*$_i$ takes the three different definitions of bank i's simulation results described above in alternative specifications. *Δ Cost of Funding*$_i$ is bank i's change in total interest expense (scaled by total liabilities, source: BvD Bankscope) in the financial year 2011 (relative to financial year 2010). The variable is supposed to control for effects of market monitoring. Additional variables control for the banks' incentives to adjust risk-taking from the closeness to the tier 1 minimum ratio (source: BvD Bankscope), the proportion of sovereign debt measured at fair value (source: July 2011 stress-test templates), size (source: BvD Bankscope), analyst following (source: I/B/E/S), and state ownership (source: BvD Bankscope). For the change in sovereign credit risk exposure being associated with the stress-testing result, we should observe a negative coefficient estimate for β_1.

Second, we measure risk-taking by estimating the market price sensitivities of a bank's stock to changes in sovereign CDS spreads (Knaup and Wagner [2012]; Ryan [2011]). We follow prior literature (Schrand [1997]; Guay [1999]; Zhang [2009]) and use model (4) to estimate the market perception of a bank's exposure to sovereign credit risk:

$$R_{it} = \beta_0 + \beta_1 R\_MI_{jt} + \beta_2 R\_IBOR_{jt} + \beta_3 R\_PIIGSCDS_t + \varepsilon \quad (4)$$

where R_{it} is the buy-and-hold stock return for bank i in week t, R_MI_{jt} is the return for country j's local stock index in week t, R_IBOR_{jt} is the percentage change of country j's local 3-month interbank offered rate in week t, and $R\_PIIGSCDS_t$ is the percentage change of a self-constructed index of CDS net premia on 5-year sovereign bonds issued by the five PIIGS countries in week t. The local stock index is defined in accordance with Pukthuanthong and Roll [2009]. All stock price data is taken from Thomson Reuters Datastream. The local interbank offered rate is derived from Thomson Reuters Datastream. The 3-month LIBOR (Euro) is used

for the eight countries for which no local rate is continuously available (Austria, Cyprus, Liechtenstein, Lithuania, Luxembourg, Malta, Portugal, and Slovenia).

For the construction of the CDS index for PIIGS countries, we identify all CDS contracts on sovereign debt from the five countries from Thomson Reuters Datastream. Thomson Reuters Datastream incorporates price information provided by CMA DataVision for over-the-counter CDS markets. For uniformity, we restrict the index to CDS contracts on senior 5-year bonds with complete restructuring clauses (CR). In accordance with the Markit methodology for the iTraxx SovX index, we assign equal weights to each CDS net premium. The net premium is calculated as the excess premium over an equivalent 5-year benchmark CDS contract (CR clause) on senior sovereign debt issued by AAA-rated Germany to isolate the sovereign credit risk. Similar to Knaup and Wagner [2012], our measure for market-perceived sovereign credit risk exposure is the firm's coefficient estimate for β_3.

We assume that a bank learned about their individual results of the 2011 stress-test by the latest on April 29, 2011, when the national regulators submitted the audited results to the EBA. Any measures that were taken to change the risk position afterwards are, therefore, potentially affected by the 2011 stress-test results. Therefore, we estimate price sensitivities in the two ten-month windows before and after April 29, 2011.[9] The advantage of this measure is the availability of data for the benchmark group of financial institutions that did not participate in the stress-test. As a result, we can control for a general time trend in risk-taking that might be unrelated to the stress-testing exercise. The downside to this approach is the relatively large measurement error innate to any estimation of market betas (e.g. Shanken [1992]).

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[9] We use a ten-month window to exclude the period before the disclosure of the 2010 stress-test results in July 2010. The major results are not sensitive to shifting the date from April 29 to earlier event dates in March 2011 when EBA disclosed information about the details of the stress-test design.

We apply the following difference-in-differences design to identify the effect of the stress-test disclosures on banks' risk-taking behavior:

$$\begin{aligned} \textit{PIIGS Sovereign Credit Risk}_{it} = {} & \beta_0 + \beta_1 \textit{ Stress-Test Participation}_i + \beta_2 \textit{ Post-Stress Test}_t \\ & + \beta_3 \textit{ Post-Stress Test}_t * \textit{Stress-Test Participation}_i \\ & + \beta_4 \textit{ Stress-Test Participation}_i * \textit{Stress-Test Result}_i \\ & + \beta_5 \textit{ Post-Stress Test}_t * \textit{Stress-Test Participation}_i * \textit{Stress-Test Result}_i \\ & + \Sigma \beta_j \textit{ Control}_j + \varepsilon \end{aligned} \quad (5)$$

where *PIIGS Sovereign Credit Risk*$_{it}$ is the market price sensitivity of firm i's stock to changes in sovereign CDS spreads in period t (see equation (4) above). *Stress-Test Participation* and *Post-Stress Test* are defined as in equations (1) and (2). *Stress-Test Result* is equivalently defined as in equation (3). The coefficient estimate for β_3 indicates the average association between stress-test participation and risk-taking behavior. The coefficient estimate for β_5 indicates the incremental effect of the stress-test result on the change in a participating bank's risk exposure.

6. Results

Voluntary Sovereign Risk Disclosures

Table 2 compares the proportion of firms that disclosed the five items (country-wise sovereign EAD, accounting classification, maturities, non-sovereign EAD, CDS) between stress-test participants and non-participants. We compute the change in this difference from the most recent reporting period before (*Pre-Stress Test*) to the reporting period immediately after (*Post-Stress Test*) the mandatory supervisory disclosure of the item. These reporting periods are firm-

specific in that they take into account whether a firm files quarterly or half-yearly financial reports. In addition, we also compute the change in this difference from the period immediately following the mandatory supervisory disclosure to the subsequent reporting period (*Post-Stress Test + 1*) as an alternative, and more conservative, benchmark in order to control for a potential time trend.

In the 2010 interim reports issued immediately after the 2010 CEBS stress-test, the proportion of stress-test participants disclosing country-wise sovereign EAD increases by 0.1623 while non-participants experience an increase of only 0.0154 with the difference being significant at the 0.1% level (Fisher's exact test, two-sided). The increase in the proportion over the next reporting period is slightly lower for stress-test participants (0.1534) and larger for non-participants (0.0521), rendering the difference in these differences between proportions insignificant (p=0.199, two-sided). In the 2011 interim reports immediately following the 2011 EBA stress-test, the proportion of stress-test participants disclosing the accounting classification increases by 0.4853, of participants disclosing the maturities by 0.3436, and of participants disclosing non-sovereign exposures by 0.1410. At the same time, the proportion of non-participants disclosing the accounting classification increases by only 0.1204, of participants disclosing the maturities by 0.1053, and of participants disclosing non-sovereign exposures decreases slightly by 0.0043. All differences in the proportions are significant at the 0.1% level (Fisher's exact test, two-sided). For all three items, the difference in the change of proportions is reduced in the subsequent reporting period (i.e., the 2011 annual report): from 0.3649 to 0.0675 for the disclosure of the accounting classification, from 0.2382 to 0.0847 for the disclosure of the maturities, and from 0.1453 to -0.0308 for non-sovereign exposures. All three differences-in-differences are significant at the 0.1% level (two-sided). Furthermore, a similar result can be found for the disclosure of CDS exposures around the EBA's capital exercise in December 2011.

However, reports for the subsequent period (the 2012 interim reports) are not yet completely available at the time of this study. Therefore, at this point, we can only test for the difference in the increase of the proportion of disclosures between stress-test participants and non-participants. This difference is significant at the 0.1% level (two-sided).

These results can be largely confirmed in the multivariate analyses presented in Table 3. The estimation of the Cox proportional hazard model yields hazard rates for stress-test participants that are significantly larger than 1 implying that, on average, stress-test participants disclose country-wise exposures at default earlier after the 2010 CEBS stress-test and report exposure details earlier after the 2011 EBA stress-test. However, the significance disappears for the 2010 stress-test when a set of control variables is included.

The results of the logit and the fixed-effects (conditional) logit regressions also corroborate our findings. Our main focus is on the coefficient of the interaction term *Stress-Test Period * Participation* that indicates the effect on the likelihood of stress-test participants initiating a disclosure of the specific item in the period immediately following the initial supervisory disclosure of the item. The coefficient is significantly different from zero in almost any specification suggesting that stress-test participants are not only more likely to voluntarily disclose sovereign risk exposures, but also that both the timing and the content of the voluntary disclosures can be linked to the timing and the content of the supervisory stress-test disclosures. These results are consistent with our hypothesis that the supervisory stress-test disclosures play a role in the observed shift in the voluntary disclosure equilibrium.

One alternative explanation could be the unobservable influence of regulators ("behind the scenes"). As described in Section 2 of the paper, this kind of influence would occur at the country-level because EU-wide institutions do not have sufficient enforcement power for any

centralized action. We are not aware of any direct influence of regulators or standard-setters on firms' sovereign risk disclosures except for the case of Italy. In fact, we observe that the initial sovereign risk disclosures of 10 Italian firms (out of 17 total firms that disclosed during the sample period) are clustered in the 2011 interim report right after the CONSOB statement was issued. The results presented in Table 3 remain qualitatively unaffected when excluding these 10 firms. Moreover, an untabulated analysis of the timing of initial risk disclosures at the country-level does not reveal any systematic disclosure patterns. There is substantial dispersion of the timing of the disclosure initiation at the country-level (within both groups of firms). This does not rule out any unobservable regulatory influence, but it makes it implausible that potential "behind the scenes" actions are systematically overlapping with the timing of the stress-test disclosures. Given the design of our tests, it seems rather unlikely that our results are driven by unobservable regulatory actions.

Table 4 summarizes the results of our tests regarding cross-sectional differences within the group of stress-test participants. The table reports estimated hazard rates. The estimates for all three *Good News* proxies are (with one exception) significantly larger than 1. Consistent with disclosure theory, this finding implies that good news (i.e., a below-median sovereign risk exposure or a decrease in aggregate exposure at default) has, ceteris paribus, a greater likelihood of being disclosed earlier.

Bank Opaqueness

The key results that we present in Table 5 can be summarized as follows. On average, spreads are substantially increasing in size in the third quarter of 2010 and are not systematically changing during the third quarter of 2011 for our sample firms (specification [1]). The evidence

is mixed with respect to the basic treatment effect (specification [2]). While we find a statistically weak effect for participants of the 2010 CEBS stress-test during the third quarter of 2010, there is no such effect for participants of the 2011 EBA stress-test during the third quarter of 2011. Overall, and consistent with short-window results reported by Ellahie [2012], we cannot detect an unambiguous effect of stress-test participation on bank opaqueness.

Specifications [3] to [5] utilize the cross-sectional heterogeneity in the voluntary risk disclosure behavior. There is no indication that a change in the disclosure behavior has an effect around the 2010 stress-testing exercise (neither per se nor in combination with the mandated stress-test disclosure). However, the results are different for the 2011 stress-testing exercise. An increase in risk disclosure by stress-test participants is associated with a decrease in bid-ask spreads in the quarter following the July 2011 supervisory announcements (*Post-Stress Test* * *Participant* * *Disclosure Firm*). One potential reason for the difference between the 2010 and the 2011 results may be the generally lower attention investors paid to sovereign risk in 2010. An alternative explanation could be the substantially higher level of detail in the 2011 stress-test disclosures (see above, Section 2.2).

Thus, there is mild evidence that the association between firm-level voluntary disclosure and equity bid-ask spreads is more pronounced for firms that participated in the stress-test, i.e. are subject to mandatory supervisory disclosure. The observed effect in 2011 is consistent with our prediction. Whether investors interpret mandatory stress-test disclosures as a credible commitment to an increased disclosure level depends on whether the mandatory 'one-time' disclosure is accompanied by persistent voluntary disclosure with corresponding content.

Risk-Taking Behavior

Tables 6 and 7 summarize the results of two different approaches to test for potential feedback effects of disclosed stress-test outcomes on banks' risk-taking behavior. The analysis in Table 6 uses the change in the reported sovereign credit risk exposures as the dependent variable. The descriptive statistics reveal that the sovereign exposure to PIIGS countries decrease on average (at the median) by 28.29% (12.86%) of a bank's tier 1 capital. We use the heterogeneity of the stress-test results in the cross-sectional analysis. Using the capital gap from the capital simulations, the univariate analyses (Panel A) indicate that at least for the nine banks with the largest gaps (> 30%) the decrease in risk exposure is significantly larger than for the remaining banks. The alternative proxies (*Conditional Fail* and *Restructuring*) also indicate significant differences between the two groups of stress-test participants. These results still hold when controlling for the general level of capital adequacy (current tier 1 ratio), the use of fair value measurement for sovereign debt, size, analyst following, and state ownership in the multivariate analyses (Panel C). The association between the disclosed stress-test result and the change in risk-taking behavior still remains statistically significant when controlling for the effects of market monitoring through the change in the banks' funding costs. Across all specifications, a change in funding costs is negatively associated with the change in sovereign risk-taking, which suggests that an increase in funding costs is accompanied by a reduction in risk-taking.

The use of the market-based proxies for sovereign credit risk exposures in the next set of analyses (Table 7) permits the introduction of a control group. A univariate analysis (Panel A) indicates a significantly larger level of sovereign risk exposure for banks that participated in the stress-test compared to institutions from the control group. The significant difference persists even after the stress-testing exercise (0.0772 vs. 0.0461). However, the decrease in risk exposure subsequent to the 2011 stress-test is also significantly larger for the participating banks than for

the control group (-.0617 vs. -.0166). The multivariate analysis confirms this finding (Panel C). The basic treatment effect (*Participant * Post-2011 Stress-Test*) is significantly negative in most specifications. The cross-sectional heterogeneity in risk-taking behavior within the group of stress-test participants becomes also evident in this analysis. Consistent with the results in Table 4, participants with negative stress-test results (i.e., a large capital gap in the simulations (at least >30%), a simulated tier 1 capital below the critical 5%-threshold or a restructuring announcement) reduce their exposures to a significantly larger extent than other participants (*Participant * Stress-Test Result * Post-2011 Stress-Test*). Overall, these findings of a significant association between the disclosed stress-test results and the changes in risk-taking behavior are consistent with the disciplining effect of the stress-test outcomes.[10]

7. Implications and Conclusions

We use the EU-wide stress-testing exercises and the concurrent Eurozone sovereign debt crisis as a setting to study consequences of a prudential supervisor's disclosure of proprietary information about bank-specific risk exposures (i.e., sovereign credit risk exposures and capital simulations). The EU offers a useful setting to identify informational effects of a stress-test because the mandated disclosures are not accompanied by simultaneous capital injections (as they were in the U.S.). Specifically, we analyze for an international sample of financial institutions how supervisory stress-test disclosures affect banks' voluntary disclosure of risk

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[10] Our investigation period coincides with massive purchasing of sovereign bonds by the ECB which reached its peak in August 2011 right after the disclosure of the 2011 EBA stress-test (ECB Monthly Bulletin September 2011). Part of the general reduction in sovereign risk-taking that we observe for this period might directly result from this regulatory program. However, the program was accessible to all financial firms in our sample, i.e. all firms were similarly affected by this measure. Therefore, this kind of regulatory intervention fails to explain the cross-sectional heterogeneity in the change of sovereign risk-taking that is associated with the stress-test results.

exposures in subsequent reporting periods and to what extent a shift in the disclosure equilibrium is associated with a decrease in bank opaqueness in capital markets and a reduction of risk-taking in the financial sector during a financial crisis. By highlighting potential side effects of stress-test disclosures over a longer time horizon, our analysis complements the recent work on the short-term information content of stress-test disclosures (Peristiani et al. [2010]; Ellahie [2012]).

We find a substantial increase in stress-test participants' voluntary disclosure of sovereign credit risk exposures following the EBA's release of credit risk tables relative to a control group of non-participating financial institutions. This finding is consistent with a one-time mandated disclosure shock lowering a firm's threshold for a commitment to voluntary disclosure. Stress-test participants' commitment to increased disclosure of sovereign risk exposures is accompanied by a decline in measures of information asymmetry among market participants, thus resulting in a decrease in bank opaqueness.

Stress-test disclosures might indirectly contribute to a decrease in market-wide uncertainty by providing disciplining incentives for banks to reduce their level of exposure. Exploiting the sovereign exposures of banks as of September 30, 2011, which the EBA disclosed at short notice in December 2011, we find that banks with negative stress-test results reduced exposures to sovereign credit risk to the largest extent. This observation is consistent with the disciplining effect of disclosed stress-test results on banks' risk-taking (although our setting does not allow for clean identification of channels that cause this significant association).

Overall, our study illustrates how and under which conditions disclosure can potentially serve as a macro-prudential tool in reducing uncertainty in capital markets during a financial crisis.

Appendix:

A1. Commerzbank's disclosure of sovereign credit risk exposures following the 2010 stress-test

	Gross exposures[2)]	of which Banking book	of which Trading book	Net exposures
Austria	0.7	0.5	0.3	0.7
Belgium	0.8	0.5	0.3	0.8
Bulgaria	0.0	0.0	0.0	0.0
Cyprus	0.2	0.2	0.0	0.2
Czech Republic	0.4	0.4	0.0	0.4
Denmark	0.0	0.0	0.0	0.0
Estonia	0.0	0.0	0.0	0.0
Finland	0.2	0.1	0.0	0.2
France	1.3	0.6	0.7	1.3
Germany	42.8	38.6	4.3	42.8
Greece	2.9	2.9	0.0	2.9
Hungary	1.2	1.1	0.0	1.2
Iceland	0.0	0.0	0.0	0.0
Ireland	0.0	0.0	0.0	0.0
Italy	10.0	9.8	0.2	10.0
Latvia	0.1	0.1	0.0	0.1
Liechtenstein	0.0	0.0	0.0	0.0
Lithuania	0.3	0.3	0.0	0.3
Luxembourg	0.0	0.0	0.0	0.0
Malta	0.0	0.0	0.0	0.0
Netherlands	0.5	0.1	0.4	0.5
Norway	0.0	0.0	0.0	0.0
Poland	4.0	4.0	0.0	4.0
Portugal	1.1	1.1	0.0	1.1
Romania	0.0	0.0	0.0	0.0
Slovakia	0.5	0.5	0.0	0.5
Slovenia	0.2	0.2	0.0	0.2
Spain	3.6	3.6	0.0	3.6
Sweden	0.1	0.1	0.0	0.1
United Kingdom	2.4	2.3	0.1	2.4

A2. Supervisory disclosure of Commerzbank's sovereign credit risk exposure as part of the 2011 stress-test (excerpt)

Residual Maturity	Country/Region	GROSS DIRECT LONG EXPOSURES (accounting value gross of specific provisions)		NET DIRECT POSITIONS (gross exposures (long) net of cash short position of sovereign debt to other counterparties only where there is maturity matching)				DIRECT SOVEREIGN EXPOSURES IN DERIVATIVES	INDIRECT SOVEREIGN EXPOSURES IN THE TRADING BOOK
			of which: loans and advances		of which: AFS banking book	of which: FVO (designated at fair value through profit&loss) banking book	of which: Trading book [3]	Net position at fair values (Derivatives with positive fair value + Derivatives with negative fair value)	Net position at fair values (Derivatives with positive fair value + Derivatives with negative fair value)
3M	France	211	168	210	0	0	42	0	0
1Y		111	8	19	0	0	11	3	0
2Y		213	7	46	0	0	45	1	0
3Y		521	0	37	0	0	13	7	-1
5Y		603	18	405	157	0	26	0	0
10Y		471	33	306	0	0	17	3	0
15Y		815	80	634	0	0	37	0	0
		2.944	313	1.657	157	0	191	14	-1
3M	Germany	4.326	2.547	4.266	149	0	725	7	0
1Y		8.384	2.404	8.273	3.578	0	1.825	-5	0
2Y		4.080	1.902	3.694	233	0	922	-36	0
3Y		5.195	1.988	4.413	940	0	896	-68	0
5Y		4.424	1.635	3.508	977	0	443	20	6
10Y		11.171	4.047	11.066	5.550	0	496	76	1
15Y		9.351	7.674	8.856	42	0	604	-22	0
		46.930	22.196	44.075	11.469	0	5.910	-28	6
3M	Greece	0	0	0	0	0	0	0	0
1Y		1	0	0	0	0	0	0	0
2Y		38	0	31	21	0	9	0	1
3Y		7	0	0	0	0	0	0	-4
5Y		100	0	94	17	0	53	0	38
10Y		21	0	21	0	0	1	0	1
15Y		2.898	0	2.898	334	0	0	0	0
		3.065	0	3.043	372	0	63	0	36
3M	Hungary	131	0	131	0	0	11	0	1
1Y		92	0	92	0	0	2	0	-2
2Y		167	0	160	0	0	32	0	0
3Y		64	1	64	0	0	18	0	7
5Y		473	1	473	50	0	27	0	-4
10Y		286	2	286	0	0	2	0	0
15Y		0	0	0	0	0	0	0	0
		1.212	5	1.205	50	0	92	0	2

A3. Commerzbank's disclosure of aggregate sovereign credit risk exposures at default in the 2011 interim report [disclosure item (1)]

2.4 Country classification

The regional breakdown of the exposure corresponds to the Bank's strategic direction and reflects the main areas of its global business activities. Around half of the Bank's exposure relates to Germany, another third to other countries in Europe and 7% to North America. The rest is broadly diversified and split between a large number of countries where we serve German exporters in particular or where Commerzbank has a local presence.

Portfolio by region as at 30.6.2011	Exposure at default €bn	Expected loss €m	Risk density bp
Germany	266	729	27
Western Europe	128	380	30
Central and Eastern Europe	44	317	72
North America	38	129	34
Other	51	231	45
Total	**527**	**1,787**	**34**

The table below shows the exposure in the countries Greece, Ireland, Italy, Portugal and Spain based on the member state of the head office or the object.

EaD[1] as at 30.6.2011 €bn	Sovereign	Banks	CRE	Corporates/ Other	Total
Greece[2]	2.2	0.6	0.2	0.1	3.1
Ireland	0.0	1.0	0.2	0.8	2.0
Italy	8.7	1.1	2.5	2.7	15.0
Portugal	0.9	0.5	1.9	0.4	3.7
Spain	2.9	5.5	4.1	3.0	15.5

[1] Without exposures of ABF Shipping.
[2] Including non-impaired parts of Greek bonds in LaR and AfS.

A4. Intesa Sanpaolo's disclosure of accounting classification of sovereign credit risk exposures in the 2011 interim report [disclosure item (2)]

	DEBT SECURITIES						LOANS
	Loans and Receivables	Financial assets available for sale	Financial assets held to maturity	Financial assets designated at fair value through profit and loss	Financial assets held for trading	Total	
EU Countries	**8,415**	**50,420**	**2,084**	**316**	**14,734**	**75,969**	**23,040**
Austria	-	80	2	-	66	148	-
Belgium	-	90	-	-	14	104	-
Bulgaria	-	-	-	-	1	1	-
Cyprus	19	-	-	-	-	19	-
Czech Republic	-	27	-	-	-	27	23
Denmark	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	-
Finland	-	102	-	-	12	114	17
France	115	505	-	-	87	707	-
Germany	152	2,306	-	-	1,115	3,573	-
Greece	226	317	-	-	16	559	-
Hungary	300	257	23	-	165	745	168
Iceland	-	-	-	-	1	1	-
Ireland	-	186	-	-	-	186	-
Italy	6,988	43,829	939	282	12,434	64,472	22,051

A5. Groupe BPCE's disclosure of remaining maturities of the sovereign credit risk exposure in the 2011 annual report [disclosure item (3)]

The maturity dates of net exposures in the banking book at December 31, 2011 are as follows:

	Remaining maturity						
in millions of euros	1 year	2 years	3 years	5 years	10 years	> 10 years	Total
Greece	100	38	17	(7)	68	466	682
Ireland	15	5	50	(17)	7	114	174
Italy	100	8	87	214	187	2,155	2,751
Portugal	82	10	9	(17)	15	0	99
Spain	49	(5)	(105)	(48)	53	14	(42)
TOTAL	**346**	**56**	**58**	**125**	**330**	**2,749**	**3,664**

A6. HSBC's disclosure of non-sovereign credit risk exposures in the 2011 interim report [disclosure item (4)]

Exposures to selected eurozone countries – other financial institutions and corporates

At 30 June 2011	Greece US$bn	Ireland US$bn	Italy US$bn	Portugal US$bn	Spain US$bn	Total US$bn
Loans and advances	3.5	2.4	1.1	0.1	5.4	12.5
– gross	3.6	2.4	1.1	0.1	5.5	12.7
– impairment allowances	(0.1)	–	–	–	(0.1)	(0.2)
Financial investments available for sale[8]	–	–	0.3	0.1	0.2	0.6
Net trading assets[9]	–	–	–	–	0.1	0.1
Derivatives[10]	–	–	–	–	0.2	0.2
Total	3.5	2.4	1.4	0.2	5.9	13.4
Off-balance sheet exposures	2.1	0.1	1.0	–	0.2	3.4

A7. BNP Paribas' disclosure of indirect sovereign credit risk exposures from CDS contracts in the 2011 annual report [disclosure item (5)]

31 December 2011 *In millions of euros*	Banking Book(1)		
	Central Governments		
	Securities	Loans	CDS
Eurozone			
Austria	539	0	0
Belgium	17,383	1,826	0
Cyprus	22	0	0
Estonia	0	0	0
Finland	293	0	0
France	13,981	161	101
Germany	2,550	0	0
Italy	12,656	552	92
Luxembourg	31	147	0
Malta	0	0	0
Netherlands	7,423	1,685	0
Slovakia	29	0	0
Slovenia	41	0	0
Spain	457	349	0
Programme countries			
Greece	1,041	5	0
Ireland	274	0	0
Portugal	1,407	0	0
TOTAL EUROZONE	**58,127**	**4,726**	**193**

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TABLE 1

Sample and Sovereign Credit Risk Disclosures by Country

Country	N	Stress-Test Participation			Control Group (Insurance)	Voluntary Disclosures				
		July 2010	July 2011	December 2011		July 2010 Item EAD	July 2011 Item Measurement	July 2011 Item Maturity	July 2011 Item N-sovereign	Dec 2011 Item CDS
Austria	8	2	3	3	2	8	5	2	4	1
Belgium	3	2	2	2	0	3	3	3	1	1
Bulgaria	7	0	0	0	3	2	0	0	0	0
Croatia	1	0	0	0	1	0	0	0	0	0
Cyprus	6	2	2	2	2	4	4	3	3	0
Czech Republic	1	0	0	0	0	1	1	0	0	0
Denmark	11	3	4	4	3	6	1	0	1	0
Finland	3	1	1	1	1	3	0	0	0	0
France	11	4	4	4	5	10	8	9	2	3
Germany	32	14	13	13	10	29	17	11	12	8
Greece	13	6	6	0	1	10	10	7	1	1
Hungary	2	2	1	1	0	1	0	0	0	0
Ireland	4	2	3	3	1	3	2	2	3	1
Italy	28	5	5	5	8	17	14	11	1	3
Liechtenstein	2	0	0	0	0	0	0	0	0	0
Lithuania	3	0	0	0	0	0	0	0	0	0
Luxembourg	4	1	1	1	2	4	2	2	0	1
Malta	5	1	1	1	1	3	1	1	0	0
Netherlands	9	4	4	4	2	8	4	0	3	3
Norway	15	0	1	1	2	4	0	0	1	0
Poland	15	1	1	1	2	1	0	0	0	0
Portugal	5	4	4	4	0	4	4	4	1	1
Romania	3	0	0	0	1	0	0	0	0	0
Slovakia	1	0	0	0	0	0	0	0	0	0
Slovenia	6	1	2	2	3	5	2	1	0	0
Spain	17	13	14	5	2	7	6	3	1	2
Sweden	6	4	4	4	1	4	2	0	0	0
Switzerland	15	0	0	0	7	10	3	2	1	2
United Kingdom	37	4	4	4	27	18	4	3	7	4
Total Sample	273	76	80	65	87	165	93	64	42	31

Table 1 summarizes the sample and provides country-level frequencies of sovereign risk disclosures. Sovereign credit risk disclosures are defined in accordance with the mandatory stress-test disclosure. *July 2010 Item: EAD* is the country-wise disclosure of sovereign exposures at default. *July 2011 Item: Measurement* is the disclosure of the accounting classification of sovereign exposures. *July 2011 Item: Maturity* is the disclosure of the maturities of sovereign exposures. *July 2011 Item: Non-sovereign* is the country-wise disclosure of non-sovereign exposures at default. *December 2011 Item: CDS* is the country-wise disclosure of indirect sovereign exposures from CDS contracts or similar credit derivatives.

TABLE 2

Univariate Analysis of the Timing of Voluntary Sovereign Credit Risk Disclosures

Panel A. Disclosures of Sovereign EAD around the July 2010 Stress-Test

	July 2010 Item: EAD			
	N	Stress-Test Participants	Control Group	Diff (p-value)
Pre-Stress Test	246	0.0986	0.0343	+.0643 (.057)
Post-Stress Test	230	0.2609	0.0497	+.2112 (<.001)
Post-Stress Test + 1	237	0.4143	0.1018	+.3125 (<.001)
Pre-Stress Test -> Post-Stress Test (p-value)		+.1623 (.015)	+.0154 (.588)	+.1469 (.001)
Post-Stress Test -> Post-Stress Test + 1 (p-value)		+.1534 (.073)	+.0521 (.096)	+.1013 (.018)
Diff-in-Diff (p-value)				+.0456 (.199)

Panel B. Disclosures of Accounting Classification around the July 2011 Stress-Test

	July 2011 Item: Accounting Classification			
	N	Stress-Test Participants	Control Group	Diff (p-value)
Pre-Stress Test	248	0.2133	0.0289	+.1844 (<.001)
Post-Stress Test	227	0.6986	0.1494	+.5492 (<.001)
Post-Stress Test + 1	219	0.8088	0.1921	+.6167 (<.001)
Pre-Stress Test -> Post-Stress Test (p-value)		+.4853 (<.001)	+.1204 (<.001)	+.3649 (<.001)
Post-Stress Test -> Post-Stress Test + 1 (p-value)		+.1102 (.172)	+.0427 (.362)	+.0675 (.286)
Diff-in-Diff (p-value)				+.2974 (<.001)

Panel C. Disclosures of Maturities around the July 2011 Stress-Test

	July 2011 Item: Maturity			
	N	Stress-Test Participants	Control Group	Diff (p-value)
Pre-Stress Test	248	0.0400	0.0116	+.0284 (.164)
Post-Stress Test	227	0.3836	0.1169	+.2667 (<.001)
Post-Stress Test + 1	219	0.4706	0.1192	+.3514 (<.001)
Pre-Stress Test -> Post-Stress Test (p-value)		+.3436 (<.001)	+.1053 (<.001)	+.2382 (<.001)
Post-Stress Test -> Post-Stress Test + 1 (p-value)		+.0870 (.312)	+.0023 (1.000)	+.0847 (.001)
Diff-in-Diff (p-value)				+.1535 (<.001)

Panel D. Disclosures of Non-sovereign EAD around the July 2011 Stress-Test

	July 2011 Item: Non-sovereign Exposure			
	N	Stress-Test Participants	Control Group	Diff (p-value)
Pre-Stress Test	248	0.1467	0.0173	+.1293 (<.001)
Post-Stress Test	227	0.2877	0.0130	+.2747 (<.001)
Post-Stress Test + 1	219	0.3214	0.0775	+.2439 (<.001)
Pre-Stress Test -> Post-Stress Test (p-value)		+.1410 (.046)	-.0043 (1.000)	+.1453 (<.001)
Post-Stress Test -> Post-Stress Test + 1 (p-value)		+.0337 (.703)	+.0645 (.009)	-.0308 (1.000)
Diff-in-Diff (p-value)				+.1761 (<.001)

TABLE 2 [CONT.]

Panel E. Disclosures of Sovereign CDS Exposures around the December 2011 Capital Exercise

	Dec 2011 Item: CDS Exposure			
	N	Stress-Test Participants	Control Group	Diff (p-value)
Pre-Stress Test	248	0.1167	0.0319	+.0848 (.018)
Post-Stress Test	219	0.3966	0.0373	+.3593 (<.001)
Post-Stress Test + 1				
Pre-Stress Test -> Post-Stress Test (p-value)		+.2799 (.001)	+.0054 (1.000)	+.2745 (<.001)

Table 2 reports results of the analysis of voluntary sovereign risk disclosures during the calendar years 2010 and 2011. The disclosure items used in Panels A to E are defined in Table 1. The tables report the proportions of firms disclosing the item in the specific reporting period. The p-values in the columns indicate the statistical significance of differences in the proportion of disclosures of the specific item between stress-test participants and the control group. The p-values in the rows indicate the statistical significance of the change between the two reporting periods within a group of firms. The diff-in-diff row indicates the statistical significance of the difference in the differences of the change over time between the two groups of firms. All p-values are two-sided and derived from Fisher's exact test.

TABLE 3

Multivariate Analysis of the Timing of Voluntary Sovereign Credit Risk Disclosures

Panel A. Descriptive Statistics

	N	Mean	SD	P1	Median	P99
PIIGS Default Risk	1,528	5.683	0.871	4.336	5.714	7.351
Size [Log (TA)]	1,528	16.245	2.423	9.805	16.358	21.124
Profitability [Return on Equity]	1,528	0.017	0.594	-1.830	0.077	0.553
Capitalization [Equity Ratio]	1,528	0.113	0.122	0.005	0.072	0.636
Share Turnover [% Free Float]	1,528	0.200	0.288	0.000	0.072	1.269

Panel B. Voluntary Disclosure of the July 2010 Item (Sovereign EAD)

	Cox Model		*Logit*			*FE Logit*	
Test Variables							
Stress-Test Participation	3.872***	1.367	1.144***	0.330	0.383		
	(7.118)	(1.454)	(6.397)	(1.267)	(1.382)		
Stress-Test Period			-2.505***	-2.458***		-2.496***	-2.489***
			(-3.462)	(-3.363)		(-3.528)	(-3.508)
Stress-Test Period * Participation			1.808**	1.560*	1.415*	1.937**	1.970**
			(2.221)	(1.880)	(1.706)	(2.492)	(2.528)
Control Variables							
PIIGS Default Risk				0.772***			
				(6.264)			
Size [Log (TA)]		1.545***		0.483***	0.473***		5.402**
		(6.261)		(6.359)	(6.035)		(2.550)
Share Turnover [% Free Float]		0.861		-0.160	-0.083		-0.043
		(-0.477)		(-0.454)	(-0.238)		(-0.038)
Profitability [Return on Equity]		0.996***		0.000***	0.000***		0.004***
		(-6.034)		(6.619)	(6.316)		(3.159)
Capitalization [Equity Ratio]		1.729		-0.221	-0.607		-14.373
		(0.428)		(-0.147)	(-0.410)		(-1.177)
Constant			-2.340***	-14.816***	-11.254***		
			(-20.906)	(-8.696)	(-7.518)		
Quarter Dummies	No	No	No	No	Yes	No	No
Clustered SE	No	No	Firm	Firm	Firm	Firm	Firm
N	204	204	1,406	1,406	1,406	643	643
McFadden's Pseudo-R^2			0.0822	0.194	0.257	0.0795	0.119
% Correct Predictions			0.901	0.905	0.907	0.262	0.375
Wald $\chi 2$	50.67***	106.52**					

TABLE 3 [CONT.]

Panel C. Voluntary Disclosure of the July 2011 Items (Sovereign EAD Details)

	Cox Model		*Logit*			*FE Logit*	
Test Variables							
Stress-Test Participation	4.619***	1.453*	1.029***	0.331	0.673*		
	(7.530)	(1.661)	(3.632)	(1.012)	(1.823)		
Stress-Test Period			1.331***	0.831**		1.875***	1.841***
			(4.262)	(2.366)		(5.124)	(4.723)
Stress-Test Period * Participation			1.206**	1.099**	0.561	1.303**	1.297**
			(2.462)	(2.185)	(1.128)	(2.282)	(2.075)
Control Variables							
PIIGS Default Risk				0.849***			
				(3.809)			
Size [Log (TA)]		1.530***		0.348***	0.355***		2.349
		(6.550)		(4.129)	(3.818)		(1.490)
Share Turnover [% Free Float]		1.027		-0.200	0.036		-0.540
		(0.097)		(-0.547)	(0.100)		(-0.513)
Profitability [Return on Equity]		0.994***		0.000***	0.001***		0.002**
		(-8.373)		(4.859)	(4.993)		(2.286)
Capitalization [Equity Ratio]		0.384		-2.770	-3.332		-5.140
		(-0.489)		(-0.907)	(-1.028)		(-0.399)
Constant			-3.566***	-14.090***	-9.692***		
			(-18.601)	(-6.413)	(-5.284)		
Quarter Dummies	No	No	No	No	Yes	No	No
Clustered SE	No	No	Firm	Firm	Firm	Firm	Firm
N	202	202	1,597	1,597	1,438	608	608
McFadden's Pseudo-R^2			0.166	0.242	0.334	0.346	0.352
% Correct Predictions			0.931	0.935	0.938	0.650	0.649
Wald $\chi 2$	56.69***	122.20**					

TABLE 3 [CONT.]

Panel D. Voluntary Disclosure of the December 2011 Items (CDS)

	Cox Model	*Logit*			*FE Logit*	
Test Variables						
Stress-Test Participation		1.303**	-0.123	-0.318		
		(2.380)	(-0.202)	(-0.484)		
Stress-Test Period		0.927	-0.851		0.882	0.691
		(1.119)	(-0.988)		(1.019)	(0.793)
Stress-Test Period * Participation		2.108**	2.154**	2.334**	1.655*	1.889*
		(2.160)	(2.141)	(2.243)	(1.673)	(1.917)
Control Variables						
PIIGS Default Risk			1.340***			
			(5.862)			
Size [Log (TA)]			0.557***	0.550***		-0.71
			(4.081)	(4.021)		(-0.297)
Share Turnover [% Free Float]			0.259	0.518		-1.246
			(0.671)	(1.296)		(-0.788)
Profitability [Return on Equity]			-0.024	-0.026		-0.061
			(-0.296)	(-0.312)		(-0.639)
Capitalization [Equity Ratio]			-18.929***	-19.965***		-45.751*
			(-2.890)	(-3.009)		(-1.802)
Constant		-5.303***	-22.089***	-13.001***		
		(-13.144)	(-6.708)	(-4.949)		
Quarter Dummies		No	No	Yes	No	No
Clustered SE		Firm	Firm	Firm	Firm	Firm
N		1,819	1,819	900	223	223
McFadden's Pseudo-R^2		0.249	0.364	0.366	0.286	0.307
% Correct Predictions		0.983	0.985	0.969	0.581	0.581

Table 3 reports results of the multivariate analysis of the timing of voluntary sovereign risk disclosures during the calendar years 2010 and 2011. Panel A provides descriptive statistics. Panels B to D report the results of multivariate regressions of firms' disclosure timing. The disclosure item in Panel B is the *July 2010 Item: EAD* (see Table 1). The disclosure item in Panel C is an aggregate of the *July 2011 Items: EAD Details* (see Table 1). The disclosure item in Panel C is the *December 2011 Item: CDS* (see Table 1). The dependent variable in the Cox proportional hazard model is the time (in firm-quarters) until the first disclosure of the item after the respective stress-test. The dependent variable in the (FE) Logit models is a dummy variable taking a value of 1 in the period in which a firm discloses the specific item for the first time, and 0 otherwise. *Post-Stress Test* takes a value of 1 in the reporting period immediately after the respective stress-test (2010 interim report for the July 2010 stress-test, 2011 interim report for the July 2011 stress-test, 2011 annual report for the December 2011 capital exercise), and 0 otherwise. *Stress-Test Participant* takes a value of 1 if a firm is subject to the supervisory risk disclosures during the respective stress-test, and 0 otherwise. *PIIGS Default Risk* is the log-transformed average level of the PIIGS CDS index during a quarter. The table reports hazard ratios for the Cox proportional hazard models, coefficient estimates for the (FE) Logit models and z-statistics (in parentheses). The z-statistics are based on robust standard errors. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

TABLE 4

Cross-Sectional Differences in the Timing of First-Time Disclosures among Stress-Test Participants

	Good News = Absolute EAD to PIIGS		Good News = Change in EAD to PIIGS		Good News = Change in EAD to Greece	
Good News	1.592**	1.573*	1.726**	1.669**	1.666**	1.439
	(1.978)	(1.809)	(2.232)	(1.995)	(2.113)	(1.496)
Size [Median Log(TA) 2009-2011]		1.389***		1.331***		1.330***
		(4.015)		(3.372)		(3.507)
Analyst Following [Median # Forecasts]		1.053		1.146		1.107
		(0.408)		(1.064)		(0.794)
Profitability [Median ROA 2009-2011]		0.998		0.997		1.000
		(-0.959)		(-1.134)		(-0.110)
Capitalization [Median Tier 1 Ratio]		5.512		18.394		62.141
		(0.359)		(0.639)		(0.903)
N	71	71	70	70	70	70
Wald $\chi 2$	3.91**	20.59***	4.98**	17.56***	4.47**	17.66***

Table 4 reports results of the multivariate analysis of the timing of voluntary sovereign risk disclosures during the calendar years 2010 and 2011 by stress-test participants. The dependent variable in the Cox proportional hazard model is the time (in firm-quarters) until the first disclosure of the country-wise sovereign EAD (*July 2010 Item*) where counting begins in the fourth quarter of 2009. There are three different definitions for the *Good News* variable: a below-median level of absolute exposure at default to PIIGS countries, a decrease in the aggregate exposure at default to all five PIIGS countries or to Greece only over the investigation period. The table reports hazard ratios. The z-statistics are based on robust standard errors. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

TABLE 5

The Effect of Supervisory Disclosure on Bank Opaqueness

Panel A. Descriptive Statistics

	N	Mean	SD	P1	Median	P99
Bid-Ask Spread	1,593	0.018	0.032	0.000	0.007	0.189
Market Value of Equity	1,593	6068.614	13777.590	8.740	1236.587	63097.480
Share Turnover (% of Free Float)	1,593	0.258	0.358	0.000	0.139	1.670
Return Variability	1,593	0.024	0.015	0.005	0.020	0.093
Fog Index	1,593	16.521	6.073	10.551	15.955	25.619

TABLE 5 [CONT.]

Panel B. Results of Multivariate OLS Regressions

	Log (Bid-Ask Spread)									
	Stress-Test 1 (July 2010)					*Stress-Test 2 (July 2011)*				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Test Variables										
Post-Stress Test	0.081***	0.095***	0.103***		0.100***	-0.017	-0.001	0.029		0.058
	(4.655)	(4.810)	(5.036)		(4.787)	(-0.392)	(-0.031)	(0.483)		(1.041)
Participant					-0.413*					-1.048***
					(-1.836)					(-2.953)
Post-Stress Test * Participant		-0.060*	-0.022	-0.022	-0.039		-0.062	0.130**	0.093	0.109*
		(-1.662)	(-0.497)	(-0.488)	(-0.886)		(-1.473)	(2.141)	(1.382)	(1.773)
Disclosure Firm					-0.472***					0.061
					(-2.770)					(0.363)
Post-Stress Test * Disclosure Firm			-0.073	-0.076	-0.078			-0.063	-0.056	-0.060
			(-1.111)	(-1.156)	(-1.196)			(-1.178)	(-1.137)	(-1.129)
Participant * Disclosure Firm					0.896***					0.885**
					(2.595)					(2.233)
Post-Stress Test * Participant * Disclosure Firm			-0.027	-0.026	-0.011			-0.174**	-0.170**	-0.141*
			(-0.300)	(-0.288)	(-0.131)			(-2.162)	(-2.099)	(-1.756)
Control Variables										
Log(Market Value of Equity (t-1))	-0.273***	-0.278***	-0.276***	-0.292***	-0.502***	-0.333***	-0.331***	-0.329***	-0.177***	-0.479***
	(-3.020)	(-3.091)	(-3.083)	(-2.893)	(-16.352)	(-3.439)	(-3.465)	(-3.466)	(-2.825)	(-8.606)
Log(Share Turnover (% of Free Float (t-1)))	-0.227***	-0.239***	-0.235***	-0.260***	-0.351***	-0.179	-0.177	-0.177	-0.066	-0.260*
	(-2.645)	(-2.741)	(-2.692)	(-2.887)	(-3.120)	(-1.344)	(-1.335)	(-1.343)	(-0.621)	(-1.728)
Log(Return Variability (t-1))	0.202***	0.204***	0.203***	0.133**	0.212***	0.351***	0.350***	0.352***	0.165*	0.326***
	(3.851)	(3.879)	(3.862)	(2.266)	(3.900)	(3.338)	(3.320)	(3.357)	(1.887)	(3.266)
Fog Index	-0.001	-0.000	-0.000	0.002	0.002	0.002***	0.002***	0.002***	0.002***	0.002**
	(-0.126)	(-0.103)	(-0.086)	(0.445)	(0.498)	(3.312)	(3.230)	(3.301)	(2.841)	(2.477)
Constant	-2.359***	-2.318***	-2.337***	-2.472***	-0.621**	-1.224*	-1.241**	-1.250**	-3.267***	-0.233
	(-3.344)	(-3.309)	(-3.346)	(-3.219)	(-2.372)	(-1.936)	(-1.985)	(-2.015)	(-6.153)	(-0.618)
Firm FE	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Quarter FE	No	No	No	Yes	No	No	No	No	Yes	No
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	796	796	796	796	796	797	797	797	797	797
Adjusted R^2	0.102	0.103	0.101	0.123	0.103	0.240	0.240	0.241	0.348	0.241

TABLE 5 [CONT.]

Table 5 reports results of the analysis of the effects of the supervisory stress-test disclosures on bank opaqueness. Bank opaqueness is approximated by the bid-ask spread. Panel A summarizes descriptive statistics. *Bid-Ask Spread* is the quarterly median of the daily closing bid-ask spreads. *Market Value* is the quarterly median market value of outstanding equity in Million Euros. *Share Turnover* is the quarterly median percentage trading volume (trading volume in units divided by the number of outstanding free float shares). *Return Variability* is the quarterly standard deviation of daily stock returns. Panel B reports results of multivariate OLS regressions. *Fog Index* is the index score of the most recent financial report (Li [2008]). The regression includes firm-quarter observations. *Post-Stress Test* and *Participation* are defined as in Table 3. *Disclosure Firm* takes a value of 1 if a firm changes its voluntary disclosure of sovereign risk before or immediately after the stress-testing exercise (equivalent to the dependent variable in Table 2, Panel C). The table reports OLS coefficient estimates and t-statistics (in parentheses). The t-statistics are based on robust standard errors that are clustered by firm. We use the natural logarithm of the raw values where indicated in the panel. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

TABLE 6

The Effect of Supervisory Disclosure on Banks' Risk-Taking Behavior: Reported Sovereign Credit Risk Exposures

Panel A. Univariate Analysis

	Change in Sovereign Risk Exposure				
	Negative Stress-Test Result		Positive Stress-Test Result		p-value (Wilcoxon ranksum)
Stress-Test Result …	N	Median	N	Median	
Simulation Gap (>Median)	32	-0.1610	32	-0.0604	0.262
Simulation Gap (>20%)	22	-0.1493	42	-0.0812	0.766
Simulation Gap (>30%)	9	-0.2243	55	-0.0753	0.052
Simulation Gap (>40%)	6	-0.3313	58	-0.0908	0.042
Simulation Gap (>50%)	4	-0.9366	60	-0.0908	0.091
Conditional Fail	10	-0.3807	54	-0.0748	0.019
Restructuring	26	-0.2509	38	-0.0641	0.032

Panel B. Descriptive Statistics

	Mean	SD	Min	Max
Change in Sovereign Exposure	-0.2829	0.5273	-2.6987	0.6663
Δ Cost of Funding	0.1070	0.3807	-2.1244	0.6755
T1 Ratio (t-1)	0.0925	0.0327	0.0371	0.2842
% Sovereign Exposure @ FV (t-1)	0.6225	0.3344	0.0000	1.0863
Size	11.3285	1.2687	8.1450	13.7165
Analyst Following	1.9247	1.4831	0.0000	3.5927
State Ownership	0.3906	0.4917	0.0000	1.0000

Panel C. Results of Multivariate OLS Regressions

	Change in Reported Sovereign Exposure after the 2011 EBA Stress-Test					
	Stress-Test Result =					
	Simulation Gap		Conditional Fail (Dummy)		Restructuring (Dummy)	
Stress-Test Result (July 2011)	-0.547**	-0.630***	-0.448*	-0.668**	-0.298**	-0.352**
	(-2.533)	(-3.000)	(-1.713)	(-2.066)	(-2.024)	(-2.561)
Δ Cost of Funding		-0.339***		-0.344***		-0.429***
		(-2.840)		(-2.957)		(-3.251)
T1 Ratio (t-1)		-1.889		-5.100		-4.072
		(-0.474)		(-1.350)		(-0.958)
% Sovereign Exposure @ FV		0.016		0.044		0.039
		(0.100)		(0.237)		(0.196)
Size		-0.023		-0.064		-0.044
		(-0.521)		(-1.285)		(-0.889)
Analyst Following		-0.003		-0.002		0.032
		(-0.064)		(-0.039)		(0.627)
State Ownership		0.167*		0.208*		0.206*
		(1.810)		(1.778)		(1.884)
Constant	-0.178**	0.282	-0.213***	0.991	-0.162***	0.651
	(-2.626)	(0.443)	(-3.666)	(1.519)	(-3.156)	(0.990)
Observations	64	64	64	64	64	64
R-squared	0.08	0.22	0.10	0.30	0.08	0.22

TABLE 6 [CONT.]

Table 6 reports results of the analysis of banks' risk-taking behavior around the July 2011 EBA stress-test. Risk-taking behavior is measured by the change in reported sovereign credit risk exposures to PIIGS countries between December 2010 (disclosed in July 2011) and September 2011 (disclosed in December 2011), scaled by tier 1 capital. Panel A presents a univariate analysis using different proxies for the banks' stress-test results. *Simulation Gap* is the difference between the current tier 1 ratio and the estimated tier 1 ratio under the most adverse simulation scenario for 2012. *Conditional Fail* takes a value of 1 if the 5% threshold for tier 1 capital is not met in the July 2011 EBA stress-test, 0 otherwise. *Restructuring* takes a value of 1 if the necessity for a restructuring or a recapitalization plan is announced in the July 2011 EBA stress-test. Panel B summarizes descriptive statistics. Panel C reports results of cross-sectional OLS regressions of the change in sovereign credit risk exposure. For this analysis, *Simulation Gap* is defined as a continuous variable. *Δ Cost of Funding* is the change in total interest expense (scaled by total liabilities, source: BvD Bankscope) in the financial year 2011 (relative to financial year 2010). *T1 Ratio* is the tier 1 ratio in financial year 2010 (source: BvD Bankscope). *% Sovereign Exposure @ FV* is the proportion of sovereign debt measured at fair value (source: July 2011 stress-test templates). *Size* is the natural logarithm of the book value of total assets in financial year 2011 (source: BvD Bankscope). *Analyst following* is the average monthly number of 1-year EPS analyst estimates included in the firm's I/B/E/S consensus forecast during 2011 (source: I/B/E/S). *State Ownership* is a dummy variable taking a value of 1 if a bank's largest shareholder is a government institution (source: BvD Bankscope). The table includes OLS coefficient estimates and t-statistics (in parentheses). The t-statistics are based on robust standard errors. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

TABLE 7

The Effect of Supervisory Disclosure on Banks' Risk-Taking Behavior: Market-Perceived Sovereign Credit Risk Exposures

Panel A. Univariate Analysis

	Sovereign Risk Beta		
	Participants	Control Group	Difference
Before Stress-Test	0.1361	0.0622	-0.0739***
After Stress-Test	0.0772	0.0461	-0.0311***
Difference	-0.0617***	-0.0166***	0.0450***

Panel B. Descriptive Statistics

	Mean	SD	Min	Max
Market Price Sensitivity	0.0659	0.0643	0.0001	0.4926
Participant	0.2265	0.4190	0.0000	1.0000
Size	6.5554	2.2314	0.4824	11.8085
Analyst Following	1.4158	1.2244	0.0000	3.5835
State Ownership	0.1267	0.3329	0.0000	1.0000

TABLE 7 [CONT.]

Panel C. Results of Multivariate OLS Regressions

	Market Price Sensitivity to Change in Sovereign Credit Risk								
			Stress-Test Result =						
	Basic Specification		Simulation Gap (> Median)	Simulation Gap (>20%)	Simulation Gap (>30%)	Simulation Gap (>40%)	Simulation Gap (>50%)	Conditional Fail (Dummy)	Restructuring (Dummy)
Participant	0.073***	0.070***	0.046***	0.054***	0.054***	0.060***	0.060***	0.060***	0.038***
	(8.429)	(7.517)	(3.617)	(4.649)	(5.270)	(6.014)	(6.109)	(5.938)	(3.467)
Post-2011 Stress-Test	-0.016***	-0.018***	-0.018***	-0.018***	-0.018***	-0.018***	-0.018***	-0.018***	-0.018***
	(-2.779)	(-3.123)	(-3.137)	(-3.123)	(-3.118)	(-3.115)	(-3.118)	(-3.114)	(-3.137)
Participant * Post-2011 Stress-Test	-0.042***	-0.041***	-0.026	-0.026*	-0.029**	-0.033**	-0.033**	-0.032**	-0.017
	(-3.385)	(-3.392)	(-1.500)	(-1.691)	(-2.131)	(-2.479)	(-2.543)	(-2.370)	(-1.133)
Participant * Stress-Test Result			0.041***	0.035**	0.061***	0.054***	0.058***	0.042**	0.078***
			(2.713)	(2.258)	(3.486)	(2.675)	(2.713)	(2.220)	(5.126)
Participant * Stress-Test Result * Post-2011 Stress-Test			-0.028	-0.034	-0.049**	-0.052*	-0.055*	-0.047*	-0.061***
			(-1.307)	(-1.591)	(-2.031)	(-1.870)	(-1.872)	(-1.797)	(-2.873)
Size		-0.005**	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**
		(-2.582)	(-2.481)	(-2.433)	(-2.194)	(-2.303)	(-2.315)	(-2.353)	(-2.062)
Analyst Following		0.011***	0.011***	0.011***	0.010***	0.010***	0.010***	0.010***	0.009***
		(3.177)	(3.295)	(3.227)	(3.089)	(3.151)	(3.171)	(3.161)	(2.863)
State Ownership		0.002	0.001	-0.000	-0.003	0.000	-0.000	0.001	-0.001
		(0.211)	(0.081)	(-0.040)	(-0.308)	(0.022)	(-0.027)	(0.126)	(-0.161)
Constant	0.062***	0.079***	0.078***	0.078***	0.076***	0.076***	0.076***	0.077***	0.075***
	(15.091)	(8.114)	(7.987)	(7.931)	(7.771)	(7.805)	(7.820)	(7.825)	(7.794)
Observations	521	521	521	521	521	521	521	521	521
R-squared	0.174	0.190	0.203	0.198	0.210	0.201	0.202	0.198	0.231

Table 7 reports results of the analysis of banks' risk-taking behavior around the July 2011 EBA stress-test. Risk-taking behavior is measured by the market price sensitivity of a bank's stock to changes in a sovereign CDS index (see Table 1). Panel A presents a univariate analysis of differences in the change of the market price sensitivity around the stress-test disclosures between stress-test participants and the control group. Panel B summarizes descriptive statistics. Panel C reports results of a multivariate OLS regression of the market price sensitivity. The regression includes observations for a ten-month period before and after the filing of the stress-test results to the EBA (April 29, 2011). The stress-test results and control variables are defined as in Table 6. The table reports OLS coefficient estimates and t-statistics (in parentheses). The t-statistics are based on robust standard errors. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively.