Disclosure, banks CDS spreads and the European Sovereign crisis

Hervé ALEXANDRE*, François GUILLEMIN†and Catherine REFAIT-ALEXANDRE‡

Abstract

We empirically investigate the impact of banks disclosure on the evolution of their CDS spreads during the period 2011-2013. If the banks that disclose the most have the smallest reaction, then disclosure enhances the financial stability on the CDS market. The disclosure by a bank about its sovereign exposure help investors in building expectations: an increase of disclosure participates into the reduction of the information risk premium and reduces CDS spread. We cumulated the evolution of the spread of CDS on 4 different timeframes. Then we explain cumulative abnormal returns by sovereign exposure and by bank disclosure. We modeled two disclosure indexes: one global and one specifically dedicated to sovereign exposure. We obtained significant results on the impact of targeted sovereign disclosure on the evolution of the CDS spreads, showing that disclosure reduces the reaction on the CDS market, while the global index have not significant impact on the evolution of the CDS spread.

JEL Classification: G14, G21

Key words: bank, sovereign crisis, disclosure, CDS

*DRM Finance, Université Paris Dauphine, Place du Maréchal de Lattre de Tassigny, 75016 Paris, FRANCE, herve.alexandre@dauphine.fr

†Corresponding author. CRESE, Université de Franche-Comté, 30, avenue de l'Observatoire, BP 1559, 25009 Besançon, FRANCE, francois.guillemin@univ-fcomte.fr

‡CRESE, Université de Franche-Comté, 30, avenue de l'Observatoire, BP 1559, 25009 Besançon, FRANCE, catherine.refait-alexandre@univ-fcomte.fr

1 Introduction

The European crisis have raised major concern about the solvability of some countries and about the solvability of some banks. The main issues of the recent European crisis are diverse. One of the important issues is the increasing probability of default of European countries. The sovereign downgrade have an impact on bank risk portfolio. Furthermore, deeply in debt countries may not bail banks in financial difficulties. For these two reasons, sovereign crisis has important consequences on the solvability of banks, especially when domestic bank are the more likely to be buy domestic sovereign debt. The combine effect of "no bailing" and "higher risk" asset can be harmful for the interconnected banking sector. An other important issue of the recent years concern the disclosure around the situation. Actually, the so-called "subprime crisis" has enlightened the lack of disclosure and transparency in the management of the crisis by banks and have led regulation authority to review the international agreement in order to restore and maintain stability in the banking sector. So the European Central Bank (ECB) and the European Banking Authority (EBA) created stress tests to prepare banks to extreme scenarios and to help them reacting to emergency situations. The stress tests conducted by the EBA are designed around possible scenarios close to real macroeconomic situation. Such test can assess the resilience of the banking sector, and the resilience of each participating bank. The first objective of the EU's stress testing exercises of the banking sector is the assessment of whether banks will maintain an adequate level of capitalization even when facing an exogenous shock. To such purpose, banks core capital are simulated under different scenarios. The first stress-testing exercise was done in 2009 with 22 participants and none of the results nor the identity of the participants were disclosed. The second and third stress test of the proposed by the EBA were led in 2010 and 2011. The EBA and the ECB decided to enable access to the public to the results and the data used for these two resilience tests. The results have been publicly disclosed respectively in 2011 and 2012. The test of 2011 provided more intelligence about exposure to financial institutions, corporations, retail customers and sovereign exposure. The use of the data collected for those tests helps us to analyze the reaction of bank CDS spreads when banks are confronted to disclosure. The decision to publicly disclosure, data and results of those stress have also play an important role on banks communication policy, especially regarding their disclosure to sovereign exposure. In the same idea, the new Basel 3, and Basel 2 Pillar III before it, agreement's prerogatives emphasize the necessity of disclosure and market discipline in order to avoid similar situation and increase financial stability and banks resilience.

The aim of this article is to analyze whether disclosure by banks did improve financial stability during the European sovereign crisis. We analyze the relationship between disclosure by banks and their credit default swaps (CDS) spreads during the European sovereign debt crisis. We focus on the reaction of CDS spread when the credit rating of a country has been downgraded. If a change in a sovereign rating provides information, the investors will react based on their expectations and their knowledge. Does bank disclosure

reduce the fluctuation of the CDS spread? If not, does it affect positively or negatively the spread of the CDS? The disclosure of information by the banks should reduce the informational risk premium, and as a consequence, disclosure should reduce the reaction of the CDS market.

We consider two kinds of disclosure: first, we consider disclosure of information about sovereign risk exposure ("specific disclosure"). If investors have access to such information, do they more or less react than if they do not have information? Second, we consider disclosure of general information (such as corporate governance) ("global disclosure"), because a strategy of global disclosure may create confidence: if investors have access to general information they may react less than if they do not. This question is important from a regulatory point of view: does disclosure increase financial stability? Is disclosure a key of the market discipline on the financial market? May disclosure avoid potential systematic crisis on the banking sector? Finally, is mandatory disclosure necessary? The policy implications are important: If disclosure act like an enhancer of stability over the CDS spreads, the recommendations and the decisions to increase successfully the mandatory level of disclosure coming from bank have provided important regulation features.

This paper investigates the relationship between disclosure and bank CDS spread during the sovereign debt crisis over the period 2011-2013. The idea is to study if the spread vary less at the surrounding of a downgrade announcements if the participating agents are more informed. We use the data obtained from the European Banking Authority in order to know the banks exposure to sovereign risk: results of stress tests in 2010 and 2011 are considered. We assess the impact of downgrading sovereign credit ratings on the evolution of the CDS spreads. We calculate cumulative variations of spread above a CDS index. Then we analyze the role played by banks' disclosure on the CDS spread reactions, when controlling for bank sovereign exposure to the different banks and countries participating in to the EBA stress tests. We used a ordinary least square model with correction for heteroscedasticity over a set of stacked panel data. We show that specific disclosure reduces reaction of the spread, estimated by the cumulative abnormal spread. This analysis also shows that global disclosure is less beneficial for financial stability. We also shows that banks in the Eurozone are more likely than non-eurozone banks to see their CDS spread increases during this period. This article provides several contribution. First, we analyze the role of disclosure by banks when a sovereign downgrading is announced whereas only the impact of disclosure by the EBA has already been analyzed (see Petrella and Resti, 2013). Second, we create a new disclosure index based on yearly reports of banks. The index reward banks that are the most transparent based on our selected criterion. Our third originality come with the use of the bank CDS spreads instead of equity or bonds, as most of the empirical literature related to disclosure.

The paper will be divided as follow. The section 2 presents the background, offering a brief summary of the European Sovereign crisis and reviewing the existing literature about disclosure, disclosure policies and CDS. Section 3 describes the empirical strategy and the data set. Statistics about the variables and the event study are given in section 4. Section 5 presents our results. Section 6 concludes and brings further

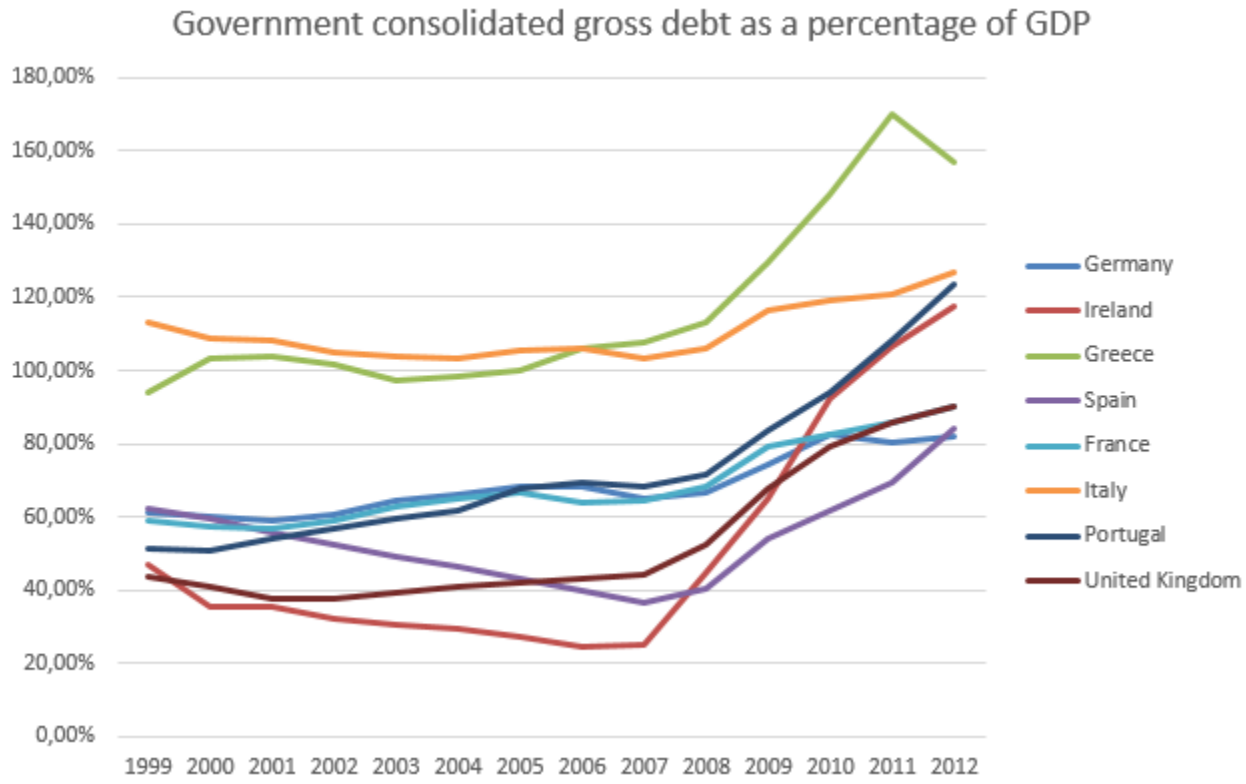
discussions for upcoming researches.

2 Background

2.1 Chronicle of the sovereign crisis

A macroeconomic shock stroke the Eurozone right after the publication of the newly elected Greek government, and lead to a huge increase of sovereign debt in EU (see Figure 1). The link between credit risk of European banks and government debt is direct, as sovereign bonds are essentially purchased by commercial banks.

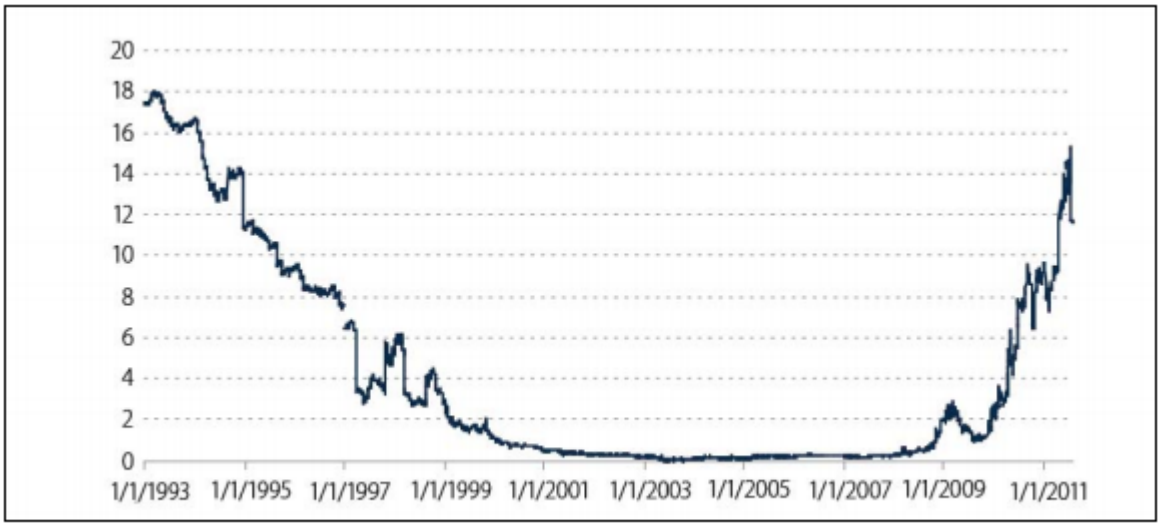
Figure 1:



By December of the year 2009, Greece admitted that its debts had reached more than 300 billion euros (113% of its GDP), nearly the double of the Eurozone limit of 60%. Rating agencies started to downgrade Greek banks and the sovereign debt. In January 2010, an EU report from Eurostat deplored the fact that Greece had revised its budget deficit last year from 3.7% of its total GDP to 12.5% (four times the maximum allowed by EU rules). After this announcement and in order to avoid negative anticipations, the European Central Bank (ECB) dismissed several rumors which were arguing that Greece would have to leave the Eurozone.

The European Commission and the ECB pressured Greece to unveil a series of austerity measures aimed at curbing the deficit. Several heavily indebted countries, such as Portugal, Ireland, Greece and Spain, started to rise concerns about their ability to avoid default or ECB bailout. By the end of the first quarter the Eurozone members and the International Monetary Fund agreed on a safety net of 22 billion euros to help Greece to curb its deficit and its debt, in exchange for drastic austerity measures. During the second quarter of the year 2010, the Eurozone members agreed to provide a second help plan by providing a 30 billion euros emergency loan. Ratings agencies downgraded Greek sovereign debt again for the fourth time in 6 months, leading Greek bond spreads to reach record high, up to 15% for 10 years bonds (see figure 2)

Figure 2: Greek Bond Spreads, 1993-2011



Source: Global Financial Data.

On April 22nd, 2010, The European Commission announced that the Greek deficit is even worse than anticipated: net deficit was nearer to 13.6% of its GDP for the year 2009 instead of 12.7%. The Eurozone members and the IMF finally agreed on a 110 billion euros bailout package to rescue Greece and stabilize the European macro-economic environment. During the entire year other EU members started to be pointed at for theirs, yet heavy, sovereign debt starting with the Republic of Ireland. As a consequence, the EU and the IMF agreed to a bailout package to the Irish Republic totaling 85 billion euros in exchange of austerity measures on November 28th. During 2009, the ECB and the IMF spend over 250 billion euros in order to avoid default of one of its members, as Portugal. February 2011 saw the implementation of a permanent bailout fund for the region: 500 billion euros called the European Stability Mechanism (ESM). Portugal admitted it cannot handle its financial situation and 78 billion euros were granted by EU on May 17th. Later that year, the Greek situation was not improving and during the month of June, the Eurozone ministers insisted on the necessity that Greece must impose new austerity measures in order to benefit from

its next part of its emergency plan. In July 2011, the Greek parliament voted in favor of a fresh round of drastic austerity measures while the EU approved the latest tranche of the Greek loan, for more than 12 billion euros. Greece received a second bailout package for more than 109 billions euros while other countries bonds, such as Spain and Italy, started to rise sharply and while the German bonds fell to record lows. As a consequence, on August 7th, the ECB decided to buy Italian and Spanish sovereign bonds to bring down their borrowing cost. At the same time, the G7 also reminds its determination "to react in a coordinated manner", in an attempt to reassure investors and to reduce tension on sovereign debt market, hoping rating agencies would reevaluate their rating on the weakest EU members. The month of September is full of austerity measures in Spain and Italy, respectively adding a "golden rule" to the constitution and a 50 billion euros austerity budget, but could not avoid the new downgrade, late September, for Italy. After the US Treasury Secretary, Timothy Geithner, speech, asking Europe to create "firewall" around its problems to stop the crisis from spreading, the month of October had shown several actions to avoid economics contractions. The Bank of England injected £75 billion into the UK economy while the Franco-Belgian bank *Dexia* received a huge bailout from the French and Belgian government. During the month of December, Eurozone members were pressed to define a regional treaty that will emphasize new safer budgetary rules to put an end to the crisis. Several attempts to get all 27 EU countries to agree to treaty changes failed due to the objections of the UK and Hungary.

The year 2012 can be considered as less tough than the two previous one: less downgrades were announced and the communication around the tensions between members of the European Union, European Commission and the ECB are largely diminishing. However, on January 13th, Standard & Poor's (S&P) downgraded nine Eurozone countries (France and Austria both lost their AAA ratings), blaming the failure of Eurozone leaders to deal with the debt crisis. January also brought the signature of the "fiscal pact" by 25 members beside the UK and the Czech Republic. During the beginning of the year, weeks of negotiations ensue between Greece and the "troika"[1] as Greece tried to get a debt write-off and make even more spending cuts to get its second bailout. Those negotiations finally were passed by the Greek coalition government, leading to dramatic riots and protests all over Greece and more generally in Europe. The year 2012 was also marked by an increase in Italian and Spanish bond spreads but none of those countries asked for bailout. Although, several banks were facing financial difficulties mostly in Spain, asking for their respective government for a bailout[2].

2.2 Disclosure and financial stability

A growing literature analysis the impact of mandatory disclosure on financial stability. Vauhkonen (2011) shows that mandatory information disclosure has a positive impact on bank safety. He considers a model of

[1] European Commission, ECB and IMF

[2] Spain's fourth largest bank, *Bankia*, says it has asked the government for a bailout worth of 19 billion euros

banking competition in which the bank probability of continuing its activity depends on the quality of its risk management and measurement systems. Disclosure imposed by mandatory requirements (e.g. Basel 2 Pillar 3) lowers the cost of outside equity and fosters bank's quality competition. Bank competition becomes safer and avoid behavior which could be harmful to the financial market stability. This article also shows disclosure reinforcement enhance the benefits of the use of other regulatory tools such as capital requirements. The results support the claim by Gordy and Howells (2006) that the ultimate success of Basel II standards depends on how well the Pillar 3 works. Cordella and Yeyati (2002) also study the impact of disclosure on disciplinary effect. The article analyze the banks' risk taking behavior under different assumptions about disclosure of information. Depositors can asses the financial information of the bank to monitor banks probability of default. Their results shows that banks have an incentive to improve the quality of their portfolio and to become less risky when the monitoring of the bank's conditions is possible. Informed depositors participate to an increase in stability through the modification of the risk management. Cordella and Yeyati (1998) are more qualified. They show that if the bank does not chose the risk of its assets (because of systemic issues for instance), banks disclosure may increase their probability if default.

Most of the empirical literature has analyzed impact of banks disclosure on stock market. Baumann and Nier (2004) showed that the stock prices volatility is reduced by disclosure. Their results suggest that disclosure is useful to investors because it reduces the rumor effect and participates into the reduction of unwanted volatility. Other authors obtain more qualified results. For instance, Jirasakuldech et al. (2010) show that, facing an external shock, disclosure participates into the reduction of the extreme volatility when the magnitude of the shock is reasonable but when the magnitude of the shock is large, disclosure does not have a significant impact on stock prices volatility. Furthermore, Akhigbe and Martin (2008) find the existence of a relationship between disclosure and volatility variation. They show that disclosure decrease individual risk and total risk but has no effect on systematic risk[3]. At last, Tadesse (2006) focuses on the impact of the introduction of mandatory disclosure on banking stability. He shows a very significant negative relationship between quantity and quality of disclosure and the probability of occurrence of a systemic banking crisis.

2.3 Sovereign debt exposure and bank resilience during EMU crisis

The risk of sovereign default in the EMU has been a fear over last decades and the implementation of the Maastricht criterion were purposely introduce to limit those fear. At the beginning of the Economic and Monetary Union (EMU) some concerns in the literature were related to the change in the riskiness of euro-investment hold by euro-area banks. The change in the risk of a German bond to a mix German-Greek-Spanish bond raise awareness about the risk of the situation especially when euro banks are largely holding public debt: prior the peak of the sovereign debt crisis, on average euro-area bank's holdings of public debt

[3]For more details about the impact of disclosure on financial markets, see for instance Farvaque et al. (2011)

are larger than their capital (Arnold, 2012). Goodhart (1997) argues the EMU alters the risk profile of public debt due to the lose of monetary sovereignty of central government. The right to print money to pay off domestic debt has been largely diminished by the introduction of one independent European central bank leading to a decrease of inflation or currency risk and the only risk would then be the risk of default of a country. This academic argument were not taken into account by policymakers at the creation of such regulation. Policymakers only based their analysis on the EMU entry requirements and the independence of the European Central Bank. With a regard to the current situation in Europe, Goodhart's argument seems to would have been relevant.

A recent literature has put emphasis on the relationship between sovereign risk and banking risk during the recent European sovereign crisis. Arnold (2012) actually shows that the sovereign risk has a positive impact on banking risk. He uses the sovereign exposure of July 2010 provided by the EBA stress test. He investigates whether heavily exposed banks were hit harder during the crisis in May 2010, at the peak of the EBA release. He shows that the more banks are exposed to distressed sovereign debt the more their stock return and their CDS spread respond to a change in a change in sovereign CDS rates. However, this reaction appears to be driven by fixed effects on banks located in the in crisis countries (ICC : Spain, Ireland, Greece and Purtugal). Banks in these countries appear more vulnerable to sovereign risk either directly due to their exposure to domestic debt or indirectly by the impossibility of government to bail them out increasing the risk of default of bank and all the spillover risk which come with. Actually, Acharya et al. (2014) show that financial sector bailouts and sovereign credit risk are intimately linked. A bailout benefits the economy by improving the under-investment problem of the financial sector. The authors show that the announcement of financial sector bailouts was associated with an immediate opening of sovereign CDS spreads, while the banks' one were becoming more and more narrow. After the bailout, however, a significant co-movement between bank CDS spread and sovereign CDS spread are visible even after controlling for bank's equity performance.

De Bruyckere et al. (2013) also study the spillovers effects in the European debt crisis from sovereign debt to banks. The contagion effect between bank risk and sovereign risk is investigated in Europe over the period 2006-2011. Contagion is here define as an excess of correlation between CDS spread of banks and sovereign CDS spread. The article shows that contagion between bank and sovereign credit risk exists especially at the emergence of the debt crisis in 2009 (significant spillovers for 86% of the banks of the sample). An important channel of contagion holds on a strong home bias in banks exposure. However, Alexandre and Wang (2015) obtain more qualified results: co-movements between sovereign CDS spread and banks CDS spread are only significant in Belgium and in Greece.

The results provided by Arnold (2012) and De Bruyckere et al. (2013) suggest that the stress test add new information for investors as they show a market reaction to the disclosure of stress tests results. Petrella

and Resti (2013) also analyze the impact of supervisors test as an information tool on bank stock prices in 2011. The article shows that market participants significantly react upon disclosure of the stress-test results. Stress-test do reveal new information which were not already accessible to investors and the abnormal returns of bank stock prices are strongly correlated to the output of the stress tests. Both historical data and for resilience indicators appear to be showing that stress tests provide investors very relevant information and are an effective tool to mitigate bank opacity. This article shows empirical evidences on the benefits, to investors, of stress tests providing information. It also provides important policy implication on the debate of disclosing stress test results.

At least, the closest article to our analysis is Bischof and Daske (2013) who study the consequences of supervisory disclosure of bank specific information such as credit risk exposure and stress-test simulations. They analyze how mandatory supervisory disclosures interact with banks' subsequent voluntary disclosures or opaqueness. Their results show a substantial rise in voluntary disclosure of sovereign credit risk exposure in all of their sample firms over the investigation period (from 2009 to 2011). The general pressure of investors, auditors, regulators or rating agencies to provide such specific disclosure increased with the severity of the Eurozone debt crisis. They used both stress test participants and non stress test participant . And shows that for stress-test participants, the likelihood of a change in disclosure behavior was significantly greater during the reporting periods immediately after the stress-tests. These results are consistent with the literature about the impact of disclosure regulation on corporate reporting behavior (Beyer et al. (2010) or Bushman and Landsman (2010)) and is also consistent with the literature which examines market reaction to supervisory bank disclosures (Peristiani et al., 2010 and Ellahie, 2012 analyze short term market reaction at the surroundings of the European stress-test).

2.4 Testable hypotheses

The purpose of this paper is to analyze whether or not disclosure increase stability on the CDS market. When a sovereign credit risk increases, banks credit risk may be be deteriorated and their CDS spread will increase too. If the investors are rational and well informed, the increase for a bank is proportional to its exposure to sovereign risk. The different rating agencies disclose changes in their credit rating of a country is happening. The point of disclosing such information is to informed all of the market participants on the risk. If the downgrade or the upgrade of a sovereign credit rating has an impact on the banks' CDS spread, then this disclosure provides information that was not already known or anticipated by the participating agents. A downgrade of sovereign credit rating should increase the risk premium of the entities owning the downrated asset due to an increase of the probability of default.

A change in the banks' CDS spread is not only explained by a change in the risk premium but also in the informational risk premium. More disclosed information reduce the uncertainty, and therefore the informa-

tional risk premium. So the disclosure of information also reduces the CDS spread of the banks when the signal emitted is able to reassure investors. So the information disclosed by the bank on its sovereign exposure can have an impact in the evolution of the CDS spreads. By disclosing information regularly, a bank can smooth the market reaction to new information. If investors have a good knowledge of bank exposure, their reaction to an announce of sovereign downgrading will be lower because the informational risk premium will be lower. furthermore, banks can provide different kind of information than the one related to sovereign exposure. These information may have an impact on the investors reaction by creating confidence (Coates, 2007), and reducing the risk premium.
As a consequence, we test three hypotheses.

- *H1* disclosure has stability effect over the CDS spreads
- *H2* disclosure related to sovereign debt has stability effect over the CDS spreads
- *H3* sovereign debt exposure has an impact on the CDS spreads

The policy implications for supranational supervisor could be important, as forcing bank to diversify more their portfolio of sovereign debt (especially for banks largely holding sovereign debt of countries in difficulties) or as imposing a conversion system to guarantee those debts even if they got downgraded.

3 Data and empirical methodology

3.1 Sample and dataset

Our study focus on the European banks that have participated to stress tests in 2011 and 2012, in order to use the information content of their reports, especially the exposure to sovereign risk. In 2011 79 banks ran the test, and in 2012 61 banks ran the tests. IN order to have a panel structure, we only considered the 59 banks that ran the tests both in 2011 and 2012. Furthermore, we must focus on the banks with CDS emitted in their name. Our sample contains the 47 banks respecting these three conditions. We used both Bloomberg and Bankscope [4] databases. The Bloomberg database provided the CDS spreads, and Bankscope provided the ratings, accounting data, and information about required capital, core tier one capital and RWA (risk weighted assets). In addition, we use the results of two tress-tests led by the EBA. The first one was led in 2011, and the results were published on 15th July 2011. The second one was led in 2012, and the results were published on 3rd October 2012. We browsed the website of each bank in order to obtain the financial reports. We built our banks disclosure indexes on the analyses of their financial reports.
(see Table 1).

[4] BUREAU VAN DIJK

Table 1: Banks of our sample

Name	Location	Total Asset in million USD
ABN AMRO BANK	NETHERLANDS	520 391
ALLIED IRISH BANKS	IRELAND	161 652
ALPHA BANK	GREECE	76 999
BANCA MONTE DEI PASCHI DI SIENA	ITALY	288 801
BANCO BILBAO VIZCAYA ARGENTARIA (BBVA)	SPAIN	841 516
BANCO COMERCIAL PORTUGUÊS	PORTUGAL	118 411
BANCO DE SABADELL	SPAIN	213 151
BANCO PASTOR	SPAIN	39 301
BANCO POPOLARE	ITALY	174 062
BANCO POPULAR ESPAÑOL	SPAIN	207 967
BANCO SANTANDER	SPAIN	1 675 192
BANK OF IRELAND	IRELAND	195 469
BANKINTER	SPAIN	81 066
BARCLAYS	UK	2 352 449
BAYERISCHE LANDESBANK	GERMANY	378 444
BNP PARIBAS	FRANCE	2 516 546
CAIXA GERAL DE DEPÓSITOS	PORTUGAL	140 858
CAJA DE AHORROS Y PENSIONES DE BARCELONA	SPAIN	473 821
COMMERZBANK	GERMANY	839 000
CREDIT AGRICOLE	FRANCE	2 430 876
DANSKE BANK	DENMARK	615 854
DEUTSCHE BANK	GERMANY	2 655 138
DEXIA	BELGIUM	471 315
DNB NOR BANK	NORWAY	361 480
ERSTE GROUP BANK	AUSTRIA	282 127
HSBC HOLDINGS	UK	1 286 857
ING BANK	NETHERLANDS	1 103 138
INTESA SANPAOLO	ITALY	888 603
IRISH LIFE AND PERMANENT	IRELAND	53 990
KBC BANK	BELGIUM	296 641
LANDESBANK BADEN-WURTTEMBERG	GERMANY	443 760
LANDESBANK HESSEN-THURINGEN	GERMANY	262 965
LLOYDS BANKING GROUP	UK	1 487 761
NATIONAL BANK OF GREECE	GREECE	138 275
NORDDEUTSCHE LANDESBANK	GERMANY	297 599
NORDEA BANK	SWEDEN	893 665
RABOBANK NEDERLAND	NETHERLANDS	992 756
RAIFFEISEN ZENTRALBANK OSTERREICH	AUSTRIA	192 578
ROYAL BANK OF SCOTLAND GROUP	UK	2 026 628
SKANDINAVISKA ENSKILDA BANKEN (SEB)	SWEDEN	377 194
SNS BANK	NETHERLANDS	107 324
SOCIETE GENERALE	FRANCE	1 650 212
SVENSKA HANDELSBANKEN	SWEDEN	366 508
SWEDBANK	SWEDEN	283 936
UNICREDIT	ITALY	1 222 889
UNIONE DI BANCHE ITALIANE (UBI BANCA)	ITALY	174 738
WESTLB	GERMANY	130 282

Our sample of banks is widely distributed from the size point of view. The average size of total asset is 697,663 millions USD. The sample contains large international banks such as the Deutsche Bank which has the largest total asset of our sample with more than 2,655,138 million USD of asset. Our sample includes other large banks such as BNP PARIBAS, CREDIT AGRICOLE or HSBC. On the other hand the bank with the smallest amount of asset the BANCO PASTOR with only 39,301 million USD. The geographical distribution of banks among Europe is rather uniformly distributed but gives a high representativeness to German, Italian and Spanish banks. The largest banks are located in France, UK and Germany. 37 banks over the 47 are located in the Euro zone, and 14 banks over 47 are located in Portugal, Ireland, Greece or Spain.

3.2 Downgrade events

We used the *Europress.com* database to determine the exact date of each downgrade by Standard & Poor's, Moody's, and Fitch. The ratings agencies announced more than 65 sovereign downgrades over the period January 2011 to June 2013 in the European Union. The different rating agencies even announced several downgrade on the same day, reducing the 65 announcements to 56 unique dates.

We restricted the number of downgrades analyzed in this study in order to focus on the main events. We consider three different kinds of events: first, when the magnitude of the downgrade is at least equal to three, when a triple A country is downgraded (even if the magnitude is below 3), and finally when at a single date there is more than two countries downgraded. By choosing only the events that have a larger magnitude, we eliminate the downgrades that are considered as adjustments: the downgrade of a country can be interpreted as an adjustment when the country is in a situation where its economic forecast will not be fulfill. For example: if Spain economics forecast is supposed to be negative, and 6 months after the rating agency downgrade the sovereign debt ; then this downgrade is considered as an adjustment because it is supposed to be anticipated.

If we decide not to take into account downgrade with a low magnitude, we need to make sure we take into account the downgrade of countries that are less likely to be downgraded by such a large magnitude. By choosing to incorporate AAA countries that are suffering from a downgrade of their sovereign debt rating, we ensure that we take into account other countries and not only Portugal, Ireland, Greece and Spain. By choosing to incorporate the downgrade of France, the United Kingdom or other AAA countries, it allows us to analyze sovereign debt that used to be considered as "risk free". The lost of a triple A can be considered by the investors as important as a downgrade of magnitude 3.

We also integrate an event with more than one downgrade on the same day. In January 13th, 2012 S&P downgraded 9 European countries. Those downgrades are the answer from S&P to European policy maker that judge that the initiatives taken in the recent weeks may be insufficient to fully address ongoing systemic

stresses in the Eurozone. S&P try to encourage Euro Zone member decision's makers to solve the sovereign debt issue, to cooperate in order to stabilize the European Union and to raise awareness about the potential contagion effect of the situation.

The list of events is now up to 16 dates around which we conduct our study (see Table 2). The events we selected covers the following period: January 1st 2011 and will stop by the end of June 2013.

Table 2: Selected events

This table provides information about the selected downgrading events: name of the downgraded country, magnitude of the downgrade, name of the agency which changed the rating, initial and final rating.

Date	Country	Magnitude	Downgrading Agency	Initial Rating	Final Rating
03/07/2011	Greece	3	Moody's	Ba1	B1
04/02/2011	Portugal	3	Fitch	A-	BBB-
05/20/2011	Cyprus	3	Fitch	AA-	A-
06/14/2011	Greece	3	S&P	B	CCC
07/05/2011	Portugal	4	Moody's	Baa1	Ba2
07/14/2011	Greece	3	Fitch	B+	CCC
/	Ireland	1	Moody's	Baa3	Ba1
07/26/2011	Greece	3	Moody's	Caa1	Ca
10/05/2011	Italy	3	Moody's	Aa2	A2
01/13/2012	Austria	1	S&P	AAA	AA+
/	Cyprus	2	S&P	BBB	BB+
/	Spain	2	S&P	AA-	A
/	France	1	S&P	AAA	AA+
/	Italy	2	S&P	A	BBB+
/	Malta	1	S&P	A	A-
/	Portugal	1	S&P	BBB-	BB+
/	Slovakia	1	S&P	AA-	A+
/	Slovenia	1	S&P	A+	A
08/03/2012	Slovenia	3	Moody's	A2	Baa2
10/08/2012	Cyprus	3	Moody's	Ba3	B3
10/19/2012	Cyprus	3	S&P	BB	B
11/19/2012	France	1	Moody's	Aaa	Aa1
01/12/2013	Cyprus	3	Moody's	B3	Caa3
02/22/2013	United Kingdom	1	Moody's	Aaa	Aa1
04/20/2013	United Kingdom	1	Fitch	AAA	AA+

3.3 Variables

3.3.1 Dependent variables

We analyze the CDS spreads of banks over the period 03/01/2011 and 06/30/2013. More specifically, the dependent variable is the variation of the CDS spread following the announcement of a downgrade of sovereign credit rating. We use the cumulative abnormal return (CAR) of CDS. The abnormal return $AR_{b,t}$ for the bank b at time t is the difference between the value of the CDS spread and a more global measure of the volatility of the CDS market: the CDS index used for the analysis is the SNRFIN CDSI GEN 5Y

published by iTraxx over the same time period of time. The choice of this index rather than a European CDS index allows to limit the over representation of the European sovereign debt crisis in the index. The index reduces also the country-specific effects. Following Norden and Weber (2004), we consider that the abnormal return $AR_{b,t}$ for the bank b at time t is the difference between the value of the CDS spread and a CDS market index. We use the SNRFIN CDSI GEN 5Y published by iTraxx over the same time period of time. The choice of this index rather than a European CDS index allows to limit the over representation of the European sovereign debt crisis in the index.

The CARs are computed as follows:

$$CAR^{T}_{b,-i,+j} = \sum_{t=T-i}^{T+j} (CDSspread_{(b,t)} - CDSindex_t) \tag{1}$$

where T is the date of the event, b the bank, i the number of days we observe the CDS spread before the event and j the number of days we consider the CDS spread after the event. For each one of the 16 events, and for each bank, we determine the CAR over four different windows in the neighborhood of the date of the event: $CAR^{T}_{b,-5,+5}$, $CAR^{T}_{b,-2,+2}$, $CAR^{T}_{b,0,+5}$, $CAR^{T}_{b,0,+2}$.

The reaction of the market is analyzed to scan for ante announcement reaction and post announcement reaction. If the cumulative abnormal return at the neighborhood of the event should tends to 0, the CDS spread is stable.

3.3.2 disclosure variables

We consider two levels of disclosure: disclosure about sovereign exposure and global disclosure. To build the two variables, we downloaded the financial report of each participating bank for the year 2010 and 2011. The yearly financial reports are usually published during the month of March for the previous year. This information allows us to cover our whole set of events from early 2011 to mid 2013. The financial report of 2010 are used to define our the disclosure index from early 2010 till march 2012. The same reasoning is applied for the report of 2011, applied to the disclosure index of 2012 till the first quarter of 2013.

A first way to assess bank disclosure about its sovereign exposure is to consider the number of times the word "sovereign" is pronounced in each financial reports. In order to have a normed indicator, we assess $TIME\_SOV$ by dividing the number of times for each bank by the maximal number provided by a bank (considered as the most transparent).

$$TIME\_SOV_{b,n} = \frac{time\,the\,word\,sovereign\,is\,pronounced_{b,n}}{\max time\,the\,word\,sovereign\,is\,pronounced} \tag{2}$$

where b is the bank b, where n=2010, 2011.

We also calculate the number of pages devoted to sovereign risk denominated. In order to have a normed indicator, we assess *PAGES_SOV*.by dividing the number of pages for each bank by the maximal number provided by a bank (considered as the most transparent).

$$PAGES\_SOV_{b,n} = \frac{number\,of\,pages\,dedicated\,to\,sovereign\,exposure_{b,n}}{\max number\,of\,pages\,dedicated\,to\,sovereign\,exposure} \tag{3}$$

where b is the bank b, where n=2010, 2011.

The degree of disclosure is somehow hard to correctly measure, and the choice of using a relative scale allow us to think that it defines a better scale to measure disclosure over the market participants: all of the disclosure levels here are based on voluntary disclosure. The fact that it is not based on mandatory disclosure allow us to discriminate between banks. The choice of using relative value to the bank with the highest score reinforce the capacity of discrimination.

The last component of our proxy variable, $QUAL\_SOV$ is about the quality of disclosure devoted to sovereign exposure. The quality is measured by a 100% to 0% scale. In order to obtain the maximum grade, here 100%, the financial report must provide graphical analysis, charts, figures and must be easy to find in the report (typically if the sovereign exposure is easy to find across the summary or the table of content). The bank gets a grade of 66,66% if no graphical analysis if provided, gets a grade of 33,33% if it not easy to find in the report, and a grade of 0% if not reported or poorly reported.

At last, we calculate a sovereign disclosure index $DISCLOS\_SOV$ that takes into account the three previous components.

$$DISCLOS\_SOV_{b,n} = Mean\,(TIME\_SOV,\, PAGES\_SOV,\, QUAL\_SOV) \tag{4}$$

We built a second disclosure index, *DISCLOS_GLOB*. It integrates several subcomponents, listed in the table 3, concerning the global policy of disclosure by each bank. We consider the size of the financial reports in pages, the presence or absence of the Basel II Pillar 3 (B2P3) annexes, the presence of information about the remuneration of the decision maker (number of pages devoted to the say on pay), the presence of information about the bank compliance with national or supranational rules of governance, the presence of information about the attendance of board members to meetings, the presence of information about majority shareholder and finally the presence of noticeable shareholder (hold more than 3% of the capital). For the two sub variables that pay attention to the number of pages, we transformed both variables into dummy variables: the variable equals 1 if the number of pages is above the median of the sample, 0 otherwise. Since we base this analysis only on mandatory disclosure, the choice of using the median reward banks that provide the more information in the most broaden communication and discipline otherwise. For the five

other variables, we used dummies that reward disclosure: for example, if the financial report of the bank b gives information about the attendance of boards members to meeting the value of this variable will be 1 for this bank, and 0 otherwise.

Table 3: Global disclosure index

Variable name	Meaning	Value
FINANCIAL REPORT SIZE IN PAGES		1 if above me
		0 otherwis
B2P3 APPENDIX	Presence or not	1 if appendix is provid
	of the appendix	or in report 0 ot
SAY ON PAY	Number of pages devoted to	1 if above me
	directors remuneration	0 otherwis
COMPLY OR EXPLAIN	Compliance with the governance code	1 if information is p
	national or higher	the financial report
MAJORITY SHAREHOLDER	Presence or not	1 if information is p
	in the report	the financial report
NOTICEABLE SHAREHOLDER	Presence or not	1 if information is p
	in the report	the financial report
MEMBER ATTENDANCE TO BOARD MEETING	Presence or not	1 if information is p
	in the report	the financial report

The *DISCLOS_GLOB* is computed by cumulating the value of each component divided by 7, so its value is between 0 and 1.

Considering our hypothesis H1 and H2, the expected relationship between the disclosure variables and the CARs should be negative. disclosure should increase the stability of CDS spread.

3.3.3 Sovereign exposure per bank

Thanks to the stress test, conducted by the EBA in 2010 and 2011, and whose results have been disclosed in 2011 and 2012, we were able to obtain the sovereign exposure of the participating banks per bank and per country. The stress test provides extensive data at 3 different times: 31st, December 2010, 31st, December 2011 and 30th, June 2012.

For each date, the stress tests give information about the amount, the maturity and the type of sovereign risk held by the bank for each country. For this analysis we use three maturities: from zero to three months, from three months to one year and finally from one year to five years. We compute nine different variables.

The first variable is the total exposure of each bank to all of the participating countries of the EBA stress tests. This variable is denominated *TOT_EXPO.* This variable provides information about the total sovereign exposure of a particular bank, and gives indication of its fragility. The second variable is around the total exposure to the ICC country summed for all of the residual maturity. The *ICC_EXPO* variable allows us to identify banks that are more exposed to ICC sovereign debts. The third variable is trying to identify the exposure of each bank to countries that suffered from a downgrade over the period 01/01/2011 to 06/30/2013. The variable DOWN_TOT_EXPO does not take into account the exposure of countries like Germany, Luxembourg, Sweden, Norway, the Czech Republic or the baltic countries which has not been downgraded during our sample period. This variable was computed for all of the residual maturity. The last 6 variables translates the specific exposure of the country or countries that were downgraded at the date of the event. For each event, we used the value of the gross and net direct exposure to the country that suffered the downgrades for the subsequent event. The *GROSS_EXPO_ST*, *GROSS_EXPO_MT*, *GROSS_EXPO_LT*[5] express the gross exposure to the country/countries suffering the downgrade for each individual event. The *NET_EXPO_ST*, *NET_EXPO_MT*, *NET_EXPO_LT* express the net exposure of the country suffering the downgrade for each individual event. In the case of the event of 12th, January 2012, we summed up the exposure data for each countries that were affected by the different downgrades (nine in total).

These variables focused on the sovereign exposure of each bank. Each of the variables are expected to affect positively the variation of the CDS spread. For instance, the higher the exposure to ICC countries for a bank, the higher the variation of the spread. To control for the size effect we divide each variables for each bank, by the total asset of each bank.

3.3.4 Control variables

First, we control whether the bank is located in the same country affected by the downgrade. *SAME_NAT* equals 1 in this case, 0 otherwise. We expect this variable to have a positive impact on the CARS, as a State deeply in debt cannot easily provide financial support to the national banking sector.

The following control variables are related to the core problem of the European sovereign debt crisis. On order to take into account that the totality of the countries who ask for support of both the IMF and the BCE are all Eurozone members, we consider *EURO_ZONE*, equals to 1 if the bank is located in a Euro member country, and 0 otherwise. Our sample is composed of 10 banks that are not located in a Euro member country. Both expectations about the sign of this variable are possible:

- First, the Eurozone variable may have a negative impact on CARS, if CDS markets participants anticipate that the size and the strength of the institutions of the Eurozone ensure the stability of the

[5] *ST stands for short term: [0, 3M[; MT stands for medium term: [3M, 1Y[; and LT for long term: [1Y, 5Y[*

all zone even in period of trouble.

- Secondly, the Eurozone factor may have positive impact on CARS, if CDS markets participants anticipate that the situation in the Eurozone is difficult enough that the stability cannot be ensure.

ICC takes the value 1 if the bank is located in one of the following country: Portugal, Ireland, Greece and Spain. The choice of only using a narrow definition of the In Crisis Countries is justified by the fact that they are the only countries that benefit from a ECB emergency rescue plan during of sample period. These countries are the less able to ensure the bail out process of one its bank in case of default because of its high level of debt. We expect this variable to have a positive impact on the CARS.
The last variable ($BANK\_TOT\_DOWN$) related to the sovereign debt crisis takes the value 1 if the country is located in a country that has been affected by a downgrade during the period 01/01/2011 to 06/30/2013, 0 otherwise. The expected sign of this variable is positive because a bank located in country that haven been downgrade during our sample period is less likely to be rescued by the government in which the bank is located because of its low capacity of issuing new debt.
The variable EXPO/ASSET is our size control variable where the total exposure of the bank is divided by the total asset of the same bank. This variable allow us to understand the importance of the size of total exposure among the whole assets of the bank. The sign of this variable on the evolution of the spread of the CDS is positive. The choice of using relative data allow us to control for size problem. It seems understandable that a large bank is more likely to hold more sovereign debt than the smallest bank of our sample. Large bank can decide to hold more sovereign debt to diversify its asset portfolio.
At last, we control the total risk of the bank. We used the Risk-weighted asset (RWA). This asset calculation is used to determine the level of capital requirement for a bank, and provides a quite complete measure of the bank risk.
The RWA is expected to have a positive impact on the CARs.
We also consider RATIO_NPL equals to the percentage of non performing loan (NPL) in the loan portfolio of a bank. A non performing loan is defined as a sum of borrowed money upon which the debtor has not made his or her schedule payments for at least 90 days. This variable is supposed to have a positive impact over the CARs.

3.4 Empirical strategy

We analyze the evolution of CDS spreads of banks over the period 01/03/2011 to 06/30/2013. The explanatory variable is the cumulative abnormal return (CAR) of CDS in order to measure the reaction of the market to a downgrading in sovereign credit ratings. For each events, and for each bank, we determine the CAR over different windows. The choice of several time frames with different length allows us to diversify the

frequency of response of the CDS and allows us to study the effect before and after the announcement. It also allows us to check for the robustness of our results. By choosing the +5/-5 days windows as a benchmark, we can use the 3 other windows to control the stability of our results.

The empirical model estimates the relationship between the CARS, disclosure and sovereign exposure. The model is as follow:

$$CAR^{T}_{b,-i,+j} = \alpha + \beta_1 SOVEREIGN\ DISCLOSURE_{b,T} + \beta_2 GLOBAL\ DISCLOSURE_{b,T} \qquad (5)$$

$$+\beta_3 * SOVEREIGN\ EXPOSURE_{b,T} + \beta * CONTROL_{b,T} + \varepsilon_{b,T}$$

where T is the date of the event and b is the bank.

We use a panel model due to our data (16 times the same sample of banks for 16 different dates). The model originally used was based on an ordinary least square regression over panel data and we were confronted to a significant level of heteroscedasticity which forced us to used an OLS regression which took into account the correction of heteroscedasticity. The White's General Heteroscedasticity Test was particularly significant for the transparency score and for three exposure variables related to exposure to Spain, Portugal, Ireland and Greece.

We expect the disclosure related to sovereign exposure to have stability effect over the CDS spreads. In other words, it means we assume that if a bank decides to disclose information about its exposure to sovereign debts, the bank brings complement information to the EBA results. We also assume that this information, for a given level of risk, reduces the risk premium because the investors are reassured by disclosure. The CDS spread can also react to a more general disclosure. In case of a negative significant link between market reaction and disclosure it indicates that investors are reassured by any kind of information: a global policy of disclosure gives confidence to market participants.

We also analyze the degree of exposure to sovereign debt of each bank of our set. The data set provided by the EBA offers us information about the amount of sovereign debt held by each bank. Those results, and the fact that they are publicly available, have an impact on the behavior of participating actors. They can know the exposure of each bank to sovereign debt, and can assess a good estimation of bank credit risk.

4 Statistical analysis

4.1 CARs statistical analysis

We consider 16 events which cover the period starting on 01/01/2011 till 06/30/2013. In order to detect an abnormal change in CDS spreads, we run a t-test for each day surrounding each event from minus 5 days to

plus 5 and also for each CDS cumulative abnormal return. The following tables show the results of the tests for the three main events.

Table 4: t-tests
This table provides results about the mean of abnormal spreads of the CDS spread and cumulative abnormal spreads. The means are provided for three main events and for different days or period surrounding the event. In parentheses are the values of the t-test. ***, **,* indicate statistical significance from zero at the 1%,5% and 10% level respectively.

	event of 03/07/2011	event of 03/16/2011	event of 11/19/2012
Days	Mean for all banks	Mean for all banks	Mean for all banks
-5	-3,7240	-5,8181***	3,2822***
	(-1,1577)	(-2,0152)	(8,2529)
-4	4,7799	-0,1147	-3,6293***
	(1,3942)	(-0,1004)	(-11,8307)
-3	-5,2720	7,2741***	1,0608**
	(-1,5554)	(3,2557)	(1,9891)
-2	-2,4651***	-1,5567	1,8090
	(-2,2677)	(-0,4071)	(1,5194)
-1	5,6540***	-1,6990	-0,1212
	(2,2586)	(-0,6631)	(-0,2325)
0	-1,3900	-1,1280	-7,0581***
	(-0,8851)	(-1,0670)	(-7,3756)
+1	1,6127	2,6732***	-4,9169***
	(0,9253)	(3,5124)	(-10,6787)
+2	0,0709	1,8295	-3,3689***
	(0,0550)	(0,9428)	(-10,1669)
+3	3,0048**	10,5642***	1,1396
	(1,9014)	(2,4135)	(0,7542)
+4	-2,1234**	-4,0809***	-0,8409***
	(-1,8618)	(-5,0092)	(-2,2404)
+5	-3,2058	2,9469***	5,6280***
	(-1,1218)	(7,3381)	(14,4582)
CAR CDS -5/+5	-3,0580	10,8905	-7,0158***
	(-1,0313)	(1,0717)	(-2,8389)
CAR CDS +5	-2,0308	12,8048***	-9,4173***
	(-0,7224)	(2,1246)	(-4,6838)
CAR CDS -2/+2	3,4825	0,1189	-13,6562***
	(1,0953)	(0,0146)	(-5,5280)
CAR CDS +2	0,2936	3,3746	-15,3440***
	(0,2137)	(1,2625)	(-9,5831)

For the two first events, the mean of the abnormal returns of the CDS and the CARs are often different from 0, but the sign of the evolution is not constant. The third event is related to the second downgrade of France, by Moody's. We can see that except for the days -2,-1 and +3, the CDS spreads abnormal changes are significantly different from zero. It indicates that investors are reactive at the announcement of downgrade but also shows that such announcement may participate in a reduction of the spread which is

against first expectations.

4.2 Disclosure variables' analysis

DISCLOS_SOV focus on the communication about the sovereign exposure of the bank during the European sovereign crisis and *DISCLOS_GLOB* assesses the global disclosure of the bank. The following tables reviews general statistics about the two variables in 2010 and 2011.

Table 5: Disclosure variables statistics

	2010		2011		Evolution	
	DISCLOS_SOV	DISCLOS_GLOB	DISCLOS_SOV	DISCLOS_GLOB	DISCLOS_SOV	DISCLOS_GL
AVG	27,280%	41,489%	32,750%	39,722%	16,70%	-4,45%
STD	24,896%	20,157%	26,491%	19,595%	6,02%	-2,87%
MED	24,823%	37,500%	36,351%	37,500%	31,71%	0,00%
Q1	3,788%	25,000%	3,819%	25,000%	0,83%	0,00%
Q3	47,033%	62,500%	54,594%	56,250%	13,85%	-11,11%
D1	0,455%	12,500%	1,181%	12,500%	61,50%	0,00%
D9	60,227%	62,500%	69,525%	62,500%	13,37%	0,00%
MIN	0%	0%	0%	0%	0%	0%
MAX	92%	75%	88%	75%	-5,63%	0,00%

The highest level of disclosure about sovereign exposure is 92% in 2010 obtained by the DEUTSCHE BANK, while the highest value in 2011 is equal to 88% obtained by ALLIED IRISH BANK. The evolution over the period is positive after the rise of awareness all over Europe, and most largely all around the world, about the European sovereign debt crisis. Actually, the above statistics globally shows a positive evolution from 2010 to 2011 for the sovereign disclosure variable: the average value of the variable distribution is increasing by more than 16% when the median is increasing by more than 30%. The different participating banks decided to explain throughout annual reports theirs exposure to the different European countries. On the other hand, we can see an increase in the standard deviation translating a more scatter distribution. Five banks (BAYERISCHE LANDESBANK, CAJA DE AHORROS Y PENSIONES DE BARCELONA, NORDDEUTSCHE LANDESBANK, RABOBANK NEDERLAND and SWEDBANK) have a index equal to 0 during the year 2010 and only one for the year 2011 (DANSKE BANK). This evolution is consistent with the idea that the rise of awareness about the situation would also have been transported to the annual report of the following year.

Concerning the global disclosure variable, the assessment is somehow reverse. On average, the level of global disclosure is reducing in 2011 compared to what it was in 2010, but the dispersion of the distribution is

also reducing. It can be interpreted like the banks are reorienting their communication on what matters the most at a significant time period. The banks could have decided to communicate more on the sovereign and could have reduce their global decision to disclosure. The maximum level of global disclosure in 2010 is 75%, obtained by three banks (ALLIED IRISH BANK, BARCLAYS and HSBC). For the year 2011, the maximum is still 75% and is obtained by two banks (ROYAL BANK OF SCOTLAND and COMMERZBANK). In the mean time, the minimum value is 0% in both year obtained by the NATIONAL BANK OF GREECE in 2010 and in 2011.

4.3 Sovereign exposure analysis

Table 6 presents total exposure variables. The total exposure to sovereign risk (TOT_EXPO) shows a negative evolution for the year 2012 compared to the 2011 situation. This negative evolution is consistent with the European Union commission decision and with the decision of the European Central Bank to reduce the amount sovereign exposure of banks. The evolution is ranged from 0% to -45%. The maximum was held by BNP PARIBAS for the year 2011 and by UNICREDIT for the year 2012. The minimum exposure fluctuate less by only a decrease of 5%. The bank which held the smallest amount of sovereign debt was IRISH LIFE AND PERMANENT for the year 2012 and by BANCO PASTOR for the year 2011.
The situation is quite similar for the exposure to ICC risk. The data shows a large decrease in the average amount of sovereign debts held by the participating banks but the scatter of the distribution remains stable with a slight decrease in the standard deviation. We can also see that several banks which decided to not hold any ICC sovereign debt for the year 2011 and for the year 2012: three banks in 2011 and four in 2012. The maximum exposure is held by the BBVA bank for both years. The variable ICC indicates that the ECB plan to reduce exposure to the countries that are under surveillance by the ECB and the IMF was a success. Concerning the last variable (DOWN_TOT_EXPO), the comments are similar. The maximum exposure is held by BNP PARIBAS in 2011 and in 2012. Both the average total exposure to the downgraded countries and the standard deviation are decreasing.

Table 6: Total exposure variables, in million EUR

	TOT_EXPO			ICC_EXPO			DOWN_TOT_EXPO		
	2011	2012	EVO	2011	2012	EVO	2011	2012	EVO
AVG	37804,80	35120,06	-8%	6 570	5379,47	-22%	23691,36	20963,39	-13%
STD	31512,95	26073,45	-21%	11 698	11644,30	0%	25597,53	21445,29	-19%
MED	32445	30444,38	-7%	2 608	2152,01	-21%	12347	9479,70	-30%
Q1	10123,75	9420,68	-7%	456	170,40	-62.6%	3964,75	4350,34	9%
Q3	58110,25	58250,66	0%	6 982	4472,63	-36%	37711,5	31146,64	-21%
D1	6862,70	5555,35	-24%	20	0,00033	-5786732%	1540	359,89	-328%
D9	78411,50	75862,94	-3%	14 849	10126,06	-47%	63873	59118,78	-8%
MIN	2553	2434,67	-5%	0	0	0%	0	0	0%
MAX	139661	96426,16	-45%	56 514	53925	-5%	99189	70058,39	-42%

Table 7 presents information on the exposures to the downgraded country. The amount of domestic sovereign debt own by a domestic bank: French banks own in majority French sovereign bonds, German banks German bonds, Greek banks Greek bonds and so on. It is an illustration of the traditional home bias. The second thing that come to our mine is the very large variance between our sample. This large dispersion can be explained by the very large amount of banks that don't hold much sovereign debt of the concerned country at each event. The average exposure to the downgraded country is rather low compare to the total exposure value.

Table 7: Exposure variables for the entire set of events, in million EUR

	GROSS_EXPO_ST	GROSS_EXPO_MT	GROSS_EXPO_LT	NET_EXPO_ST	NET_EXPO_MT	NET_EXPO_LT
AVG	384	362	961	335	304	776
STD	2 760 445	2 353 939	8 030 212	2 473 194	1 822 718	6 012 168
MED	0	0	9	0	0	3
Q1	0	0	0	0	0	0
Q3	64	78	268	50	41	258
D1	0	0	0	0	0	0
D9	718	735	2 647	606	651	2 037
MIN	0	0	0	-1 999	-391	-1 814
MAX	17 977	13 566	26 674	17 784	12 961	25 980

When have a closer look to the evolution between the events we can see a decrease in quantity of the amount of sovereign debt hold per bank the further we advance into our time period. This evolution can be explain like previously: the IMF and ECB plan were designed in that goal. The decrease in exposure is not observable crescendo but show a slight decrease from 2011 to 2012.

4.4 Control variables analysis

On average, only 9,04% of the banks have the same nationality that the downgraded country. Our sample is composed of 37 banks located in Euro-zone member country (EUROZONE); the ten other banks are residents of the following countries: Denmark (1 bank), Norway (1 bank), United Kingdom (4 banks) and Sweden (4 banks). In the same time, our sample is composed of 14 banks located in countries in crisis: Portugal (2 banks), Ireland (3 banks), Greece (2 banks) and Spain (7 banks). 17 banks are not located in a country which has been downgraded during our sample period (BANK_TOT_DOWN). Most of this banks are located in "AAA" countries like Germany (7 banks), Netherlands (4 banks), Denmark (1 bank), Norway (1 bank) and Sweden (4 banks) during the period 01/01/2011 to 06/31/2013.

Table 8: Control variables

Variable name	Value	Ratio
SAME_NAT	1 if located in a country suffering a downgrade	9,04%
	0 otherwise	90,96%
EUROZONE	1 if member	78,72%
	0 otherwise	21,28%
ICC	1 if located in a ICC country	71,22%
	0 otherwise	29,78%
BANK_TOT_DOWN	1 if located in a downgraded country	63,83%
	0 otherwise	36,17%

5 Results

We run several regressions for the four windows surrounding the event. We consider in the first column the gross exposure to sovereign risk, and we consider in the second column the net exposure to sovereign risk.

Table 9: CAR +5 days surrounding the event
In parentheses are the values of the Student test. ***, **,* indicate statistical significance at the 1%,5% and 10% level respectively

	CAR +5	CAR +5	CAR +5 / -5	CAR +5 / -5
gross exp to	sov debt gross exp	sov debt net exp	sov debt gross exp	sov debt net exp
Variables	Coefficient	Coefficient	Coefficient	Coefficient
const	−1366,73***	−1192,84***	−2528,55***	−2618,83***
	(-14,417)	(-14,686)	(-14,110)	(-14,294)
TRANS_SOV	−263,413***	−224,389***	−515,548***	−530,951***
	(-3,492)	(-3,375)	(-3,649)	(-3,634)
DISCLOS_GLOB	1756,12***	1535,31***	3308,37***	3482,34***
	(13,282)	(13,455)	(13,133)	(13,414)
DOWN_TOT_EXPO	0,0112***	0,0093***	0,0208***	0,0209***
	(7,244)	(6,666)	(7,210)	(6,736)
EXPO/ASSET	3954,3***	3427,6***	7184,41***	7318,81***
	(6,382)	(6,460)	(6,253)	(6,351)
TIER_1	−3,5139e-06*	−2,4932e-06	−6,6670e-06*	−6,7026e-06*
	(-1,787)	(-1,565)	(-1,782)	(-1,882)
RWA	−9,24207e-08	−1,06708e-07	−1,65585e-07	−2,21206e-07
	(-0,443)	(-0,624)	(-0,425)	(-0,586)
RATIO_NPL	−2,51975e-06	−2,34911e-06	−5,06955e-06	−5,50653e-06
	(-1,010)	(-1,002)	(-1,087)	(-1,101)
SAME_NAT	318,399**	258,749**	705,747**	521,144*
	(2,199)	(2,001)	(2,506)	(1,791)
ICC	3317,27***	3012,13***	6164,06***	6336,27***
	(14,928)	(16,285)	(15,285)	(15,500)
ICC_EXPO	−0,0888428***	−0,0820721***	−0,171383***	−0,177642***
	(-8,089)	(-8,544)	(-8,237)	(-8,413)
ICC_C	0,0282187***	0,0260311***	0,0580269***	0,0595136***
	(3,107)	(3,316)	(3,418)	(3,444)
EUROZONE	668,437	604,682***	1241,99***	1315,57***
	(11,579)	(12,345)	(11,371)	(11,834)
GROSS_EXPO_ST	0,0558*		0,1067*	
	(1,652)		(1,724)	
GROSS_EXPO_MT	0,0231		0,0326	
	(0,834)		(0,653)	
GROSS_EXPO_LT	−0,0378**		−0,0775**	
	(-2,240)		(-2,452)	

	CAR +5	CAR +5	CAR +5 / -5	CAR +5 / -5
gross exp to	sov debt gross exp	sov debt net exp	sov debt gross exp	sov debt net exp
Variables	Coefficient	Coefficient	Coefficient	Coefficient
NET_EXPO_ST		−0,01698		−0,0821
		(-0,487)		(−1,065)
NET_EXPO_MT		0,0479*		0,1127*
		(1,720)		(1,744)
NET_EXPO_LT		−0,0153		−0,0163
		(-0,835)		(-0,408)

Table 10: CAR +2 days

In parentheses are the values of the Student test. ***, **,* indicate statistical significance at the 1%,5% and 10% level respectively.

	CAR +2	CAR +2	CAR +2/-2	CAR +2/-2
gross exp to	sov debt gross exp	sov debt net exp	sov debt gross exp	sov debt net exp
Variables	Coefficient	Coefficient	Coefficient	Coefficient
const	−643,377***	−667,657***	−1157,66***	−1793,91***
	(-14,243)	(-14,631)	(-14,494)	(-10,768)
DISCLOS_SOV	−92,5284**	−99,5405***	−212,151***	−612,616***
	(-2,477)	(-2,656)	(-3,260)	(-4,317)
DISCLOS_GLOB	817,776***	838,057***	1484,44***	2298,84***
	(12,733)	(13,112)	(13,040)	(11,088)
DOWN_TOT_EXPO	0,00547454***	0,00540475***	0,00924433***	0,0057264**
	(7,203)	(6,951)	(6,947)	(2,387)
EXPO/ASSET	1850,89***	1979,69***	3274,66***	6895,79***
	(6,146)	(6,426)	(6,232)	(6,719)
TIER_1	−1,6088e-06*	−1,55687e-06*	−2,23815e-06	3,3767e-06
	(-1,718)	(-1,765)	(-1,322)	(0,795)
RWA	−1,049e-07	−7,6325e-08	−1,29447e-07	−2,60056e-08
	(-1,071)	(-0,819)	(-0,711)	(-0,061)
RATIO_NPL	−1,31649e-06	−1,34323e-06	−2,10277e-06	8,53386e-07
	(-1,002)	(-0,976)	(-0,971)	(0,146)
SAME_NAT	238,628***	174,635**	372,628***	639,82***
	(2,935)	(2,068)	(2,840)	(3,899)

	CAR +2	CAR +2	CAR +2/-2	CAR +2/-2
gross exp to	sov debt gross exp	sov debt net exp	sov debt gross exp	sov debt net exp
Variables	Coefficient	Coefficient	Coefficient	Coefficient
ICC	1553,01***	1633,72***	2863,73***	3435,08***
	(14,236)	(14,513)	(16,245)	(26,855)
ICC_EXPO	−0,0461711***	−0,0470929***	−0,0786349***	−0,113991***
	(-8,764)	(-8,697)	(-8,175)	(-7,440)
ICC_C	0,0172274***	0,0166053***	0,0252381***	0,0427381***
	(3,961)	(3,657)	(3,176)	(3,380)
EURO_ZONE	336,549***	337,558***	586,624***	811,221***
	(12,236)	(12,166)	(12,029)	(8,719)
GROSS_EXPO_ST	0,0323427*		0,0734311***	
	(1,913)		(2,801)	
GROSS_EXPO_MT	0,0108461		0,0157502	
	(0,799)		(0,770)	
GROSS_EXPO_LT	−0,0227457***		−0,0440236***	
	(-2,666)		(-3,030)	
NET_EXPO_ST		−0,0096		−0,1210***
		(-0,464)		(-2,983)
NET_EXPO_MT		0,0337**		0,0303
		(2,099)		(0,811)
NET_EXPO_LT		−0,0106		0,0338
		(-0,990)		(1,352)

The disclosure variables are both very significant in our analysis for each time frame and for both gross exposure and net exposure. First we see sovereign disclosure has a negative relationship with the cumulative abnormal returns of CDS spreads when at the same time the global disclosure variable has a positive relationship with the evolution of the CDS spread for each of our window and for both net and gross exposure. The stability in the results shows that investors behaviors are also stable. The results obtained are consistent with our expectation: sovereign disclosure has a significant relationship with the evolution of the CDS spreads and this relationship participates into the reduction of the value of CDS spreads. This result insists on the fact that disclosure does not participate to an increase of the stability of the spreads but indicates a reduction in the risk of default. On the other hand, we see an increase of the value of the spread for the global disclosure. Such result provides interesting behavioral result where investors worship more oriented, specific, disclosure in their calculation of the premium. These results show that the disclosure of characteristics which are more in line with the current financial and economic situation are more likely to participate to the reduction of the spread of CDS. It does not participate to an increase of stability though. Specific disclosure is rewarded by investors in the value of the spread when global disclosure, potentially judged vague, discipline the spread.

The total exposure per asset ratio has a significantly positive relationship with the cumulative abnormal return of the CDS market when using the both net and gross exposure variables. This means that the total exposure controlled for size have a positive relationship with the evolution of the CDS spreads for each of the window surrounding an events for our sample period (01/01/2011 to 06/30/2013). The result obtained above is consistent with our expectation where we expected the more implicated bank into the sovereign debt market to be the more vulnerable to an increase of the CDS spreads. The result is explained by the gravity of the situation concerning sovereign debt. Informed investors react to the amount of exposure to sovereign debt even if it is not concern by a downgrade.

A closer look to the total exposure to countries that have been downgraded shows a significant positive relationship between the amount of sovereign debt, that has been downgraded over the past 2.5 years, hold and the cumulative abnormal return of CDS spreads, which is consistent with our hypothesis and the literature about sovereign debt exposure. This result is important in a sense that investors react to announcement of downgrade when banks hold sovereign debt that have been, or will be downgraded. The investors are responsive to downgrades. The stability of the results obtained comforts us in the choice of several window to reinforce our analysis. Concerning net and gross exposure for either short, medium and long term, the conclusion are somehow different but similar to the benchmark situation. Some of these variables are significant and it could be interpreted as the fact that our banks are not specifically affected by one event for a unique country. The fact that both coefficient and the significativity are not stable shows that this variables does not affect significantly the behavior of investor in the calculation of the premium.

The accounting variables also provide interesting results. First of all, the Tier 1 variable's coefficient is negative and highly significant (at 1%) for each window surrounding each event and for both net and gross exposure. The higher the Tier 1, the more the CDS spread is reduced when a downgrade happens. It does not participate to the stability of the CDS spread but is still beneficial to the decrease of the CDS spreads. This result is consistent with the recommendations of Basel II capital agreement. Investors reward banks with the highest Tier 1 at the downgrade announcement. Tier 1 is the core measure of a bank's financial strength from a regulator's point of view and proved it is an interesting value to measure the stability on the CDS market. The RWA is never significant for each window and for both gross and net exposure. Such result is interesting in a sense that investors do not react to the RWA and they largely react to Tier 1. The non reaction can be interpreted as RWA does not provide enough information to investors when the total equity capital is not known. Concerning the NPL variable, we see it has a negative significant relationship with the cumulative abnormal return of the CDS spreads. This result does not appear to be consistent with our expectations where the higher the level of non performing loan the more the probability of default increase.

The coefficient of the variable SAME_NAT is positive for each window and for both net and gross exposure. Such result indicates that investors react negatively to announcement of downgrade by asking for a greater premium when using CDS for banks which are located in the downgraded country. The value of the coefficient increases also significantly from 722 for the shortest window (from the announcement to 2 days after) to 3752 for the longest window (from 5 days before the announcement to 5 days after). Investors attach importance to the nationality of the bank and attach even more importance when the window is large at the surrounding of the event. Investors do not anticipate the nationality of the bank in their calculation but react significantly when a downgrade happen.

The relationship between ICC and the CDS spread reveals interesting results. The ICC variable have a positive and significant relationship with the evolution of the CDS spreads at the downgrade surrounding. This result shows that investors do take into account the nationality of the bank in their calculation of the spread. The fact of being located in one of the four country listed is interpreted as an increase of the probability of default of the bank and can be explain by the diminishing capacity of central government of those countries to ensure the potential bailing out of banks in trouble. This variable does not participate to an increase in stability and translate well the fear of investors in the current economic situation. Do investors take into account the exposure to sovereign debt of coutries in crisis? The answer is visible in this analysis where we can see that the ICC exposure have a negative significant relationship with the cumulative abnormal return of the CDS spread. This result is a bit surprising when we expect a bank to see its CDS spread increase more, at the surrounding of a downgrade announcement, when the bank has a bigger amount of exposure to countries in crisis. It can be explain with the nationality of bank holding sovereign debt of countries in crisis which are not located in one of those countries. If a strong German bank hold a significant amount of Italian sovereign debt, investors are less afraid of the situation because of the solvability of the German government. In order to confirm the previous result, we see the impact on the evolution of CDS spreads of the cross variable ICC_C which is positive and significant. Such result indicates that investors are more likely to revise positively their calculation about the CDS spread when the bank have the more sovereign debt of countries in crisis when located in one of the four countries. This result can be explain by the diminishing capacity of those government to ensure the stability of their banking sector due to their highly indebted situation.

6 Conclusion

This analysis shows results on the relationship between disclosure and stability. The results are sometimes divergent but tend to outline some interesting results about the impact of disclosure. We can see that a too large measure of disclosure, too global, has not the expected effect on a market and does not participate to the reduction of volatility on a market. This finding is consistent with a large section of the empirical and

theoretical literature which advocate for less disclosure. This phenomenon can be also interpreted by the fact that the macroeconomic situation of each of the participating was not as stable as it could have been a couple years before. The global disclosure may not be rewarded during crisis or when there is a unstable perspective but it will require further research to understand more globally the impact of global disclosure on the CDS market.

Although, the previous argument can still validate our results on targeted disclosure. As mentioned before the literature around disclosure is dual sided about the impact of disclosure on stability. We see in our results a negative correlation between targeted disclosure, here sovereign disclosure, and the evolution of the CDS spreads compared to the evolution of the CDS index in most of the cases. Targeted disclosure is in fact participating to market stability by limiting the increase of the probability of default of banks, during a period of unstable macroeconomic environ. This finding is extremely relevant for further research and it can definitely be a motivation for further research in two different macroeconomics situations: in a growing macroeconomics situation and in another crisis to corroborate the results.

The results found here also corroborate the critics emitted during the European sovereign debt crisis. It looks like that being a bank located in the Eurozone tend to significantly increase the volatility of the CDS spreads. The recent crisis has proven that the Eurozone has been weakened due to the crisis and it is reasonable to think a bank located in one of the countries member of the unique currency. In the mean time, the fact of being located in countres in crisis seems to tend to increase the probability of default for those banks. Those banks are holding a large amount of sovereign that were getting closer to default after each downgrade: the risk of default was then transferred from the country to the subsequent bank. The contagious effect found by Arnold (2012) is here verified. Meanwhile, on the other hand the exposure to countries in crisis does not seem to impact positively the CDS volatility.

The validity of the results found during this analysis comfort us on doing deeper analysis about the benefits and the cost of disclosure. This article went over the cost of disclosure but would be a very interesting track to follow while doing further research. It would also be extremely pertinent to develop some theoretical research on the impact of disclosure and the volatility of CDS spreads, in either stable and unstable environment.

References

Akhigbe, A. and A. D. Martin (2008). Influence of disclosure and governance on risk of us financial services firms following sarbanes-oxley. *Journal of Banking & Finance 32*(10), 2124–2135.

Alexandre, H. and T. Wang. Are bank credit risks linked to sovereign credit risks? evidence in the euro area. *Working Paper DRM*.

Arnold, I. J. M. (2012). Sovereign debt exposures and banking risk in the current eu financial crisis. *Journal of Policy Modelling 34*, 906–920.

Baumann, E. and U. Nier (2004). Disclosure, volatility, and transparency: An empirical investigation into the value of bank disclosure. *Fed. Reserve Bank New York Econ. Pol. Rev. 10*, 31–46.

Beyer, A., D. A. Cohen, T. Z. Lys, and B. R. Walther. (2010). The financial reporting environment: Review of the recent literature. *Journal of Accounting and Economics 50*, 296–343.

Bischof, J. and H. Daske (2013). Mandatory disclosure, voluntary disclosure, and stock market liquidity: Evidence from the eu bank stress tests. *Journal of Accounting Research 51*(5), 997–1029.

Bushman, R. (2010). The pros and cons of regulating corporate reporting : a critical review of the arguments. *Federal Reserve Bank of New York Staff Reports*.

Coates, J. C. (2007). The goals and promise of the sarbanes–oxley act. *Journal of Economic Perspectives 21*(1), 91–116.

Cordella, T. and E. Yeyati (1998, March). Public disclosure and bank failures. *International Monetary Fund Staff Papers 45*(1).

Cordella, T. and E. Yeyati (2002, March). Financial opening, deposit insurance, and risk in a model of banking competition. *European Economic Review 46*(3), 471–485.

Ellahie, A. and G. Ricco (2012, oct). Government spending reloaded: Informational insufficiency and heterogeneity in fiscal vars.

Farvaque, E., C. Refait-Alexandre, and S. Dhafer (2011). Corporate disclosure: A rewiew of its (direct and indirect) benefits and costs. *International Economics 128*, 5–32.

Frolov, M. (2007). Why do we need mandated rules of public disclosure for banks? *Journal of Banking Regulation*.

Goodhart, C. (1998). The two concepts of money: implications for the analysis of optimal currency areas. *European Journal of Political Economy 14*(3), 407–432.

Gordy, M. and B. Howells (2006). Procyclicality in basel ii: Can we treat the disease without killing the patient? *Journal of Financial Intermediation 15*(3), 395–417.

Hull, J., M. Predescu, and A. White (2004). The relationship between credit default swap spreads, bond yields and credit rating announcements. *Journal of Banking & Finance 28*(11), 2789–2811.

Jirasakuldech, B. (2010). Financial disclosure, investor protection and stock market behavior: an international comparison. *Review of Quantitative Finance and Accounting 37*(2), 181–205.

Norden, L. and M. Weber (2004). Informational efficiency of credit default swap and stock markets: The impact of credit rating announcements. *Journal of Banking & Finance 28*(11), 2813–2843.

Petrella, G. and A. Resti (2013). Supervisors as information producers: Do stress tests reduce bank opaqueness? *Journal of Banking & Finance 37*(12), 5406–5420.

Tadesse, S. (2006). The economic value of regulated disclosure: Evidence from the banking sector. *Journal of Accounting and Public Policy 25*(1), 32–70.

Vauhkonen, J. (2011). The impact of pillar 3 disclosure requirements on bank safety. *Journal of Financial Services Research 41*(1-2), 37–49.