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Bank Disclosure and Financial Stability

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General Introduction

The last two financial and economic crisis led to changes regarding the rules and standards fixed by regulators (both domestic and supranational). The financial crisis of the XXIth century, the Subprime crisis, brought under the spotlight weaknesses in financial and banking regulation, in market discipline and in the supervision of various financial markets. The beginning of one of the major crises of financial history comes from several regulatory vulnerabilities which amplified the consequences of the financial crisis.

Parallel parts of the banking sector were not controlled: the securitization of special purpose vehicle, asset-backed commercial papers, or even non-banking intermediaries responsible for analyzing mortgages proposals were not under any surveillance concerning liquidity, leverage or even risk quality supervision and internal control. The lack of surveillance of large broker-dealers hosting derivatives activities also participated to the subprime crisis. In addition, Bernanke (2010, 2012) pointed out that the lack of available information for both market participants and regulators was crucial in the reduction of market discipline.

Bernanke's statement is the central theme of this dissertation: we investigate the role of informational disclosure and its potential effects onto stability for both the financial sector and for the banking sector. We study the stability of the banking sector in relation with disclosure because disclosure is a one way to exert a better control of banks throughout several actors and channels. The control mechanism is called governance and it s through this mechanism that disclosure can allow a reduction of the risk taking by bank managers, in order to satisfy the demand of

each actor of the governance. In the following dissertation, we will be studying the relationship for the financial by the banking sector. The link between financial market and the banking sector is not especially thick. Disclosure has positive effect which is reassuring for investors leading to a reduction of the overall volatility of bank titles. It leads then to a diminution of the risk of bank's assets.

Before continuing this dissertation, relating disclosure and financial stability, it is important to understand carefully the governance applied on a bank. For a financial institution or for any corporate firm, the governance is the system by which firms are controlled and led (Shleifer et Vishny, 1997). Governance can be realized by various agents. For a bank, there are three types of agents: the depositors, the external investors and finally the regulator. The lack of governance was also pointed out by Bernanke (2010, 2012). The governance of bank is slightly different for bank than the one from corporate firms (Bouaiss and Marsal,2009). For banks, the governance is slightly different from regular corporate governance. The particularities are not numerous but generate important consequences.[1]: banking opacity leads to asymmetric information and emphasize the limited competition of the banking sector[2].

Therefore, good governance on banks is important. As mentioned above, the governance of a bank is enforced by different agents which have sometimes similar interest and sometimes opposite. The expectations of each agents are going to play a different role on guiding bank decision makers for three main reasons. First, banks which are known to have a good corporate governance are usually performing better, contribute more to the economic growth and to financial development. Those exact banks choose wisely their risk and allocate better their capital (Levine, 2004). Overall, in developed economies in which intermediate financing is the most common, banks exert themselves an important role onto corporate governance of firms they finance. So not only, the bank benefits from good governance practices but also transfer it to other firms throughout crossed effects and throughout a reduction of the cost of credit. Lastly, efficient gover-

[1]Macey et O'Hara (2003)
[2]Levine (2004)

nance participates to enhance the resilience of the financial sector by reducing the quantity of asymmetric information and more generally enhance the resilience to shocks (Levine, 2004). It carried out with the combination of both two above statements. The reduction of the asymmetric information reduces the volatility of the risk premiums associated to the various assets. It participates to an increase of the stability, reducing therefore potential shocks.

In order to exert its governance correctly, each agent must be provided with enough information. Without it, behavior of agent starts to become less rational and prompt to unexpected decision. The notion of financial stability is complicated in a sense that no consensus was made in the financial sector. Even without consensus, it remains some common elements in the literature. According to Allen and Wood (2006) or Borio and Dhremann (2009), the first common element to the various definitions of financial stability is the overall negativity of the concept. Indeed, stability is usually characterized by a situation which is not unstable, enforcing the blur around the concept. The problem with instability is that it can result with positive and negative variation which does not have the same implication and consequences. The definition of stability is a vague notion which regroup the whole financial sector (intermediaries, markets and infrastructure) and to which we assign a high level of success into its key function (gathering of saving, enhancing investment, managing risk or the payment solution). The overall definition of financial stability we will use all along this dissertation identify financial stability as a state of the financial market able to be resilient to shocks. This definition is the reflection of the vision proposed by the European Central Bank.

> «The condition in which the financial system – comprising financial intermediaries, markets and market infrastructures – is capable of withstanding shocks and the unravelling of financial imbalances, thereby mitigating the likelihood of disruptions in the financial intermediation process which are severe enough to significantly impair the allocation of savings to profitable investment opportunities.[3]»

[3] `https://www.ecb.europa.eu/home/glossary/html/glossf.en.html`

The regulation of the banking sector over the recent years has been focusing on enhancing market discipline throughout different channels and especially one: disclosure. The enhancement of disclosure or the reduction of the opacity of the banking sector has been a central question since the crisis of 1929. The Glass-Steagall Act, proposed by US senators C. Glass and representative H.B. Steagall, of 1933 is probably one of the first steps in favor of a reduction of opacity. It was originally designed to separate commercial banks from investment banking in four sections, but can be assimilated to a reduction of opacity. The beginning of the deregulation, originated during the 1970s, repealed the Glass-Steagal Act and let place to the implementation of economic liberalism where market discipline is self enhanced. The reality is different and the implementation of new regulation becomes more and more justified.

During the early years of 2000, the United States were facing two large financial scandals (Enron and Worldcom). The public Law 107-204[4], more commonly known as Sarbanes-Oxley Act, is implemented in order, *"to protect shareholders and the general public from accounting errors and fraudulent practices in the enterprise, as well as improve the accuracy of corporate disclosures. The U.S. Securities and Exchange Commission (SEC) administers the act, which sets deadlines for compliance and publishes rules on requirements."* The bill contains the first approach to implement in the United States a standard of communication for firms. It does not only apply to public companies, numerous provisions of the Act also apply to privately held companies.

As the evolution of the first Basel agreement emitted by the Bank of International Settlements, the second agreement of Basel, in 2004, is lined up around 3 different pillars in order to cover 3 purposes. The first pillar focuses on the regulatory capital. The second focuses on the supervisory review while the third pillar concerns all the measures relating to market discipline and disclosure. The third pillar aims to complement the minimum capital requirements and supervisory review process by developing a set of disclosure requirements which will allow the market participants to gage the capital adequacy of an institution. The market

[4]https://www.gpo.gov/fdsys/pkg/PLAW-107publ204/content-detail.html

discipline enforcement is purposely supplementing regulation as of information facilitates assessment of the bank by others.

The evolution of banking regulation and the growth of the market-based finance is the reason driving us all along the dissertation. In the upcoming chapters, we are going to try answer different issues relating the notion of disclosure and financial stability. What is the nature of the relationship between disclosure and financial stability for each agent? Addressing this issue is the main purpose and main contribution of the dissertation. In addition to the previous stated issue, we are going to understand the effect of disclosure for all agents together: does disclosure have the same impact of financial stability for each actor of the governance? Providing an answer to this specific issue is important because it will allow us to provide specific policy implication for each agent in case, where disclosure does not have the same impact for depositors and for external investors. The last issue which will be expressed here relates the notion of disclosure and financial stability under the notion of ambiguity. More specifically, it relates to decision theory under ambiguity. Ambiguity can be considered as another state of the decision-making process, which differs from risky and uncertain. Does ambiguity have an impact on the nature of the relationship between disclosure and financial stability? The second most important contribution of the dissertation rest upon answering this issue: it is important to address this issue because ambiguity is likely to affect the decision-making process and the utility calculation of agents.

Throughout this dissertation focused on individual agents, we are going to provide extensions to the limits of some parts of the economic and financial existing literature regarding the link between disclosure and financial stability. The existing literature is presented more specifically in **chapter 1**, and shows that disclosure does not have only one effect onto financial stability. The effect of disclosure is not as bold as expected to be and is dependent onto to the type of agents it is addressed to. The positive effect of disclosure onto bank activity also shows that maximum transparency is not optimal and that an arbitrage between opacity and full transparency should be made. The various regulator agencies are and were aware of the necessity of increasing banking disclosure. The Basel Committee,

in the Basel II Pilar 2 agreements, already integrated the necessity of disclosure, through the standardize communication, even before the 2007 financial crisis: the recommendation were officially published on June, 26^{th} 2004 and were implementation progressively up from January, 1 st 2006. The Basel II agreement is following the first Basel agreement of 1988. The second and third pillar introduces and reinforce mandatory disclosure with the implementation of the validity test of equity or the homogenization of financial communication to ease the lecture of the portfolio by analysts. The agreement also introduced standardized good banking habits. This chapter is close to the survey literature relating bank disclosure such as Frolov (2007) or closer to other corporate disclosure literature as Leuz (2016).

The rest of the dissertation studies individually the effect on both external investors and depositors. **Chapter 2** analyzes the effects of disclosure, on 47 banks onto the evolution of the spread of the credit default swaps (CDS) during the European sovereign debt crisis. The results show that disclosure reduces the value of the credit spread at the neighborhood of crisis events. This result is the main contribution of the chapter. The second important contribution of the chapter relies on the use of credit default swaps spread as a measure of bank risk, while most of the literature relies on the use of stock prices (Baumann and Nier, 2004) or bond prices. It completes the existent literature linking governance of external investors and disclosure (Poshakwale and Courtis, 2005) and the literature relating disclosure and bank risk behavior (Neretina et al., 2014 and Petrella and Resti, 2013).

Chapter 3 is a theoretical chapter which analyzes the relation between the action of governance by depositors, throughout a withdrawing process, and a situation which translate the level of ambiguity of depositors. The theoretical work proposed in this chapter is an extension of the model of Gorton (1985) to which we implemented the notion of ambiguity. The level of ambiguity of depositors concerns both the confidence into the bank it deposited in and the confidence in the macroeconomic environment. The results of the chapter allows us to provide implications in terms of regulation to enhance the stability of the banking sector. The nature of the relationship is negative: the higher the ambiguity of depositors

concerning the ability of a bank to pay back deposits, the more likely they are to withdraw from a bank. The implications in terms of disclosure are strong and reinforce the necessity of disclosure increase onto the banking sector. The contribution of the chapter opens new research opportunities with ambiguity within the decision-making process.

Lastly, **chapter 4** is an empirical application of the third chapter to which we took into account disclosure. To do so, we analyze the deposit levels of 117 European banks over the last 25 years. The results show a negative relationship between total deposit and ambiguity, especially when the economic situation is fragile. Another result shows a negative relationship between disclosure and disclosure level until the implementation of Basel II. This result, in developed countries, outlines interesting consequences especially when other empirical literature works regarding the same topics outlined positive effect of disclosure.

This dissertation is part of the literature linking various financial themes such as banking regulation, behavioral financial and overall financial regulation.

Introduction Générale (version française)

Les deux dernières grandes crises économiques et financières ont entrainé, dans leurs sillages, des conséquences à la fois sur les habitudes des anticipations des agents et sur les normes et règles fixées par les différents régulateurs (nationaux ou supranationaux). La première crise financière du XXIe siècle, la crise des Subprimes, a mis en lumière des faiblesses dans la régulation, dans la discipline de marché et la supervision des différents marchés financiers. Le commencement de l'une des crises majeures de l'histoire financière trouve ses origines au sein de plusieurs vulnérabilités réglementaires ayant amplifié les conséquences de la crise.

Des pans entiers du système bancaire adjacent n'étaient pas contrôlés : la titrisation par les fonds communs de créances, les papiers ABCP ou encore des intermédiaires non bancaires responsable de l'étude des dossiers de demande de crédits hypothécaires n'ont été soumise à aucun contrôle de liquidité, de levier ou bien de qualité de prise de risque. Le manque de surveillance des grands brokers-dealers hébergeant des activités de marchés dérivés est aussi une source de la crise financière de 2007. Un des derniers points que met en avant Bernanke (2010, 2012) est le manque d'information disponible à la fois pour les autorités régulâtes et pour les autres acteurs du marché financier, réduisant ainsi les capacités de discipline de marché.

Ce dernier point est celui qui va nous intéresser tout au long de cette thèse : la problématique de la transparence informationnelle et ses effets sur la stabilité, à

la fois sur la stabilité du secteur financier, mais aussi du secteur bancaire. Avant de poursuivre sur la stabilité financière et la transparence informationnelle, il est important de bien comprendre le fonctionnement de la gouvernance d'une banque. Elle désigne, pour une société financière ou pour une société non financière, le système pour lequel les firmes sont contrôlées et dirigées (Shleifer et Vishny, 1997). Plusieurs acteurs peuvent être responsables de la gouvernance. Finalement, pour résumer Bernanke (2010, 2012), la crise des Subprimes peut être réduite à un manque dans la gouvernance de ces dernières. La gouvernance d'une banque est sensiblement différente d'une société non financière. Les particularités sont peu nombreuses, mais génèrent des conséquences importantes.[1] : l'opacité des banques renforce la présence d'asymétrie d'information (et ainsi le risque de dissimulation[2]) et une favorise concurrence plus limitée du secteur bancaire.

Dès lors, on comprend l'importance de la gouvernance de ces dernières. La gouvernance d'une banque est mise en place par un ensemble d'agents économiques et financiers qui ont des objectifs parfois alignés ou parfois divergents. Les acteurs de cette gouvernance sont les investisseurs internes (déposants entre autres), les investisseurs externes (marché financier, interbancaire) et enfin le régulateur. Ces trois acteurs, et leurs incitations, de la gouvernance vont jouer un rôle important pour guider les décisions d'une banque pour trois raisons principales. Tout d'abord, les banques caractérisées par une bonne gouvernance sont plus performantes, contribuant ainsi mieux à la croissance et au développement financier. Les banques disposant de la meilleure gouvernance sélectionnent mieux leurs risques et allouent mieux leur capital (Levine, 2004). De plus, dans les économies où le financement intermédié est majoritaire, les banques exercent un rôle important dans la gouvernance des sociétés non financières (par la gouvernance des créanciers). Ces dernières peuvent donc participer à l'amélioration de la gouvernance des sociétés non financières par des effets croisés et en contrepartie d'un accès au crédit facilité. Enfin, une bonne gouvernance participe à améliorer la résilience du secteur financier et bancaire en réduisant le volume d'asymétrie d'information et d'une manière générale, améliore la résistance aux chocs.

[1] Macey et O'Hara (2003)
[2] Levine (2004)

Pour exercer cette gouvernance, il faut que chaque acteur de la gouvernance dispose de suffisamment d'informations pour être en mesure d'exercer correctement la gouvernance qui lui est propre. La transparence informationnelle peut être transmise via plusieurs canaux pour obtenir différents objectifs : un objectif microprudentiel, grâce aux communications individuelles de chaque banque, ou un objectif macroprudentiel dans le cadre de l'utilisation de stress-test qui sont devenus fortement présents ces dernières années.

Cette thèse vient compléter la littérature existante sur les effets de la transparence informationnelle des banques liée à la stabilité financière. La définition de stabilité financière est compliquée, car il n'existe pas vraiment de consensus dans le domaine financier. Bien que les définitions de la stabilité financière soient divergentes, il existe tout de même des éléments communs dans la littérature selon les travaux de Allen et Wood (2006) ou encore Borio et Dhremann (2009). Le premier élément commun est le caractère négatif de la définition. En effet, l'instabilité est caractérisée par l'absence de stabilité : dès lors, la notion est floue. Une instabilité peut engendrer des variations à la fois positives et négatives mais n'ayant pas forcément les mêmes intérêts ou conséquences. La définition de stabilité est une notion vague et large qui regroupe le système financier au sens large (intermédiaires, marchés et infrastructures) tout en lui assignant un niveau élevé de réussite dans ses principales fonctions (ici collecte de l'épargne pour favoriser l'investissement, la gestion du risque ou encore le traitement des paiements). En somme, la définition retenue ici identifie la stabilité financière comme un état du marché financier capable de faire face aux chocs. Cette définition recoupe la vision de la définition de la stabilité financière proposée par la Banque Centrale Européenne.

> «The condition in which the financial system – comprising financial intermediaries, markets and market infrastructures – is capable of withstanding shocks and the unravelling of financial imbalances, thereby mitigating the likelihood of disruptions in the financial intermediation process which are severe enough to significantly impair the allocation

of savings to profitable investment opportunities.[3]»

Au cours de cette dissertation, nous allons essayer de contribuer à la littérature économique et financière existante concernant le lien entre transparence et stabilité financière et apporter des compléments à certaines limites mises en avant dans la littérature. Cette dernière vous sera présentée plus en détail dans le **chapitre 1**. Ce dernier montre qu'un seul effet de la transparence sur la stabilité financière n'est pas à attendre. En effet, les différents effets de la transparence informationnelle du secteur bancaire ne sont pas aussi tranchés et dépendent nettement de l'auditoire. Bien que la littérature s'accorde sur la nécessité de transparence, cette dernière montre aussi que le niveau de transparence optimal n'est pas le niveau de transparence maximal et qu'un arbitrage compris entre opacité et transparence complète reste souhaitable et ce quelques soit la branche de la gouvernance. Le régulateur a déjà intégré la dimension nécessaire de la transparence. Le Comité de Bâle sur le contrôle bancaire, pour le second volet de recommandations internationales, avait déjà intégré la nécessité de transparence dans ses recommandations bien avant la crise financière de 2007. En effet, les recommandations de Bâle II furent publiées officiellement pour la première fois le 26 juin 2004 pour une entrée en vigueur progressive pour les banques européennes et à travers le monde à compter du 1er janvier 2006. Les accords de Bâle II viennent succéder aux normes mises en place par les premiers accords de Bâle de 1988. Le pilier 2 de Bâle 2 ainsi que le pilier 3 viennent introduire et renforcer les obligations de transparences avec l'implémentation de test de validité des fonds propres ou encore une homogénéisation des communications pour faciliter les lectures de portefeuilles par les analystes. Ces dispositions s'accompagnent d'une uniformisation des bonnes pratiques bancaires, quelles que soient la banque et la réglementation.

Pour étudier les effets de la transparence informationnelle dans son ensemble, il est important d'étudier les différents mécanismes de la transparence informationnelle pour chaque agent. Le **chapitre 2** sera consacré à l'étude des effets de la transparence sur les spreads des dérivés sur événement de crédit (aussi appelés Credit Default Swap) pendant la crise de la dette souveraine Européenne, portant

[3] `https://www.ecb.europa.eu/home/glossary/html/glossf.en.html`

sur 47 banques européennes. Les résultats montrent que la transparence participe à une réduction du spread des évènements de crédits au voisinage des évènements de la crise de la dette souveraine européenne. Le **chapitre 3** est un chapitre théorique qui étudie la relation entre l'action de gouvernance des déposants, le retrait des dépôts, et une situation qui traduit les différents niveaux d'ambiguïté que les déposants accordent à la fois à l'environnement économique ainsi qu'au niveau d'ambiguïté qu'ils accordent à la banque dans laquelle ils ont déposé. Les résultats qui en découlent nous permettent de fournir des implications en matière de régulation visant à améliorer la stabilité de l'ensemble du secteur bancaire. La relation entre les différents niveaux d'ambiguïté est la suivante : moins un déposant est ambiguë vis-à-vis de l'environnement macroéconomique dans lequel il est, ainsi que la capacité de la banque à rembourser les dépôts, plus il retarde sa décision de retirer par erreur. Les implications en termes de transparence sont fortes et renforcent la nécessité de réduire l'opacité du secteur bancaire. Enfin, le **chapitre 4** est une application empirique des résultats obtenus dans le chapitre précédent. L'analyse des 25 dernières années en Europe portant sur les dépôts montrent que l'ambiguïté a en effet négatif sur le montant total des dépôts, surtout lorsque la situation économique est fragile. L'autre résultat de ce chapitre montre que la transparence informationnelle a des effets négatifs sur les montants des dépôts jusqu'à l'introduction de Bâle II.

Cette dissertation s'inscrit dans l'ensemble de littérature liant les thèmes de la finance, de la littérature bancaire, de finance comportementale et de la régulation.

Chapter 1: Disclosure and banking sector: a review on the relationship between disclosure, governance and financial stability

Chapter 1

Disclosure and banking sector: a review on the relationship between disclosure, governance and financial stability

1.1 Introduction

The financial shocks of the last two decades have participated into the design, and then the redesign, of the financial and banking regulations to avoid the repetition of such shocks. The recent evolution concerning the banking sector has been elaborated around the creation of more market discipline for each of the component of the regulation. The regulation which interests us here is about disclosure and its relationship to each component of banking governance.

The questioning reflection on getting the banking industry a little more transparent is, since the recent financial crisis, one of the top priorities of international banking supervisors but the first recommendation to reduce bank opacity originated from the Glass-Steagall Act of 1933. The 1933 Glass-Steagall Act could be considered as one of the first attempts to reduce banking industry's opacity. The regulation proposed by the United States Senator Carter Glass and the Rep-

resentative Henry B. Steagall was originally designed to reduce the mistrust of depositors about banks and to separate the activity of commercial banking from the investment banking branch. In this way, it would help to clarify the border between the two different activities. Commercial banks were, at this time, suspected of taking tremendous risks with commercial depositors' money in order to finance their investment activities.

More recently, thanks to different studies conducted in the 1990's by diverse organizations (the IMF, World Bank and the Basel Committee), new recommendations have been established by the Basel Committee which reflect the committee's wish to reduce opacity in the financial sector and the banking industry. The different studies used, after analyzing the composition and the purpose of disclosure procedures in different countries, enabled the committee to emit recommendations to create a standardized disclosure procedures for the banking industry. The disclosure recommendations of the Basel Committee would then be applied, as a rule, to any member country which would have ratified the treaty.

Since the first release of these rules in the early 2000's, conflicting points of view on the benefits of disclosure between market participants and the banking sector were noticed. Different point of views on increasing disclosure on the banking sector were issued: the panic risk, resulting from an increase of disclosure, was consulting with the idea where disclosure has a positive impact on banking stability. The Basel Committee of Bank Settlement (BCBS) held a debate to listen and to take into account every opinion on the disclosure reflection and tried to accommodate most of market participants (banks and market operators) for the upcoming new international banking agreement: Basel II Pillar 3. Despite the skepticism of the banking sector, the committee expressed, about the international settlement, a desire for the reduction of bank opacity and published new rules in favor of informational transparency for banks, publicly quoted or not, in June 2004. By the end of 2006, each member of the BCBS needed to implement their national regulation design, based on Basel II rules. Since this implementation of the Pillar 3 of Basel II, the debates and negotiations have not stopped about what should be disclosed and what should not.

The financial crisis of 2007 showed a lack of transparency in the management of the crisis and before the occurrence of the crisis. It also highlighted a lack of informational disclosure and an inadequate level of regulation in the Basel I agreement. Even if the Basel II agreement was already and recently implemented, the 2007 financial crisis can find some of its origin in the lack of mandatory disclosure imposed by Basel I. In addition, the United States had not yet ratified the Basel II agreement at the time the subprime crisis initiated. The goal of disclosure would have been here to increase the market discipline effect on the most toxic bank to force them to become more sustainable. It would also have reduced the panic effect of the financial crisis itself. Disclosure has different purposes and this article will be devoted to the impact of disclosure. The ongoing Basel 2 agreement introduced different pillars to apply and ensure the different objectives of the BCBS. The Pillar 1 was designed to create regulatory capital to buffer some major components of risk that banks could face. The second pillar instituted prudential surveillance and recommendations to manage risk. It also integrated the first notion of disclosure and banking transparency to reduce the opacity of the banking sector. While the third Pillar insisted on the necessity of having, creating, a market discipline. Introduced recently in January 2013, the Basel 3 agreement appears to reinforce the priority of the committee to limit more and more the opacity of the banking industry and to enhance more the market discipline. The United States introduced, in 2002, a new settlement for quoted firms after the publication of financial scandals such as Enron or Worldcom, early 2000. The Sarbanes-Oxley law[1] (SOX) was proposed to congress by Senator Paul Sarbanes and Congressman Mike Oxley in order to reform the accounting and transparency rules for quoted firms on the US territory to protect investors. By introducing this new prudential rule onto the American financial markets, this rule is also extended worldwide, even for companies, which are not based in the United States, but quoted on an American index.

In this chapter we review the core and the most recent development on the relationship of disclosure and the different components of the banking governance

[1]Public Law 107-204, Sarbanes-Oxley Act of 2002
http://www.gpo.gov/fdsys/pkg/PLAW-107publ204/pdf/PLAW-107publ204.pdf

over the questions of financial stability. The conflicting interest in the reduction of banking opacity convinces us of the necessity of having such fundamental review. The reflection debate over the benefits and the cost of disclosure is a central question and is in constant evolution. Informational transparency is a complex notion and deserves an important treatment due to the different impact on each market participants. Depositors, stakeholders and managers do not have similar expectations regarding bank governance and disclosure, which will be investigated in the following sections. The complexity of the financial and the banking sector tends to reinforce the necessity of having such debate over the importance of disclosure, and on how it should be implemented in order to enhance banking stability. The main concept highlighted in this chapter concerns the impact of disclosure on banks governance and therefore on banking stability. Does disclosure enhance banking stability throughout the market discipline process? Should laws and regulations be oriented on a better quality disclosure or on a larger disclosure? Should disclosure be only mandatory or does market discipline should enhance voluntary disclosure by rewarding the most transparent banks? All of these questions are essential in analyzing the impact of disclosure globally or more individually (per agents) and will be answered in this article. The following sections are devoted to reviewing both theoretical literature and empirical studies to answer our different research question around the impact of disclosure on agents behavior and on the impact of disclosure on financial stability. The main purpose of this chapter is to highlight disclosures benefits on the bank and on the different market participants and if it does overcompensate its cost.

The ambition of this chapter is to provide a summary of the literature concerning disclosure in function of the type of public disclosure is provided. By analyzing the effect on both depositors and investors, we were able to understand better the ongoing conflicts regarding the implementation of disclosure. We analyze in the chapter the literature both empirical and theoretical which investigate the notion of disclosure and its relationship with overall financial stability. In order to fully complete the upcoming literature review, we will need to analyze behavior of agents and the effect of disclosure onto risk taking policy of the bank manager. This chapter provides extended conclusions by comparison to the one expressed by

Frolov (2007) especially concerning the impact of disclosure in an unstable financial environment. It also contributes to the growing literature around disclosure for several reasons. First, the effect of disclosure remain uncertain. Both conclusions, positive and negative, about the effect of disclosure have been expressed and justify by itself the necessity of conducting further research for the field. Secondly, this survey contributes to enlisting the difference in the needs of agents participating in the banking sector.

The chapter is organized as follows: first we will be reviewing the relationship between disclosure and depositor's governance throughout different financial environment. Then we will be focusing on the relationship between financial market participants and disclosure. The last section will be dedicated to conclusion and discussion.

1.2 Disclosure, governance by depositors and financial stability

Before going any deeper into this chapter, we are going to refresh the definition of depositors' governance. The depositors exert a pressure on banks manager and bank decision makers in order to satisfy their objectives. As of, the depositors governance can be very different from the two other types of governance, the manager's and the investor's governance. Depositors expect a bank to be able to hold deposits and be safe enough that depositors can withdraw the entire deposits plus a potential interest, which is possible only if the bank is safe enough. If the depositors feel that the bank, they deposited in, is not safe enough and that they might not be able to withdraw their whole deposit, they can decide to withdraw their deposits to deposit them in a safer asset. The need of withdrawing put a strong pressure on the bank's shoulders: if only one depositor realizes that he feels the need to withdraw and put its deposit in another safer asset, a bank is not fully in danger but if a bank is facing a large amount of withdraw at the same time, the bank is not able to honor the deposit contract and won't be able to

give back the entire deposit. This situation is called a bank run where depositors are waiting to be allowed to withdraw their deposits. This situation is taken very seriously by regulation agencies because of the strong contagious effect and the large interconnections between banks. If one bank is facing a run, the probability that the whole banking sector will be facing runs as well is increasing. The bank run are due to the lack of trust of depositors in the bank they deposited in and increasing disclosure to reduce "the feeling" or the rumor effect can be a solution to ensure the trustworthiness of a bank and more generally the entire banking sector. Some example of bank runs

[2] are famous and the management of those crises by the different regulation agencies gives us a good idea on how runs can have tremendous impact on the system.

Depositors have three possible ways of exercising their governance: first disciplining by price: where depositors require higher interest rates from riskier banks because these interest rates contain the risk premium. Disciplining by quantity: if bank fundamentals demonstrate greater risks, depositors tend to withdraw their fund from this bank, so it becomes more difficult for the bank to raise additional deposits. Disciplining by maturity shifts: depositors may switch from riskier long-term deposits to less risky short-term or even on-call ones if they face additional risk-taking by banks. Diamond and Dybvig (1983) have probably contributed the most to the literature on bank runs and therefore contributed to the different extensions of the Diamond and Dybvig original model. Most of the literature proposed in the following section will present similar features to the Diamond Dybvig model but since the author did not integrate disclosure and transparency to the original model we will not be presenting any deeper. In order to understand if disclosure affects, positively and negatively, the depositor's governance and therefore on the financial stability, we are going to review the different literature , both empirical and theoretical, to understand the different mechanics lying behind this relationship. The first subsection will be focusing on the positive relationship between

[2]Banesto 1994
Northern Rock 2007
Recent bank runs in Greece, Spain or Italy

disclosure and depositor's governance.

1.2.1 Disclosure in a stable macroeconomic environment

It is important to notice the different environment in which a bank can be in. A bank in a monopoly situation or a bank in a situation where they faced risk is entirely exogenous will not bring the same conclusion about the impact of disclosure. The next section will be presenting the conclusion on disclosure when a bank is in a monopoly situation and when banks are on the competitive market. The first situation seems to be slightly unrealistic but a single bank is used here to describe the functioning of the global banking sector.

1.2.1.1 Disclosure effect in a monopoly situation

The first article we are presenting is Cordella and Yeyati (1998). The paper studies the impact of disclosure on the depositors' governance by studying the bank's behavior while it chooses the portfolio in which it is willing to invest for its activity. The two authors wondered if banks should disclose information to the public or if secret is relevant enough to ensure the future of the bank. The model used here is a monopolistic banking sector facing a large number of identical depositors, who can decide to either deposit in the bank, subject to interest, or invest in an international risk-free asset. The timing of the model is: the bank defines or faces the risk of its investment portfolio, then it defines the level of interest rates of the deposit, each depositor then decides to whether or not to deposit in the bank safe. Finally, the bank will invest if it is a success it pays the interest and give back the deposit and then the game restart. If the invested project is not a success, the game end and depositors cannot have their whole deposits back. There is no deposit insurance in this model.

In Cordella and Yeyati (1998) the bank is able to manage the amount of risk it will be taking in the portfolio. In this scenario, the authors determined that the deposit interest rate is always the lowest interest that guarantees a positive aggregate deposit supply (S).

$$\begin{cases} S = 1, \, if \, \phi^e(r, .) \geq 1 \\ S = 0, \, if \, \phi^e(r, .) < 1 \end{cases}$$

Where $\phi^e(r, .)$ is the depositors' assessment of the expected returns of a unit of cash deposited in the bank and r the gross deposit rate. The bank, however, is not transferring any kind of information throughout the interest rate but only through communication channels. It maximizes the value of the profit of the investment by reducing the financing cost. At this rate of interest, the profit is calculated on the expected returns of the continuum of investment portfolios $R_j$and not the variance of the portfolio:

$$\bar{R} > 1$$

The variance of the portfolio varies in between $[0; 2R]$. In this situation, with disclosure, the bank generally chooses a risk-free portfolio, forced by depositors' governance to behave prudently. The bank is better off by choosing the less risky portfolio, and will increase the future benefits by reducing the probability of the liquidation of its activity. The bank has a preference for the future and ensuring the future bank activity is one of its objectives.

When there is no disclosure, the depositors are able to anticipate the distribution of the portfolios into the deposit supply function. The bank will choose a risk-free portfolio when the future time preference, here a discounted value, is high enough. The more the bank is willing to continue its activity, the lower the investment risk will be. Disclosure helps depositors to anticipate the distribution of the portfolios by giving information on the quality of the bank itself and then on the investment project. Disclosing intelligence about the quality of the different portfolio forces banks to behave prudently with the increase of knowledge of the different depositors. The disclosing process is especially efficient when the preference for the future is rather low: if the preference for the future is about to be null, informed depositors will have more impact on the bank decision-making in order to satisfy their expectations. Disclosure emphasizes the pressure power of

depositors governance when the bank is able to carefully manage the risk of the different portfolios in which the bank can invest.

The market situation in most of the countries in the world does not allow us to conduct analysis on the disclosure effect on a bank in a monopoly situation but it would be extremely interesting to analyze the deposit movement when disclosure is introduced.

1.2.1.2 Disclosure effect in a competitive situation

1.2.1.2.1 Depositor's incentives to withdraw

Chen (1999) proposes an analysis of the information externalities on depositors behavior in presence of first-come, first-served rule. This rule is applied in most of the banking sector where banks do not have to cover the whole collected deposits. The model used is a three-date model in which N banks are facing a numerous amount of depositors. Banks do not have capital and only collect deposits to make investments. Each depositor receives an endowment at the first period, which he can deposit in a bank (and obtain remuneration at the end of the game) or in a costless asset. At the second date, depositors face liquidity shocks and a fraction of those die when the remaining depositors die at the last period. The early diers consume their endowment while late diers defer their consumption to later. The deposit contract is:

$$R = R_{ST} < R_{LT} < 1$$

Where R_{ST} pays less and less thanR_{LT} . There is no deposit insurance program. The bank invests the collected deposit at the first period, before knowing the type of the depositors. The investment projects are different for each bank but the long-term expected return is the same for all banks. If the investment projects are successful then the bank is still open, depositors who have not yet withdrawn withdraw. Otherwise the bank fail to pay back deposits and go bankrupt. It exists a moral hazard between bankers and depositors, at the second date, a banker can liquidate the long-term project, the investment of one dollar generates a lower ex-

pected return that the returns for the longer-term project. The disclosure process happens at the end of the first period for all banks simultaneously.

At the equilibrium, assuming that depositors choose the Pareto-dominant equilibrium when multiple equilibria exist, informed depositors can still trigger a run by the failures of other banks. The model shows that both payoff externalities and information externalities are important in causing panic runs. If the payoff for the long-term project reaches the maximum, there are no payoff externalities among depositors, depositors always wait until bank-specific information is revealed. While, on the other hand, if systemic information arrives at the same time depositors have no chance to respond to failures of other banks, so contagious bank runs never happen. These results have policy implication where specific disclosure conveys more information than global systemic disclosure. Runs still happen in this condition. The author result also shows the condition under which a panic run is more likely to occur. Runs are more likely to occur when the deposit contracts are not well defined. If the early withdraw payoff is close to the long-term payoff, a late dier might be interested to withdraw if bank-specific disclosure is not satisfying.

The author also proposes a set of policy implications for regulators. He insists on the fact that bank runs can occur due to negative payoff externalities but runs can be deeply reduced by forcing depositors to be more patient in responding to information. He proposed a deposit insurance scheme where only uninformed depositors do buy a deposit insurance. In this system panic runs never occur, and a bank is liquidated at the second date if and only the outcome of its long-term investment is bad. Bankers, informed depositors, and uninformed depositors are better off than in the case without deposit insurance. Uninformed depositors are less likely to have incentive to early withdraw because of the insurance. Then the bank follows the investment process and is able to give back deposits with the associated interest.

The result of this proposal shows that the disclosure of information reduces the incentives of depositors to early withdraw while it is unnecessary. The result of

this article also shows that panic runs can also appear even if disclosure happens. Bank-specific disclosure reduces the probability of runs, while systemic disclosure does not have an impact of depositors behaviors. Runs cannot be entirely avoided. The only possibility of avoiding runs is the introduction of an optimal deposit contracts which include deposit insurance for uninformed depositors.

Several empirical studies have been conducted on the effect of disclosure on deposit movement. Most of the empirical literature is related to analysis during exogenous shock but we will try here to only focus on empirical studies realized during a stable macroeconomic environment.

1.2.1.2.2 Governance of depositors in emerging countries

Wu and Bowe (2012) tries to determine how Chinese bank's deposit mass is affected by disclosure. Since the 1930s, the Republic of China has gone through impressive changes in its banking sector. Indeed, coming from four nationally own banks, now the country count a very large number of banks which capital are now open to foreign investors. While changing the composition of the industry, the Chinese banking sector has been ruled in such way to prevent systemic risk and increase prudential managerial decision. Those improvements were made due, as we said earlier, the abilities of depositors to choose in which institution they want to deposit their money. Risk, depositors and competition are so a part of bank's governance.

Both authors started the analysis by setting up three hypotheses about depositors' governance. The first one is somehow pretty basic: depositors' behaviors are influenced by changing in bank's risk profile. The riskier the bank, the more depositor's will withdraw their deposits. Which is classically admitted by the literature and is the main pillar of the depositor's governance.

The second hypothesis introduces the notion of information. An informed depositor is more disposed to choose and deposit in an institution that chooses to

disclose more information: both authors based this hypothesis on the model used by Cordella and Yeyati (1998), and Boot and Schmeits (2000). At the equilibrium, informed depositors do not withdraw and participate into the success of the bank investment project. By giving information to depositors about its risk, the bank is able to reduce default risk by making sure the depositors will not withdraw in any case.

Each depositor reacts differently about a change in the proposed interest rate, conditioned by the health of the bank. For example, in most solid banks (considered as the most healthy), depositors are more likely to react positively by supplying more deposits when interest rate is getting higher. However, for banks perceived to be financially weak and/or imprudently managed, they would be much more reluctant to supply further funding. The supply of deposits is both endogenous (by a change in interest rates) and exogenous (change in risk profile). By introducing this hypothesis, the authors introduced the idea that raising interest rate is not necessarily associated with an increase in a bank's deposit base, leading to the fact: communication and disclosure are also affecting depositors' choice. Only, safe perceived banks can price compete. Both second and third hypothesis allow them to differentiate and categorize banks by soundness using the dual criteria of information disclosed and their risk-weighted capital ratio.

The authors used a GMM estimation method to be able to reduce inconsistency in the estimates due to unobservable heterogeneity across banking institutions especially on the growth of bank's deposit base.

Used variables here are the deposit base growth, banks fundamentals (proxy of several variables such as interest rates, non-performing loans, liquidity ratios, credit ratio or the quantity of assets own by banks), how bank is own (publicly own, national banks...) and then some macroeconomic factors like GDP growth or industrial concentration (Herfindahl-Hirschman index). The analysis is about 169 Chinese banks over the period 1998-2009, with still some restrictions until 2002: most institutions started the reporting of their risk-weighted capital ratio in 2002, following Basel I definitions from 1998.

The results show that depositors discipline banks which are known to be imprudent or having bad management policy. If banks are facing important functioning costs, they are more likely to have a lower growth deposit rate. The high cost can translate an increase of reserve to cover losses, an increase in management costs, inefficiency... On the other hand, the more the bank hold liquidity, the more depositors are willing to deposit their funds in an institution. The more liquidity is hardly comparable to the liquidity quality: in some way depositor values more the quantity than the quality. Depositors do not value in the same way the quality (not significant). Depositors think the amount of liquidity is more likely to cover a bank rush than quality assets. But depositors chose massively to deposit in institutions that are compliant with IFRS accounting rules.

Such findings lead the authors to conclude: growth deposit rates are sensitive to an increase of bank fundamental, on the Chinese competitive banking market during the last 15 years. If the bank decides to communicate and disclose information about its health, the bank will attract new depositors and won't be only doing price competition. The more disclosing banks, the more likely wise bank will be increasing its deposit base. Chinese depositors are able to differentiate several risk profile to choose among the wisest. Both risk-weighted capital ratio and informational disclosure are associated with an increase of the deposit base.

Semenova (2011) is a working paper which tries to analyze the role of information on Moscow depositors. The Russian market is specific because Russian banks are largely dependent on the deposit market. Deposits may sometimes be 80% of banks' liabilities and the competition on the Moscowian banking sector motivated the author to analyze this segment of the banking sector. First of all, the author analyze what role does information about bank's financial positions and performance plays in depositors' decision-making process related to market discipline and whether the need of financial information, if sufficient and satisfied, emphasize depositors' governance disciplining effect. They then study the effect of additional financial information, free of cost for depositors, on market discipline.

The data set use is composed of a survey of Moscow bank depositors. The survey was realized in between September to October 2009 and covers the largest bank in Moscow (65% of personal deposit market shares). The tested banks are very differently own: one is publicly own by the local authorities, one is owned by Gazprom (Russian gas leader), two controlled by the state (directly and indirectly controlled), one private national bank, and four banks members of foreign groups.[3]. One thousand and one questionnaires were completed by individual depositors. The questions asked for the survey were really straightforward and provides both qualitative and quantitative answers. The complete list of questions ask by the author during the survey are available in the appendix section.

The depositors demonstrated some strong sensitivity to changes in some of the financial position and performance of their bank: 32% of depositors would close their deposits if they became aware of a decrease in their bank's profit and 31.5% would withdraw in case of growth of bad loans. The most interesting information of this survey comes from the only 5.3% of the respondents who would not withdraw their deposits in response to changes in financial indicators. Concerning the maturity shifts of depositors: a third of the participating depositors would switch to short-term deposits if there were a decrease in bank profits, 31.5% of those depositors would adjust the maturity structure of their deposit in case of bank's capital drop and only 6.6% would do nothing. In the same time, depositors demonstrated the need of monitoring by arguing that 71.4% of the depositors monitor at least once a year the reliability of their bank.

The author's results suggest that the depositors, which demonstrate the need of more financial information and readiness to use it, have more incentives to exert market discipline. The strong positive relationship exists for every control operated in this analysis (sex, age, education, income and interest rate). But on the other hand, it appears that larger depositors are the less likely to discipline a bank, only through the maturity shift process. The author explains that it may be that the costs of canceling or changing the deposit for them are too high due to the

[3]OTP Group, Raiffensen Centrale Austria, one fully owned by Société Générale and one partly owned by Société Générale

large amount deposited (this reasoning is also applied to long-term depositors but the cost is on the loss of interest). The depositors' reactions are higher in case of negative information than when it is positive.

The results of this working paper show that depositors are monitoring and do care about financial information on the Russian, more specifically on Moscow, banking sector. The results can be partially explained by the nature of those banks deposit and by the size of the deposits. Anyhow, the analysis proves important policy implications concerning disclosure and its effect on depositors' decision-making.

Depositor's governance play a role on bank's behavior by a glorifying process of solid and disclosing banks. By being a transparent bank, it satisfies the participation constraint of depositors.

1.2.1.2.3 Bank's behavioral shift with disclosure

Cordella and Yeyati (2002) proposes an extension of the article from 1998, by introducing competition in the model instead of a monopolistic banking model facing a large number of depositors. This article assesses the impact of increased competition on banks' risk-taking behavior in the banking sector under different assumptions regarding deposit insurance and disclosure of information. This model also introduces the concept of deposit insurance in the analysis, by comparison of the 1998 model. In this case, governments guarantee bank deposits, which can conduct to a limitation of depositors incentives and also influences banks to higher risk-taking behavior.

The model use a spatial competition model à la Salop (1979) where n banks are located symmetrically around a unit circle that represents the product specification space. A typical bank collects funds from depositors offering an interest rate, and then invests it in a project that pays a unit in return if the project is a success. If not, the bank goes bankrupt and is liquidated: a fraction of the insolvent bank's deposit liabilities is reimbursed, on a proportional basis (not first come first serve

rule is applied here) by the deposit insurance scheme. The banks are responsible for the payment of the deposit insurance. Depositors also face a transportation cost, depending on their location along the circle. Each depositors have the choice to invest either in bank deposits (transportation costs) or in outside risk-free assets with a return normalized to zero.

To study the public disclosure effect, the author decides to disclose the quality of the project invested in by the bank: called the choice of effort (to monitor by the bank the quality of the subsequent project). The results show that public disclosure introduces additional incentive, from banks to monitor more the quality of their investment when the deposit insurance scheme provides only a partial coverage while it is fully financed through a flat insurance premium (no risk-based deposit insurance). By comparison, when the deposit insurance is financed on a risk-based premium and banks do not disclose information, the monitoring effort of the quality of invested projects is still higher than under a flat insurance premium scheme. The design of the deposit insurance scheme seems to have important implication when disclosure is not implemented. When the two previous scenarios are combined, the results show that both deposit insurance schemes (flat or risk-based) are equivalent in terms of disciplining effect on banks' risk choice.

The overall results of this article show important results on the disciplining effect of disclosure on bank risk-taking behavior throughout the depositor's governance in a competition banking sector. The effect of competition also convinces the author to implement disclosure in order to avoid a fragilization rapidly of the banking sector.

Gilbert and Vaughan (2001) studies the deposit reaction to several federal bank announcement since the early 1990s. In order to test depositors reaction to enforcement action announcements, the authors assembled a sample of publicly disclosed actions from the 1990s. They were finally about to provide a sample of 87 enforcement actions on 87 different banks. They examined the sample to insure that depositors, rather than bank supervisors, were behind any observed declines in deposits. Supervisors assign confidential safety-and-soundness grade at the close

of each examination. These grades are called composite CAMELS score. Depositors should respond to enforcement actions only when the announcements contain news about bank's condition. It is important to identify the available information to the public as of the announcement date. If, the sample bank is already facing a difficult situation, the announcement may not convey much more information than the depositors would already have. The authors insist that the participating bank were adequately capitalized at the moment of the announcements.

The research strategy used was to compute deposit growth rate for the sample banks in the weeks and quarters following the announcements. They then applied different seasonal and geographic controls to ensure that any observed changes in deposits were related to the enforcement action. The control group was formed by matching each sample bank with at least three and as many as ten peer institutions. Peer banks had to maintain headquarters in the same census region, to have similar CAMEL index and to maintain deposit equal to at least 25% of the sample bank as of the date of the enforcement. They also controlled for underlying trends in deposit growth. The deposit variables used were the total deposit, the transaction deposits, savings, small-time deposit and large time deposits.

Gilbert and Vaughan (2001) tested for the possibility that announcements of formal actions sparked runs by examining changes in adjusted deposits in the four weeks following disclosure. Specifically, the authors defined a run as an exceptionally large decline in adjective deposits at the sample banks within the four weeks after the announcement, by comparison to the four weeks prior to the announcement. The adjusted deposit growth in the four-week interval after the formal actions suggests that the announcements did not spark runs. The average change in total deposits was a positive 0.49%, implying that funds flowed into the sample banks relative to peer banks (not significant). The analysis of the individual deposit categories shows that the sample banks did suffer relative runoffs of savings deposits. The cash deposit exhibited the most sensitivity to the announcement. This result can be explained by the type of the sample banks used. In fact, most of the bank used are rather large and the probability that they would fail even after the CAMEL announcements were weak.

The results of this article do not show significant drop or increase in deposit relatively to the control sample. Several causes were brought to light: first the sample might be responsible for the results, the proportion of "too big to fail" banks might force some conclusion in this direction. Then, depositors would have anticipated the downgrade announcements in their anticipation. Anyhow, the authors suggest that supervisors should discontinue such announcements. Rapidly improving banking conditions and a rapidly declining number of bank failures characterized our sample period. Depositors might find information about formal actions useful in a banking environment more like that of the 1980s. More importantly, depositors might find news about formal actions useful, irrespective of the condition of the banking sector, if the press releases contained more contextual information.

The different conclusions of the above articles convinces us that more investigation is needed in order to have a better understanding of the disclosure mechanics. The conclusion obtained here were obtained when the macroeconomic environment was stable but later in this article we will be investigation the impact of disclosure when the macroeconomic situation is not as stable as the one used in those articles.

1.2.1.3 Introducing the timing of disclosure

The result obtained above showed interesting policy concerning the impact of disclosure on the depositors' behavior. The results have emphasized the positive impact of disclosure on depositors' behavior. As a continuous work, Chen and Hasan (2006) proposes to analyze the depositors incentives to withdraw to complete the article from (1999). These articles gives use interesting features to understand the mechanics behind disclosure and its effect on depositors behavior.

Chen and Hasan (2006) insists on the disciplining characteristic of disclosure on bank behavior. The model used here is a three-time period with two banks (symmetrical) in a competitive market located each on its own geographic location. In the initial period, each depositor gets a $1 endowment and faces liquidity shock

in either t=1 or t=2: depositors here are dying, type-1 depositors' dies at t=1 and type-2 depositors' dies at t=2. Each depositor can either deposit in the bank's safe or invested in a risk-free asset at no cost (and with no remuneration). The risk-free asset guarantees depositors to be able to collect their deposits at anytime without any loss. The remuneration granted by the bank depends on the moment when depositors withdraw its endowment. Allowing the bank to continue the long-term investment pays more than an early withdraw.

$$R_2 > R_1 > R_{rf} = 0$$

With R_x , the remuneration by the bank and R_{rf} when invested in the risk-free asset. The bank faces a panic run if every depositor withdraws at the beginning of $t = 1$. The bank chooses to invest the collected deposit in a long-term project (2 periods long project) with a probability of success p, and will reach maturity at $t = 2$. Each bank has only collected deposits in its possession and must liquidate its project in order to be able to proceed to withdrawal. At the beginning of the first period, each bank sends a signal about the quality of the project they invested in. This period is divided as follows: first the signal of the bank A (1.1), then the signal of bank B (1.2) and then consumption of endowments by type-1 depositors (1.3).

The authors assume the probability of bank A's project to be a success which increases with the quality of the disclosure emitted by A and B, and which will decrease when both signals are weak. It is permitted because the information transmitted is the true information. Since the depositors' confidence is very important, banks have to transmit a true signal to ensure that the depositors will keep the endowment in the bank. The depositors' governance has an important role here, the high pressure of the depositors forces the bank to reveal the true statement. In the case where one of the banks would be lying, depositors would know and would anticipate an early withdraw to punish the bank. Moreover bank's a signal has a greater impact on depositors because it was emitted first.

By supposing no withdrawal will be done before banks know the depositors' type,

if the probability of success of the invested project is higher than the ratioR_1/R_2 then no panic run will occur in periods 1.2 and 1.3. Otherwise, a panic run will occur. This has two implications: the first one is the fact that if both banks are transmitting a bad signal, they will face a panic run; then secondly, a bank can face a panic run even when it is emitting a good signal. They suggest that a bank run is more likely to occur to a bank when depositors are more pessimistic about its profitability. Banks with high quality signal, can still face a panic run if the promised remuneration is not satisfying regardless of the risk the bank is taking. The depositors' payoffs are as follows: probability of being a type-1 depositors added to the probability of being a type-2 weighted by the probability of success p .

$$\bar{R} = \frac{t_1 + t_2}{p}$$

Where t_i is the probability of being a depositor a the i-type. Then, Chen and Hasan (2006) added the deposit insurance to the model to study the impact on banks and depositors behavior to increase panic run efficiency. Depositors are either fully covered or partially covered. The goal of a partial insurance is to re balance the incentives about withdrawing so depositors won't have too high of an incentive to withdraw as soon as they have a conviction. A panic run is now defined by the authors as the fact that all partially covered depositors withdraw their endowment. The deposit insurance has a premium and will be paid by the bank with the remuneration of bank's project at the end of the project, if the project is a success and if the bank is not suffering from a panic run.

Depositors will deposit at the very beginning of the game in each bank's safe and will not withdraw until 1.3 (once banks the banks can deduce the depositors' type). In this scenario a panic run can appear when the probability of success of the project is below the inverse of the remuneration offered by the bank at the end of the second period. Deposit insurance can increase welfare of depositors. Such insurance will always increase the depositor's welfare when it comes with an increase of banking transparency.

Finally, the author decides to give the possibility to managers to choose if they what to disclose information and when they want to disclose the signal: bank's A manager can now decide to either disclose in period 1.2 or in period 1.1 solely, or even simultaneously with bank's B managers. Managers of each bank decide, simultaneously, at the initial period when they will be emitting a signal. In this framework, several equilibrium are possible: banks can decide not to disclose any information when the remuneration ratio R_1/R_2 is higher than the probability of success of the project. One bank decides to disclose, while the other decides not to disclose, and only if the probability of success of the disclosing bank is lower than the remuneration ratio R_1/R_2 . Both banks disclose at the same time, when the remuneration ratio R_1/R_2 is lower than the probability of success.

All of these equilibrium imply different conclusions. By choosing not to disclose, when the banking horizon is good, bank managers can protect the bank from the market competition. Competitors know less about the bank's health. And can avoid the situation where disclosure can provoke an increase in the fear of its depositors. By choosing to disclose, when the second one is not disclosing, the bank protect itself from emitting a bad signal. Even if the disclosure provided is translated a poor health of the bank, the disclosing bank always benefits from it due to the fact that disclosing is always better than staying secret.

The authors' conclusion is here to show that a panic run can appear even with disclosure. As presented in the Chen (1999) paper, disclosure cannot suppress entirely the probability of occurrence of a panic run. It allows in certain situation banks to benefit from it, especially when the disclosed information translate information about the good health of the disclosing bank.

Chen and Hasan (2006) also mentioned an interesting feature about the behavior of depositors. During the discussion the authors discussed the full rationality of depositors. In Chen and Hasan (2008), the authors demonstrate that even if depositors are fully rational and always choose the Pareto dominant equilibrium when there are multiple equilibria, a bank run can still occur when depositors' expectations of the bank's fundamentals do not change. In other words, a bank run

may occur when depositors learn that noisy bank-specific information is revealed, or when they learn that precise bank-specific information is not revealed (while competitors decided to disclose).

The model used by the author is the same as the Chen and Hasan (2006) one. And the result obtained confirm the previous results obtained concerning the capacity of disclosure to make panic run disappear, especially when depositors are particularly rational. The 2008 paper is a combination and a completion analysis of the article from 1999 and from 2006.

1.2.2 Disclosure effect in an unstable macroeconomic environment

It is important to understand the mechanics of disclosure also when the financial environment is unstable or when it faces an exogenous shock. We have seen earlier that disclosure has a positive impact on emphasizing governor disclosure, leading to safer bank management because of the depositors' incentive to withdraw if the management of the bank sound too risky for them. We have also seen that disclosure does not trigger more bank runs while unleashing new information. The following section will be devoted to analyze the effect of disclosure when the bank is either facing an exogenous shock or if it is unable to manage its investment risk.

1.2.2.1 Disclosure, exogenous investment risk and monopoly

Cordella and Yeyati (1998) also study the effect of disclosure on the bank's governance and bank risk management policy when the bank is not able to manage its investment portfolio. This situation can translate the impossibility for the bank to invest in safe enough asset or it can translate an impossibility of the bank to diversify its investment portfolio. In both situations, the risk of the is known by the depositors but they are not able to know if the bank is able or not to manage

this risk.

The conclusions about the impact of disclosure when exogenous risk are not quite the same. The model is still a 2 period model presented earlier where bank collect deposits in function of a deposit contract and use the deposit money to invest in. A bank run appears if depositors withdraw before the end of the game. The bank's managers cannot manage with proper care the portfolio that it will be invested in. The bank will adjust the deposit interest rate to satisfy a positive deposit supply. At this point depositors are indifferent to depositing in the bank or to investing in the risk-free asset. When there is no disclosure and exogenous risk, the bank profit decreases when the deposit interest rates are increasing. Thus, the bank will choose the lowest rate that satisfies a positive supply of deposits. In this case, the bank can be facing a run even though it cannot manage the risk it is facing. The disclosure policy appears here as less optimal than earlier and can be triggering inefficient bank run.

The conclusion of Cordella and Yeyati (1998) have shown that disclosure should be implemented in situations where it can reduce moral hazard for the bank in order to ensure the continuing of its business. But here, the bank even if the bank has a preference for the future equal to 0, the bank moral hazard cannot influence the bank manager's decision to invest in a riskier project. In a case where a bank cannot manage its investment risk, disclosure should be implemented when the exogenous risk is low to avoid rumor effect and potential runs from depositors with the highest incentive to withdraw and should not be implemented when the risk is high to avoid inefficient runs, operated by over-informed depositors.

Allenspach (2009) proposed here to show the consequences of disclosure on bank stability, when the bank faces a macroeconomic shock. The article provides an unbalanced analysis on the potential harmful effect of disclosure even though the banking sector has become more transparent as a whole. The model is composed of one bank and informed depositors. As Cordella and Yeyati (1998), disclose can be counterproductive in certain market condition. The model analyzes the risk of disclosure and its potential inefficient liquidation risk.

It is a three-step dynamic model. In the first period, the bank defines the level of disclosure that will be released in case of a shock, the level of interest of the deposit, and the amount of project risk it will be investing in. At the same moment the depositors decide whether to deposit in the bank or to invest in a risk-free asset with a call rate equal to one.

During the second period, depositors receive a signal about the probability of success of the bank's investment. The signal always reflects what the bank is facing. The author here decides that the bank will be honest about the real nature of risk it is facing. The depositors can now decide whether or not to withdraw with any interest from the bank, and invest in the risk-free asset, or to leave the deposit in the bank. During the last period, if the project is a success and if the depositors still have their deposit in the bank, then the bank pays the interest and gives back the deposit. Otherwise, if the investment project fails, the bank does not pay interest and cannot pay back the deposit.

The disclosure decision is up to the bank and only the bank. The more transparent it decided to be, the more precise the signal transmitted in during the second period will be. The bank's decision is to maximize its own gain, under the participation constraints of the depositors. The first-best allocation is characterized by the investment in the project during the original period, and if the depositors do not withdraw in the next period. If the depositors withdraw too early, the bank cannot continue the project. This allocation shows the marginal cost of transparency: the price of one more unit of disclosure is expressed by the evolution of depositors early withdrawal process. The cost of disclosure is composed of two components: the direct cost of disclosure (the real cost for broadcasting the information) and the indirect cost of disclosure (if depositors withdraw before the last period, the bank is facing a cost: it is unable to complete the project and is unable to make benefits out of it). If the cost of one more unit of disclosure, over the expected payoff of the project, is superior to the indirect marginal cost, then the optimal level of disclosure is located between maximum opacity and maximum transparency. Otherwise, the optimal level of disclosure is the full opacity.

The author shows that when the bank faces an exogenous shock, increasing the level of disclosure reduces the probability of an inefficient bank run if and when the transmitted signal is considered relevant enough (precise and sufficiently informative). On the other hand, it increases the probability to create a bank run in case of a bad signal (irrelevant on the shock or imprecise) . When the exogenous shock is negative, a bank is more likely to be facing a higher probability of liquidation because depositors do not take into account the expected future gains when they decide to withdraw. Without the signal, in this situation, opacity can avoid inefficient liquidation by reducing the chance of panic run. The optimal level of transparency can then be defined as the level that maximizes the probability that the bank will continue to operate until the end of all the periods. In other words, the level of disclosure is by the bank chosen depending on the odds of occurrence of an exogenous shock.

When all the risk parameters are not fully manageable, it appears that disclosure can have harmful consequences. The market situation might be responsible for such consequences and we need to compare the results obtained to be more informed of disclosure mechanics on depositors' governance over banks.

The importance of disclosure seems to be growing with the settlement of new regulations in order to force banks to be transparent. On the other hand, it appears that bank disclosure regulations must be implemented in the same time with other regulation policies to avoid severe consequences. Furman and Stieglitz (1998), even though the article is dedicated to the Asian crisis, explains that the United States had faced its own version of a similar crisis where regulation was abandoned, creating wrong incentives during the saving and loans crisis in 1987. The authors both argue that greater transparency could have severely aggravated the savings and loans crisis in the United Stated as many banks would have had to go bankrupt, cut their lending to a significant extent or receive substantial equity injections. This is related to the definition of disclosure itself. Allenspach (2009) explains that "disclosing information does not necessarily imply transparency as it does not automatically ensure that the information disclosed is also received and correctly

understood by the market." De Grauwe (2008) also points out that transparency is not always the solution to prevent financial crises and may sometimes even be counterproductive.

1.2.2.2 Disclosure, financial crisis and competition

Yorulmazer (2003) provided a theoretical working paper concentrated around the role of information externalities and herd behavior of depositors as a source of bank runs and suggest that transparency and disclosure of information on banks' soundness and management of the crisis can alleviate and eliminate some problems related to bank runs. The main research questions ask in this paper concerns first the risk of triggering a run when disclosure is implemented. Secondly, what is the cost of preventing such runs. Does the optimal deposit contract should allow for runs even when they can be generated by herd behaviors of depositors and finally, in the presence of disclosure can a deposit contract, even with deposit insurance scheme from the central bank, achieve the first-best efficient outcome?

The bank run model is similar to Diamond and Dybvig (1983) and Allen and Gale (1998) but implement sequentially movement of depositors to trigger the run, instead of a simultaneous situation (the rule of first come, first serve is applied here). The implementation of a sequential movement of depositors make the model into a more realistic representation of bank runs in the real world. There are 3 periods, *t= 0, 1, 2* and a single consumption good available at each date. There are n banks in a competitive market. They offer deposit contracts and make investments on their behalf. Banks choose the deposit contract that maximizes the welfare of depositors, to ensure a positive demand of deposits. There are two assets: a *safe* and a *risky* asset. The safe asset is considered as a storage technology that pays one unit at date *t+1* for each unit invested at date *t.* The risky asset pays a random return $\widetilde{R}$ at *t=2* for each unit invested at *t=0* where:

$$\widetilde{R} = \begin{cases} R\, with\, probability\, 1/2 \\ r\, with\, probability\, 1/2 \end{cases}$$

We have$r < 1 < R$ so that the risky asset does not entirely dominate the safe asset. Only banks have access to risk free assets. Risky assets can be liquidated at$t = 1$ but only with some discount. When liquidated early, only a fraction of the return can be collected. There is an infinite number of depositors. A depositor can be an early or a late consumer depending on their time of consumption: $t = 1$ for early consumers and $t = 2$ for late consumers. The type of depositors is known ex-post by the bank and cannot write specific contracts to discriminate each type of depositors.

In order to implement the concept of disclosure, the depositors will receive noisy signals about the quality of the bank's portfolio. The emitted signals are informative enough but are not perfect. The results show that in presence of noisy information depositors can trigger a run even on healthy banks. Disclosure appear here to increase depositors incentive to withdraw if deposit insurance is not implemented in the same time as disclosure policies. Moreover, this insurance is costly. The bank can also choose a deposit contract that completely eliminates runs but this has some costs as well. Furthermore, in cases where the bank cannot pay everybody the promised amount (first come first serve), it may be socially optimal to have a run as shown in Allen and Gale (2008). The result here a similar to the result obtain in Allenspach (2009) in both Chen and Hasan (2006, 2008) where disclosure can still trigger bank run for healthy banks.

Farvaque, Refait-Alexandre and Weill (2012) examines the relationship between bank transparency and efficiency on the Russian banking sector. The utmost interest of Russia convinced the authors to investigate the Russian banking sector and its relationship with disclosure and transparency. The case of Russia is complicated in a sense that the country is still facing difficulties regarding institutional deficiencies which limit the development of a strong banking sector and it appears significant that an analysis of the impact of disclosure is needed. The authors used a set of 37 Russian banks over the period 2005-2007 which by 2007 represented 67% of the total asset of the Russian banking sector. Information regarding transparency was obtained from Standard & Poor's reports for the three years covering the analysis providing 4 transparency scores. All of the scores are based on public

information, essentially annual reports, public regulatory reporting and all of the disclosure information available on the Internet.

The methodology used is commonly used to assess efficiency of banks in transitioning countries as of Bonin et al. (2005) and Karas et al. (2010). The estimated model consists of the cost frontier function and an equation explaining inefficiency. One result of the paper shows significant information relative to the impact of the transparency variables on the notion of inefficiency. A more transparent bank appears to be more efficient: the action to disclose information to stakeholders allows banks to collect more deposits and to grant more credits. Disclosure about ownership and corporate structure and about financial and operational information are not significant despite the wishes of the Russian Central Bank to increase transparency about shareholders. On the other hand, disclosure regarding board and management structure plays a positive and significant role on bank's efficiency.

The results are not only important for Russia but are also valid for countries where there is no strong institutional power. Disclosure and transparency can therefore be substituted to public regulators.

Hasan et al. (2013) studies the impact of information on growth deposit rate in Central European banking industry during the recent financial crisis. The Central European banking system is influenced by a large quantity of foreign owned entities. As a result, the Central European banks became the subsidiaries of larger foreign well-known banks. The sovereign debt crisis was a unique phenomenon since the fall of communism and therefore motivated the authors to analyze the situation. The research question behind this article was to analyze: whether depositors react flexibly to changing sources of risk; whether they base their knowledge on banks fundamentals or on rumors; whether depositors can assess the informational content of rumors; and whether depositors' decision is affected by public aid received by foreign parent company.

The study uses a large set of 416 banks operating in 11 central European countries over the period 1994-2011. The banks' information was obtained by using the annual reports of banks, official publications of regulatory bodies, and articles of

various newspapers. Their final data set is composed of more than 2264 bank-year observations.

Hasan et al. (2013) shows first that the recent financial crisis did not alter the sensitivity of deposit growth rates to accounting risk measures. The recent financial crisis did not reduce the interest of depositors in having information. The authors were able to observe that depositors' decision were more strongly influenced by press rumors regarding a parent company's condition than by fundamentals of the same bank and that the effects of those rumors on deposit growth rates were economically significant (at 1%). They also demonstrate that the depositors reaction to negative rumors were surprisingly rational, as the withdraws were concentrated in banks for which negative rumors turned out ex-post to be founded but also indicate that depositors react to positive rumors but less strongly. The public aid to banks was principally interpreted as confirmation of the financial distress rumors. Depositors also were not misled by the different name of the parent and subsidiary.

Hasan et al. (2013) supports the view that depositors monitor the condition of banks and respond to changes in the economic environment, it also shows the media power to convey information during the financial crisis. Disclosure, throughout market discipline, enhance depositors' governance in the most poorly managed banks, at least in developing countries.

In the same direction, Bourgain et al. (2012) captures banks' reaction to depositor discipline, with disclosure in the MENA[4] countries. The article analysis how international competition, between developed countries and emerging, for deposits can prevent excessive bank risk-taking in emerging countries. The paper specifically studies the interaction between transparency in bank-risk taking and the disciplinary role of depositors. They based their analysis on the theoretical results close to Cordella and Yeyati (2002) and Hyytinen and Takalo (2002). The first paper analyzes the dissemination of financial information in a model of banking competition.[5]. When the second paper argues that transparency required by bank

[4]Middle East and North Africa countries
[5]Extension of the article Cordella and Yeyati (1998)

regulation comes at a cost, which in turn can reduce the charter value of banks and increase the fragility of the banking sector.

Bourgain et al. (2012) calculated a bank disclosure index based on Baumann and Nier (2004)[6]. They then empirically tested the impact of financial openness and disclosure on bank risk-taking on a set of 258 banks located in MENA countries applied to Turkey, over the period from 2005 to 2008. Turkey is here the developed country with all the protections for both depositors and investors as we can find in a developed country. The authors also insist on the fact that most of this country has been facing difficulties over the recent period. In this empirical analysis, the risk-taking in emerging countries can be affected by disclosure and financial openness. The disclosure index aggregates information from six categories: loans, other earning assets, deposits, other funding, memo lines and incomes, with a total of 17 sub-induces. The results show that financial openness affects the liquidity variables negatively and positively the leverage. But what matters most for us is the relationship between risk-taking and disclosure. The disclosure index influences positively the liquidity variables and the z-score (universal measures of soundness in banking-related studies)

[7], while it affects the leverage negatively. The results are very significant (even at 1%) in all of the authors regression and consistent with their hypothesis which disclosure increases the likeliness that the banking sector will opt for a sound risk management in the case of sufficient financial openness. Meanwhile, larger banks appear to be relatively taking more risk than smaller banks and also lower soundness.

The results shown by the authors offer us a good policy implication about implementing disclosure while the banking sector is becoming more and more open. The depositors' governance on bank decision-making has a strong importance in this situation and shows important policy implications especially for emerging coun-

[6]Presented in section 3

[7]Inversely proses the probability of banks' failure $Z_i = \frac{ROA+E/TA}{\sigma ROA}$
ROA is the period-average return on assets for bank i
E/TA stands for the period average equity to total assets
σROA represents the standard deviation of ROA that captures the volatility of returns

tries which can potentially be facing a financial crisis like in this article.

The last article presented here, concerning the relationship between disclosure and depositors exercising their discipline on banks, is Semenova (2012). After the working paper on the Moscow banking sector, the author analyze this time the statistically significant relationship between market discipline and banking system transparency with a cross-country data set from 1990 to 2003. After expressing the three mechanisms of depositors possible actions to exert their market discipline, they decided to use publicly available cross country data to examine whether there is statistically significant relationship between market discipline and banking system transparency. As a reminder:

- Disciplining by price: the depositors require higher interest rates from riskier banks because these interest rates contain risk premium.
- Disciplining by quantity: if bank fundamentals demonstrate greater risks, depositors tend to withdraw their fund from this bank, so it becomes more difficult for the bank to raise additional deposits.
- Disciplining by maturity shifts: depositors may switch from riskier long-term deposits to less risky short-term or even on-call ones if they face additional risk-taking by bank.

The author combined two data sets to construct the dependent variables measuring market discipline. Demirgüç-Kunt, Huizinga (1999) and Hosono (2004) cover both the period 1990-1997 for the first one and 1992-2002 for the second. The two cross-country analysis cover more than 40 countries both for price-based mechanism of market discipline and for quantity-based mechanism. The transparency index was constructed based on the answers to three questions from the World Bank questionnaire:

- Are off-balance sheet items disclosed to the public?
- Must banks disclose their risk management procedures to the public?

- Are bank directors legally liable if information disclosed is erroneous or misleading?

The regression type is as follow:

$$MD = \alpha + \mu Transp + \gamma Macro + Period + \varepsilon$$

The results show no confirmation of statistically significant and this confirms the influence of the banking system transparency on quantitative market discipline. A positive relationship somehow exists for disciplining by price, but it is very unstable and sensitive to model specification. In case of countries suffering financial instability, the probability of quantitative market discipline is high. For countries with low level GDP per capita, those have a higher probability of disciplining by price to be discovered. Meanwhile, countries with larger banking systems are more probable to demonstrate discipline effect by quantity and by price but is very model dependent and unstable. The instability of the results show that the measures aimed to increase transparency or to increase the volume and types of reported information should be accompanied with other regulations related to information availability and interoperability. Otherwise, disclosure requirements may be inefficient.

1.2.3 Summary

As we can see above, the conclusions on disclosure policies are sometimes really in favor of the implementation of such policies, some of the research realized are sometimes more doubtful about the supposed impact. One other fact shows that depositors seems to act differently when financial environment is unstable than when the financial environment is stable. In both cases, they express the wish to monitor banks' activities and fundamentals. The Moscow banks survey in Semenova (2013) emphasize this conclusion. We tried to provide as different as possible case of study for the empirical literature to analyze local type of depositors. The cross-country analysis does not show significant results about the beneficial impact of disclosure and might translate important information about different depositors

behavior and expectancies. The following table sum up the results of this section:

1.3 Disclosure, governance by financial market and financial stability

In this section, we will be going through the governance of financial market participants and its relationship with disclosure. As we did on the previous section, we will be presenting both theoretical and empirical recent literature. The next section is divided as follows: first we will be focusing only on the cost of capital globally, then we will present the literature about the relationship between equity and disclosure. While finally, we will focus on the cost of debt.

1.3.1 Disclosure and cost of capital in stable financial environment.

1.3.1.1 Cost of equity and disclosure

First, we are going to focus on the outsider's investors governance when disclosure is introduced. By taking a closer look at how the cost of capital will be affected in case of introduction we will be able to understand better the banking industry critics about new policy, or to emphasize Basel committee decisions. First we will start with a recent article of Vauhkonen (2011) which will present some advantages of having a transparent communication policy. While the next presented paper will be reviewing the opposite point of view.

The 2007-2008 banking crisis shown some lacks in risk management by banks and in their transparency behavior. Basel II agreements and the new Basel III agreements should participate in helping investors to identify changes in bank's fundamentals and in bank's security cushion.Vauhkonen (2011) model is as follows: he considered a geographical banking competition, each bank is located on a circle away from each other, based with four different risk neutral agents: Insiders, who already had invested in the bank's capital, Outsiders, who are ready to invest in the bank's capital, Depositors and then the regulator. Each bank collects its own

Environment	**Market structure**	**Article**	**Disclosure effect on depositors' governance**	**Effect of disclosure on stability**
Stable Macroeconomic Environment	Monopoly	Cordella, Yeyati (1998)	Reinforce the power of governance when bank risk is endogenous	Reduces bank moral hazard if low preference for the future
	Competition	Chen (1999)	Reduces incentives to early withdraw	Panic runs can still occur Should be accompagnied with deposit insurance
		Cordella, Yeyati (2002)	Forces bank to monitor more its investment portfolio	Must be implemented with competition, to avoid fragilization
		Wu and Bowe (2012)	Disciplines banks by choosing the more transparent	Depositors glorify safer banks
		Gilbert and Vaughan (2001)	Depositors do not worship federal bank annoucements	
		Semenova (2011)	Reinforces small depositors monitoring and governance	Depositors reaction are stronger when negative signal is disclose
		Chen and Hasan (2006)	Timing of disclosure affects depositors governance	Panic runs can still occur because of over incentive to early withdraw
Unstable Macroeconomic Environment	Monopoly	Allenspach (2009)	Depositors withdraw more with negative disclosure	Negative disclosure reduce stability
		Cordella, Yeyati (1998)	Hexogenous risk do not reinforce governance	Rumor effect fragilize banking sector
	Competition	Yorulmazer (2003)	Disclosure can trigger runs	Healthy banks are vulnerable to run in case of disclosure Disclosure must be accompagnied with deposit insurance
		Farvaque et al. (2012)	Disclosure attracts depositors	Disclosure allow banks to grant more credit
		Hasan et al. (2013)	Depositors monitor banks fundamental changes	Disclosure enhance market discipline on poorly managed bank
		Bourgain et al. (2002)	Reinforce the depositors governance	Disclosure reduce leverage Increase liquidity and z-scores Increase the soundness of the banking sector

deposit and uses those deposits to invest in a set of risky projects, with a certain probability of success p. If the project fails, the bank files through bankruptcy and the game is over. Depositors are free to deposit their money wherever they want: either in any of the participating banks, which will grant them of a payoff, at a cost equal to their transportation[8], either in a risk-free asset with no cost and no remuneration. In order to be able to run a normal activity level, a bank has to either collect deposit or emit a certain amount of debt on the financial market. Lastly, the deposits are protected by a cost-free deposit insurance.

The timing of the model is as it is:

1. The regulator defines the mandatory ratio $\frac{equity}{credits}$.
2. Each bank define the level of interest rate for the deposit, the amount of capital needed and the risk of the project in which it is going to invest.
3. Depositors choose their banks, or the risk free asset
4. Banks issue equities to finance its activities
5. Banks invest the collected deposit and capital
6. If the project is a success, banks distribute the promised payoff to depositors and to investors.

As we have seen earlier in Cordella & Yeyati (1998), disclosure has positive effects on a bank's risk management behavior. Here the author uses these results to build up their hypothesis, it will be interesting to see if the results are also positive for the bank.

The initial benchmark framework is a situation where there is no mandatory disclosure and no mandatory capital request (therefore no need of equity). It obtains an equilibrium probability of success / deposit payoff such as:

- The equilibrium quality is equal to $\frac{transportation\,cost}{number\,of\,banks^2}$

[8] Geographic model a la Salop (1979), depositors are located on a circle

- And the equilibrium deposit interest rate is $R_p^i - \frac{transportation\,cost}{number\,of\,bank}$ where R_p^i is the return of the project p chosen by the bank i.

- And banks profit function is $\pi_i^B = q_i(R - r_i)D_i - q_i^2$ where r_i is the interest rate for the deposit in bank i , D_i the demand of deposit that the bank is facing and q_i the quality of the project invested in by bank i.

The benchmark consequence is that the insiders cannot benefit from their whole efforts. Depositors gain more than insiders, which result in a lack of incentives for the bank to consent to a risk management effort. This consequence delivers enough incentives to the regulator to introduce a new kind of legislation into the banking industry.

To reduce the probability of occurrence of moral hazard due to asymmetrical information between insiders and depositors, the regulator is about to introduce a capital ratio requirement. Banks have to raise funds in order to satisfy the required ratio. The author supposed that banks can only raise funds to satisfy the required ratio and cannot raise more funds and use it as reserves. Without any information, the cost of capital is based on the anticipated risk of the project the bank will invest in. So with such a hypothesis, a higher level of risk should not directly affect the cost of capital of the bank.

First in the case of no disclosure of information from the bank to investors, the capital ratio requirement does not participate in an increase of the security of the industry. In this situation, only insiders will be able to know the quality of the subsequent project. Outsiders will still be in an opaque situation. To cover the unanticipated risk, they will ask for a greater payoff, regardless of the one they would ask if they had some information: investors take into their anticipation an information risk premium. In this scenario, the introduction of capital requirements does not improve the safety if the banking sector. Capital requirements are not able to exert investors discipline to banks.

Then the regulator is adding, to the capital ratio requirement, the necessity of communication on the quality of the project the bank is going to invest in. With

this requirement, the regulator forces to bank to disclose, at least partially, the risk of the project or to fully disclose the probability of success of the project. When the disclosure is only partial[9], outsiders evaluate the information rationally and without any aversion to risk incorporate it into their expectation calculus.

In this situation, it appears that the industry is more secure with the two requirements than with only one ratio requirement was in place. The introduction of disclosure results in a greater competition between banks due to the introduction of a new parameters in the depositors choice and to the investor's choice: competition creates a disciplining effect over the market. The evaluation of the bank project is now better taken into account by outsiders to efficiently define the cost of capital. Insiders and outsiders now have equal incentives to participate in the bank's activity. The bank is now unable to benefit from an under estimation of the project's quality by outsiders: it still results in a slight increase of the cost of capital but still generates an increase of global welfare due to the reduction of the moral hazard from the bank's perspective. The bank's profits will be remain constant because the increase in the cost of capital will be transported to the depositors throughout a drop in the interest rate, by comparison to the one in the benchmark. When both requirements settle, the banking sector security is even greater. With ratio requirements, banks have to raise funds for every single level of risk: a lower quality project will be more expensive to finance and will result either in a lower profit or in the non-participation of depositors. A higher quality project can result in a lower cost of capital and can then increase bank benefits because outsiders know the real amount of risk the bank will be facing. The bank chooses safer project to invest in and it participates to a less risky sector. Vauhkonen (2011) shows that disclosure is able to ensure a reduction of the cost of capital due to the reduction of banks moral hazard.

Tarazi and Soedarmono (2013) examines the relationship between opacity and the cost of intermediation in Asian publicly traded commercial banks during the period 2002-2008. The results show empirical evidence that higher opacity is associated with lower intermediation costs in banking: bank managers, in their efforts

[9]When only the standard deviation of the project menu are known

to overcome asymmetric information issues and to improve transparency tends to offset the higher cost of acquiring and disclosing information. The result is balanced by the growing globalization during this period. Bank opacity therefore become costlier in countries with higher globalization.

We have seen how equity cost evolved when disclosure is integrated. Therefore, we also need to focus on when the cost of capital is based on debt. A bank can choose how to finance its activity by using either the financial market, by emitting long-term liabilities, or by emitting a debt on the interbank market. Van Tassel (2011) in his paper analysis the relation between disclosure and interest rate of the debt the bank is issuing.

1.3.1.2 Interbank debt cost and disclosure

Van Tassel (2011) uses a one time period model with a credit market, composed N banks able to borrow from each other, and a large amount of participating project managers who have a need of financing. Each project manager borrows \$1 to complete a project: each of the projects will be reimbursed plus an interest rate if the project is successful. The probability of success depends on the type of the managers: managers qualified as high have a 100% successful rate for their projects, managers qualified as low will always fail at reimbursing their projects. New customers of a bank are always designed as low, because banks are not able to know their type until they fail or succeed their projects.

Among the N banks of the model, there are two types of banks: informed, which knows the type of their current customers, here the project managers and uninformed, which does not know the type of their current customer. Only the bank knows if it is an informed bank or not, managers do only know their type and not the bank's type. To be able to lend to customers, the bank has to emit debt (endogenous interest rate) and to use its equity. The ratio $\frac{debt}{(equity+debt)}$ is supposed to be identical for all participating banks. Risk neutral investors are buying bank's debt and will determine the interest rate they will be asking in exchange of buying debt. The competition between banks will be only be on the interest rate that will

be offered by the bank to clients who need to be financed.

The benchmark situation is a no disclosure situation. Banks are not able to disclosure partially or totally the composition of their customers portfolio. Outsiders cannot estimate correctly the portfolio's composition of the bank he will be funding, they cannot discriminate banks by using a different interest rate for banks with a higher proportion of low customer. So all the banks will be facing the same interest rate in the benchmark situation. The first proposal says when no disclosure procedure is settled, banks will try to keep their high customer in order to generate more benefits than banks with only news customers. Informed banks are also facing a dilemma: the informed bank benefits from knowing its customer, but cannot benefit from a lower cost of capital by comparison to banks with a higher proportion of new customers. Banks cannot benefit entirely from its knowledge.

The benchmark is giving enough incentives to set up new rules on the banking industry. Now banks are able to partially or entirely disclose the nature of its portfolio. The follow up will be divided in two subsections: firstly, banks decide to be less opaque when other banks do not disclose and secondly, banks decide to disclose when all of the participating banks are disclosing (uninformed banks do not disclose anything). Outsiders are now able to discriminate between banks and agents which are publicly known for being high. So with such hypothesis, and with a large number of banks participating to the interbank market which decides not to disclose, an informed bank has incentives to disclose information about its customer's portfolio when it's able to emit debt with a lower interest rate than its competitor. By choosing to disclose, the bank can reach an even lower interest rate. Banks, with a large proportion of high-type customers, are less risky than the one with a lower proportion of low type customers and are able to reduce the interest rate of their debt. On the other hand, information that banks decide to disclose can be used against it to attract high customer to the bank. This proposal shows the existence of competition to attract high customers. This will lead to a lower cost of capital for banks and a lower interest rate for high type customers of the disclosing bank. To guarantee a positive profit, disclosing banks are engaged

into a negotiation process with outsiders in order to obtain the lowest possible interest rate. This interest rate is then extremely close to the risk-free interest rate. One more thing about this proposal, the more the bank is using the financial market to fund its activity, the more the cost of capital will be reduced due to the particular. Internal cost of capital will then be more expensive than the external cost of capital for disclosing banks.

When informed banks decide to disclose, it exists an equilibrium as all the informed banks have incentives to disclose their customer's portfolio when they faced a need for a certain amount of equity. More generally, when informed banks decide not to use their equity to finance their activity, it exists a net benefit to disclose in order to reduce the cost of capital. Outsiders are rewarding banks which are the more transparent, and the one which have the highest proportion of high customers. The consequence of this proposal is the same as previously: banks' negotiation can reduce drastically the cost of capital and will generate higher benefits. Informed banks will maintain competition on the high type customer to generate as much profit as possible.

Van Tassel (2011) shows important consequences about the whether or not disclosure reduce cost of capital debate. In this situation informed banks must disclose regardless to other banks' decision to disclose. This decision will permit to reduce significantly the cost of capital and will be generating future profits. Competition between banks will force banks to attract as much high type customer as possible. In a sense, the competition between informed banks will enhance the stability of the market. Just like previously with the article from Vauhkonen (2011), introducing disclosure will create market discipline and will participate in a more stable banking sector.

1.3.2 Disclosure and unstable macroeconomic environment

The impact of disclosure over the cost of equity is probably the governance field the most analyzed empirically over last two decades. We will be reviewing some of the key articles and tools that are commonly used in this field of research. Most of

the proposed literature are related to corporate governance such as Botosan (1997) or Leuz and Wysocki (2016) will be starting by the article Baumann & Nier (2003).

1.3.2.1 Disclosure and equities volatility

Baumann & Nier (2003) shows which variables are the most significant when focusing on the impact of disclosure and market discipline on stock prices volatility for the banking industry. The authors decided to focus on the transparency prudential measure introduced by the Basel II Pillar 1 agreement. The data base used in this article include more than 600 banks over 31 countries, on a 7-year period (1993-200). The data set used contains enough information on what banks are willing to disclose to the public such as interest rate risk, credit risk, market risk or the liquidity risk. The authors based their study on three different problematic commonly used in the literature: how is the correlation of transparency degree and stock price volatility? If the market value and reward disclosure? And if disclosure is beneficial to the bank?

Besides a large risk of collinearity in between the different transparency variables, the study confirms that a more transparent bank suffers a less large volatility of its stock price. Even if good quality signal (when the signal emitted provides positive information about the fundamentals of a bank) tends to create less volatility than bad signal, a greater transparency maintain investors informed on the firm, reducing in the same time the problem of adverse selection. The paper also shows the variables which are generating the greatest impact of disclosure: non-interest income seems to have the greatest impact on stock price volatility. Interest rate shows enough information already: the higher, the greater the risk is, when the credit activity is stable (in terms of volume).The credit structure is also a weak contributor to reducing volatility (not significant) even if it can express a riskier behavior of the bank. By contrast, non-interest income appears to be opaque for investors which make it a lot more positive impact on volatility when information about it is disclosed.

In the same time, the financial market reward transparent banks. In particular, a larger transparency about credit structure seems to generate a greater reward of the financial market. The disclosure effort appears to be playing a role on the value of the equity over the market. The market reward the firms which are considered the most transparent transmitted through an increase of the stock price. Such results show the introduction of mandatory disclosure is not really armful for firm which decided to be less opaque. The decision maker installed a rule, and seems here to be helping firms by making their stock price more attractive.

Lastly, they succeeded in showing a strong positive relationship between equity of a bank and different transparency variables. The disclosure variables responsible for the greatest impact over the bank's equity are the funding structure and losses forecast. By creating losses forecast, the bank is trying to prepare itself in case of shock (internal or external). The information available are important due to the fact it transmits the information on how the bank sees the future of itself or of the sector. The more disclosure and communication is done about it seems to reassure the market and is beneficial to the bank.

The results obtained by the authors are similar to the one fund earlier in Vaukhonen (2011) and are consistent to the theoretical literature. The authors also proved here the important implication of macro-economic variables which lead to influence greatly the results obtained here. When the macroeconomic situation does not show good perspective, disclosure appears to be less beneficial than when the macroeconomic perspective is good.

Baumann & Nier (2004) was purposely written to reinforce conclusions obtained in their previous paper (Baumann & Nier 2003) by studying the relationship between disclosure and the volatility of stock prices. They studied how standard deviation of weekly return for bank equity regardless to a transparency variable and a whole proxy of control variables (here: bank's size, dividend ratio, cost-to-income ratio, loan ratio, beta, leverage ratio, loan growth and return on assets).The database used in this article is composed of 600 banks of 31 countries over the period 1993-2000.

The disclosure index created by the author is based on 17 different categories related to the interest risk, credit default risk, market risk or the amount of equity capital. Such information was extracted from publicized annual reports. Such categories are used by the notation's agencies to determine the firm's health they are underrating.

When the entire set of variables in the transparency proxy are taken into account, it exists a strong negative correlation between disclosure and volatility of the stock prices, significant at 1%. A large part of these categories are statistically significant beside the counterpart credit variable, long-term bank's financing and the equity capital found in the bank's annual reports.

The results obtained here suggest information is useful to investors because it limits the impact of potential rumors and other noisy information, leading to more stable market prices. Banks benefits, ex-ante, are more difficult to enlighten but ex-post it allows banks to reduce the cost of stock prices variations. A reduction of the volatility also reduce the global cost of capital for a firm by making expectations easier to calculate. The reduction of the uncertainty premium reduce in the same time the global cost of capital. Stakeholders are willing to reduce their payoff when the prices of stocks are stable.

Greater bank's stock price stability can allow a stronger shareholder governance on the manager when managers' remuneration is based on the company performance. By choosing this type of remuneration for banks' managers, the shareholders align manager interests with theirs. Managers are acting safer to prevent a drop of their income, leading the company on a virtuous circle.

Transparency here brings conclusion on the volatility of banks' stock price when disclosure is taken into account. Nevertheless, the conclusion obtained here need to be face to some critics and convince use to focus more on the question. The transparency index here is presented with some limits: it only captures available information in annual report and doesn't take into account voluntary disclosure

out of those reports during the rest of the year. A lot of institutions are using other ways of communication to disclose information to the public. Such communication can sometimes not find into annual reports. Moreover, the differences of jurisdiction and transparency rules in between countries seem to affect the model. More control variables are needed.

Norden and Weber (2004) analyzes the response of stock and credit default swap markets to rating announcements by the main rating agencies during the 2000-2002. They applied traditional events study methodology to examine whether stock and CDS markets responded to rating announcements during the ongoing period for corporate financial and sovereign entities. Ratings announcements were collected from the three major rating agencies: Standard & Poor's, Moody's and Fitch.

They used both actual rating changes and the different reviews coming aside with the rating announcement. The findings in this article suggest that both markets are able to anticipate both rating downgrades and reviews for downgrade by all rating agencies if taken separately. On the other hand, neither market shows any significant response to positive changes in ratings. But most importantly, on a combined analysis of different rating events within and across agencies, the authors show that the stock market and CDS market exhibit a significantly negative abnormal return on days of reviews for downgrade from Standard & Poor's and Moody's, whereas actual downgrades are only showing signs of abnormal performance for the CDS market. The magnitude of abnormal performance in both markets is influenced by the level of the old rating, previous rating events and, only in the CDS market, by the per-event average rating level by all agencies. In this article we can see that the change in the CDS spread is not related to the macroeconomic environment but also due to the individual outcome.

Poshakwale and Courtis (2005) studies the impact of voluntary disclosure on the cost of equity capital throughout the relationship manager to investors. The authors claim that investors and managers are very keen to know the extent of the impact of disclosures about firm's financial and non-financial performance ac-

tivities on market value and cost of capital. This paper makes an important contribution by providing evidence from the banking sector using a rather large sample of 135 banks.

[10] from Europe, North America and Australia over the period 1995-1999. They created a disclosure index about 29 key financial industry-specific performance measures supplied by PriceWaterhouseCoopers.

The hypothesis used in this article are common in the literature: the first hypothesis concerns the existence of a negative relationship between higher levels of disclosure and the cost of equity and the second hypothesis concerns this time the relationship between disclosure level and the amount of analyst following, the number of news items and its accuracy to analysts forecast. The third hypothesis used in this empirical study states there is no statistical difference between disclosure categories in the reduction of capital, which is different than Baumann and Nier (2003). The last hypothesis is geographical and states that there is no constant change, in conclusion, across geographical locations.

The results obtain in Poshakwale and Courtis (2005) show that the coefficients for disclosure rank and market value are significantly negative (consistent with Botosan (1997)[11]). The authors also claimed that due to low adjusted R-square, the model used might not capture a substantial variation in the cost of capital. Concerning the analyst following and related forecasts, a positive correlation exists between the disclosure index and the number of analysts following, the number of news items and the forecast accuracy. This result is consistent with banking survey findings provided by PriceWaterhouseCoopers and consistent with Lang and Lundholm (1993). On the other, the third hypothesis is rejected and shows that some items in the disclosure index are more efficient than others (especially the Beta and P/E ratio). This result is consistent with Baumann and Nier (2003) and PwC survey on banks. Finally, the authors show that it exists a difference in between the European banks and non-European banks.

[10] 73 European banks
62 non-European

[11] Analyze the same hypothesis on non-banking sector

Akhigbe & Martin (2006) studies the impact of the introduction of disclosure via the Sarbanes-Oxley law on US soil. The law was originally created to reduce the opacity of the banking/financial market by increasing the amount of visible information. This paper is an event study during the political process of its introduction. The model used here is based on data of 201 financial firms in the United States on 600-day period (300 days before the final announcement and 300 days after it). The authors' aim here is to study the evolution of portfolio profitability when the law was about to be proclaimed: variables such as market return, disclosure, political announces, governance variables and systemic risk are used. To capture transparency and disclosure, the authors used a set of several variables. The independence of the audit committee, the presence of a financial expert in the audit committee or the amount of footnote were used to create the disclosure variable. The governance variable is standard: independence of the board regardless to managers, number of different shareholders, number of institutional shareholders (banks are often considered as more independent than other non-institutional board members) or the implication of the board into the company governance. Thanks to an independent audit transmitted to the board of directors, S.O.X enhances the investors' governance and the reduction of opacity. The point of this article is to study if the increase in the mandatory disclosure would generate an abnormal return over a 3-day period.

Besides increasing return, they also show several significant factors which limit such positive returns: if the audit committee is less independent, without any financial expert in it, or if the board is less implicated in the firm, a larger level of transparency limit the positive benefits of such introduction. The quality of the disclosed information is not sufficient enough for analysts, investors. So they are not valuing it. The financial market decided to reward firms in which it was already introduced, and penalized the others. A possible justification to the results obtained here, is the incoming high cost for firms to comply with the soon to be law. The market reward firms which have already paid the cost and are already complied with the SOX law. The market anticipates a potential drop into firm profits leading them to reward firms which are going to be more profitable.

The impact of this announcement is the most important for financial firms where the audit committee and the board of directors are the most independent from each other. The board implication in the bank management or when internal control tools are already existing, are also generating a great important abnormal positive return around announcement dates. The financial market values more firms with more accurate auditors and better expertise.

The authors conclude by arguing the introduction of new disclosure and transparency directives have a positive impact on opaque sectors (banking industry) and with this new directive, insiders and outsiders investors reward firms which were already complying with the SOX law, even before it was officially introduced in 2002. Most of the disclosure variable allow us to think that an increase in mandatory disclosure participates in generating better return on the financial market. The main justification is mainly due to the soon to come increase of the cost in order to be compliant, for non-compliant firms.

1.3.2.2 Disclosure and systemic risk changes

Akhigbe & Martin (2008) shows here how risks (idiosyncratic and systemic) evolve after the introduction of the SOX law. They justify their choice of study with theoretical literature which relates transparency and risk: it appears that in certain case disclosure is negatively correlated to risk. In order to study this relationship, they identified more than 201 US financial companies divided in several categories such as: large commercial banks, small commercial banks, saving establishments, insurance companies, credit unions or investment companies.

Investment companies. The variables used here will be trying to capture the nature of the SOX law: they used variables like presence of a financial expert in the audit committee, independence of the audit committee, number of annexes and foot notes in annual reports, the degree of independence of the board of directors, the quantity of stocks held by the chief executive, the credibility of the board

and other controls variable such as the type of firm, the size or the ratio $\frac{stockprice}{present\,value}$.

They focused their research on every kind of risk: either total, idiosyncratic or systemic risk. The period used is 2001-2004, in which two sub periods were created: short-term period, where daily stock return data were used and a long-term period, where monthly stock return data were used.

They justify their choices to separate monthly and daily data to make sure fundamentals of the SOX law would take time to fully be represented through firms' return. The aim of Akhigbe and Martin is to demonstrate how risk evolved after the announcement in 2002 of the SOX law, which introduce mandatory disclosure for firms quoted into American stock places.

For either a short term or a long-term period, the article shows a negative relationship between disclosure and risk variation exists. This relationship is statistically significant for the three kinds of risks. An increase of the degree of mandatory disclosure is affecting the bank's risk negatively. Banks decide to act safer because they will have charted their behavior to board and to outsiders in order to reduce their cost of capital. If each financial company is now safer, it will lead to a safer market. Disclosure lead to a greater market discipline, either due to individuals or due to the whole market.

The analysis shows the existence of a negative relationship between governance and risk, which can justify the first result of the model. For the daily stock return data, an increase in the governance will participate in a risk reduction thanks to the variable monitoring of the board. For the monthly stock return data, the negative relationship between governance and risk is explained by the property proxy (type of shareholders, quantity of stocks held by managers and percentage of shares held by one agent).

The authors explained here that banks with the highest degree of disclosure and governance are less likely to face a large variation of its risk. The market is able to reward and to sanction companies through the stock return. When companies risk

is stable, cost of capital is also more stable and easier to forecast. Furthermore, in a long-term perspective, firms with higher levels of disclosure and governance are facing a smaller drop of their total risk and non-systemic risk.

When the SOX law was presented, it was proclaimed that the independent audit committee must be composed of financial expert but critics against the idea were sufficiently strong to force the senator Sarbanes and the congressman Oxley to review their position about the necessity of financial experts in the audit committee. The critics were mainly linked to the cost of such expert. The authors showed the necessity of such financial expert in the audit committee: the presence of financial experts is significantly correlated with a drop of the total risk and the non-systemic risk. Even if the cost of financial experts is probably bigger than without one, the risk a bank is decreasing and will be then rewarded by the stock market. The critics against the presence of financial seem to be less funded than what it actually appears.

To conclude, Akhigbe & Martin (2008) demonstrated the existence of a negative relationship between transparency and governance over risk variation. Such consequences justify the theoretical literature about introduction of such prerogatives. More disclosure and a better governance participate into an improvement of market stability. The results of this article are similar to the one obtained in Baumann and Nier (2003 and 2004).

In the same way, Tadesse (2006) focus on the impact on banking stability when facing an introduction of mandatory disclosure. The cross-country analysis presented here concerns 41 countries during the 90s. The model studied the probability of occurrence of a systemic shock[12] in the banking sector explained by different variables such as transparency of the banking sector, quality of disclosure and transparency, informational propagation, capacity of acquiring information by agents, credibility of announcements, banking sector competition and concen-

[12]A systemic shock is a shock to any system that perturbs a system enough to drive it out of equilibrium. Systemic shocks occur in a wide range of fields, ranging from medicine (see shock) to economics to engineering. Dean Ing

tration, or some macroeconomic control variable. Data used are based on international authorities' studies done between 1998 and 1999. The set of countries used is spread between developed countries and countries in development. Among countries listed, several of them faced, during this period, from the banking systemic crisis (particularly Southeast Asian country).

Tadesse (2006) demonstrates that a negative, very significant, relationship exists between transparency and the probability of occurrence of a systemic banking crisis. This relationship is still valid for any macroeconomics control variable used, especially when the real economic sphere is unstable. It can be explained by the fact disclosure tend to increase largely market discipline, which supports favorable critics of mandatory disclosure. Variables like institutional force (power of justice, government credibility, etc.) assure a greater stability in developed countries than emerging countries: they are less likely to suffer a systemic crisis because these public institutions are influencing directly financial firms' behavior and the incentives that come with.

The author insisted on the relationship of quality of information, informational propagation and probability of occurrence of a systemic shock. This relationship appears to be negatively significant. The results of such findings show the more information is available in different places, the more the disclosure is taking into account by agents. The decision to spread the information influenced agents' incentives because they consider that a, spread and available, information in different communication way is less likely to be "manipulated." But in the same time Tadesse (2006) indicates a non-significant relationship between the ability to acquire information and stability. In other words, participating agents (in this case banks and investors) can acquire and treat information whatever the cost is.

If we have a deeper look to the analysis, we can clearly see that some transparency variables provide more valuable information than some others. The author indicates that the probability of occurrence of a systemic shock is greatly reduced in countries where regulation impose disclosure to be more comprehensive, more informative, more frequent and where banks are considered more credible. If we

control with the variable "monitoring of the media penetration" in the population, the probability of occurrence of a systemic shock is greatly reduced. The quality of the disclosed information and the credibility of media are playing a significant role on banking stability.

Despite a controversial debate, transparency seems to have positive impact over the probability of occurrence of a systemic shock. Tadesse (2006) shows transparency is largely associated with banking stability. More specifically, the probability of systemic shock is lower when disclosure is more comprehensive, when information is largely available and when more frequent and more credible. This article corroborates the theoretical academic literature which enlightened the benefit of disclosure and transparency. This article also highlights the externality of financial sector disclosure over the real sphere. A larger degree of transparency participate in an enhancement of saving in high transparency countries. The funding of the real sphere is easier for high transparency countries which are mostly using intermediate funds.

We have seen disclosure and transparency are actively playing a role on financial sector stability. Baumann and Nier (2004) and Tadesse (2006) highlighted important results about the necessity of the credibly of disclosure. Transparency, thanks to its quality, generates market discipline by creating awareness about risky behavior. It is then important to study how moral hazard is related to disclosure when market discipline is helped by disclosure and transparency. To do so, we will be using the article of Baumann and Nier published in 2006.

1.3.2.3 Moral hazard, capital level and probability of default

Baumann & Nier (2006) demonstrates the kind of relationship between market discipline, disclosure and moral hazard between banks and capital investors. They created a panel of international data over more than 729 banks in 32 different countries. The period chose is 1993-2000. They decided to test the hypotheses: does market discipline Influence risk management in banks?

The analysis uses two regressions: one about the capital, in function of the risk and market discipline and the second one about the amount of risk, expressed by the capital regression and the market discipline. The capital regression tests how market discipline affects the amount of capital held by the firm, as a safety cushion throughout disclosure mechanism. The risk regression is focusing on how market discipline affect the choice of equity (risky or safe) portfolio of the bank for a certain amount of capital. They analyzed three set of factors which reinforce market discipline: the degree of (implicit or explicit) public decision maker guarantee on deposits, the quantity of uninsured equity in banks' annual balance sheets, and the degree of observability of banks risk behavior.

With the capital regression, governmental guaranties on deposits and on investor protection (either implicit or explicit) tends to reduce the buffer capital of banks. Investors protections provide incentives to banks to reduce their capital buffer. Moral hazard is bigger when banks know they got their deposit cover in case of a mistake. The effect is stronger for explicit governmental insurance than when guaranties are implicit. On the other hand, a larger share of uninsured banks' equity participate in a significant increase of the market discipline, and will lead to increase capital buffers. The financial market rewards banks which are safer by proposing a reduced cost of capital, and sanctions banks which decided to have riskier equity. More generally, banks and financial companies which are the most transparent and which are facing a greater market discipline tends to reduce the probability of default when choosing a high level of capital. The market discipline is here measured by several variables such as ratings, bank deposit, uninsured deposits or the support rating. This result can be an answer to the question why banks decide to hold more capital than mandatory requested?

In the same time, results obtained by the authors on the capital regression can be applied to the risk regression. As a matter of fact, it exists a strong negative relationship between deposit insurance and risky behavior, but on the other hand, there is no significant prove that a reduction of uninsured equity in banks' balance sheets will lead to a diminishing probability of default for a bank. An explanation

to this finding can be found in the fact that market discipline exerts enough incentive on banks for them to already manage to choose as little as possible uninsured equity.

The conclusions and results brought by Baumann and Nier (2006) fully support the Basel Committee recommendations and the different pillars of Basel II agreement. Explicit governmental deposit insurance participate in a reduction of capital cushions and reinforces the idea "too big to fail." By choosing implicit rules of insurance, market discipline can play a greater role on stability when transparency and disclosure is mandatory: this would influence individual risk for each bank and would de facto reduce global risk of the activity.

Petrella and Resti (2013) also propose to analyze the impact of supervisors test as an information tool on bank stock prices in 2011. The article tests several hypotheses about the impact of stress tests. The first hypothesis tested assess the question of relevance of such information for market participants and if the answer to this question was positive, what was driving such result? Historical data or resilience indicator? The result of this article suggests that market participant significantly reacts upon disclosure of the stress-test results.

Stress test does reveal new information which was not already accessible to stakeholders 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 contributes to the existent literature by showing empirical evidences on the benefits ,to investors, of stress tests providing information in order for them to better understand the risk and value of the bank. It also provides important policy implication on the debate of disclosing stress test results.

1.3.3 Summary

We have seen important results about the impact of disclosure on stakeholder's governance. First we can see that disclosure is a key to reduce the cost of equity for banks. Moreover, in the same time, some disclosure criterion are more efficient to favorites a reduction of the cost of capital: Baumann and Nier (2003) and Poshakwale and Courtis (2005) are a valid example concerning this result.

Secondly, we have seen that the implementation of new disclosure regulation has a positive impact on stakeholder's governance, especially when banks used to be the most transparent prior to the implementation of such regulation. Then lastly, the impact of disclosure on stakeholder's governance is correlated to a positive shift in risk taking by banks. Disclosure allows for a safer banking sector throughout the channel of stakeholders' governance.

The following table is recapitulating the literature used in this section and the results associated with.

1.4 Conclusion and openning

The literature presented in this chapter is trying to analyze the impact of disclosure on both components of banking governance, more especially trying to provide a causality relationship between disclosure and financial stability. What does the literature have to say concerning our research questions? First of all, we need it provides answers concerning the different effect on depositors behavior and on financial market participants which is consistent with our original expectations. The different impact also confirms the necessity of conducting research onto depositors and financial market participants both separately and grouped.

Then, when having a closer look to each individual component of banking governance, we can see that the impact on depositors are often toned. We expected disclosure to have a dubious impact on financial stability. Numerous results indicate that disclosure has a positive impact on the reduction of potential panic runs. Results, such as the one from Cordella and Yeyati (1998 and 2002) showed, theoretically, a positive impact of disclosure on financial stability, confirmed by empirical studies. Depositors are attracted, in most cases, by transparent banks. Transparent banks convey positive resilience signals via the process of market discipline. The most transparent banks are considered safer, due to incentives for banks to disclose intelligence rather than disclose nothing. Empirical works, such as Wu and Bowe (2012), Semenova (2012) or Farvaque et al. (2012) e.g., confirm the eagerness of depositors to monitor banks, via the channel of disclosure, and to deposit in the most transparent banks.

Thanks to the literature, we were also able to notice some reduce interest of disclosure on depositors governance in certain situations. Chen (1999) and therefore later work Chen and Hasan (2006) showed panic runs can still occur even in presence of bank disclosure due to over incentives of depositors. Both articles provide interesting policy implications concerning the importance of using both disclosure and other regulatory tools to avoid inefficient panic runs. Allenspach (2009) provides the same conclusions.

Environnement	**Article**	**Effect of disclosure on financial market governance**	**Effect of disclosure on stability**
Stable Macroeconomic environment	Vauhkonen (2011)	Reduces cost of capital	Reduces banks moral hazard
	Van Tassel (2011)	Reduces the cost of capital Banks have incentive to disclose, whichever the decision of its competitor	Safer banks banks attracts safer clients Banks make safer investment
	Baumann and Nier (2003)	Financial market governance reward disclosure	Allows a lower cost of equity
	Baumann and Nier (2004)	Reinforces financial market governance	Reduces prices volatility
	Norder and Weber (2004)	Positive changes in ratings do not affect financial market governance	Reduces stock prices at the surroundings of negative events
	Poshakwale and Courtis (2005)	Has postive effect on financial market governance	Disclosures has stronger stabilizing effects in Europe
	Akhigbe & Martin (2006)	Reduces the cost of capital Is rewarded by both insiders and outsiders, throughout a lower cost of capital	Has stronger effect on opaque sectors
Untable Macroeconomic environment	Akhigbe & Martin (2008)	Emphasize the effect of financial market governance	Disclosure reduces risk taking Disclosure reduces systemic risk
	Tadesse (2006)	Reinforces market discipline via financial market governance	Reduces the probability of occurrence of systemic banking crisis
	Baumann and Nier (2006)	Is rewarded by financial market participant, through cost of capital	More transparent banks face more market discipline, Transparent banks are safer
	Petrella and Resti (2013)	Public generalized disclosure emphasized the effect of financial market governance Regulatory information provide significant disclosure	

Table 1.2 : Section 3, litterature summary

Concerning the effect of disclosure onto financial market governance and its relationship with financial stability the results are little less dubious and confirm the first expectations concerning the differences of the impact of disclosure on different branches of governance. A large pan of the literature confirms the reduction of the cost of capital for the most transparent banks, both theoretically and empirically (Vaukhonen (2011) or Akhigbe & Martin (2006)) while it also confirms the disciplining effect of disclosure by financial markets.

We tried to answer as much as possible to our research question by taking into account the overall stability of the macroeconomic environment and the results do not show significant difference in between the two different states. The further section will be providing extra analysis to assess more the potential of disclosure.

Appendix

Disclosure index criterion samples

The following section presents a sample of disclosure index criteria used by some authors of the presented litterature. The presented disclosure index criterion is presented by author. Some similarities in the criterion are noticeable even if each author has a singular approach to compute a disclosure index. In order to capture disclosure, each criterion of each index is taken into account individually

1.4.0.0.1 Semenova (2011)

The author conducted a study with a set of questions which the author ask depositors. Each answer is then gather to provide information about depositors interest into monitoring a bank.

- What information could make you withdraw your money from this bank?
- What information could make you switch from long-term to short-term or even on-call deposits in this banks?
- The answer choice were as follow:
  - 1 bank assets decreased
  - 2 bank assets increased
  - 3 bank capital decreased
  - 4 bank capital increased
  - 5 overdue loans granted to bank clients decreased
  - 6 overdue loans granted to bank clients increased
  - 7 bank profit decreased
  - 8 bank profit increased
  - 9 bank invests into less risky projects
  - 10 bank invests into riskier projects
  - 11 nothing from mentioned above

1.4.0.0.2 Poshakwale and Courtis (2005)

The disclosure index proposed here is based on 29 key criteria supplied by PWC. Each criteria is taken into account to build the disclosure index. The disclosure index is oriented to capture disclosure for financial market participants.

1. I. STRATEGY
    a) Plans for growth
    b) Delivery channels
    c) Product innovation
    d) IT expenditures
    e) Degree of diversification
2. II. CUSTOMERS AND MARKETS
    a) Customer retention
    b) Customer penetration
    c) Market growth
    d) Market share
3. PEOPLE AND REPUTATION
    a) Quality of management
    b) Employee satisfaction
    c) Brand equity
    d) Regulatory reputation
4. IV. RISK MANAGEMENT
    a) Risk management practices
    b) Asset/liability management
    c) Asset quality
    d) Market risk exposure

5. V. FINANCIAL POSITION
    a) Capital adequacy
    b) Capital management
    c) Assets under management
    d) Investment performance
    e) Core deposit growth
6. VI. FINANCIAL PERFORMANCE
    a) Earnings
    b) Loan loss ratio
    c) Return on risk-adjusted capital
    d) Fee-based revenue growth
    e) Economic profit
    f) Performance by business segment
    g) Cost/income ratio

1.4.0.0.3 Baumann and Nier (2003) and Baumann and Nier (2004)

The author build a disclosure index which is apply to relate disclosure and stock prices. The index covers 17 categories covering credit default risk, interest risk, or market risk.

1. Loans
    a) Loans by maturity
    b) Loans by type
    c) Loans by counterparty
    d) problem Loans
    e) Problem loans by type
2. Other Earning assets.

   a) Securities by type
   b) Securities by holding purpose
3. Deposits
   a) Deposits by maturity
   b) Deposit by type of customer
4. Other funding
   a) Money market funding
   b) Long-term funding
5. Memo lines
   a) Reserves
   b) Capital
   c) Contingent liabilities
   d) Off-balance sheet items
6. Income Statement
   a) Non-interest income
   b) Loan loss provisions

1.4.0.0.4 Wu and Bowe (2012)

The disclosure build by the author is used to capture the effect of disclosure onto depositors in China. 15 subcategories compose the index covering financial performance, deposit and income.

1. Loans
   a) Loans by maturity
   b) Loans by type
   c) problem Loans

   d) Investment

2. Other Earning assets.
   a) Investment by maturity
   b) Deposits with other parties
3. Deposits
   a) Deposits by maturity
   b) Deposit by type of customer
4. Other funding
   a) Long-term funding
5. Memo lines
   a) Reserves
   b) Capital
   c) Contingent liabilities
   d) Letter of credit and guarantee
6. Income Statement
   a) Non-interest income
   b) Loan loss provisions

Disclosure index for non financial firm

- C1: THE ATTITUDE TOWARDS THE CORPORATE GOVERNANCE
  - C1.1 The existence of a reference towards CG
  - C1.2 The existence of a commitment towards CG
  - C1.3 The existence of a special column dedicated to the corporate governance

- C2: INFORMATION REGARDING THE STRUCTURE OF THE OWNERSHIP
  - C2.1 Ownership structure
  - C2.2 Shareholder type (individual investors, institutional investors, shareholding by nationality etc)
  - C2.3 The list comprising the significant shareholders
  - C2.4 Information about Corporate group structure
- C3: THE RELATION WITH THE INVESTORS
  - C3.1 Number of issued stocks and their nominal value
  - C3.2 The transaction value
  - C3.3 Information regarding the transaction
  - C3.4 GMS convening notice
  - C3.5 Attorney form
  - C3.6 GMS decisions
  - C3.7 Information regarding the dividends
- C4: FINANCIAL TRANSPARENCY
  - C4.1 Annual report
  - C4.2 Half-yearly report
  - C4.3 Quarterly report
  - C4.4 The report of the audit firm
- C5: INFORMATION REGARDING THE COMPANY BOARD
  - C5.1 List of Board members
  - C5.2. Details of the current occupation of the members of Board
  - C5.3. Details on age, studies, experience
  - C5.4. Details of role and functions of the board of directors

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  - C5.10 Details of the shares owned by the Board
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- C6: ROLE OF STAKEHOLDERS IN CORPORATE GOVERNANCE
  - C6.1 Clients – details of the offered services / products
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  - C6.3 Made or planned investments
  - C6.4 Information which is of interest for the employees (employments, wage system policy, information regarding the syndicate etc)
  - C6.5 Information regarding environmental problems
  - C6.6 Declarations concerning the social responsibility of the corporation

Chapter 2: Sovereign downgrading and impact on banks CDS spread: does disclosure improve stability?

Chapter 2

Sovereign downgrading and impact on banks CDS spread: does disclosure improve stability? [1]

2.1 Introduction

The European crisis has raised major concerns about the solvability of some countries and about the solvability of some banks. In the European Union, euro members and none members, the European Central Bank (ECB) and the European Banking Authority (EBA) have decided to create stress tests to prepare banks to an eventual scenario and to help them while reacting to an emergency situation. After the conduct of those tests in 2010 and 2011, the ECB and the EBA decided to disclose the results of those tests to inform investors and customers about the current situation. The publication was accompanied by the disclosure of all the data collected during the tests and are available to everyone on the EBA's website. The recent crisis has weakened banks and countries in the European Union right after the subprime crisis of 2007, offering us opportunities to analyze the

[1]This chapter led to a publication in the Revue Economique number 2016/5 Vol.67. The authors are thankful for the comment emitted during the 32nd Journées de microéconomie appliquée, during the 32nd International Symposium of the European Research Group "Monnaie Banques Finance" and the comment issued during a Seminar in CRESE (Université de Franche-Comté). The authors are also thankful for the anonymous referees.

behavior and the solvability of those banks. The previous financial crisis enlighten a lack of disclosure and transparency in the management of the crisis by banks and have forced regulation authority to review the international agreement in order to restore and maintain stability in the banking sector. As a result of, the new Basel 3, and Basel 2 Pillar III before it, agreement prerogatives emphasize the necessity of disclosure and market discipline in order to avoid similar situations.

The main issues of the recent European crisis are diverse. The first issue concerns the European Union. It is the first resilience test for the European Union as a whole and for the unique currency. This concern by itself can justify any economical research but it is not really the purpose of this chapter. The second issue concerns the probability of default of a developed country. For the first time, the term "risk-free" investment into government bonds is reconsidered. The fact that more and more countries are being downgraded to very low grades can make us reconsider the question. The reconsideration of the term "risk-free" for government bonds have a deep impact on bank solvability and the probability of default of the bank holding such debt. The sovereign downgrade has an impact on the bank risk portfolio especially in the European Union because national banks hold national debt. This concern also raises another problem: can deeply in debt countries bail banks in financial difficulties the same way government did during the subprime crisis and the recent one? This problem has important consequences on the solvability of banks in delicate, temporary or not, financial situation especially when domestic banks are the more likely to hold domestic sovereign debt. The combine effect of "no bailing" and "higher risk" assets can be harmful for the interconnected banking sector. The last issue of the recent years concerns the disclosure around the situation. The EBA and the ECB decided to enable access to the public to the results and the data used for the resilience tests (called here stress tests) conducted for the year 2009, 2010 and 2011. Such disclosure behavior has great purposes for research and provides reliable data to conduct empirical studies. The decision to publicly disclose data and results of those stress has also played an important role on banks communication policy, especially regarding their disclosure to sovereign exposure. All of the collected data will be used to understand the effect of disclosure on banking stability. The decision to disclose is new during period of financial

disturbance. This decision and the fact that the macroeconomic situation in the EU is unstable motivates us to conduct analysis on the impact of disclosure on the banking sector.

In the following chapter we analyze the relationship between disclosure and bank's credit default swaps (CDS) spreads during the European sovereign debt crisis thanks to the data obtained from the European Banking Authority and assess its impact on the evolution of the CDS spreads when controlling for bank sovereign exposure to the different banks and countries participating in to the EBA stress tests. All of the concerns stated earlier are used to guide our research around the following questions: does disclosure reduce the fluctuation of the CDS spread? If not, does it affect positively or negatively the spread of the CDS? These questions are important in a situation of financial disturbance: the impact of disclosure on volatility can be relatively different from an environment where the financial environment stable to a period of financial crisis. The impact of disclosure on the volatility of derivative assets, and the answer to those questions, are our main purposes and motivations for the conduction of this study. With regards to the literature, we are firmly convinced that disclosure has an impact on the banking sector and conducting an analysis about it was an important motivation to us in order to understand the mechanism lying behind disclosure and evolution of a financial asset. Another motivation to conduct this analysis can be found in the fear of a systemic crisis. We started this analysis on the end of the sovereign debt crisis, where the risk of systematic risk was far from the highest level (the one from 2010-2011): by understanding the mechanism of disclosure and its impact, we could use the conclusion obtained here if a similar crisis occurs again and therefore avoid potential systematic crisis on the banking sector. The presented chapter contributes to the literature regarding EU capital exercise.

analysis shows that bank in the Eurozone are more likely than other banks, to see their CDS spread increase during this period and that disclosure can have different results on stability: global disclosure seems to have a more negative impact on stability than specific, oriented, disclosure which has a positive impact on reducing volatility of the spread. Most of the results obtained here are consistent

with the theoretical and empirical literature about the relationship between disclosure and investors governance. The originality beyond this chapter are several. First, this analysis brings the creation of a new disclosure index based on the study of the yearly report. The index rewards banks that are the most transparent based on our selected criterion. The second originality in this chapter comes with the use of the bank CDS spreads instead of equity or bonds. Most of the empirical literature related to disclosure focus on equity or bonds and the choice of using CDS spreads provides originality to justify research in this field.

The chapter will be divided as follows. The second section reviews the existing literature about disclosure, disclosure policies and CDS: the section is provided in addition to the chapter 1. We present also our hypotheses beyond our analysis in this section. The third section describes the empirical strategy and the data set. The fourth section presents the results obtain, while the fifth one concludes and brings further discussions for upcoming researches.

2.2 Academic litterature and theoretical background.

2.2.1 Academic Litterature

Before entering into the analysis of the relationship between CDS spreads and disclosure we need to review the literature, both theoretical and empirical, around disclosure, CDS spreads, sovereign debt, bank debt and default probability of banks. The following subsection will be developed the following way: first we are going to identify the literature about disclosure, then we will be investigating the literature on bank debt and sovereign debt, when the last subsection is presenting close literature to our to the bank CDS spreads and its relationship with sovereign exposure.

2.2.1.1 Effect of disclosure on financial market participants

Disclosure has been a prerogative of the different banking agreements since Basel 1. The recent literature concerning disclosure has evolved over the last years to integrate larger dimensions into the analysis. The following subsection provides the recent workaround and the recent useful literature about disclosure, in addition to what can be found in the first chapter.

Firms will not disclose all the information they have gotten about their conditions but will release partial information until the cost of disclosing is equal its benefits. Since disclosure is socially desirable, Frolov (2007), disclosure regulation is desirable only if voluntary disclosure falls short of the socially optimal level. This argument suggests that disclosure can lead to a presence of externalities. The externality argument covers many situations with spillover effects: a firm is likely not to recover all of the disclosing costs if the released of information serves also as a signal send to other market participants (e.g. competitors). Disclosure might then have a negative impact on the competitive position of the firm if its competitor benefits from the signal send by the disclosing process (Frolov, 2007). The solution to externality problem is then a mandatory solution for disclosure and is likely to dominate other solutions.

this situation where we suppose the voluntary disclosure level is below socially optimal level, we need to study if mandatory disclosure has benefited regardless to stability on financial markets. Most of the available literature has been done on stock market data or bond and not much on CDS market, and more generally on derivative markets. Baumann and Nier (2004) studied how the stock price volatility is affected in presence of disclosure. They studied how standard deviation of weekly returns for bank equity evolved regardless to a transparency variable and a whole proxy set of control variables. Their results suggest that disclosure and transparency is useful to investors because it reduces the rumor effect. By reducing the rumor effect, disclosure participates into the reduction of unwanted volatility. Since stakeholders prefer stability when calculating their expectations, disclosure reduces the undesired volatility. Disclosure reduces the

volatility and then, as we mentioned earlier, reduces the probability of a drop under the value leading to default of the subsequent bank (throughout its equity). Jirasakuldech et al. (2010) also studied the relationship between disclosure and the volatility of stock prices when facing an external shock. They show 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-price volatility. The empirical literature also proposes more research on the impact of disclosure. Tadesse (2006) focuses on the impact on banking stability when facing an introduction of mandatory disclosure. It shows a very significant negative relationship between disclosure and the probability of occurrence of a systemic banking crisis. This finding is valid for any macroeconomics control variable used in the model, especially variables that translate instability in the real economic sphere. This result is very important for the core of this chapter: the macroeconomic situation in the European Union at the moment when we were collected the data was strongly unstable. The author also insists on the necessity of having a quality vector of disclosure in order to have this kind of relationship, and not only a quantitative vector of disclosure. This conclusion is extremely relevant. The introduction of Basel 3 came along with the introduction of new prudential recommendations for banks regarding disclosure. Most of the new disclosure tools are quite complicated to understand, even for someone acquainted with the topic. This statement is more valid for depositors than for some other branches of bank governance. Choosing simpler tools or more qualitative tools is important in order to grant stability on the sector where disclosure is introduced. Akhigbe and Martin (2008) also demonstrated the existence of a negative relationship between transparency, governance and risk variation. The authors are focusing on the different kind of risk and provide an extensive analysis of the cost of disclosure and its relationship with the reduction of all kinds of risks: disclosure decreases individual risk, systemic risk and also total risk. The two previously mentioned articles provide detailed policy implications about the necessity of having disclosure policies. The disclosure policies participate into creating market discipline where at some point the voluntary disclosure will out reach the potential effect of the mandatory disclosure (Baumann and Nier (2004)).

The closest article to our analysis is Bischof and Daske (2013) which studies the consequences of supervisory disclosure of proprietary bank specific information such as credit risk exposure and stress-test simulations. First they analyze how mandatory supervisory disclosure interacts with banks. 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 stakeholders, 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 (2010)) and is also consistent with the literature which examines the 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).

Finally, based on an American sample of banks, Neretina et al. (2014) shows that disclosing results of stress tests lead to a reduction of the CDS spreads of participating banks. Meanwhile, with a long-term perspective, a correlation exists with disclosure and a reduction of systematic risk. Disclosure leads to a change in the risk behavior with lower risk incentives and lower systemic risk. In addition to empirical papers, the theoretical literature shows interesting results about the impact of disclosure on the financial market. Vauhkonen (2011) shows that the impact of mandatory information disclosure on bank safety in a model of banking competition in which the bank probability of continuing its activity depends on the quality of its risk management and measurement systems. In the model, banks collect deposits and invest them in a loan project with variable quality. It shows, under the scenario of partially or fully observable health information about the bank imposed by mandatory requirements (for e.g. Basel 2 Pillar 3), disclosure lowers the cost of outside equity and fosters bank's quality competition. Such result has important consequences where bank competition become safer and avoid behavior which could be harmful to the financial market stability. 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. It also shows disclosure reinforcement enhances the benefits of the use of other regulatory tools such as capital requirements. Cordella and Yeyati (2002) also studies the impact of disclosure on disciplinary effect. The article also analyzes the banks' risk-taking behavior under different assumptions about dissemination of information. The model uses a spatial competitive framework as of Salop (1979) where two kinds of competitions are possible: national and foreign. All of the banks are fully financed by deposits and banks chose to invest in a pool of risky projects. Depositors can assess the financial information of the bank to monitor banks probability of default. Their results show 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 and therefore under disclosure rules. Informed depositors participate to an increase in stability through the modification of the risk management.

The recent changes in the disclosure literature provide incentives to impose more mandatory disclosure in order to ensure market discipline.

2.2.1.2 Soverreign debt exposure and stress-tests

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 is 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 tests of the proposed by the EBA was then publicly disclosed and the test of 2011 provided more intelligence about the exposure to financial institutions, corporations, retail customers and sovereign exposure.

Grilli, Masciandaro and Tabellini (1991) shows evidence there are different paths of sustainability for public debt: sustainable paths which do minimize the distortionary effects of taxation and the unsustainable paths which do not participate

in to minimizing the distortionary effect of taxation. The articles investigate the reasons of government deficits (form of the democracy, political stability, etc.) and therefore government debt over 12 countries located in the European union and 5 other large countries (US, Japan, New Zealand, Canada and Switzerland). It provides conclusions about the different paths of the different participating countries where each country had to face heterogeneous economic incentive leading to a variety amount of debt. The results of this article, especially concerning inflation and the short-lived government, have important implications for the ongoing debate over the feasibility and appropriate sequencing of the European monetary integration and the regulation authorities must reinforce the regulation criterion to avoid a risk to stability of the financial sector if governments would fail to service their public debt.

The risk of government default in the EMU has been a chronic fear over last decades and the Maastricht criterion were purposely introduced to limit those fears. 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 are larger than their capital (Arnold (2012)). Goodhart (1997) argues the EMU alters the risk profile of public debt due to the loss of monetary sovereignty of central government. The right to print money to pay off domestic debt has been 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 was 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 would have been relevant.

Arnold (2012) shows the relationship between sovereign risk and banking risk during the recent European sovereign crisis. The article tries to address the ques-

tion if information provided, by market valuations prior to the stress tests, to stakeholders was sufficient enough to trigger effect on the market and if the new data released with the stress test add up to the information available to investors. It uses the data provided about the sovereign exposure of July 2010 in the EBA stress test. To investigate whether heavily exposed banks were hit harder during the crisis in May 2010, at the peak of the EBA release. The results of the article are mixed. Banks exposed to distress sovereign debt are also the one responding more to a change in sovereign CDS rates and appears to be driven by fixed effects on banks located in country in crisis[6]. 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 banks and all the spillover risk which come with. The sovereign risk has a positive impact on banking risk according to Arnold (2012).

Bischof (2012) provides in its analysis an important feature about the relationship between stress-test results and subsequent reduction in sovereign risk-taking by a bank. His findings show that negative stress-test results are associated with a subsequent reduction in sovereign risk taking. Enhancing the efficiency of supervisory disclosure as a prudential tool. The market discipline is made possible with the action of disclosure on the reduction of sovereign exposure by the use of the stress test publication. The stress test on sovereign exposure can then be used as a prudential tool to ensure the stability of the financial sector.

De Bruyckere et al. (2013) also studies the spillover 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 defined as an excess of correlation between banks and sovereigns using CDS spreads at the bank and at the sovereign level from both sides either from bank to sovereign or the opposite. The article also explains which channel is more sensitive to drive the contagion from sovereign to banks. The article shows significant empirical evidences where contagion between bank and sovereign credit

[6]During this chapter, banks located in these countries (Greece, Ireland, Portaugal and Spain) will be refered to ICC

risk exists especially at the emergence of the debt crisis in 2009 where significant spillovers for 86% of the banks in the sample is visible in 2009. In the meantime, several critical channels of contagion are identified. It exists a strong home bias in banks' exposure where domestic banks hold mostly domestic sovereign debt. And finally the last finding of this article is imputable to short term funding sources. The higher a bank relies on short term funding the higher the spillovers between sovereign risk and bank risk are. All of the results provided here suggest that the stress test adds new information for stakeholders and show a market reaction to stress test.

Petrella and Resti (2013) also proposes to analyze the impact of supervisors test as an information tool on bank stock prices in 2011. The article tests several hypotheses about the impact of stress tests. The first hypothesis tested assess the question of relevance of such information for market participants and if the answer to this question was positive, what was driving such result? Historical data or resilience indicator? The results of this article suggest that market participants significantly react upon disclosure of the stress-test results. Stress tests do reveal new information which was not already accessible to stakeholders 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 contributes to the existent literature by showing empirical evidences on the benefits, for investors, of stress tests providing information in order for them to better understand the risk and value of the bank. It also provides important policy implication on the debate of disclosing stress test results.

Academic literature about sovereign debt and stress has both shown important results where sovereign debt has contagion risk with the banking sphere in Europe partially due to the EMU and where the stress tests provide enough information to drive market participants reaction to the disclosure of such intelligence.

2.2.1.3 Bank's CDS, probability of default and market efficiency

The relationship between CDS spreads and default probability have been largely investigated over the last decade, for either the financial sector or even for the corporate sector. The following subsection will be overlooking the relationship in the recent empirical literature. This subsection will also deal with the contagion effect during the European sovereign debt crisis.

Amato (2005) analyzes the relationship between the risk aversion and the risk premiums in the CDS market. As mentioned earlier, the credit default swap (CDS) spread compensates investors for unexpected losses, throughout the risk premium. The risk premium provides enough information to study the behavior of investors and its potential risk aversion. The author used data for the period 2002 until 2005 to measure the relationship between the risk premiums and the risk aversion on the CDS market, while investigating for the main determinants of risk premiums in the CDS market. The results of this article suggest that default risk premiums and risk aversion are strongly related to fundamental factors, such as indicators of the real economic activity and the stance of monetary policy, a technical market factors, such as issuance of collateralized debt obligations (CDOs). The results are similar to the one obtained by Berndt et al (2005).

Norden and Weber (2004) analyzes the response of stock and credit default swap markets to rating announcements by the main rating agencies during the 2000-2002. They applied traditional events study methodology to examine whether stock prices and CDS markets responded to rating announcements during the ongoing period for corporate financials and sovereign entities. Ratings announcements were collected from the three major rating agencies: Standard & Poor's, Moody's and Fitch. They used both actual rating changes and the different reviews coming aside with the rating announcement. The findings in this article suggest that market is able to anticipate both rating downgrades and reviews for downgrade by all rating agencies if taken separately. On the other hand, neither market shows any significant response to positive changes in ratings. But most importantly, on a combined analysis of different rating events within and

across agencies, the authors show that the stock market and CDS market exhibit a significantly negative abnormal return on days of reviews for downgrade from Standard & Poor's and Moody's, whereas actual downgrades are only showing signs of abnormal performance for the CDS market. The magnitude of abnormal performance in both markets is influenced by the level of the old rating, previous rating events and, only in the CDS market, by the pre-event average rating level by all agencies. In this article we can see that the change in the CDS spread is not related to the macroeconomic environment but also due to the individual outcome.

Arnold (2012) analyzes the relationship between sovereign risk and banking risk during the European sovereign debt crisis in May 2010. They used a dataset of 51 banks European banks with listed CDS spreads, which participated to EU stress test of 2010. The author analyzes the relationship between bank's stock returns and CDS rates to sovereign CDS. The main objective of this study was to examine the spillover effect of sovereign risk onto the banking system in the EU. They also used the sovereign exposures of the listed bank in the European stress test from 2010 to assess if heavily exposed banks were more likely to be hit harder during the sovereign debt crisis. The results obtained in this article are mixed. Bank mostly exposed to countries in distress respond more to changes in the sovereign CDS rate. This result appears to be driven mainly by banks which are located in countries experiencing sovereign debt problems. Banks in those countries are more sensitive to such changes because the sovereign debt problem tends to limit the government's ability to bail out banks asking for help. Meanwhile when the author controls for this risk factor, the power of information of the exposure, in the stress test, is greatly reduced. The author also insists on the fact that such disclosure of sovereign debt exposures adds information to the market, leading to interesting policy implication where government would not have to bail banks when bond market is unstable.

Acharya et al (2014) shows positive relationship between the bailout decision of the financial sector and the sovereign credit risk. Bailout claims are associated with an immediate increase of the sovereign CDS spreads and to a diminution of the spreads of bank CDS. In the mean time, right after bailout announcements,

the authors observe a positive and significative co-movement between banks CDS spreads and the sovereign ones. Alexandre and Wang (2015) shows more dubious results. The co-movements between banks CDS spreads and sovereigns are not as strong as the ones explained by Acharya et al (2014): those movements are only significant for Belgium and Greece.

Carboni (2011) studies the sovereign CDS market from 2 perspectives. First, it analyzes the relationship between CDS and bond spread and then secondly, the relationship between CDS spreads for sovereign and corporate entities using CDS indexes and individual spreads for both the sovereign and the banking sector. The results suggest that the relationship between sovereign CDS and bond spreads offers several useful indications. First, the credit risk indicators do not follow the same course in the long run. For the short term, the result suggests that one market has a predictive effect on the other one, with a two-way relationship. The credit risk seems to be led mainly by the CDS sovereign market during 2010, especially for higher spread countries.

2.2.2 Theoretical background

The main purpose of this analysis is to investigate the impact of disclosure on the evolution, and stability, of bank CDS during the period 2010-2013. Several results can be seen in this analysis, both the sovereign downgrade announcements and the publication of the EBA results can make the CDS market fluctuate. If disclosing stress tests results or disclosing a change in a sovereign rating provide information, the different stakeholders will react based on their expectation and adjust their future actions. The impact of such disclosure is visible through the evolution of the subsequent asset (here the CDS spread): if the price of the spread goes up or down, the disclosing process provided enough information to the different stakeholders. On the stock market, an increase of disclosure participates into the reduction of the information risk premium and reduce the modify the risk premium, depending on the quality of the signal. In case of a negative quality signal, the premium goes up and in case of a positive outcome the premium is reduced. The same argument is also valid for the CDS market, or the bond market.

The information given or disclosed by the bank on its sovereign exposure can also have an impact in the evolution of the CDS spreads. By disclosing information more regularly, a bank can reduce or even cancel the informative purpose of "public" disclosure such as the publication of the stress tests results. On the other hand, if both the "private" disclosure and the "public" disclosure provide valuable information, then participating agents are responsive to any kind of information and both disclosure have combined effect on the evolution of the CDS spread. The stakeholders are then considered rational. There is no "over" reaction when the participating agents are already informed. Banks can also provide different information than the one related to sovereign exposure, this would have an impact on the stakeholder reaction to the intelligence provided by the EBA. If the results of the EBA whichever the quality of the signal, stakeholders will not react too strongly to such information if the bank is known to its stakeholder to be transparent. In other words, the information provided by such tests are not impacting the stakeholders decision-making process. All of the scenarios can provide interesting policy implication and motivates us to conduct research in this direction.

The different rating agencies publically and frequently disclose press reviews when a change in the credit rating of a country is happening. The point of disclosing such information is to inform all of the market participants on the risk of such asset. It informs the bond buyers (typically a bank) and the stakeholder (of the same bank). If the downgrade or the upgrade of a credit rating has an impact on the spread of the CDS, then this disclosure process provides information that was not already known or anticipated by the participating agents. A change in the spread is explained by a change in the information risk premium and in the non-informative risk premium. A downgrade should increase the risk premium of the entities buying the downgraded asset due to an increase of the probability of default. The information provided by such announcement plays a role on the aversion for uncertainty. More information reduce the uncertainty, and therefore the aversion itself. The disclosure also increases the liquidity of the asset when the signal emitted is able to reassure stakeholders. The inverse effect is also possible when the signal is not.

Most of all, the purpose of this chapter is to analyze whether or not disclosure increases stability on the CDS market. The following sections will be oriented around the role of disclosure as part of the market discipline on the financial market. The idea is then to study if the spread varies less at the surroundings of a downgrade announcements if the participating agents are more informed. A large part of the theoretical literature on disclosure is devoted to the stock market and we will try to apply it to the derivative market. The following subsection is devoted to the empirical literature that helped us for this analysis. It will present the empirical results concerning disclosure, the sovereign risk and the relationship between CDS spreads and probability of default.

2.2.3 Testable hypothesis

The stress test created by the regulation authorities are designed around possible scenario close to real macroeconomic situations. Such test can assess the resilience of the banking sector, and the resilience of each participating bank. 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. If the bank that discloses the most have the smallest reaction, then disclosure is an enhancer of financial stability on the CDS market. The CDS spread is an indicator which translates the risk of the bank, through the probability of default.

- *H1:* disclosure has stability effect over the CDS spreads

This hypothesis is the core hypothesis of our research project and the one which driven us to conduct such research. The policy implication of such result is important and justify this research. 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 the bank has provided important regulation features. Contrary to evolution, stability contributes to the achievement of high levels of financial activity. On the other hand, if disclosure is shown has not enhancing stability it is interesting to see if disclosure participates to a reduction

or an increase of CDS spread. This result also has a significant importance and significant policy implications. Two scenarios would, then, be offered to us: the first one concerns the capacity of disclosure to be an enhancer of stability or to provide a reduction of the CDS spreads which lead to a reduction of the probability of default.

We are also investigating here the modification of the information premium through the question why information disclose by a bank, about sovereign exposure or not, might have an impact on the subsequent CDS spread? If the bank decides to disclose more information about its exposure to a variety of sovereign debt, we are going to analyze if the bank just brings complement information to the EBA results or if it is the opposite. A negative link between bank specific disclosure about sovereign exposure and the evolution of the CDS spread would tell us that the result of the EBA does not bring significant information. On the other hand, if there is a positive link between an increase of specific sovereign debt disclosure and the evolution of the CDS spread, it would actually give us information about stakeholder behavior: stakeholders react to any kind of information even if they already have some incomplete information. For some reason, if the CDS spread is significantly reactive to a different kind of disclosure, not related to sovereign exposure, it would mean that stakeholders reaction is dependent on the global disclosure of the bank. In case of a negative significant link between disclosure, not related to sovereign exposure, it indicates that stakeholders react more rationally when they already have access to similar information.

- *H2:* disclosure related to sovereign debt has stability effect over the CDS spreads

The result of such hypothesis has also great policy implication. In a situation where all the light is on sovereign debt, it can provide incentive to decision makers to reinforce the regulation around disclosure and to force disclosure to be more oriented on the cause of the financial disturbance. Such result would probably help the future research around the question of disclosure when the benefits of disclosure has not yet been well entrenched.

For our research 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 regardless to the country emitting it. Those results, and the fact that they are publicly available, have an impact on the behavior of participating actors. Different stakeholders are going to react to such disclosure of information if they consider that the EBA stress tests results brings significantly more information than what they already have. In the case where we have an increase in the amount of information given by the tests, stakeholders will react and the spread of the CDS will be modified. The quality of the information can also affect the evolution of the CDS spread: if the information is positive, the CDS spread will tend to decrease due to a reduction of the informational premium or the opposite if the information is sending a bad quality signal. On the other hand, the test can also not bring enough information leading to a null evolution of the CDS spread.

- *H3:* sovereign debt exposure has a negative impact on the CDS spreads.

If we accept the hypothesis, the policy implications for supranational supervisors could force banks to diversify more their portfolio of sovereign debt (especially for banks largely holding national sovereign debt) or can impose a conversion system to guarantee those debts even if they got downgraded.

The recent literature, provided in the previous subsection, has brought interesting results to the impact of disclosure and we are hoping this analysis will also bring interesting results on the relationship between disclosure and CDS spreads during period of financial disturbances. The following subsection will detail more our empirical strategy and the model used for our analysis.

2.3 Data set

2.3.1 Events used

2.3.1.1 Chronicle of the sovereign crisis

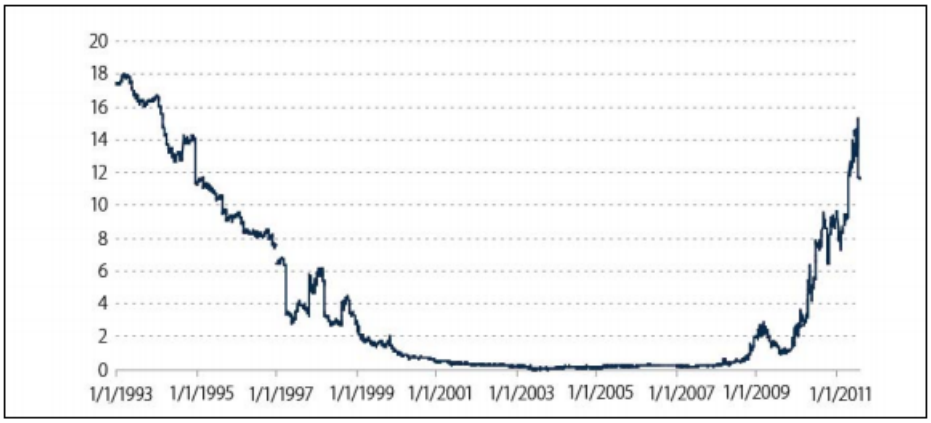
Before going any deeper in this section we are going to reassess the historical process of the so-called crisis. First we have to understand the link between banks and government deficit. When a government is facing a deficit in its budget, it has two possibilities in order to make sure its expenses are covered: increase taxes or emit treasury bonds to finance that deficit. Since the Maastricht treaty, the central bank is not allowed to directly purchase those bonds, from its national government, then sold to other buyers. With this treaty those bonds are now purchased by commercial banks and other investors. The transmission link between banks and government debt is nowadays more direct. The process of emitting treasury bonds in order to finance a deficit is not a recent procedure but the recent financial crisis has shown that the process of financing can cause problems. A macroeconomic shock stroke the Eurozone right after the publication of the, newly elected, Greek government. By December of the year 2009, Greece admitted its debts had reached more than 300 billion euros: the country was burdened with debt amounting to 113% of its GDP, nearly the double of the EURO ZONE limit of 60%. Rating agencies started to downgrade Greek banks and the sovereign debt, while Mr Papandreou[11] insisted that his country is "not about to default on its debts." In January 2010, an EU report from the EU's statistical office, 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 the potential rumor effect, the European Central Bank (ECB) dismissed several rumors which were arguing that Greece would have to leave the Eurozone, leading euro members into a communautary trust issue. 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 (ICC), started to raise con-

[11] Greek Prime Minister on December, 11th 2009.

cerns 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. [12].

During the second quarter of the year 2010, the EURO ZONE members agreed to provide a second safety 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 borrowing costs to reach record high, up to 15% interest rate for 10 years maturity bonds. The following chart shows us the large change in Greek sovereign debt cost over the last 15 years. Its cost increased so much, that it started to become unsustainable.

Figure 2.1 : Greek Bond Spreads, 1993-2011



Source: Global Financial Data.

On April 22th, 2010, The European Commission announced that the Greek deficit is even worse than thought after reviewing its accounts: net deficit was near to 13.6% of its GDP for the year 2009 instead of 12.7%. Amid growing speculation around a failure of Greece to honor its sovereign debt and in order to avoid new downgrade, on May 2nd, the Eurozone members and the IMF finally agreed on a 110 billion euros bailout package to rescue Greece and stabilize the European

[12]During this period, the austerity plans spark strikes and riots all over Greece

macro-economic environment. During the entire year, the value of euro currency continued to fall by comparison to the USD as a consequence of the financial situation in the Eurozone and 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 (toughest of the country's history) on November 28th. During 2009, the ECB and the IMF bailed out two countries and spend over 250 billion euros in order to avoid default of one of its members, while growing speculation, strongly dismissed by the EU, announced that Portugal will soon need to be bailed out. The year 2010 was somehow the most difficult year for the unique currency since its introduction in 1999.

The year after, seemed to be just as tense as the previous one for EU members decision makers. In January a new member, Estonia, joined the euro currency and rose up the number of countries with the single currency to 17. February saw the implementation of a permanent bail-out fund for the region: 500 billion euros called the European Stability Mechanism (ESM). Portugal soon admitted it cannot handle its financial situation and asks the EU for help which was granted for 78 billion euros 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: the country would have likely defaulted without the plan. In July, 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. The end of 2011 was still tense, Greece received a second bail-out package for more than 109 billion 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 it would be buying Italian and Spanish government bonds[15] to try to bring down their borrowing cost, with a concern growing that the sovereign debt crisis might spread to the larger economies of Italy and Spain. At the same time, the G7 group

[15]By this mechanism, the ECB hoped that investors would reevaluate their demand returns to borrow since the debt would be "guaranteed" by the central bank

Figure 2.2 : EU-IMF Assistance for Greece, Ireland, and Portugal

	Date Agreed	European Financial Assistance	IMF Financial Assistance	Total Financial Assistance
Greece	May 2010	€80 billion (about $115 billion)	€30 billion (about $43 billion)	€110 billion (about $158 billion)
Ireland[a]	December 2010	€45 billion (about $65 billion)	€22.5 billion (about $32 billion)	€67.5 billion (about $97 billion)
Portugal	May 2011	€52 billion (about $75 billion)	€26 billion (about $37 billion)	€78 billion (about $112 billion)

Source: IMF press releases.

Notes: Figures may not add due to rounding.

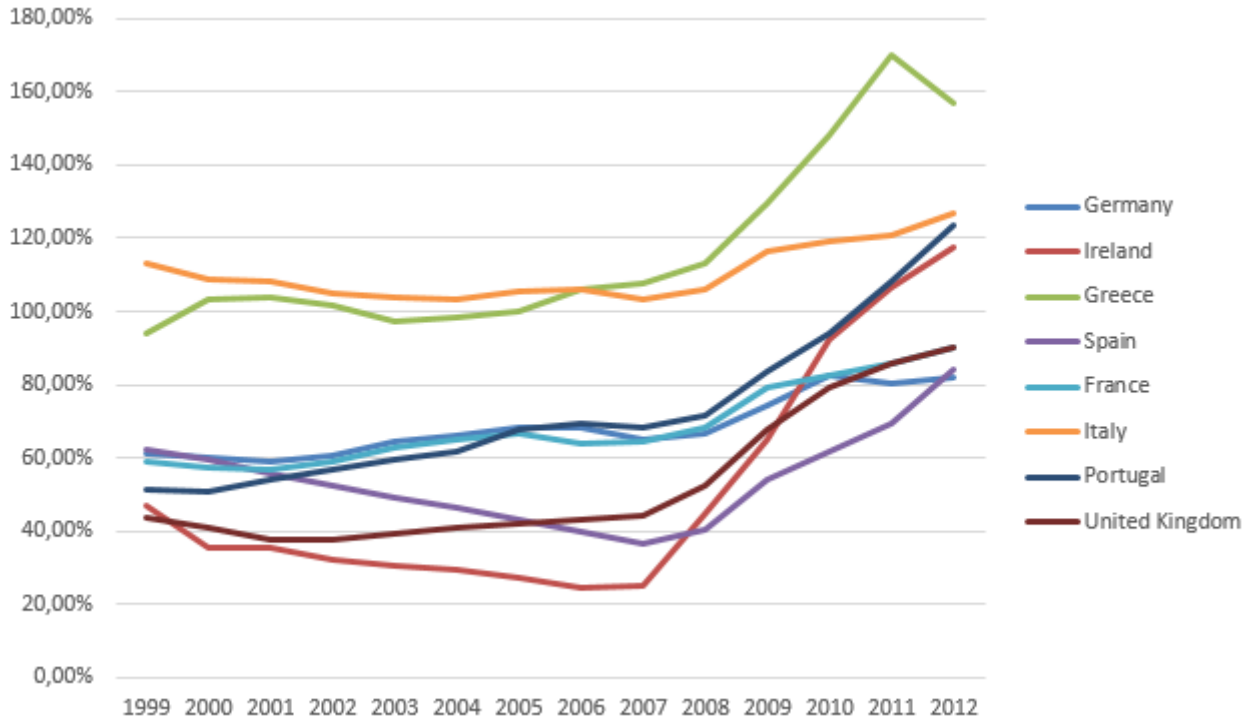
of countries also says it is "determined to react in a coordinated manner", in an attempt to reassure investors in the wake of massive falls on global stock markets. With this unity, the G7 group is hoping to reduce tension on sovereign debt market and hoping rating agencies would reevaluate their rating on the weakest EU members, while the strongest would back them up. The month of September is full of austerity measure in Spain and Italy, respectively adding a "golden rule" to the constitution and a 50 billions euro 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 of central banks to avoid economic 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. EU members summit on the debt crisis is delayed by a week but continued its efforts to find a solution to the debt crisis in the EURO ZONE. 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 in its whole can be considered as less unstable than the two previous one but the beginning of it had also a lot of implications: fewer downgrades

were announced and the communication around the struggle from members of the European Union, European Commission and the ECB are largely diminishing. The government of each country member of the Union have reinforced dialog and policies in order to avoid such shock in the future. On January 13th, Standard & Poor's (S&P) downgraded France and eight other EURO ZONE countries, blaming the failure of EURO ZONE leaders to deal with the debt crisis. France and Austria both lost their AAA ratings while Germany's perspective is announced as positively stable by S&P. January also brought the signature of the "fiscal pact" by 25 members besides the UK and the Czech Republic. During the beginning of the year, weeks of negotiations ensue between Greece and the "troïka"[16] as Greece tried to get a debt write-off and make even more spending cuts to get its second bailout. Those negotiations will finally be passed by the Greek coalition government, leading to dramatic riots and protests all over Greece and more generally in Europe. The EU commission expected this year to be "economically rough" by predicting a contraction of .3% in 2012. The year 2012 will also be marked by the announcement of a better future for the European Union: the economic situation is getting better: official figures are showing that the EURO ZONE retail sales increased unexpectedly in January by .3% and is reported as a positive tentative sign of recovery. The rest of the year rhymed with increase in Italian and Spanish borrowing costs but none of those countries are asking for a bailout yet. Although, several banks are facing financial difficulties mostly in Spain, asking for their respective government for a bailout[17].

[16]European Commission, ECB and IMF

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



The figure above is provided as a reminder of the evolution of Government consolidated gross debt as a percentage of GDP for PIGS countries, France, the United Kingdom, Italy and Germany. It shows us that the 2007 crisis had consequences for all of those countries in the volume of their debt.

2.3.1.2 Downgrade events

Before deciding which downgrading even we would be using for the analysis, we collected information about the beginning of the Greek sovereign crisis. We investigated the historical background of the crisis in order to carefully define the event we will be using.

The financial, and the non financial newspaper, has been reporting this kind of event. Two possibilities are then offered to us: either live it and note the date of the downgrade or dig out news reports from a national or international newspaper database. The second option was chosen and we used the Europress.com database

to determine the exact date of each downgrade[19]. The news obtained from the gathering of the French newspaper (finance oriented or not) was useful to determine the chronology of the different downgrades announcement by three different agencies: we decided to only take into account the three major rating agencies Standard & Poor's, Moody's, and Fitch because of their visibility. Each rating agency has a different rating system: the following table provides a recapitulating table of the three different rating agencies used in the study.

Table 2.1 : Recapitulative table of rating agencies grade

Moody's		**Standard & Poor's**		**Fitch**		Rating description
Long-term	Short-term	Long-term	Short-term	Long-term	Short-term	
Aaa	P-1	AAA	A-1+	AAA	F1+	Prime
Aa1		AA+		AA+		High Grade
Aa2		AA		AA		
Aa3		AA-		AA-		
A1		A+	A-1	A+	F1	Upper medium grade
A2		A		A		
A3	P-2	A-	A-2	A-	F2	
Baa1		BBB+		BBB+		Lower medium grade
Baa2	P3	BBB	A-3	BBB	F3	
Baa3		BBB-		BBB-		
Ba1	Not prime	BB+	B	BB+	B	Non-investment grade speculative
Ba2		BB		BB		
Ba3		BB-		BB-		
B1		B+		B+		Highly speculative
B2		B		B		
B3		B-		B-		
Caa1		CCC+	C	CCC	C	Substancial risks
Caa2		CCC				Extremely speculative
Caa3		CCC-				Default imminent with little prospect for recovery
Ca		CC				
		C				
C		D	/	DDD	/	In default
				DD		
				D		

[19]The summary of each article downloaded can be find in Appendix 1

The rating agencies announced more than 65 sovereign downgrades over the period February 2011 to June 2013 in the European Union. The different rating agencies even announced several downgrades on the same day, reducing the 65 announcements to 56 unique dates. We detailed every downgrade per date in order to satisfy the third hypothesis of event studies. Each date, each downgrade, is detailed as follows:

- Country that was just downgraded.
- The magnitude of the downgrade.
- The name of the rating agency, which is downgrading
- The initial rating, before the downgrade.
- The rating after the downgrade.

After analyzing the different news report published in the European news report, we were able to define a first list of downgrades to which we will apply different criterion to limit our study horizon.

Table 2.2 : European countries sovereign debt rating downgrade

Date	Country	Magnitude	Downgrading Agency	Initial Rating	Final Rating
28/02/2011	Cyprus	2	Moody's	Aa3	A2
07/03/2011	Greece	3	Moody's	Ba1	B1
10/03/2011	Spain	1	Moody's	Aa1	Aa2
16/03/2011	Portugal	2	Moody's	A1	A3
29/03/2011	Greece	2	S&P	BB+	BB-
/	Portugal	1	S&P	BBB	BBB-
30/03/2011	Cyprus	1	S&P	A	A-
02/04/2011	Portugal	3	Fitch	A-	BBB-
05/04/2011	Portugal	1	Moody's	A3	Baa1
10/05/2011	Greece	2	S&P	BB-	B
20/05/2011	Cyprus	3	Fitch	AA-	A-

Date	Country	Magnitude	Downgrading Agency	Initial Rating	Final Rating
14/06/2011	Greece	3	S&P	B	CCC
05/07/2011	Portugal	4	Moody's	Baa1	Ba2
14/07/2011	Greece	3	Fitch	B+	CCC
14/07/2011	Ireland	1	Moody's	Baa3	Ba1
26/07/2011	Greece	3	Moody's	Caa1	Ca
27/07/2011	Greece	1	S&P	CCC	CC
11/08/2011	Cyprus	2	Fitch	A-	BBB
21/09/2011	Italy	1	S&P	A+	A
28/09/2011	Slovenia	1	Fitch	AA	AA-
05/10/2011	Italy	3	Moody's	Aa2	A2
07/10/2011	Spain	2	Fitch	AA-	A+
14/10/2011	Spain	1	S&P	AA	AA-
18/10/2011	Spain	2	Moody's	Aa2	A1
20/10/2011	Slovenia	1	S&P	AA	AA-
24/11/2011	Portugal	1	Fitch	BBB-	BB+
25/11/2011	Hungary	1	Moody's	Baa3	Ba1
08/12/2011	Belgium	1	S&P	AA+	AA
19/12/2011	Belgium	2	Moody's	Aa1	Aa3
21/12/2011	Cyprus	2	S&P	B	CCC+
23/12/2011	Hungary	1	S&P	BBB-	BB+
13/01/2012	Autriche	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
13/02/2012	Spain	2	Moody's	A1	A3
14/02/2012	Italy	1	Moody's	A1	A2

Date	Country	Magnitude	Downgrading Agency	Initial Rating	Final Rating
22/02/2012	Greece	2	Fitch	CCC	C
09/03/2012	Greece	1	Fitch	C	RD
27/04/2012	Spain	2	S&P	A	BBB+
18/05/2012	Greece	2	Fitch	A	BBB+
07/06/2012	Spain	2	Fitch	A	BBB+
13/06/2012	Cyprus	2	Moody's	A3	Baa2
01/08/2012	Slovenia	1	S&P	A+	A
03/08/2012	Slovenia	3	Moody's	A2	Baa2
08/08/2012	Slovenia	1	Fitch	A	A-
08/10/2012	Cyprus	3	Moody's	Ba3	B3
12/10/2012	Spain	2	S&P	BBB+	BBB-
19/10/2012	Cyprus	3	S&P	BB	B
19/11/2012	France	1	Moody's	Aaa	Aa1
22/11/2012	Cyprus	1	Fitch	BB+	BB-
03/12/2012	Andora	1	S&P	A	A-
06/12/2012	Greece	1	S&P	CCC	CCC-
12/01/2013	Cyprus	3	Moody's	B3	Caa3
22/02/2013	United Kingdom	1	Moody's	Aaa	Aa1
08/03/2013	Italy	1	Fitch	A-	BBB+
21/03/2013	Cyprus	1	S&P	CCC+	CCC
20/04/2013	United Kingdom	1	Fitch	AAA	AA+
30/04/2013	Slovenia	2	Moody's	Baa2	Ba1
17/05/2013	Slovenia	1	Fitch	A-	BBB+
03/06/2013	Cyprus	1	Fitch	B	B

For this analysis, we chose different kinds of events: first, when the magnitude is at least equal to three, then when a AAA country is downgraded (even if the magnitude is below 3), and finally when at a single date there is more than one country downgraded whichever the magnitude. By choosing only the events that have a larger magnitude, we eliminate the downgrades that are considered as ad-

justments: 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 fulfilled. For example: if Spanish economic forecast is supposed to be negative, and 6 months after the rating agency downgrade the sovereign grade ; then this downgrade is considered as an adjustment because it is supposed to be anticipated. We also avoid the consecutive announcement about the same country.

If we decide not to take into account, in our event analysis, downgrade with a low magnitude we need to make sure we take into account the downgrade of significant 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 larger countries and not only the countries in crisis [23]. By choosing to incorporate the downgrade of France, the United Kingdom or other AAA countries, it allows us to analyze sovereign debt that could have been considered as "risk-free", when non AAA countries would have been considered as "riskier".

We also integrate in this analysis, events that happened to have more than one downgrade on the same day. The only case used here is the event of January 13th, 2012 when S&P downgraded 9 European countries regardless. Those downgrades are the answer from S&P to European policy makers that judge that the initiatives taken in the recent weeks may be insufficient to fully address ongoing systemic stresses in the Eurozone

[24]. S&P downgraded the different countries to encourage them to pay more attention to their government deficits and, moreover, their sovereign debt. S&P tempted to encourage EURO ZONE 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.

"Today's rating actions are primarily driven by our assessment that

[23]Portugal, Ireland, Greece and Spain

[24]S&P press release published on 13-Jan-2012 16:36:27 EST
http://www.standardandpoors.com/ratings/articles/en/us/%3FarticleType=HTML%26assetID=1245327294763

the policy initiatives that have been taken by European policymakers in recent weeks may be insufficient to fully address ongoing systemic stresses in the eurozone. In our view, these stresses include: (1) tightening credit conditions, (2) an increase in risk premiums for a widening group of eurozone issuers, (3) a simultaneous attempt to delever by governments and households, (4) weakening economic growth prospects, and (5) an open and prolonged dispute among European policymakers over the proper approach to address challenges."

The list of events is now up to 16 unique dates around which we conduct our study. The events used here covers the following period: January 1st 2011 and will stop by the end of June 2013. The following list enumerate the different events selected.

Table 2.4 : Events selected

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

The definition and the guidance of the events are now set. We are going to take more time on the analysis of the data we are going to use for the event study. The following part will first present the data used and then will be added a static statistical analysis of the subsequent data. Once the data is presented, we will focus on the model used for the event study.

2.3.2 Sample

The following subsection will introduce the data we used and will be followed by an extensive statistical analysis about the datas.

2.3.2.1 Description

We use both Bloomberg, Bankscope databases in addition to the data from the different stress tests of the EBA. The Bloomberg database covers a large number of sectors worldwide, provides real-time and historical financial market data. The database also provides a large panel of analytic tools. The second database used, Bankscope[26] provides ratings, individual bank analysis and global financial statement.

We have in the sample 47 banks that have participated to both stress tests of 2011 and 2012 and that has CDS emitted in their name. The following table shows the list of banks used for our study.

Table 2.5 : List of bank used for the analysis

Name	**Location**	**Total Asset in million USD**	**World rank when available**
ABN Amro Bank NV	Netherlands	520 391	66
Allied Irish Bank PLC	Ireland	161 652	161
Alpha Bank	Greece	76 999	278
Banca Monte Dei Paschi Di Siena S.P.A.	Italy	288 801	107
Banco Bilbao Vizcaya Argentaria S.A. (BBVA)	Spain	841 516	38
Banco Comercia Português S.A.	Portugal	118 411	199
Banco De Sabadell S.A.	Spain	213 151	138
Banco Pastor S.A.	Spain	39 301	

[26]BUREAU VAN DIJK

Name	Location	Total Asset in million USD	World rank when available
Banco Popolare S.C.	Italy	174 062	157
Banco Popular Español S.A.	Spain	207 967	139
Banco Santander S.A.	Spain	1 675 192	16
Bank Of Ireland	Ireland	195 469	146
Bankinter S.A.	Spain	81 066	279
Barclays PLC	United Kingdom	2 352 449	7
Bayerische Landesbank	Germany	378 444	
BNP Paribas	France	2 516 546	5
Caixa Geral De Depositos SA	Portugal	140 858	163
Caja De Ahorros Y Pensiones De Barcelona	Spain	473 821	74
CommerzbankAG	Germany	839 000	39
Crédit Agricole	France	2 430 876	6
Danske Bank	Denmark	615 854	55
Deutsche Bank AG	Germany	2 655 138	3
Dexia	Belgium	471 315	
DnB NOR Bank ASA	Norway	361 480	94
Erste Group Bank AG	Austria	282 127	
HSBC Holdings PLC	United Kingdom	1 286 857	24
ING Bank NV	Netherlands	1 103 138	29
Intesa San Paolo S.p.A.	Italy	888 603	34

Name	**Location**	**Total Asset in million USD**	**World rank when available**
Irish Life And Permanent	Ireland	53 990	393
KBC Bank	Belgium	296 641	103
Landesbank Baden-Württemberg	Germany	443 760	
Landesbank Hessen-Thüringen GZ, Frankfurt	Germany	262 965	
LLoyds Banking Group PLC	United Kingdom	1 487 761	18
National Bank Of Greece	Greece	138 275	173
Norddeutsche Landesbank -GZ	Germany	297 599	
Nordea Bank AB (publ)	Sweden	893 665	
Rabobank Nederland	Netherlands	992 756	31
Raiffeisen Zentralbank Österreich AG	Austria	192 578	
Royal Bank of Scotland Group PLC	United Kingdom	2 026 628	11
Skandinaviska Enskilda Banken AB (publ) (SEB)	Sweden	377 194	88
SNS Bank NV	Netherlands	107 324	208
Société Générale	France	1 650 212	17
Svenska Handelsbanken AB (publ)	Sweden	366 508	92
Swedbank AB (publ)	Sweden	283 936	110

Name	Location	Total Asset in million USD	World rank when available
Unicredit S.p.A.	Italy	1 222 889	26
Unione Di Banche Italiane SCPA (UBI BANCA)	Italy	174 738	156
WestLB AG, Düsseldorf	Germany	130 282	

The chapter analyzes the CDS spreads of banks over the period 03/01/2011 and 30/06/2013. As a reminder the CDS spread translates the probability of default of the emitter of the subsequent CDS: the higher the value of the spread, the riskier the emitter is. The explanatory variable is here the fluctuation of the CDS spread over time, we use the cumulative abnormal variation (CAV) of CDS. The abnormal variation$AV_{b,t}$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 also reduces the country-specific effects, reducing de facto the effect of large abnormal returns. The use of this index also provides originality to this analysis. We used the following method to compute the CAV:

$$CAV_{(-x),(+x)} = \sum_{i=t-x}^{t+x} (CDSspread_{(i,b)} - CDSindex_i) \tag{2.1}$$

where t is the date of the event and b the subsequent bank. For each one of the 16 events, we determine the CAV over four different window in the neighborhood of the date of the event:

- $CAV_{-5,+5}$ compute cumulative abnormal return over a period of 11 days: 5 days before the event, the event day and 5 days after the event.

- $CAV_{-2,+2}$ compute cumulative abnormal return over a period of 5 days: 2 days before the event, the day event and 2 days after the event.
- $CAV_{0,+5}$ compute cumulative abnormal return over a period of 6 days: the event day and 5 days after the event.
- $CAV_{0,+2}$ compute cumulative abnormal return over a period of 3 days: the event day and 2 days after the event.

The choice of several windows with different lengths allows us to diversify the frequency of response of the CDS and allows us to study the effect before and after the announcement. The reaction of the market is analyzed to scan for ante-announcement reactions and post-announcement reactions. Our main hypothesis is that the cumulative abnormal return at the neighborhood of the event should tend to 0 to translate stability over the variation of the CDS spread. If such result is obtained, this would mean that there is no reaction of the market to such announcement: the market already anticipated this information in the spread of the CDS.

In order to try to explain the stability of the CDS spread, we are using different variables to understand which components participate into the stability of the CDS spread. The following paragraphs will be divided in several subsection. The first one will be focusing on sovereign exposure per bank, the second on transparency and finally be focusing on the control variables.

2.3.2.2 Transparency variables.

For the study and to answer our concerns about the relationship between transparency and the CDS spread volatility, we created a proxy of several variables to depict a couple of different transparency variable. The idea behind it is that by choosing two levels of transparency, a global one and one dedicated to sovereign exposure, we will be more capable of assessing the power of the impact of transparency over the evolution of the CDS spreads. Once can answer the question of quantitative interest of disclosure, while the other one can focus on the contextual

and qualitative disclosure. The 2 transparency indexes, a specific and a global, are the main contribution of this chapter.

To build the two variables, we downloaded the financial report of each participating bank for the years 2010 and 2011 from bank's website. 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 from 2010 allows us to cover all the year of 2011 till the end f the first quarter of 2012. The one from 2011 allows us to cover the year from Q2 2012 till last Q2 2013.

The first variable computed is the sovereign transparency index *Sovereign Disclosure.* This variable is obtain as it is: we analysed the amount of time the word "sovereign" is pronounced in each financial reports for the two consecutive year: the variable is though denominated *Time Sovereign in Report.* We calculated the number of pages devoted to sovereign risk denominated *Pages dedicating to Sovereign.* To compute the variables, we decided to determine a subvariables which will be representated by the following ratio:

$$Time\,Sovereign\,in\,Report_{b,\,n} = \frac{time\,the\,word\,sovereign\,is\,pronounced_{b,n}}{\max time\,the\,word\,sovereign\,is\,pronounce_{\sum b,n}} \tag{2.2}$$

$$Pages\,dedicating\,to\,Sovereign = \frac{number\,of\,pages\,dedicated\,to\,sovereign\,exposure_{b,n}}{\max number\,of\,pages\,dedicated\,to\,sovereign\,exposure_{\sum b,n}} \tag{2.3}$$

where b is the bank b, where n=2010, 2011 and where $\sum b$ represent the total amount of banks.The variables are calculated relatively to the bank with the highest number of times the word sovereign is pronounced and with the highest number of pages devoted to sovereign: we then obtain a percentage value for each bank, each year. The degree of transparency is somehow hard to correctly measure, and the choice of using a relative scale allows us to think that it defines a

better scale to measure transparency and 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 allows us to discriminate between banks. The choice of using relative value to the bank with the highest score reinforces the capacity of discrimination of stakeholders.

The last component of our proxy variable, Quality of sovereign Pages is a quality variable about the pages devoted to sovereign exposure. The quality is measured by a 0% to 100% scale. In order to obtain the maximum grade, here 100%, the financial report must provide graphical analysis, charts, figures and must be easily accessible 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. The calculation of the sovereign transparency variable takes is as follows:

$$Sovereign\,Disclosure_{b,n} = Mean\,(Time\,Sovereign\,in\,Report, \tag{2.4}$$

$$Pages\,dedicating\,to\,Sovereign,\ Quality of\,sovereign Pages)$$

The second transparency index follows the same path but is more global than the sovereign transparency variable. The Global Disclosure variable integrates several subcomponents, listed in the Table-7, to create the variable: 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 if the bank comply or explain with national or supranational rules of governance, the presence of information about the attendance of board members to meetings, the presence of information about the majority shareholder and finally the presence of noticeable shareholders (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 two dummy variables while following this condition: the variable takes the value 1 if it 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 more information than what is mandatory ask. It emphasizes the value of communication and the effect of market discipline otherwise. For the five other variables, we used dummies which 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 2.7 : Global transparency variable

Variable name	**Meaning**	**Value**
Financial Report Size in Pages		1 if above median 0 otherwise
B2P3 Appendix	Presence or not of the appendix	1 if provided on website or in report 0 otherwise
Say On Pay	Page devoted to directors remuneration	1 if above median 0 otherwise
Comply or Explain	With the governance code national or higher	1 if provided in the report 0 otherwise
Minority Shareholder	Presence or not in the report	1 if provided in the report 0 otherwise
Noticeable Shareholder	Presence or not in the report	1 if provided in the report 0 otherwise
Member Attendance to Board Meeting	Presence or not in the report	1 if provided in the report 0 otherwise

The *Global Disclosure* is computed by using the mean of each sub-variable

$$Global\ Disclosure_{b,n} = mean(SIZE_{b,n} + B2P3_{b,n} + SAY\ ON\ PAY_{b,n} + COMPLY_{b,n} + MAJ\ SHARE_{b,n} + NOT\ SHARE_{b,n} + ATTENDANCE_{b,n}$$

This value of transparency allows us to define a more global value for transparency. We decided to only use the yearly financial report for several reasons: the first reason lies into the larger diffusion of yearly reports than quarterlies and the second lies into the fact that the yearly reports are more accurate to reality because of the necessity of certification by the audit committee (both internal and external).

Considering the hypothesis where transparency enhance stability, the expected relationship between transparency and the cumulative should be negative. The transparency variables should increase the stability of CDS spread over the sample period.

Now that we have defined the transparency variables and the exposure variables, we are going to introduce the different sovereign exposure variables and then the control variables. After presenting the last variables, we provide an extensive statistical analysis for the different variables we use for our study.

2.3.2.3 Sovereign exposure per bank

Thanks to the stress test, conducted by the EBA in 2010 and 2011, we were able to obtain the sovereign exposure of the participating banks per bank and per country. The stress test provides extensives data at 3 differents time:

- as of 31th, December 2010.
- as of 31th, December 2011.
- as of 30th, June 2012.

For each of this date, the stress tests give information about the amount and about the type of sovereign exposure held by the bank in function of the country[31]. Each of the different form of exposure is also function of the residual maturity over different time periods: from zero to three months, from three months to one year, from one to two years, and so on up to 15 years. 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. The last period used was summed for the different subperiods that are included in the larger one. The data provided in the two stress tests are expressed in million Euros.

With the exposure data, we were able to compute nine differents variables which will be used for the analysis. The first variables we use to translate 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. For example, the first event is based on the downgrade of Greece in March 2011. The different variables created translate the exposure of each bank to Greece. The *Gross Exposure ST*, *Gross Exposure MT*, *Gross Exposure LT*[33] express the gross exposure to the country/countries suffering the downgrade for each individual event. The *Net Exposure ST, Net Exposure MT, Net Exposure 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 countries in total).

The total exposure of each bank to all of the participating countries of the EBA stress tests is also used. This variable is denominated *Total Exposure* and does not provide enough information about the exposure to a particular country but to bypass this inconvenient we computed other variables which will inhibit the exposure variations within countries for each bank.

[31] An example of the available data can be found in the annex.

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

The second variable we computed is around the total exposure to the countries in crisis summed for all of the residual maturity. The *ICC Exposure* variable allows us to identify banks that are more exposed to in crisis countries 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 30/06/2013. The variable *Downgraded Exposure* does not take into account the exposure of countries like Germany, Luxemburg, Sweden, Norway, the Czech Republic or the Baltic countries which have not been dowgraded during our sample period. This variable was computed for all of the residual maturity.

The variables computed here are focusing on the sovereign exposure of each bank. Each of the variables are expected to affect positively the stability of the CDS spread. The higher the exposition to ICC countries for a bank, the higher the probability of the spread to increase is. The increase in exposition to a riskier country increases the riskiness of a bank that is already exposed to the country. This hypothesis is a strong component of our model.

The variables created here can be confronted to a bank size problem: a bank with a larger total asset is more likely to hold more sovereign debts than a smaller bank. To control this effect we decided to express each variable for each bank, by dividing the obtained data by the total asset of each bank. The decision to use such variable will also give us important result about the impact on banks' resilience. The table 8 provides a summary of the different exposure variables used in this analysis.

Table 2.8 : Exposure variables

Variable name	**Meaning**	**Expected sign over CDS CVAR**
Total Exposure	Total exposure to EBA participating countries	Positive
ICC Exposure	Sum of ICC countries exposure	Positive
Downgraded Exposure	Sum of downgraded countries exposure	Positive
Gross Exposure ST	Short term gross exposure to the country suffering the downgrade, for the event t	Positive
Gross Exposure MT	Medium term gross exposure to the country suffering the downgrade, for the event t	Positive
Gross Exposure LT	Long term gross exposure to the country suffering the downgrade,for the event t	Positive
Net Exposure ST	Short term net exposure to the country suffering the downgrade, for the event t	Positive
Net Exposure MT	Medium term net exposure to the country suffering the downgrade, for the event t	Positive
Net Exposure LT	Long term net exposure to the country suffering the downgrade, for the event t	Positive

The variables were purposely created to enhance the effect of sovereign debts on a bank CDS spread.

2.3.2.4 Control variables.

The first control variable we use are a dummy variable which will take the value 1 if the bank is located in the same country affected by the downgrade, and 0 otherwise. The variable Identical Nationality is different for each event and is a function of the country affected by the downgrade. For the event of January 12th 2012, the same procedure was applied. We expect this variable to have a negative impact on the stability of the spread. A bank usually is more likely to hold domestic sovereign debt. If the sovereign rating is decreased, we can assume that the risk portfolio of the bank is affected negatively which lead to an increase in the risk of the subsequent bank. At the same time, a country deeply in debt which cannot use treasury bonds to cover the bank that holds its bonds emphasize the probability of default of this bank. The choice of using this variable is very important for our analysis.

The following control variables are related to the core problematic of the European sovereign debt crisis. The totality of the countries who ask for support of both the IMF and the BCE are all Eurozone members. The variable Eurozone is a dummy variable which will take the value 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 is possible:

- First, the Eurozone variable have a positive impact on stability. The size and the strength of the institutions of the Eurozone ensure the stability of the all zone even in period of trouble.
- Secondly, the Eurozone factor have a negative impact on stability. The situation in the Eurozone is difficult enough that the stability cannot be ensure.

The variable ICC is a dummy variable which take the value 1 if the bank is located in one of the countries in crisis: Portugal, Ireland, Greece and Italy. The choice of only using a narrow definition of the country in crisis is justified by the fact that they are the only countries that benefit from a ECB emergency rescue plan during

of sample period. As we mentioned earlier, those countries are the countries the less able to ensure the bailout process of one its bank in case of default because of its high level of debt and the recent increase in its cost of emitting new debt while the probability of default of its national bank is also getting worse. This vicious circle comforts us in the choice of this variable.

The last variable (Bank Downgraded) used is related to the sovereign debt crisis and is a dummy variable which will take 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 30/06/2013. The expected sign of this variable is positive. Its justification can be explained by the fact that a bank located in country that hasn't been downgraded during our sample period is more favorable to be rescued by the government in which the bank is located because of its capacity of creating new debt.

Table 2.9 : Geographic variables

Variable	**Expected sign**
Identical Nationality	Positive
Eurozone	Indecisive
ICC	Positive
Bank Downgraded	Positive

The rest of the control variables are accounting variables from the Bankscope database. The variable Size Exposure Ratio is our size control variable where the total exposure of the bank is divided by the total asset of the same bank. This variable allows 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 expected to be positive. Choosing relative data allows us to control for size problem. It seems understandable that a larger bank is more likely to hold more sovereign debt than the smallest bank of our sample.

Larger banks can decide to hold more sovereign debt to diversify its asset portfolio.

In order to establish a variable to measure the risk of the bank, we used available data about the risk-weighted asset (RWA). This asset calculation is used to determine the level of capital requirements for a bank, and more generally for a financial institution. The choice of this variable can be justified by one of the following methodologies of Basel I agreement (which mandatory implemented it):

- Provides an interesting tool to compare banks accross different geographical area. This value is a standardize unit of risk measurement which perfect for empirical analysis.
- RWA takes into account off balance sheet to provide a measurement of the risk. Off-balance-sheet exposure can be easily included in capital requirement. RWA provides a larger and more complete measure of the bank risk than leverage for example.

The RWA variable is expected to have a positive relationship with the value of the CDS spread. The higher the value of the RWA, the higher the amount of necessary capital to cover the risk is. To conclude with the variables related to the risk of a bank, we use a variable which focuses on the non-performing loan. The Non-Performing Loan variable shows us the percentage of non-performing loans (NPL) 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. A non-performing loan is not participating into financing the activity of the bank and is considered as a cost for the bank. It also participates to the increase of the probability of default of a bank. Non-performing loans does not provide any liquidity to the bank. Non-performing loans are either in default or close to be. Based on the duration between the last payment and the probability for this loan to be fully repaid is significantly lower than a regular loan. This variable is supposed to have a positive impact over the CDS spread due to the fact that the bank does not receive any payment back for a loan that she provided in the past. The risk of default is significantly higher when the percentage of non-performing loans in its asset is high.

Table 2.10 : Accounting variables

Variable	Expected sign
Size Exposure Ratio	Negative
Risk Weighted Asset	Positive
Non Performing Loans	Positive

Now that all of our variables have been define and before continuing on our analysis, we are going to provide a statistical analysis. The following subsection is dedicated to a deep statistical analysis and is followed by a presentation of the model.

2.3.3 Empirical strategy

As presented above, the empirical model estimates the relationship between the CDS evolution, disclosure and sovereign exposure. The model is as follow:

$$CAV_{(-x),(+x)} = \alpha + \beta_1 Sovereign\, Disclosure_{i,t} + \beta_2 Global\, Disclosure_{i,t} \quad (2.5)$$

$$+\beta_3 Sovereign\, Exposure_{i,t} + \beta * Controls_{i,t} + \varepsilon_{i,t}$$

where t is the date of the event, i is the bank We decide to introduce two variables which will enhance the disclosure of banks: first globally and then more specifically about the sovereign debt exposure. The exposure of the banks to the country downgraded of the event and the global exposure are both taken into account in this model, while the last variables are here to control our sample. The model originally used was based on an ordinary least square regression and we were confronted to a important level of heteroskedasticity which forced us to use an OLS regression which took into account the correction of heteroskedasticity. The significant heteroskedasticity can be explained by the different origins of the data we used. The detection of heteroskedasticity was realized with the White's Test and the correction used the same method as well. The White's test is significant for the global transparency variable and for the exposure to Spanish, Portuguese,

Irish and Greek debt. We were not confronted to collinearity problems. Therefore we considered only linear specifications. The model will control different characteristics of the sample, especially controlling for the highly indebted country. This control can also avoid collinearity problems in between banks that do not seize equivalent. It is rather understandable if large banks have the tendency to hold more sovereign debt than smaller banks.

We expect the relationship between CAV and the disclosure variables to be negative. In other words, this would mean that more transparent banks do not have stable CDS spreads but face a reduction of the premium of their CDS at worse. This expectation on the sign of the disclosure is consistent with the different recommendation of Basel 3 and Basel 2 before it. The recommendations about disclosure are such disclosure is a great enhancer of market stability. The decision to impose mandatory disclosure first to favor the development of voluntary disclosure can also be explained by the disclosure variables because of the criterion used to create the variables. Most of the criterion are not part of mandatory disclosure because they would not give us any variance due to mandatory policies. The hypothesis about the sign of the coefficient of the exposure variable is also negative. The critics about banks' exposure to sovereign debt during the European euro crisis have forced banks and also countries to diminish their exposure and the emission of sovereign debt as we mentioned earlier.

The methodology used here was a stacked panel. The choice of this method was consistent with the form of the data we had where we used 16 times the same sample of banks for 16 different dates. The orientation of this analysis is not exactly equivalent to an event study due to the large amount of annual, semi-annual data in our dataset. Although, we decided to apply the same methodological precision as the event study methodology to ensure the quality of our results. The empirical model used in this regression is an ordinary least square regression. The minimization of the square sum fits well our set of data and the non-colinearity situation. We do not use either a ranking classification or log to log variable which could not be done with such regression.

2.3.4 Statistical analysis

This section is divided in the same way as the previous one in order to maintain clarity in the explanation but will also be introduced a small section dedicated to the our set of events and to the different banks used in our analysis and complemented by a statistical analysis of the events we used. We start first by analyzing our events then the distribution of the bank, then the cumulative variation of abnormal return of the CDS per event, the sovereign exposure variables and then the transparency variables.

2.3.4.1 Banks distribution

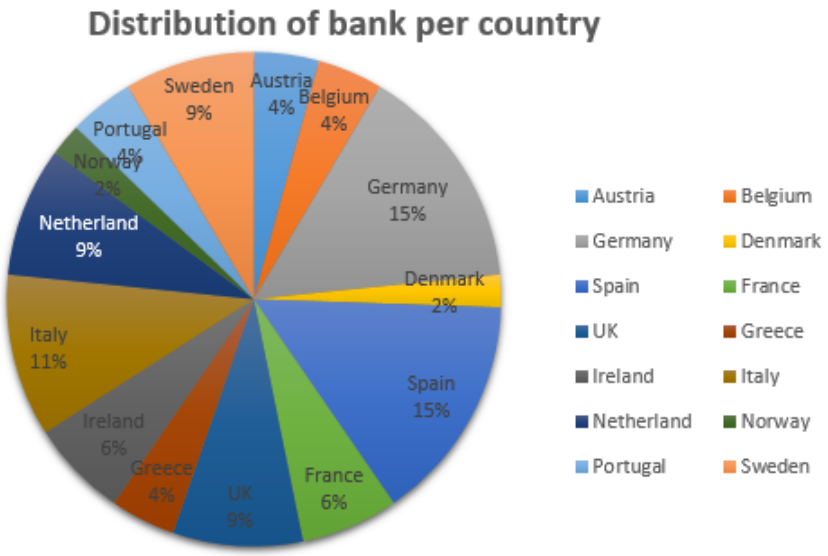
The following chart and tables provide information about the distribution of bank we use for our analysis. We have seen that our sample of bank is widely distributed and take into account large international bank such as the Deutche Bank which has the largest total asset of our sample with more than 2 655 138 million USD of assets. We can also find large banks such as BNP Paribas, Credit-Agricole S.A. or HSBC. On the other hand, the bank with the smallest amount of asset the Banco Pastor with only 39 301 million USD. The wide distribution of our sample in terms of bank size allows us to pay attention to the impact of disclosure on any sized bank.

The geographical distribution of bank among Europe is rather uniformly distributed but gives a high representativeness to German, Italian and Spanish banks. On the other hand, the largest bank are located in France, UK and Germany.

Table 2.11 : Banks distribution

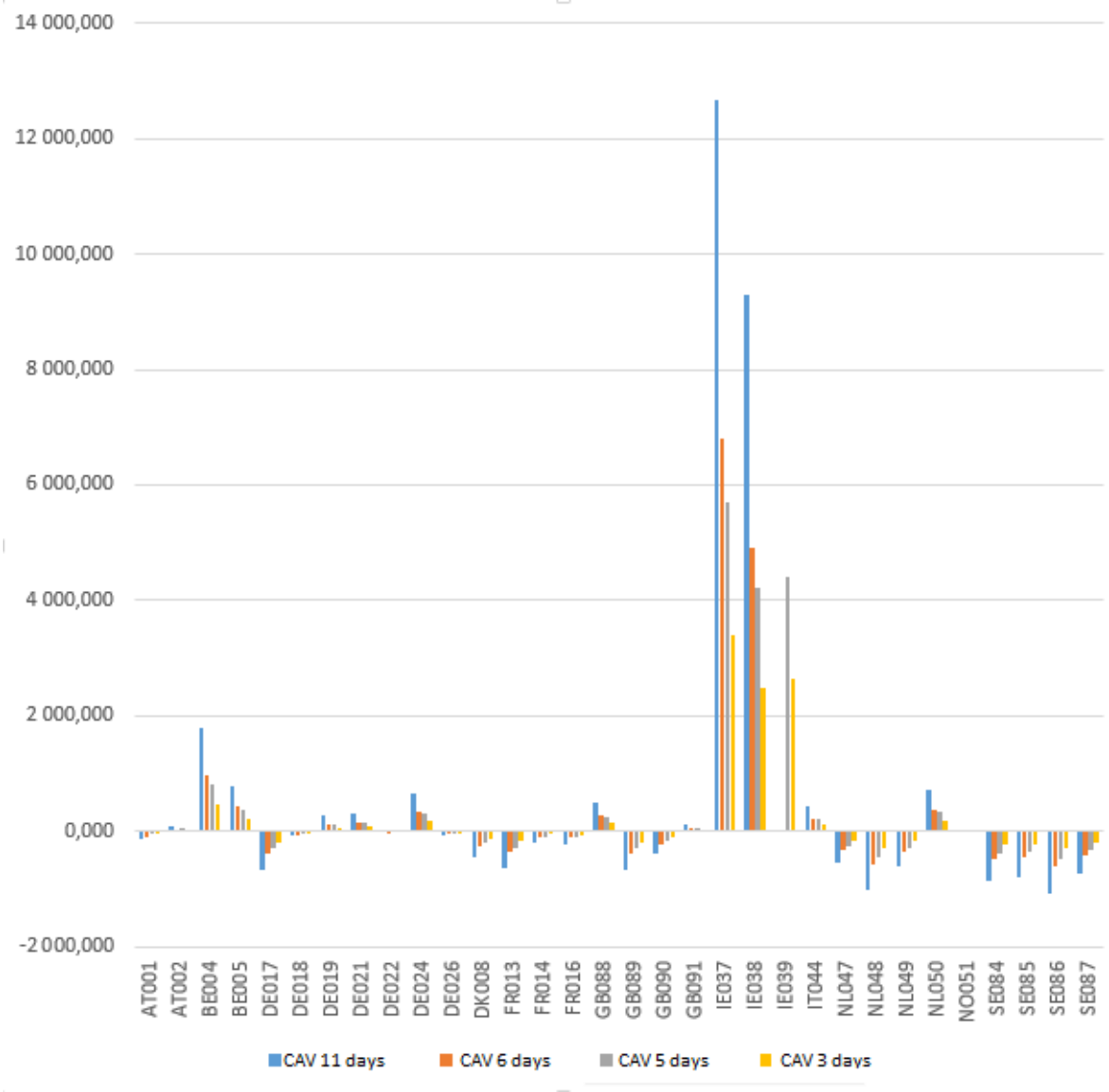
ICC banks	EuroZone bank	Min Total Asset in million EUR
14 out of 47	37 out of 47	39 301

Max Total Asset in million EUR	Average asset in million EUR	Standard deviation
2 655 138	697 663	726938



2.3.4.2 CAV on event of downgrade

Figure 2.3 : CDS CAV for the first event.



The figure 3 shows us the value of each bank numbered from 1 to 47. The name of each bank number can be found in the appendix pages. As we can see, we have the scale of the figure is rather large which here indicate a scattered distribution in between banks CDS CAV. On the other hand, we can see that on average the CDS

CAV for each period of time has the same sign even though some disturbance exists. The figure 4 also shows us countries in crisis have the largest value, especially with a positive sign. The banks numbered 2, 17, 29, 34 are all located in one of these countries. There is also surprising results. We can see that some banks have negative CDS cumulative abnormal returns. This means that the concern banks have a decrease in their probability of default in the neighborhood of the event. The static analysis of the data here shows us that some banks have an increasing probability of default in the neighborhood of the event and some others do not. The banks with the largest decrease are often located in Germany, exception made of bank 12 which is Irish.

Figure 2.4 : Countries in Crisis first event

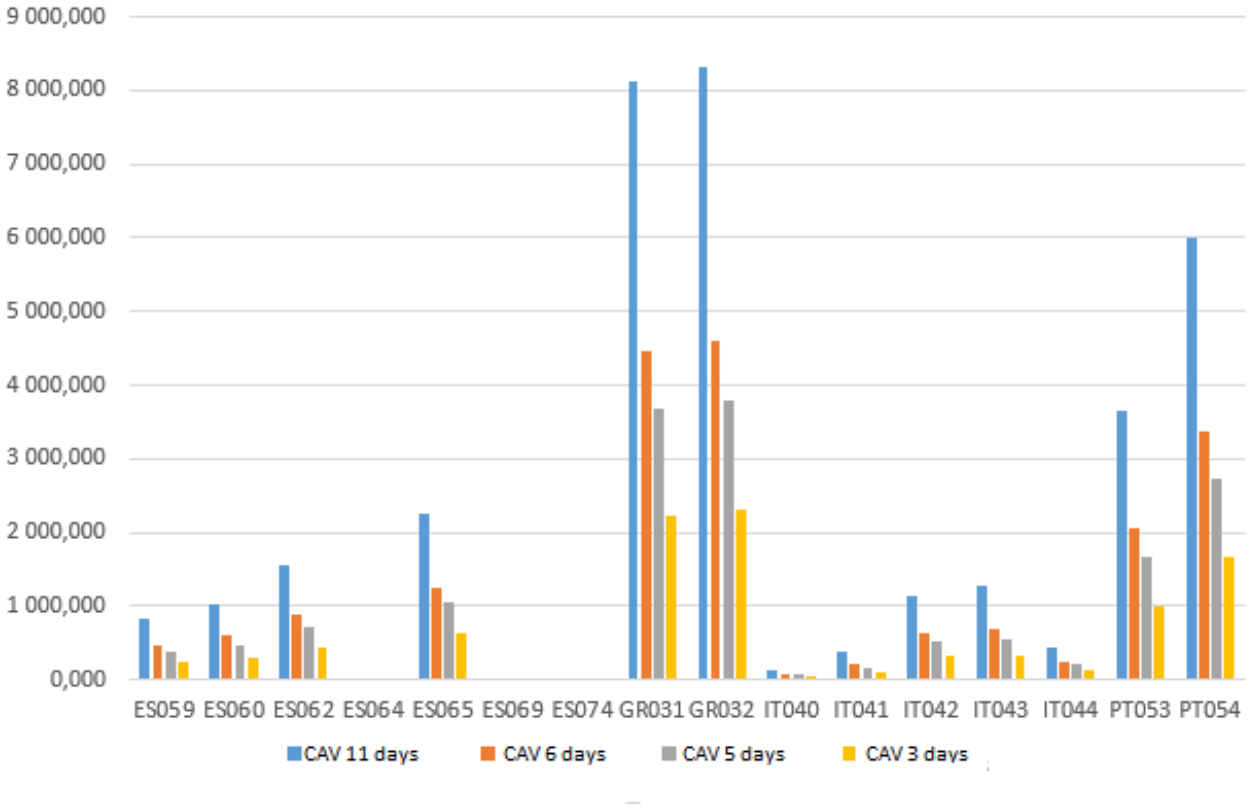
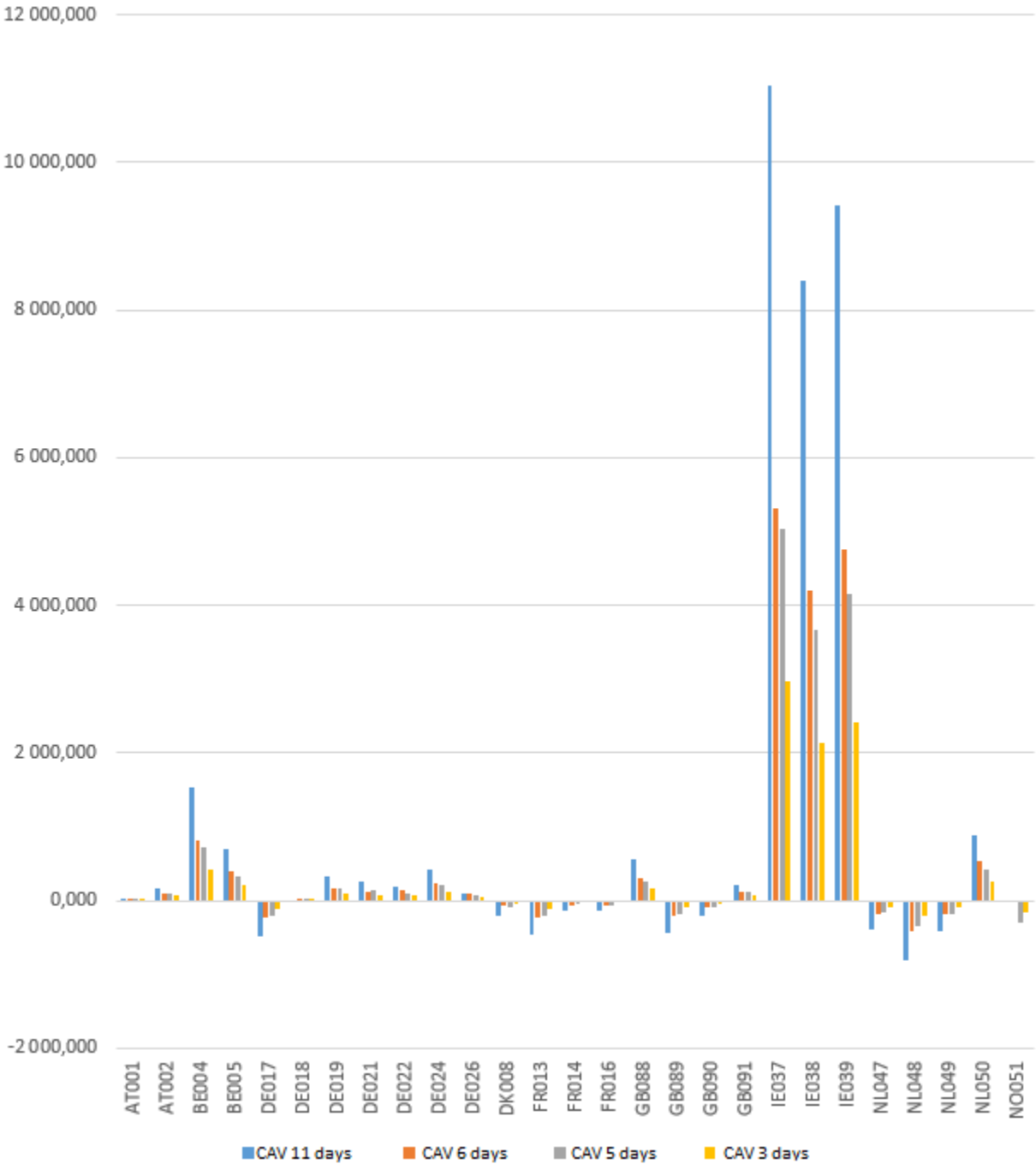


Figure 5 shows different results than the previous one. A majority of banks have a positive cumulative abnormal returns on the CDS spread at the neighborhood

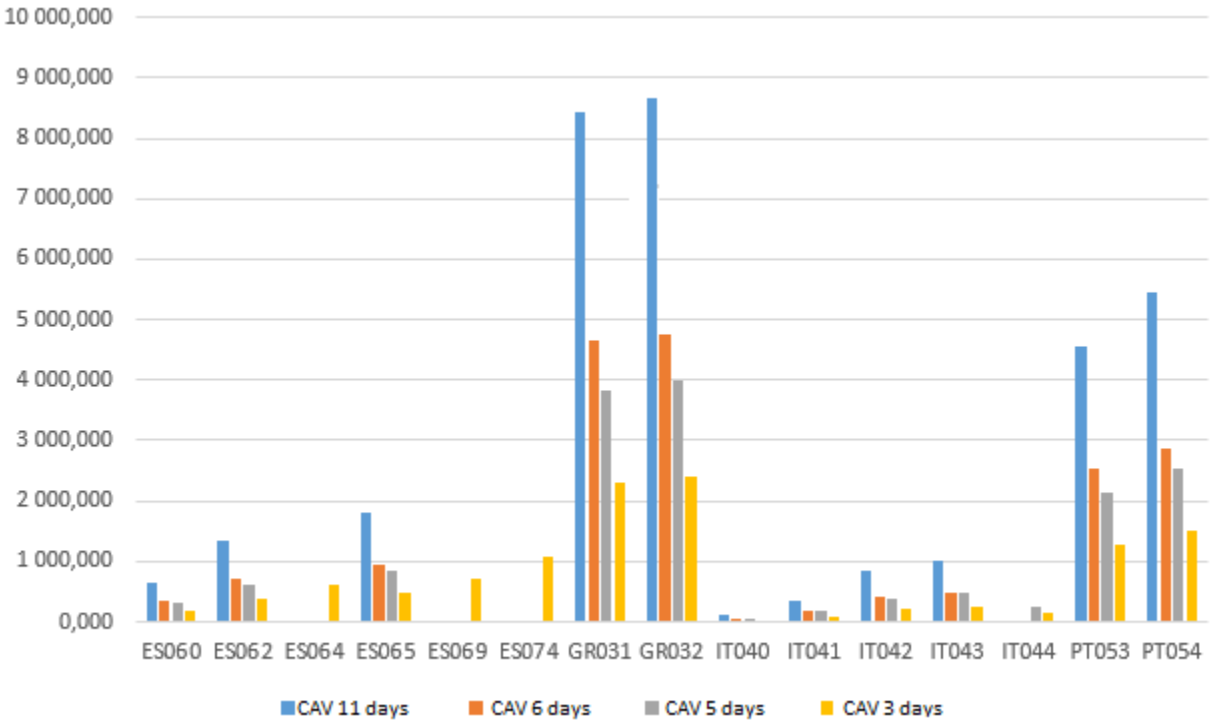
of the event. This information about the data translate the evolution of the probability of default around this event.One more interesting thing about the value of the CDS is the presence of large negative value for the banks 2, 6, 12 and 29 located respectively in Ireland (2, 12 and 29) Portugal (bank number 6). The rest of the sixteen events can be found in the appendix.

Figure 2.5 : CDS CAV for the second event.



In addition to the results presented here for the first two events, we provide in

Figure 2.6 : Countries in Crisis second event



the appendix section the 14 other events. Lastly, the following table presents the statistics concerning the cumulative abnormal variations around our 16 selected events and for each of our 4 time frames. Accordingly to the theory, the CAV are positive : the downgrade announcements lead to an increase of the spread. The longer the frame, the stronger the effect. We can interpret this results from two points of view. First, investors on the CDS market, on average do not correct their first reaction after 2 days. Then secondly, investors on the CDS market can anticipate the downgrade due to the stronger value of the CAV for the longer period relatively to shorter ones. On average, $CAV_{-5,+5}$ is higher than $CAV_{0,+5}$ and $CAV_{0,+2}$. In the mean time high standard deviation show a certain heterogeneity in the reaction to announcements.

Table 2.12 : Cumulative abnormal variations descriptive statistics

	CAV 0,+5	CAV 5,+5	CAV 0, +2	CAV -2 , +2
Mean	904.19	1644.1	459.85	760.2
Standard Deviation	2047.2	3711.8	1036.7	1726.6
Median	84.41	155.55	41.06	63.8
Q1	200.23	271.23	-24.63	-44.89
Q3	1079.5	1820.2	530.94	885.47
Minimum	-898.86	-1665	-469.09	-789.17
Maximum	12290	23119	6197.8	10375

2.3.4.3 Event statistical analysis.

Before continuing the rest of the analysis, we investigate the diversification of our events. We have 16 events which cover the period starting on 01/01/2011 till 30/06/2013. We used the Student test for each day surrounding each event from minus 10 days to plus 10 and also for each CDS cumulative abnormal return . The Student test the means of two or more groups in the total population. The choice of this test allows us to analyze the weight of each day per event and try to see if a day appears significantly different than the value we chose for the test which is here 0. The choice 0 is justified by our hypothesis where we are investigating the stability of the CDS spread: if we reject the hypothesis where the mean is significantly different from 0, then the CDS spreads are stables are found in the

annex section.

Table 2.13 : Mean test for the event of 07/03/2011

Days	Mean for all banks	T-Calc	p-value
-5	-3.724	-1.1577	0.2537
-4	4.7799	1.3942	0.1708
-3	-5.272	-1.5554	0.1275
-2	-2.4651	-2.2677	0.0287
-1	5.654	2.2586	0.0293
0	-1.39	-0.8851	0.3813
1	1.6127	0.9253	0.3602
2	0.0709	0.055	0.9564
3	3.0048	1.9014	0.0643
4	-2.1234	-1.8618	0.0698
5	-3.2058	-1.1218	0.2685
CAV -5/+5	-3.058	-1.0313	0.3084
CAV +5	-2.0308	-0.7224	0.4742
CAV -2/+2	3.4825	1.0953	0.2798
CAV +2	0.2936	0.2137	0.8319

As we can see, for the first event, the means of the cumulative abnormal variation of the CDS spreads for the day -2, -1, +3 and +4 are significantly different from our null hypothesis where the value of the mean is 0 to translate a stability relation. For the rest of the days and for all of the four CAV frames, we cannot determine the sign of the evolution. This test also provides information about the size of the population for each event. For the first event we have 42 non-empty value for a total of 47 banks and 41 non-empty value for a total of 47 banks. The empty variables are mainly explained by calendar differences: the first example which comes to our mind is the case of December 24-25-26th where quotation location are closed in different countries (Germany for example, where the stock exchange markets are closed on the 24th, 25th and the 26th of December) and open is some others. The second and third reasons behind the blank spot are the lack of reporting of certain banks in the set and the suspension of quotation of certain bank for the second year of our period. Our data for the whole set of events is a minimum of 33 banks participating in the set and up to 43 banks. The rest

Table 2.14 : Mean test for the event of 16/03/2011

Days	Mean for all banks	T-Calc	p-value
-5	-5.8181	-2.0152	0.0508
-4	-0.1147	-0.1004	0.9206
-3	7.2741	3.2557	0.0023
-2	-1.5567	-0.4071	0.6862
-1	-1.699	-0.6631	0.5112
0	-1.128	-1.067	0.2925
1	2.6732	3.5124	0.0011
2	1.8295	0.9428	0.3516
3	10.5642	2.4135	0.0206
4	-4.0809	-5.0092	0.0001
5	2.9469	7.3381	0.0001
CAV -5/+5	10.8905	1.0717	0.2904
CAV 0/+5	12.8048	2.1246	0.0400
CAV -2/+2	0.1189	0.0146	0.9885
CAV 0/+2	3.3746	1.2625	0.2143

of the events[42] shows interesting value about the significant difference to the null hypothesis especially at the peak of interest of the sovereign debt crisis (mid 2012) where in some cases the result about the mean of CDS spreads is almost entirely rejecting our stability hypothesis. The following table shows the case of the event of November 19th 2012.

[42] Available in appendix section

Table 2.15 : Mean test for the event of 19/11/2012

Days	Mean for all banks	T-Calc	p-value
-5	3.2822	8.2529	2.49E-10
-4	-3.6293	-11.8307	0.0000
-3	1.0608	1.9891	0.0532
-2	1.8090	1.5194	0.1362
-1	-0.1212	-0.2325	0.8173
0	-7.0581	-7.3756	4.24E-09
1	-4.9169	-10.6787	1.52E-13
2	-3.3689	-10.1669	6.83E-13
3	1.1396	0.7542	0.4549
4	-0.8409	-2.2404	0.0304
5	5.6280	14.4582	6.60E-18
CAV -5/+5	-7.0158	-2.8389	0.0069
CAV 0/+5	-9.4173	-4.6838	2.95E-05
CAV -2/+2	-13.6562	-5.5280	1.89E-06
CAV 0/+2	-15.3440	-9.5831	3.94E-12

The event above is related to the second downgrade of France, by Moody's. We can see that except for the days -2,-1 and +3, we can reject our hypothesis of stability. It indicates stakeholders are reactive to the announcement of downgrade but also shows such announcement participates in a reduction of the spread which is against first expectations. Surprisingly as well, the sign of the mean is often negative which is not consistent with our expectations were down ratings are expected to either maintain the value of the spreads or to increase it. Such result needs to be compared to the result obtain with the econometric study in order to conclude on the impact of stakeholders behavior.

2.3.4.4 Transparency variables' analysis

As a reminder, we have two variables that describe the degree of transparency and disclosure of the different banks used in this study: the sovereign disclosure variable that focus on the communication about the sovereign exposure of the bank

during the European sovereign crisis and a more general variable, global disclosure variable, that describe the global transparency degree of the bank. The following table reviews general statistics about the two variables for the two years 2010 and 2011.

The table 13 above shows us different information about the distribution of the two transparency variables. First let's have a closer look to the sovereign debt transparency variable. The highest level of disclosure is 92% in 2010 obtained by the Deutsche Bank AG, while the highest value in 2011 is equal to 88% obtained by Allied Irish Bank PLC. Since all the sub components are not based on relative data, the maximum was not possible to reach with the criterion used. The evolution over the test period should be positive after the rise of awareness all over Europe, and most largely all around the world, about the European sovereign debt crisis. The justification of such evolution is arduous to interpret and can be interpreted by the decision to only orient the yearly financial report on sovereign communication. The first possible interpretation that comes to mind could lie in the will of banks to limit the communication about sovereign debt exposure, but other statistics show us the opposite: on average the disclosure about sovereign disclosure appears to increase significantly. The banks which disclose the less are also increasing their disclosure about sovereign exposure. This interpretation is then not significant in this analysis. The second possible interpretation about it could lie in the fact that it has been worse reported into the annual report than the year before. This interpretation seems more believable.

Table 2.16 : Transparency variables statistics.

	2010		***2011***		***Evolution***	
	Sovereign disclosure	*Global disclosure*	*Sovereign disclosure*	*Global disclosure*	*Sovereign disclosure*	*Global disclosure*
Mean	27,28%	41,48%	32,75%	39,72%	16,70%	-4,45%

Standard Deviation	24,89%	20,15%	26,49%	19,59%	6,02%	-2,87%
Median	24,82%	37,50%	36,35%	37,50%	31,71%	0,00%
First Quarter	3,78%	25,00%	3,81%	25,00%	0,83%	0,00%
Third Quarter	47,03%	62,50%	54,59%	56,25%	13,85%	-11,11%
First Decile	0,45%	12,50%	1,18%	12,50%	61,50%	0,00%
Nineth Decile	60,22%	62,50%	69,52%	62,50%	13,37%	0,00%
Minimum	0%	0%	0%	0%	0%	0%
Maximum	92%	75%	88%	75%	-5,63%	0,00%

When we pay attention to the minimum value, we can see that there are five banks (Bayerische Landesbank, Caja De Ahorros Y Pensiones de Barcelona, Nord-Deutsche Landesbank, Rabobank and Swedbank AB) that have this score during the year 2010 and only one for the year 2011 (Danske Bank). This evolution is consistent with the prediction that the rise of awareness about the situation would also have been transported to the annual report of the following year.

The above statistics globally shows us a positive evolution from 2010 to 2011 for the sovereign transparency 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 their situations regardless to their exposure to the different European countries. On the other hand, we can see an increase in the standard deviation translating a more scatter distribution.

Concerning the global transparency variable, the assessment is somehow reverse. On average, the level of global transparency is reducing in 2010 regardless 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 reduced their global decision to disclosure. The maximum level of global disclosure in 2010 is 75%, obtained by three banks (Allied Irish Bank, Barclays PLC 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 meantime, the minimum value is 0% in both years obtained by the National Bank of Greece in 2010 and in 2011.

2.3.4.5 Sovereign exposure variables' analysis

The sovereign exposure variables analysis needs to be separated into three different parts: the dummy variables related to exposure, the exposure variables (total exposure, PIGS exposure and the downgraded country exposure) and the exposure per event (gross and net exposure, same nationality variable). We are going to start with the dummy variables analysis and then we will take a closer look to the per country exposure.

Our sample is composed of 37 banks located in Euro-zone member country ; the ten[45] other banks are residents of the following countries: Denmark, Norway, United Kingdom and Sweden. In the same time, our sample is composed of 14 banks located in a country in crisis[46]. The last variable relating to sovereign exposure that is not changing at each event is the Bank Downgraded, as a reminder this variable takes the value 1 if the bank is located in a country that has been downgraded during our sample time period. 17 banks are not located in a country which has been downgraded during our sample period. Most of these banks are located in "AAA" countries like Germany, the Netherlands[47], Denmark, Norway and Sweden during the period 01/01/2011 to 31/06/2013.

[45] Four british banks, one danish, one norwegian bank and four swede banks
[46] Portugal, Ireland, Greece and Spain
[47] As the date of May 6th 2014, the Netherlands rating is now AA+

Table 2.18 : Dummy exposure variables

Variable name	Value	Ratio
Identical Nationality	1 located in a country suffering dowrate	9,04%
	0 otherwise	90,96%
Eurozone	1 if member	78,72%
	0 otherwise	21,28%
ICC	1 if located in a country suffering crisis	71,22%
	0 otherwise	29,78%
Bank Downgraded	1 if located in a downgraded country	63,83%
	0 otherwise	36,17%

Concerning the exposure variable, Table 11 is the recapitulated tables of the key statistical. When we review the total exposure variable, we can see a negative evolution for the year 2012 regardless 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 ECB was proposing unlimited free support for banks involved in a sovereign state bailout/precautionary through some yield lowering Outright Monetary Transactions.[49]. The evolution is ranged from 0% to -45%. The maximum exposition has the biggest drop for this variable. The maximum was held by BNP Paribas for the year 2011 and by Unicredit S.P.A for the year 2012. The minimum exposure fluctuate less by only a decrease of 5%. The bank which held the shortest amount of sovereign debt was Irish Life and Permanent for the year 2012 and by Banco Pastor, S.A for the year 2011.

The situation is quite similar to the ICC variable. The data shows us a large decrease in the average number of sovereign debts held by the participating banks but the scatter of the distribution remains stable with a slight decrease in the

[49]Announced on August 2nd, 2012 and introduced in September 2012
http://www.ecb.europa.eu/press/pr/date/2012/html/pr120906_1.en.html

standard deviation. We can also see that several banks which decided not to hold any ICC sovereign debt for the year 2011 and for the year 2012: three banks in 2011 and four in 2012. The maximum is obtained 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 are working because exposure to those countries are decreasing. The idea was to reduce "toxic" exposure in order to stabilize the situation of the in endangered banks.

Concerning the last variable, the assessment is also similar and is consistent with our expectations. 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 2.19 : Fixed exposure variables, in million EUR

	Total Exposure			***ICC Exposure***		
	2011	***2012***	***EVO***	***2011***	***2012***	***EVO***
Mean	37804.8	35120.06	-8%	6 570	5379.47	-22%
Standard Deviation	31512.95	26073.45	-21%	11 698	11644.3	0%
Median	32445	30444.38	-7%	2 608	2152.01	-21%
First Quarter	10123.75	9420.68	-7%	456	170.4	-62.6%
Third Quarter	58110.25	58250.66	0%	6 982	4472.63	-36%
First Decile	6862.7	5555.35	-24%	20	0.00033	-5786732%
Nineth Decile	78411.5	75862.94	-3%	14 849	10126.06	-47%
Minimum	2553	2434.67	-5%	0	0	0%
Maximum	139661	96426.16	-45%	56 514	53925	-5%

	Expo. to Downgraded Countries		
	2011	***2012***	***EVO***
Mean	23691.36	20963.39	-13%
Standard Deviation	25597.53	21445.29	-19%
Median	12347	9479.7	-30%
First Quarter	3964.75	4350.34	9%
Third Quarter	37711.5	31146.64	-21%
First Decile	1540	359.89	-328%
Nineth Decile	63873	59118.78	-8%
Minimum	0	0	0%
Maximum	99189	70058.39	-42%

We are going to pay a closer attention to variables which are event dependant. The variables will not be different for every events but will have some variance depending on the country that is being downgraded. For example, the variables will be the same for the event three and the event nine (Cyprus was downgraded)

but will not be the same for the event 11, 12 and 14 because they are happening in 2012. We are going to analyse the data the following way: first by taking all the data together and then by studying event per event.

The first thing that comes to our mind when we pay attention to the data is the amount of domestic sovereign debt own by a domestic bank: French banks own majoritarly French sovereign bonds, German banks German bonds, Greek banks Greek bonds and so on. These findings match our expectations where we expect domestic banks to hold national debt. The second thing that comes to our mine is the very large variance in between our sample. This large dispersion can be explained by the very large number 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 compared to the total exposure value. The following table provides detailed statistics to understand better the distribution of the variables throughout the events.

Table 2.20 : 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
Mean	384	362	961	335	304	776
Standard Deviation	2 760 445	2 353 939	8 030 212	2 473 194	1 822 718	6 012 168
Median	0	0	9	0	0	3
First Quarter	0	0	0	0	0	0
Third Quarter	64	78	268	50	41	258
First Decile	0	0	0	0	0	0
Nineth Decile	718	735	2 647	606	651	2 037
Minimum	0	0	0	-1 999	-391	-1 814
Maximum	17 977	13 566	26 674	17 784	12 961	25 980

When we have a closer look to the evolution in 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 explained as the previous statistics: the IMF and ECB plan were designed to do such thing. The decrease in exposure is not observable crescendo but show a slight decrease from 2011 to 2012.

2.4 Results

2.4.1 Benchmark model

This section presents the results of our analysis when we do not apply controls in the regression. The robustness check is provided in the section 4.2. We used the two disclosure variables (core of the analysis), the total exposure (corrected by the size of each bank total asset for the year 2012) to sovereign debt regardless to every country that took part to the EBA tests, we also took other variables of exposure such as the three periods of time for net and gross exposure, and then the total exposure to the downgraded countries. Concerning the accounting variables, we used the RWA variable, the non-performing loan variable and the tier 1. The only control applied here is the variable Same Nationality which, as a reminder, take the value 1 when the bank is located in the country that faces the downgrade. We obtained the following results for each of the four periods surrounding the event. All of these results obtained here were corrected to heteroskedasticity (the results obtained are not significantly different than the one where no correction is applied and can be found in the annex section).

Table 21 shows the different regressions for each of the time frame and for both types of exposure, concerning global disclosure we have 5 times out of 8 a significant positive impact on the evolution of CDS spreads at the surroundings of announcements when sovereign disclosure coefficient is only significant once for the window 5 days after the announce. The result above is not consistent with our first hypothesis where disclosure has a positive impact on fulfilling stability. When we

are not controlling, we obtained a negative effect of disclosure on stability at the moment of the downgrades this translates a higher uncertainty on the capacity of the bank not to default. Disclosure provides a positive increase of the CDS spread which translates an increase in the risk of the bank. The results obtained here are also not consistent with the literature that enhance the benefits of disclosure such as Tadesse (2006) or Akhigbe and Martin (2006, 2008). This result concerning global disclosure suggest the announcements of downgrade provide enough information to stakeholders in order for them to revise the premium ask for the risk of the bank. The announcement of downgrade is providing information to stakeholders which was not taking into account. On the other hand, it does not appear to be valid for sovereign disclosure.

Table 2.21 : Benchmark Estimation of CAV

This table provides results about the mean of cumulative and non cumulative abnormal CDS spread change. 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.

Variables	**CAV -5,+5**		**CAV 0,+5**	
Type of Exposure	**Gross Exposure**	**Net Exposure**	**Gross Exposure**	**Net Exposure**
Constant	960.94***	1337.37***	1093.29***	620.02***
	(-3.20)	(-4.28)	(4.08)	(3.75)
Sovereign Disclosure	-24.86	-135.762	686.05**	-51.48
	(-0.09)	(-0.47)	(2.52)	(-0.34)
Global Disclosure	802.79**	717.94*	361.75	342.73*
	(2.23)	-(1.82)	(0.99)	(1.67)
Downgraded Exposure	0.03***	0.03***	0.016***	0.019***
	(8.23)	(8.25)	(3.86)	(8.34)
Total Exposure PerAsset	-3051.63	-5502.97 ***	-3342.93*	-2273.02**
Ratio	(-1.51)	(-2.69)	(-1.72)	(-2.02)
Tier 1	-5.95e-5***	-7.07e-05***	-3.83e-05***	-3.57e-05***
	(-6.31)	(-6.27)	(-4.65)	(-6.12)
RWA	6.17e-07	1.11e-06	-1.08e-06	-3.42e-05
	(0.63)	(0.87)	(-1.28)	(0.78)
NPL Ratio	-5.87e-05***	-6.84e-05***	-3.81e-05***	-3.42e-05***
	(-5.34)	(-5.72)	(-3.25)	(-5.27)
Short Term Exposure	-0.21**	-0.004	0.009	0.000955
	(-2.10)	(-0.03)	(0.14)	(0.01)
Mid Term Exposure	0.046	-0.025	0.051	-0.001
	(0.52)	(-0.26)	(0.70)	(-0.02)
Long Term Exposure	-0.09*	-0.07	-0.10**	-0.038
	(-1.90)	(-0.95)	(-2.48)	(-0.96)
Same Nationality	3752.03***	2419.23***	1784.04***	1164.25***
	(6.42)	(3.59)	(5.49)	(3.26)
R^2	0.320	0.300	0.332	0.293
R^2 Adjusted	0.313	0.284	0.313	0.277
F(11,481)	21.47	18.74	22.15	18.47
p-value	1.38e-35	2.69e-31	9.13e-37	5.80e-31
n	512	493	502	502

Variables	**CAV -2,+2**		**CAV 0,+2**	
Type of Exposure	**Gross Exposure**	**Net Exposure**	**Gross Exposure**	**Net Exposure**
Constant	441.49***	558.35***	273.87***	343.18***
	(3.25)	(4.03)	(3.34)	(4.11)
Sovereign Disclosure	20.48	-29.79	7.14	-18.16
	(0.16)	(-0.23)	(0.09)	(-0.23)
Global Disclosure	342.36**	301.39*	206.51**	171.62
	(2.01)	(1.70)	(2.01)	(1.61)
Downgraded Exposure	0.015***	0.015***	0.009***	0.009***
	(8.36)	(8.31)	(8.15)	(7.98)
Total Exposure PerAsset	-1381.27	-2159.96**	-846.18	-1271.22**
Ratio	(-1.51)	(-2.39)	(-1.50)	(-2.30)
Tier 1	-2.66e-07***	-2.96e-05***	-1.67e-05***	-1.81e-05***
	(-6.26)	(-5.91)	(-6.25)	(-5.96)
RWA	2.42e-07	3.14e-07	1.76e-05	2.42e-07
	(0.53)	0.5552	(0.61)	(0.70)
NPL Ratio	-2.66e-05***	-2.88e-05***	-1.64e-05***	-1.77e-05***
	-5.3157	(-5.28)	(-5.42)	(-5.24)
Short Term Exposure	-0.101***	0.008	-0.06*	0.007
	(-2.10)	(0.13)	(-1.92)	(0.20)
Mid Term Exposure	0.002	-0.011	3.57e-05	-0.007
	(0.06)	(-0.29)	(0.001)	(-0.30)
Long Term Exposure	-0.039*	-0.039	-0.022	-0.026
	(-1.65)	(-1.16)	(-1.48)	(-1.35)
Same Nationality	1995.44***	1160.63***	1181.25***	722.39***
	(6.95)	(3.62)	(6.51)	(3.79)
R^2	0.328	0.283	0.317	0.228
R^2 Adjusted	0.313	0.266	0.302	0.211
F(11,481)	22.23	18.01	21.22	13.54
p-value	4.98e-37	2.55e-30	1.7e-35	8.07e-23
n	512	512	515	515

When analyzing the coefficient of the sovereign exposure variables, we can see the total exposure per asset ratio has a significantly negative relationship with the cumulative abnormal return of the CDS market when using the net exposure variables. This means the total exposure controlled for size does not participate to an increase of the CDS spreads for each of the window surrounding an event for our sample period (01/01/2011 to 30/06/2013). The result obtained above is not 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 can appear surprising but can be explained by several factors. First by the location of the bank, we know banks are more likely to hold debts of the country where it is located in. By this mechanism, banks can hold a large quantity of "safer" sovereign debt (which has not suffered downgrading). For example, we can see that the BNP Paribas is the one having the largest amount of sovereign debt in 2011 and 2012 but are holding vastly French bonds. On the other hand, this variable appears not significant for when we use gross sovereign exposure.

When we pay a closer look to the total exposure to countries that has been downgraded we can see a significant positive relationship between the amount of sovereign debt, which 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 stakeholders react to announcement of downgrade when banks hold sovereign debt that has been, or will be downgraded. The response of the stakeholder is responsive to downgrades. Concerning net and gross exposure for either short, medium and long term, the conclusion is somehow different. Some of these variables are significant and it could be interpreted has the fact that our banks are not specifically affected by one event for a unique country, which can justify some of the mentioned literature where CDS spreads are less affected event specifically. The fact that both coefficient and the significative are not stable shows that this variable does not affect significantly the behavior of stakeholders to ask for a greater premium.

The accounting variables also provide interesting results in this analysis. First of all, we see the Tier 1 variable's coefficient is negative and very 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 spreads is reduced participating when the event of downgrade happen. It does not participate into the stability of the CDS spread but is still beneficial to the reduction of the value of the CDS spreads. This result is consistent with the recommendations of Basel I capital agreement, which first defined it. Stakeholders reward banks with the highest Tier 1 at the moment of the announcement of downgrade. 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 stakeholder does not react to the Risk Weighted Asset and they largely react to Tier 1. The non-reaction can be interpreted as RWA does not provide enough information to stakeholders when the total equity capital is not known. Concerning the NPL variable, we see it has a significant negative relationship with the cumulative abnormal return of the CDS spreads. This result does not appear to be consistent with our expectations which were the higher the level of non-performing loans the more the probability of default increase.

The last variable which we have not discussed is the variable Same Nationality. As we can see the coefficient of the variable for each window and for both net and gross exposure. Such result indicates that stakeholder react negatively to announcement of downgrade by asking for a greater premium when using CDS for banks which are located in the just downgraded country. The value of the coefficient increase also significantly from 722 from 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). Stakeholders attach importance to the nationality of the bank and attach even more importance when the window is large at the surroundings of the event. Stakeholders do not anticipate the nationality of the bank in their calculation but react significantly when a downgrade happens.

Now that the benchmark is set we need to control for some criterion such as the

fact that banks are located on PIGS countries and their exposure to them (most of the countries downgraded during our sample period were Portugal, Ireland, Greece and Spain, and were also the one which benefited from emergency plans of both the ECB and the IMF). The following subsection will be devoted to the analysis of the results when we control the regression with ICC related variables.

2.4.2 Controls on Eurozone and Countries in Crisis

The above results shows important conclusion on the behavior of stakeholders when we are not controlling for such criterion as the participation to the Euro currency of the situation of the ICC and the fact of being located in one of those countries. The same way as above, we used the two disclosure variables (core of the analysis), the total exposure (corrected by the size of each bank total asset for the year 2012) to sovereign debt regardless to every country that took part to the EBA tests, we also took other variables of exposure such as the three periods of time for net and gross exposure, then the total exposure to the downgraded countries and finally we applied our control through the Eurozone variable, we used also took into account the exposure to the ICC sovereign debt, then we added the variable ICC which takes the value 1 if the bank is located into one of the four countries (Portugal, Italy, Greece and Spain) and finally we created a cross variable which measure the exposure to the ICC sovereign debt when the bank is located in one of those countries: the variable ICC * ICC Exposure. Concerning the accounting variables, we used the RWA variable, the non-performing loan variable and the tier 1. We keep the control on the variable Same Nationality. We obtained the following results for each of the four periods surrounding the event. All of these results obtained here were corrected to heteroskedasticity (the results obtained are not significantly different than the one where no correction is applied and can be found in the annex section).

When we look to our regressions for each of the time frame and for both gross exposure and net exposure, we can see that the disclosure variables are both very significant in our analysis. First we see sovereign disclosure have a negative relationship with the cumulative abnormal returns of CDS spreads when at the same

time the global disclosure variable have 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 obtain shows that stakeholder behavior regardless to the situation are also stable. The result obtains are consistent with our expectation and hypothesis where sovereign disclosure has a significant relationship with the evolution of the CDS spreads and this relationship participate 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 stakeholders worship more oriented, specific, disclosure in their calculation of the premium. By comparison to the benchmark analysis, we see that the control provide better, and more stable, results in the analysis for both disclosure variable. These results show that the disclosure of characteristic 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 stakeholders in the value of the spread when global disclosure, potentially judged vague, discipline the spread.

Table 2.22 : Eurozone and Countries in crisis results

This table provides results about the mean of cumulative and non cumulative abnormal CDS spread change. 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.

Variables	**CAV -5, +5**		**CAV 0,+5**	
Type of Exposure	**Gross Exposure**	**Net Exposure**	**Gross Exposure**	**Net Exposure**
Constant	-2528.55***	-2618.83***	-1366.73***	-1192.84***
	(-14.11)	(-14.29)	(-14.41)	(-14.68)
Sovereign Disclosure	-515.55***	530.95***	-263.41***	-224.40***
	(-3.64)	(-3.63)	(-3.49)	(-3.37)
Global Disclosure	3308.37***	3482.34***	1756.12***	1535.31***
	(13.13)	(13.41)	(13.28)	(13.45)
Downgraded Exposure	0.02***	0.02***	0.011***	0.009***
	(7.21)	(6.73)	(7.24)	(6.66)
Total Exposure Per	7184.41***	7318.81***	3954.3***	3427.6***
Asset Ratio	(6.25)	(6.35)	(6.38)	(6.46)
Tier 1	-6.66e-06*	-6.70e-06*	-3.51e-06*	-2.49e-06
	(-1.78)	(-1.88)	(-1.78)	(-1.56)
RWA	-1.65e-07	-2.21e-07	-9.24e-08	-1.06e-07
	(-0.42)	(-0.58)	(-0.44)	(-0.62)
NPL Ratio	-5.07e-06	-5.50e-06	-2.51e-06	-2.34e-06
	(-1.08)	(-1.10)	(-1.01)	(-1.00)
Short Term Exposure	0.106*	-0.082	0.055*	-0.016
	(1.72)	(-1.06)	(1.65)	(-0.48)
Mid Term Exposure	0.032	0.112*	0.02	0.048*
	(0.65)	(1.74)	(0.83)	(1.72)
Long Term Exposure	-0.077	-0.016	-0.037**	-0.015
	(-2.45)	(-0.41)	(-2.24)	(-0.83)
Same Nationality	705.74**	521.14*	318.39**	258.75**
	(2.50)	(3.44)	(2.19)	(2.00)
ICC	6164.06***	6336.27***	3317.27***	3012.13***
	(15.28)	(15.50)	(14.92)	(16.28)
ICC Exposure	-0.17***	-0.177***	-0.088***	-0.082***
	(-8.23)	(-8.41)	(-8.08)	(-8.54)
ICC * ICC Exp.	0.05***	0.059***	0.028***	0.026***
	(3.41)	(3.44)	(3.10)	(3.31)

Variables	**CAV -5, +5**		**CAV 0,+5**	
Eurozone	1241.99***	1315.57***	668.43	604.68***
	(11.37)	(11.83)	(11.57)	(12.34)
R^2	0.674	0.641	0.650	0.630
R^2 Adjusted	0.663	0.629	0.639	0.624
F(15.477)	65.72	56.81	60.22	5.59
p-value	1.1e-105	6.77e-96	1.6e-100	2.35e-96
n	512	493	502	502

Type of Exposure	**Gross Exposure**	**Net Exposure**	**Gross Exposure**	**Net Exposure**
Variables	**CAV -2, +2**		**CAV 0,+2**	
Constant	-1157.66***	-1793.91***	-643.37***	-667.657***
	(-14.49)	(-10.76)	(-14.24)	(-14.63)
Sovereign Disclosure	-212.15***	-612.61***	-92.52**	-99.54***
	(-3.26)	(-4.31)	(-2.47)	(-2.65)
Global Disclosure	1484.44***	2298.84***	817.77***	838.05***
	(13.04)	(11.08)	(12.73)	(13.11)
Downgraded Exposure	0.009***	0.005**	0.005***	0.005***
	(6.94)	(2.38)	(7.20)	(6.95)
Total Exposure Per	3274.66***	6895.79***	1850.89***	1979.69***
Asset Ratio	(6.23)	(6.72)	(6.14)	(6.42)
Tier 1	-2.23e-06	3.37e-06	-1.60e-06*	-1.55e-06*
	(-1.32)	(0.79)	(-1.71)	(-1.76)
RWA	-1.29447e-07	-2.60e-08	-1.04e-07	-7.63e-08
	(-0.71)	(-0.06)	(-1.07)	(-0.81)
NPL Ratio	-2.10e-06	8.53e-07	-1.31e-06	-1.34e-06
	(-0.97)	(0.14)	(-1.00)	(-0.97)
Short Term Exposure	0.073***	-0.121***	0.032*	-0.009
	(2.80)	(-2.98)	(1.91)	(-0.46)
Mid Term Exposure	0.015	0.03	0.01	0.033**

Type of Exposure	**Gross Exposure**	**Net Exposure**	**Gross Exposure**	**Net Exposure**
	(0.77)	(0.81)	(0.79)	(2.09)
Long Term Exposure	-0.044***	0.033	-0.022***	-0.01
	(-3.03)	(1.35)	(-2.66)	(-0.99)
Same Nationality	372.62***	639.82***	238.62***	174.63**
	(2.84)	(3.89)	(2.93)	(2.06)
ICC	2863.73***	3435.08***	1553.01***	1633.72***
	(16.24)	(26.85)	(14.23)	(14.51)
ICC Exposure	-0.078***	-0.114***	-0.04***	-0.047***
	(-8.17)	(-7.44)	(-8.76)	(-8.69)
ICC * ICC Exp.	0.025***	0.042***	0.017***	0.016***
	(3.17)	(3.38)	(3.96)	(3.65)
Eurozone	586.62***	811.22***	336.54***	337.55***
	(12.02)	(8.71)	(12.23)	(12.16)
R^2	0.754	0.649	0.648	0.636
R^2 Adjusted	0.746	0.638	0.643	0.625
F(15.477)	101.26	61.18	61.26	58.31
p-value	3.6e-140	2.0e-102	9.49e-103	2.25e-99
n	512	512	515	515

When analyzing the coefficient of the sovereign exposure variables for each window, we can see the total exposure per asset ratio has a significantly positive relationship with the cumulative abnormal return of the CDS market when using both the net and gross exposure variables. This means the total exposure controlled for size have a positive relationship with the evolution of the CDS spreads for each of the window surrounding an event for our sample period (01/01/2011 to 30/06/2013). 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 does not appear surprising and is explained by the gravity of the situation concerning sovereign

debt. Informed stakeholders react to the amount of exposure to sovereign debt even if it is not concerned by a downgrade.

When we pay a closer look to the total exposure to countries that has been downgraded we can see a significant positive relationship between the amount of sovereign debt, which 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 stakeholder react to announcement of downgrade when banks hold sovereign debt that has been, or will be downgraded. The stakeholders are responsive to downgrades. The stability of the results obtained comforts us in the choice of several windows to reinforce our analysis. Concerning net and gross exposure for either short, medium and long term, the conclusion is somehow different but similar to the benchmark situation. Some of these variables are significant and it could be interpreted has the fact that our banks are not specifically affected by one event for a unique country, which can justify some of the mentioned literature where CDS spreads are less affected event specifically. The fact that both coefficient and the significative are not stable shows that this variable does not affect significantly the behavior of stakeholders in the calculation of the premium.

The accounting variables also provide interesting results in this analysis and are very similar to the benchmark situation. We see the Tier 1 variable's coefficient is also negative and very significant (at 1%) for each window surrounding each event and for both net and gross exposure. The analysis of this variable is similar to the one in the benchmark where the higher the Tier 1, the more the CDS spreads is reduced when the event of downgrade happen. It does not participate into the stability of the CDS spread but it is still beneficial to the reduction of the value of the CDS spreads. This result is consistent with the recommendations of Basel I capital agreement, which first defined it. Stakeholders reward banks with the highest Tier 1 at the moment of the announcement of downgrade. 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,

similar to the benchmark. Such result is interesting in a sense that stakeholder does not react to the Risk Weighted Asset and they largely react to Tier 1. The non-reaction can be interpreted as RWA does not provide enough information to stakeholders when the total equity capital is not known. Concerning the NPL variable, we do not have any significant results.

Concerning the result to the variable Same Nationality, we can see the coefficient of the variable is both positive and significant for each window and for both net and gross exposure, which is similar to the result obtained in the benchmark section.

The relationship between ICC and the evolution of the CDS reveal interesting results in this analysis. The ICC variable have a positive and significant relationship with the evolution of the CDS spreads at the surroundings of the downgrade. The result obtained shows that stakeholders 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 countries listed is interpreted as an increase of the probability of default of the bank and can be explained 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 stakeholders in the current economic situation. Do stakeholders take into account the exposure to ICC sovereign debt? The answer is visible in this analysis where we can see that the ICC exposure have a significant negative 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 surroundings of a downgrade announcement, when the bank has a bigger amount of exposure to ICC countries. It can be explained with the nationality of a bank holding ICC sovereign debt which is not located in one of those countries. In a sense, if a strong German bank hold a significant amount of Italian sovereign debt, stakeholder is not afraid of the situation because they are informed the German government is solid enough to help banks which could be affected by such sovereign debt. In order to confirm the previous result, we see the impact on the evolution of CDS spreads of the cross variable ICC * ICC Exp. which is positive

and significant. Such result indicates that stakeholders are more likely to revise positively their calculation about the CDS spread when the bank has the more ICC sovereign debt when located in one of the four countries. This result can be explained by the diminishing capacity of those governments to ensure the stability of their banking sector due to their highly indebted situation.

2.4.3 Robustness check

The control variables also provide interesting results. The variable Domestic has a positive influence on the CASCs. Such result indicates that investors react negatively to announcement of downgrade by asking for a greater premium when using CDS for banks 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 surroundings of the event. So investors take into account the lower ability of governments in helping their banking sector. This result is robust whatever the window is.

The relationship between ICC and the CDS spread reveals interesting results. The ICC variable has a positive and significant relationship with the evolution of the CDS spreads. 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 countries in crisis is interpreted as an increase of the probability of default of the bank and can be explained by the diminishing capacity of governments of those countries to ensure the potential bailing out of banks in trouble. The fact that investors take care about the nationality of the bank seems to be confirmed by the positive impact of Eurozone on the CAVs: ceteris paribus, a downgrade influences more the spread of a bank if it is in the Eurozone than if it is not. This result is robust whatever the window is. It tends to show that investors worried about the financial stability of Eurozone and the cohesion of the banking system in Eurozone.

Concerning the risk of the bank, the Tier 1 variable's coefficient is generally negative and significant. In average, the higher the Tier 1, the more the CDS spread is reduced when a downgrade happens, ceteris paribus. This result is consistent with the recommendations of Basel III capital agreement. Investors tend to reward banks with the highest Tier 1 at the downgrade announcement, as Tier 1 is a source of a bank's financial strength. The RWA is never significant. Such result is interesting in a sense that investors do not react to the RWA and they largely react to Tier 1. The absence of the reaction can be interpreted as RWA does not provide enough information to investors. At last, the Non-Performing Loans variable does not present a significant influence on the cumulative abnormal CDS spread change.

Table 2.25 : Model estimation with separation between Qualitative and Quantitative disclosure indexes

This table provides results about the mean of cumulative and non cumulative abnormal CDS spread change. 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.

Variables	**CASC 0,+5**		**CASC -5,+5**	
Type Of Exposure	**Gross**	**Net**	**Gross**	**Net**
Constant	-1468.12***	-1524.45***	-2728.71***	-2803.76***
	(-15.62)	(-15.64)	(-14.93)	(-14.78)
Qualitative Sovereign	-0.002 ***	-179.37 ***	-322.00 ***	-321.14***
Disclosure	(-5.07)	(-4.33)	(-4.18)	(-4.00)
Quantitative	-297.38 ***	-302.74 ***	-619.43 ***	-576.62***
Sovereign Disclosure	(-3.82)	(-3.64)	(-3.87)	(-3.56)
Qualitative Global	1386.63 ***	1453.85 ***	2615.81 ***	2717.87***
Disclosure	(12.48)	(12.49)	(12.019)	(12.19)
Quantitative Global	566.34***	584.03 ***	1075.64 ***	1101.68***
Disclosure	(8.96)	(9.04)	(8.91)	(8.79)
Relative Exposure	4920.15 ***	4970.59 ***	8556.38***	8741.94***
	(8.20)	(8.15)	(7.84)	(7.65)
ICC Exposure	-0.07 ***	-0.07 ***	-0.13 ***	-0.14***
	(-8.17)	(-8.43)	-(7.91)	(-8.27)
Downgrade Exposure	0.01 ***	0.01 ***	0.02***	0.02***
	(6.67)	(6.82)	(6.38)	(7.03)
Short Term Exposure	0.03	-0.02	0.05	-0.03
	(1.08)	(-0.66)	(1.23)	(-0.43)
Medium Term	0.004 *	0.05	0.08 *	0.08
Exposure	(1.72)	(1.55)	(1.79)	(1.30)
Long Term Exposure	-0.003 *	-0.01	-0.05 **	-0.02
	(-1.87)	(-0.56)	(-2.03)	(-0.65)
Domestic	80.80	129.33	2.77E+02 *	388.10**
	(1.07)	(1.50)	(1.66)	(2.10)
Eurozone	620.30 ***	649.29 ***	1190.88 ***	1205.38***

Variables	**CASC 0,+5**		**CASC -5,+5**	
Type Of Exposure	**Gross**	**Net**	**Gross**	**Net**
	(11.86)	(12.01)	(11.55)	(11.34)
ICC	3684.54 ***	3563.53 ***	6.66E+03 ***	6771.64***
	(16.31)	(14.98)	(15.39)	(14.73)
ICC * ICC Exposure	0.003	0.01	0.01	0.02
	(0.33)	(1.13)	(0.77)	(1.24)
Tier 1	-2.78E-06 ***	-3.74E-06 ***	-5.98E-06 ***	-7.03E-06***
	(-2.69)	(-2.75)	(-2.95)	(-2.78)
RWA	-3.36E-07 ***	-3.07E-07 **	-6.11E-07 ***	-7.36E-07***
	(-3.17)	(-1.95)	(-3.01)	(-2.65)
Non Performing Loans	-2.98E-07	-1.78E-06	-9.51E-07	-1.97E-06
	(-0.11)	(-0.64)	(-0.19)	(-0.41)
R^2	0.66	0.65	0.66	0.65
Adjusted R^2	0.65	0.64	0.66	0.64
F(15. 477)	55.60	53.14	53.90	51.82
p-value	0.00	0.00	0.00	0.00
n	493	493	512	512

We rerun our main regressions, considering CASC 0,+5 and CASC -5,+5, in order to check the robustness of our results. First, we test the robustness of our results by introducing control variables of macroeconomic stability: the VIX and the CISS. The VIX is the CBOE (Chicago Board Options Exchange) Volatility Index, measuring the market expectations of short-term volatility as they appear in the S&P 500 Index option prices. The VIX reflects the market perception of financial volatility, and can be used as a proxy of macro-financial stability. The CISS is the Composite Indicator of Systematic Stress elaborated by the ECB. Its aim is to measure the systemic stress present on the financial system. Results are given in table 8. The conclusion of this analysis is that our results do not rely on the macroeconomic stability, as shown by the stability of our results.

Then, we rerun the model for two subsamples: depending on the SIFI (Systemically Important Financial Institution, as given by the Financial Stability Board)

or not SIFI nature of the banks. The results are quite similar, but some interesting differences appear. First, the tier one is not significant for the SIFI banks, as if investors were sure of the resilience of these banks and do not car about their level of required capital. Second, the role played by Sovereign Disclosure is not significant for non-SIFI banks, as if when the risk is important, a strategy of transparency cannot reassure investors. Then, we try to see if being or not a bank located in a In Crisis Country (ICC) changes the results, following Delatte et al. (2014). The results are robust. We also regress the model depending in the year of the event. We regress the model for the 2011 event and then for the 2012 and 2013 events. The results are robust, but the Sovereign Disclosure is significant only for the first period: we can assume that the transparency mattered especially at the beginning of the crisis, when investors were worried and when information about exposure was particularly scarce. Moreover, considering the nature of our sample, we estimate the cluster-robust estimator, clustering either by the country of the bank (following for instance Neratina et al., 2014) or by the date of the event (to prevent the problem of event date clustering, emphasized for instance by Kalori and Pynnönen, 2010).

2.5 Conclusion

The conduction of this analysis show results on the relationship between disclosure and stability. We have realized how creating a measure of disclosure is not at all and must be taken seriously in order to avoid dramatic consequences regardless to the impact of disclosure on the market it is applied to. The results obtained here are sometimes divergent, depending on the control criterion, but tend to outline some interesting results about the impact of disclosure. We can see that too large a 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 advocates for less disclosure. This phenomenon can also be interpreted by the fact that the macroeconomic situation of each of the participating was not as stable as it could have been years ago. The global disclosure may not be rewarded during a crisis or when there is an 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 regardless to the evolution of the CDS index in most of the case where we control for some criterion. 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 environment. 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 macroeconomic 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 EURO ZONE tend to significantly increase the volatility of the CDS spreads. The recent crisis has proven that the EURO ZONE has been weakened due to the crisis and it is reasonable to think a bank located in one of the country's members of the unique currency. In the meantime, the fact of being located in ICC country 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 ICC exposure 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 chapter 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. The field of research has not been investigated

much and the results we obtained in this chapter convince us to go deeper in this direction.

2.6 Appendix

2.6.1 News report about downgrade.

In this section, you will find a summary of downgrade announcement during the covered period. The following articles helped us to identify and select the downgrade events.

Nombre de document(s) : **25**
Date de création : **17 octobre 2013**

L'agence Fitch dégrade la note souveraine de la Grèce
La Presse Canadienne - 22 février 2012 - 74
ATHÈNES, Grèce - L'agence de notation Fitch a annoncé qu'elle avait dégradé la note souveraine de la Grèce, de CCC à C, après l'annonce des détails de l'accord

L'Italie ignore sa dégradation par Moody's
L'AGEFI Quotidien - 15 février 2012 - 318
Alexandre Garabedian - Rome n'a donc pas souffert de la dégradation d'un cran de sa note, à A2, par Moody's, dans la nuit. Le pays est déjà noté un cran en

L'Espagne juge "contradictoire" la dégradation de sa note par Moody's
AFP Infos Françaises - 14 février 2012 - 206
Le ministre espagnol du Budget, Cristobal Montoro, a jugé mardi "contradictoire" la dégradation, la veille, de la note souveraine du pays par Moody's, alors que les agences de notation "saluent

Avec la France, neuf pays de la zone euro voient leur note dégradée par S&P
Le Monde.fr - 15 janvier 2012 - 983
La France a perdu sa note financière AAA, la meilleure possible, désormais abaissée d'un cran, à AA+, avec perspective négative, a confirmé, vendredi 13 janvier au soir, l'agence d

La dette de la Hongrie jugée « spéculative »
Le Figaro - 23 décembre 2011 - 368
Anne Cheyvialle - Moody's, qui a sévi fin novembre, l'agence de notation a dégradé, hier, la note souveraine hongroise de BBB- à BB +, la reléguant en catégorie « spéculative ». La notation est en

Moody's dégrade de deux crans la note de la Belgique
La Tribune (France) - 19 décembre 2011 - 110
L'agence de notation a annoncé ce vendredi l'abaissement de deux crans de la note souveraine de la Belgique, de « Aa1 » à « Aa3 », et l'a assortie d'une perspective

La Belgique subit l'effet S&P
La Tribune (France) - 8 décembre 2011 - 243
rigueur, l'agence de notation a abaissé d'un cran, de AA+ à AA, la note souveraine du pays vendredi 25 novembre. Une mauvaise nouvelle « pas totalement inattendue », selon le Premier

Hongrie: Moody's dégrade sept banques dans la foulée de la note du pays
AFP Infos Economiques - 25 novembre 2011 - 141
L'agence de notation Moody's a annoncé vendredi soir la dégradation de sept banques commerciales hongroises au lendemain de l'abaissement de la note de la dette souveraine du pays

Fitch dégrade le Portugal en pleine grève générale
Les Echos - 25 novembre 2011 - 393
JESSICA BERTHERAU - sous le coup d'une grève générale. L'agence de notation Fitch a dégradé la note souveraine du pays d'un cran, de « BBB- » à « BB+ », le reléguant dans la catégorie

La note souveraine de l'Espagne dégradée
L'Indépendant - 20 octobre 2011 - 167

EUROPRESSE.COM
une solution de CEDROM SNI

L'Espagne a subi une nouvelle dégradation de sa note souveraine, pour la troisième fois en moins de deux semaines. Après Fitch et Standard & Poor's, Moody's a décidé de

Standard and Poor's abaisse d'un cran la note de la Slovénie à "AA-"

AFP Infos Françaises - 20 octobre 2011 - 344

d'évaluation financière Standard and Poor's a abaissé mercredi soir d'un cran la note de solvabilité de la Slovénie, pointant la dégradation "des conditions budgétaires" du petit pays alpin

Standard & Poor's abaisse la notation de l'Espagne

Le Monde - 15 octobre 2011 - 415

Sandrine Morel - américaine à abaisser d'un cran, dans la nuit de jeudi à vendredi 14 octobre, la note de la dette souveraine espagnole. Celle-ci a été ramenée de AA à AA

Fitch dégrade les notes de l'Espagne et de l'Italie

Le Monde.fr - 8 octobre 2011 - 241

7 octobre, l'agence d'évaluation financière Fitch Ratings a abaissé de deux crans la note à long terme de l'Espagne, en raison notamment de l'intensification de la crise

Marché: Moody's dégrade la dette d'Italie de trois crans.

Cercle Finance (site web) - 5 octobre 2011 - 203

Moody's a dégradé hier soir la dette souveraine de l'Italie de 'Aa2' à 'A2', la perspective associée étant négative. L'agence de notation-crédit indique que cette dégradation de

Marché: l'obligataire perd du terrain.

Cercle Finance (site web) - 5 octobre 2011 - 180

à Londres. Les obligations des Etats jugés les plus sûrs ne profitent pas de la dégradation par Moody's de sa note sur la dette souveraine de l'Italie de trois

Slovénie: Fitch baisse d'un cran la note à "AA-", craintes sur les banques

AFP Infos Françaises - 28 septembre 2011 - 147

d'évaluation financière Fitch a annoncé mercredi avoir abaissé d'un cran à "AA-" la note de la dette souveraine de la Slovénie et a averti qu'elle pourrait l'abaisser

Marché: S&P's dégrade d'un cran la note de l'Italie.

Cercle Finance (site web) - 20 septembre 2011 - 248

Standard & Poor's (S&P's) a abaissé d'un cran la note de la dette souveraine de long terme de l'Italie, qui passe de 'A+' à 'A'. Cette

Fitch dégrade la note de Chypre, le gouvernement propose un plan d'austérité

Le Monde.fr - 11 août 2011 - 430

L'agence de notation financière Fitch a dégradé mercredi 10 août la note de la dette à long terme de Chypre, la faisant reculer de deux crans à "BBB" , assortie d

Standard & Poor's abaisse encore de deux crans la note de la Grèce

Le Monde.fr - 28 juillet 2011 - 111

Après Moody's,qui a abaissé la note souveraine de la Grèce à deux crans du défaut de paiement, c'est une autre agence de notation, Standard & Poor's, qui

La notation de la Grèce placée à un cran du défaut

Les Echos - 26 juillet 2011 - 343

MASSIMO PRANDI - la Grèce. Moody's, hier, a dégradé de trois crans (de Caa1 à Ca) la note de la dette souveraine de long terme d'Athènes en la plaçant à une seule

[Fitch punit les tergiversations de l'UE sur la Grèce L'agence de notation Fitch a annoncé hier soir l'abaissement de la note de la Grèce, qui était déjà en catégorie spéculative, de B+ à CCC.]

Le Monde.fr - 14 juillet 2011 - 121

la Grèce L'agence de notation Fitch a annoncé hier soir l'abaissement de la note de la Grèce, qui était déjà en catégorie spéculative, de B+ à CCC. Par cette

A travers l'Irlande, Moody's punit la zone euro

Le Temps - 14 juillet 2011 - 458

Ram Etwareea - La dégradation de la note de la dette irlandaise mardi par l'agence de notation Moody's, après celle de la Grèce et du Portugal, constitue une mauvaise nouvelle de plus

Le Portugal paie ses faiblesses

Le Soir - 7 juillet 2011 - 572

Détenir de la dette souveraine portugaise est désormais considéré par l'agence de notation Moody's comme un investissement « spéculatif » . Mardi soir, Moody's a annoncé qu'elle rétrogradait le « rating

La Grèce encore décotée

Métro (Montréal) - 14 juin 2011 - 34

Crise. L'agence de notation Standard & Poor's a encore dégradé la note de la dette souveraine de la Grèce, qui passe de B à CCC, estimant probable que le pays

Standard & Poor's sanctionne une nouvelle fois la Grèce

Les Echos - 10 mai 2011 - 354

MASSIMO PRANDI - , le travail des analystes des agences de notation financière frappe une nouvelle fois la dette souveraine grecque. Pour la quatrième fois depuis avril 2010, la principale d'entre elles, Standard & Poor

Nombre de document(s) : **25**
Date de création : **18 octobre 2013**

Fitch abaisse la note de Chypre d'un cran à "B-" avec perspective négative
Yahoo! Finance France (réf. site web) - 3 juin 2013 - 218
L'agence d'évaluation financière Fitch Ratings a annoncé lundi abaisser la note long terme de Chypre d'un cran de "B" à "B-" avec perspective négative, en raison du degré

Moody's relègue la Slovénie en catégorie spéculative
L'AGEFI Quotidien - 2 mai 2013 - 48
L'agence de notation a abaissé la note souveraine de la Slovénie de Baa2 à Baa3, contre A- pour Fitch et S&P. La perspective reste négative. Moody's évoque trois

L'agence Fitch dégrade d'un cran la note de la Slovénie
AFP Infos Françaises - 17 mai 2013 - 189
L'agence de notation Fitch a dégradé vendredi d'un cran la note souveraine de la Slovénie, de "A-" à "BBB+", assortie d'une perspective négative face à la dégradation de

Fitch retire (à son tour) le triple A du Royaume-Uni
La Tribune (France) - 22 avril 2013 - 209
J.D. - partir de 2017-2018.” C'est par ces explications que Fitch a annoncé la dégradation, de AAA à AA+, de la note de la Grande-Bretagne. La perspective était négative

RPT-Moody's relègue la Slovénie en catégorie spéculative
Reuters économique - 30 avril 2013 - 99
NEW YORK, 30 avril (Reuters) - Moody's Investors Service a annoncé mardi avoir abaissé la note souveraine de la Slovénie de "Baa2" à "Ba1", faisant ainsi basculer le pays en catégorie

Crise : Fitch dégrade d'un cran la note de l'Italie
Le Parisien.fr - 9 mars 2013 - 296
notation Fitch, qui a dénoncé une combinaison d'incertitude et de récession et dégradé sa note souveraine d'un cran. Elle passe de «A- à BBB+» et demeure assortie d'une

Chypre : la zone euro exige des nouvelles propositions
Les Echos (site web) - 21 mars 2013 - 645
AGENCE - le blocage de la situation, Standard & Poor's a dégradé une nouvelle fois jeudi la note souveraine de Chypre, ramenée à CCC. A Nicosie, Bank of Cyprus , la principale banque de

La Grande-Bretagne privée de son "triple A" par Moody's
La Tribune (France) - 25 février 2013 - 210
la soirée, l'agence de notation a annoncé qu'elle avait dégradé d'un cran la note souveraine du pays. Cette note passe de "Aaa" à "AA1" avec une perspective stable

Chypre espère l'aide de l'UE malgré Moody's
L'Orient-Le Jour - 12 janvier 2013 - 443
l'obtention d'une aide internationale qui semblait encore loin d'être acquise après la dégradation brutale de la note de crédit de Moody's. L'agence de notation a abaissé

Andorre / Eco : Standard&Poor's dégrade
Boursier (site web) - 3 décembre 2012 - 85

EUROPRESSE.COM
une solution de CEDROM SNI

Standard&Poor's Ratings Services indique avoir abaissé la note souveraine long terme de la Principauté d'Andorre de "A" à "A-". La note court terme est également abaissée de "A

Standard & Poor's place la Grèce en "défaut partiel"

Yahoo! Finance Québec (réf. site web) - 6 décembre 2012 - 119

AOF) - L'agence de notation Standard & Poor's a annoncé mercredi soir avoir abaissé sa note attachée à la dette souveraine de la Grèce de "CCC" à ® défaut partiel ¯. L'agence

S& P dégrade Chypre pour la 3è fois en cinq mois

La Tribune.fr - 21 décembre 2012 - 238

latribune.fr - Nouvelle dégradation de la note souveraine chypriote ! L'agence de notation américaine Standard & Poor's vient de passer la note de la dette de la petite île méditerranéenne de B à

Après S&P, Moody's prive à son tour la France de son Aaa :

Boursorama (réf. site web) - 20 novembre 2012 - 578

IS (Reuters) - Moody's a abaissé lundi la note de la France, de "Aaa" à "Aa1", jugeant ses perspectives - MOODY'S ABAISSE LA NOTE DE LA FRANCE PARIS (Reuters) - Moody's a abaissé lundi la note de la France, de "Aaa" à "Aa1", jugeant ses perspectives de croissance affaiblies et

Fitch abaisse la note de Chypre à BB-

L'AGEFI Quotidien - 22 novembre 2012 - 48

L'agence a abaissé de deux crans la note souveraine de Chypre à BB-, avec une perspective négative, sur fond de dégradation marquée des perspectives macroéconomiques du pays, de performances budgétaires

Moody's abaisse la note souveraine de Chypre

Reuters économique - 8 octobre 2012 - 99

NEW YORK, 9 octobre (Reuters) - L'agence de notation Moody's a abaissé la note de Chypre de trois crans lundi, de Ba3 à B3, justifiant sa décision par la fragilité

L'Espagne dans le collimateur des agences de notation

Le Soir - 12 octobre 2012 - 93

(S&P) a accentué la pression sur l'Espagne en abaissant de deux crans la note souveraine du pays. Les obligations espagnoles sont passées de BBB+ à BBB- et ne sont

Standard & Poor's rabaisse la note de Chypre de trois crans

Les Echos - 19 octobre 2012 - 91

, c'est au tour de la principale agence mondiale de notation financière de dégrader la note de la dette souveraine de long terme de Chypre. Désormais affublée d'un « B », Nicosie

Slovénie: les taux d'emprunt grimpent après la dégradation de Moody's

AFP Infos Economiques - 3 août 2012 - 252

à long terme de la Slovénie ont passé la barre symbolique des 7%, après la dégradation de la note souveraine du pays par l'agence d'évaluation financière Moody's, alors

La pression s'accentue sur la Slovénie

La Tribune.fr - 9 août 2012 - 338

Jérémie Pham-Lê - pour Ljubljana. L'agence de notation Fitch a annoncé mercredi avoir abaissé à «A-» la note de la dette slovène, assortie d'une perspective négative. Début août, les deux autres grandes

Moody's dégrade l'Italie

Le Point.fr - 13 juillet 2012 - 525
Source Reuters - Quelques heures seulement après la décision-surprise de l'agence Moody's d'abaisser sa note souveraine, l'Italie est parvenue vendredi à emprunter sur les marchés à un taux en

Fed et dégradation de l'Espagne entament le moral des Bourses en Europe

La Tribune.fr - 8 juin 2012 - 305
latribune.fr (Source AFP) - L'attentisme de la Réserve fédérale américaine et l'abaissement de la note de l'Espagne par l'agence de notation Fitch ont eu raison du léger optimisme affiché depuis le

Moody's abaisse la note de l'Espagne mais aussi de Chypre

Econostrum (site web) - 14 juin 2012 - 83
Astrid Jousset - Moody's abaisse la note de l'Espagne mais aussi de Chypre ESPAGNE / CHYPRE. Moody's abaisse, mercredi 14 juin 2012, la note souveraine de l'Espagne de trois crans, de

Fitch dégrade la Grèce

Le Point.fr - 18 mai 2012 - 323
Source AFP - "B-" auparavant, citant "le risque accru" de sortie du pays de la zone euro. La note de la dette de court terme en devises a été ramenée à "C" contre "B

S&P dégrade de deux crans la note de l'Espagne

Le Figaro.fr - 27 avril 2012 - 251
Golla, Mathilde - l'ensemble de la zone euro. Standard & Poor's a abaissé de deux crans la note de la dette souveraine espagnole, à «BBB+» contre «A», en dépit des vastes mesures d

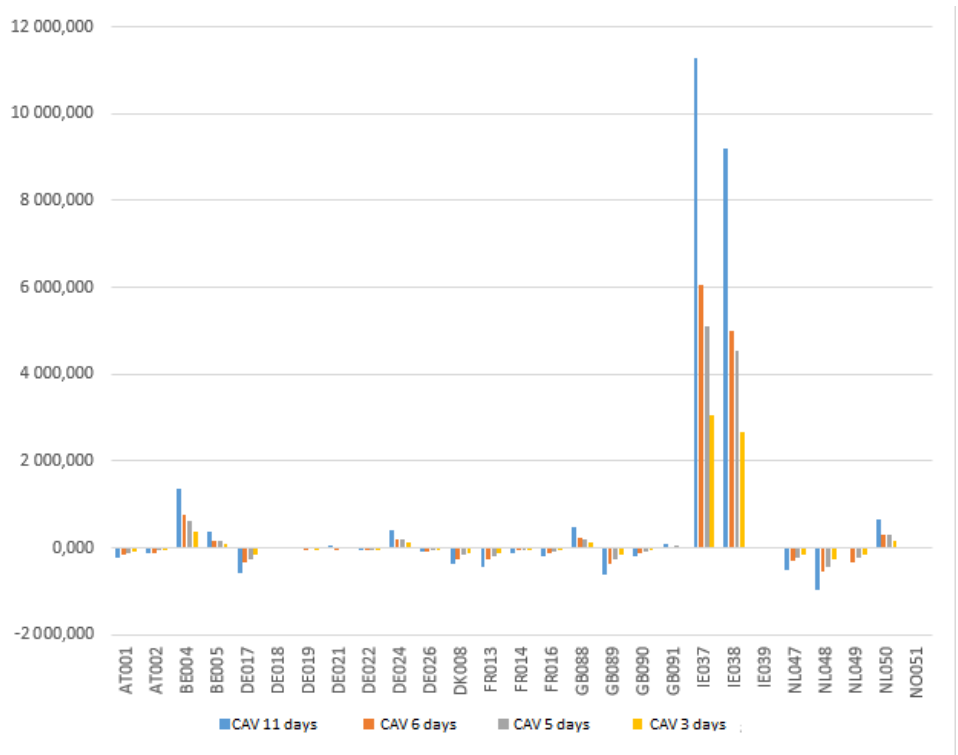
Fitch déclare la dette d'Athènes en défaut partiel

lesechos.fr - 9 mars 2012 - 118
MASSIMO PRANDI - concurrente Standard & Poor's, l'agence de notation Fitch Ratings a déclaré vendredi la dette souveraine grecque en défaut partiel (« RD » pour Restricted Default dans la classification de l'agence). Attendue

2.6.2 CAV CDS

The section under shows the cumulative abnormal variation of the CDS for each selected event. The unit used is basis point.

Table 2.27 : CAV CDS event 3,



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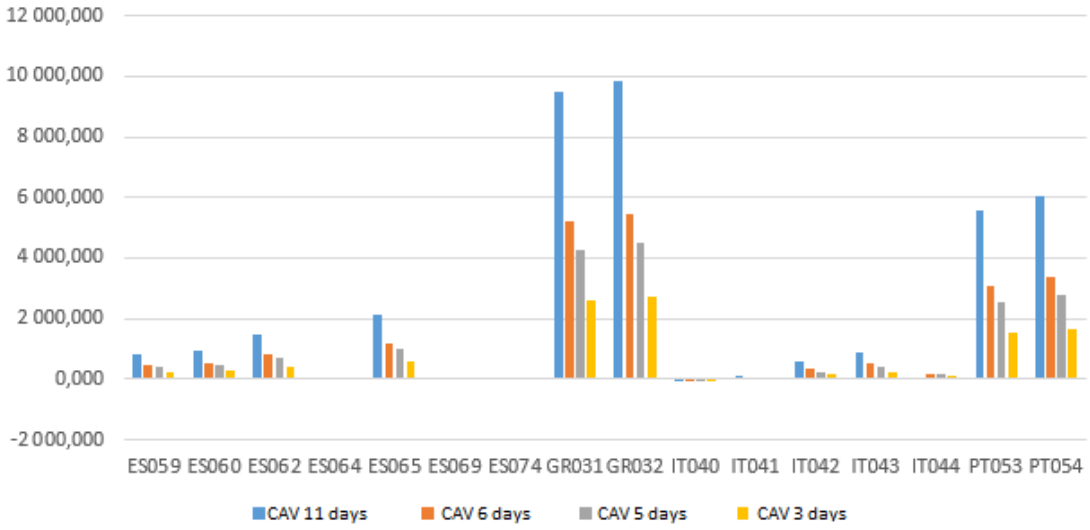
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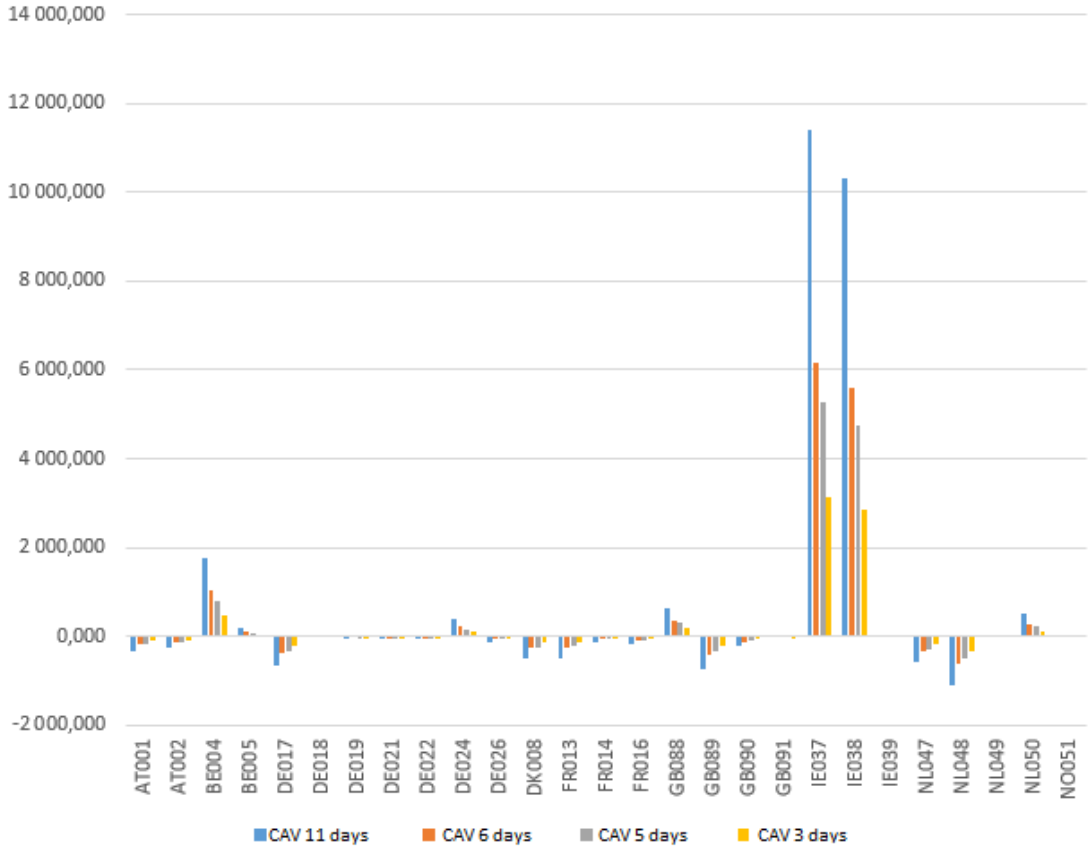
Table 2.28 : CAV CDS event 4



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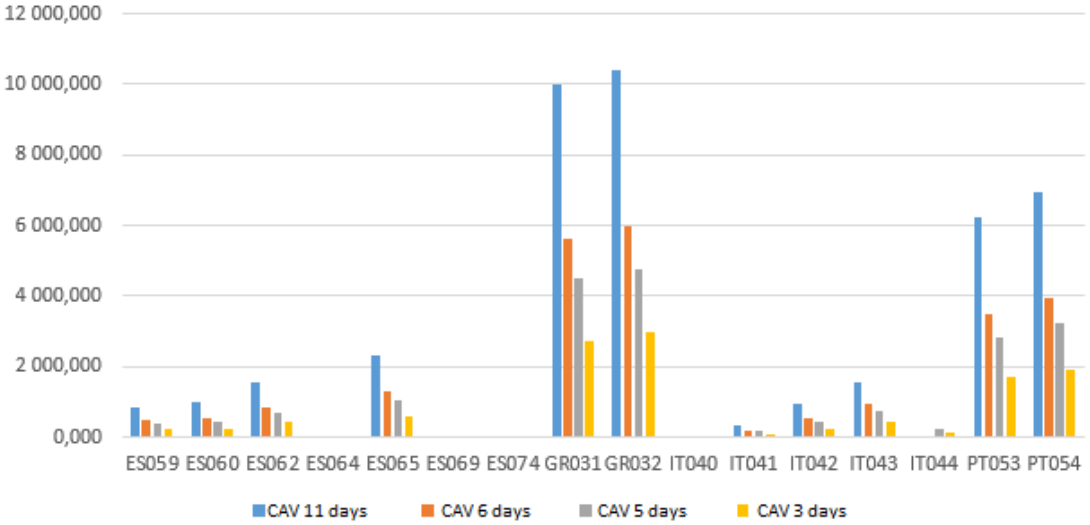

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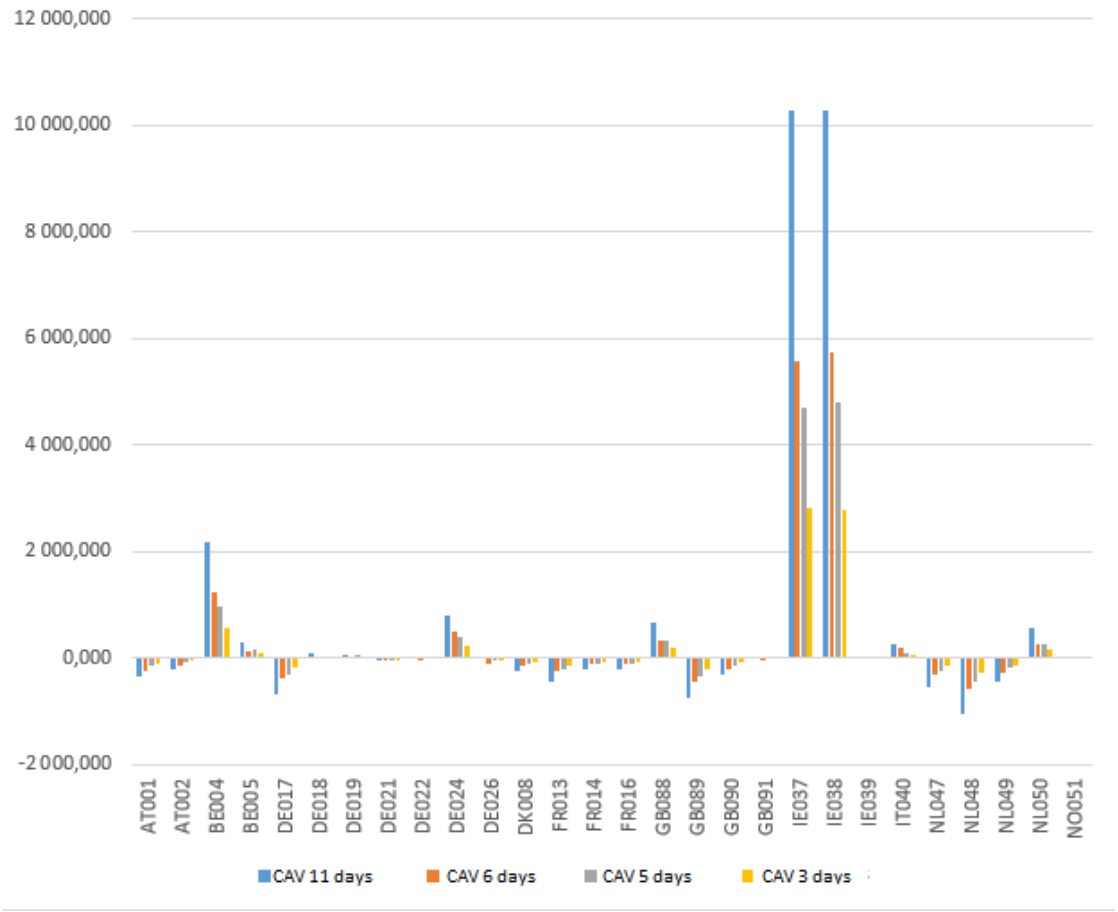

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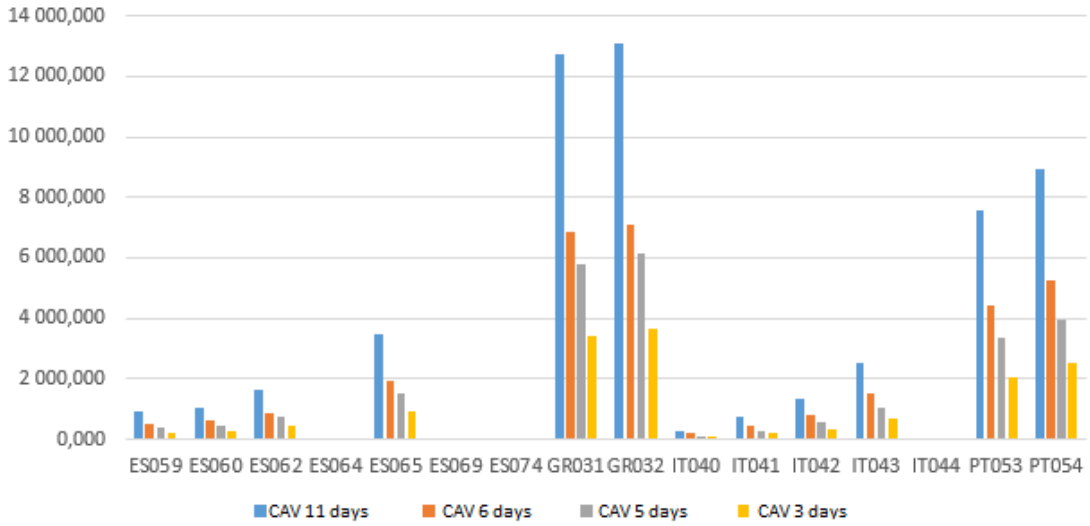
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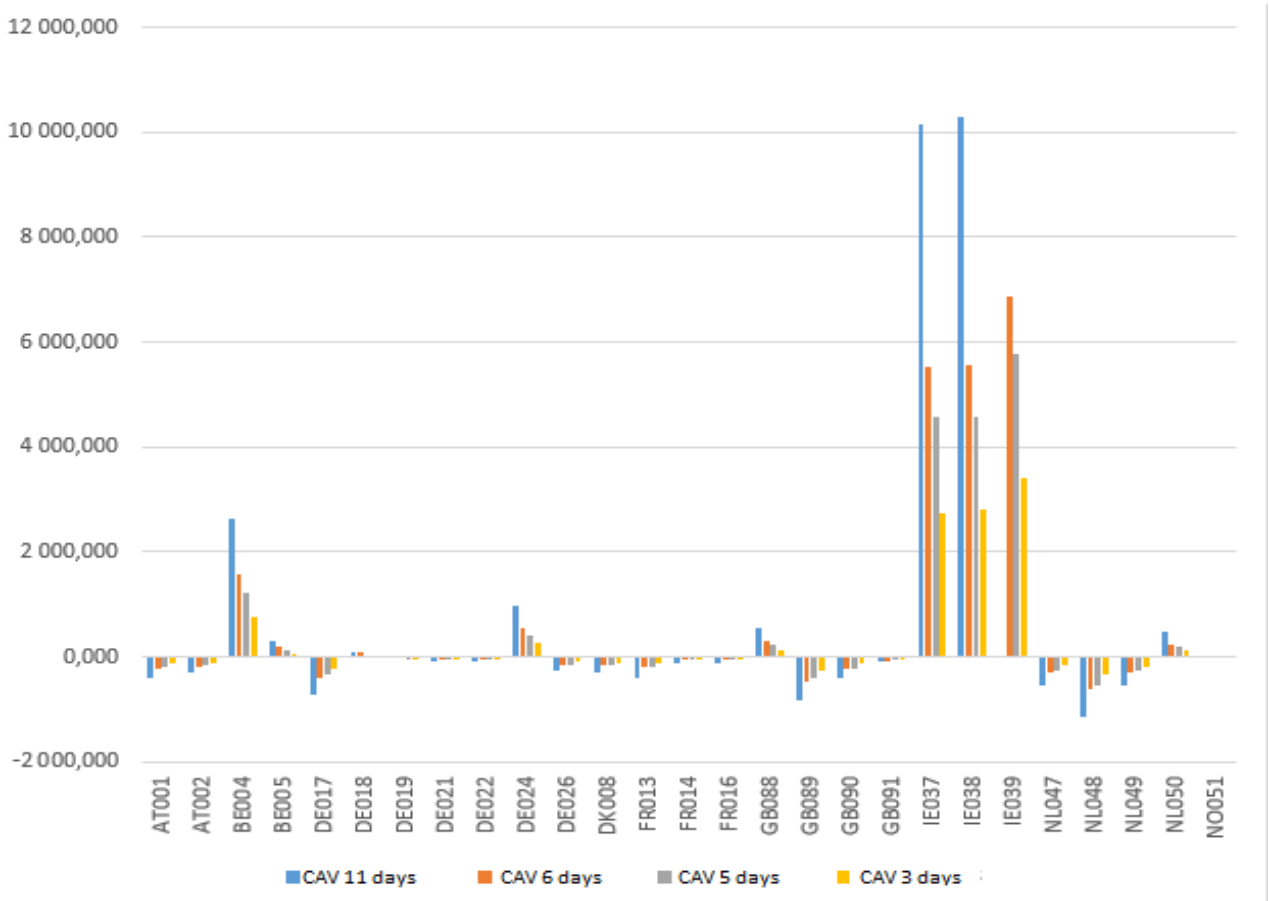
Table 2.30 : CAV CDS event 6



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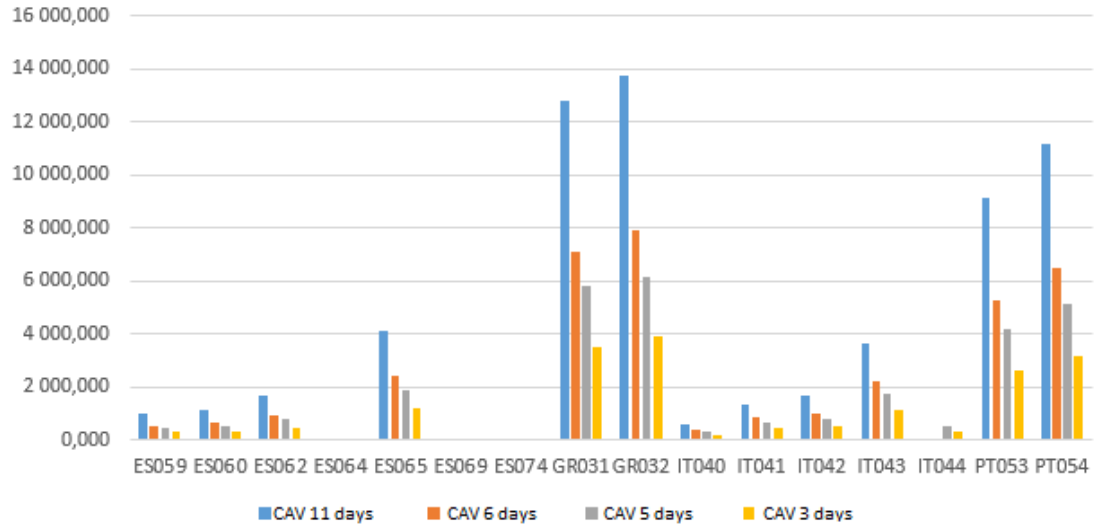
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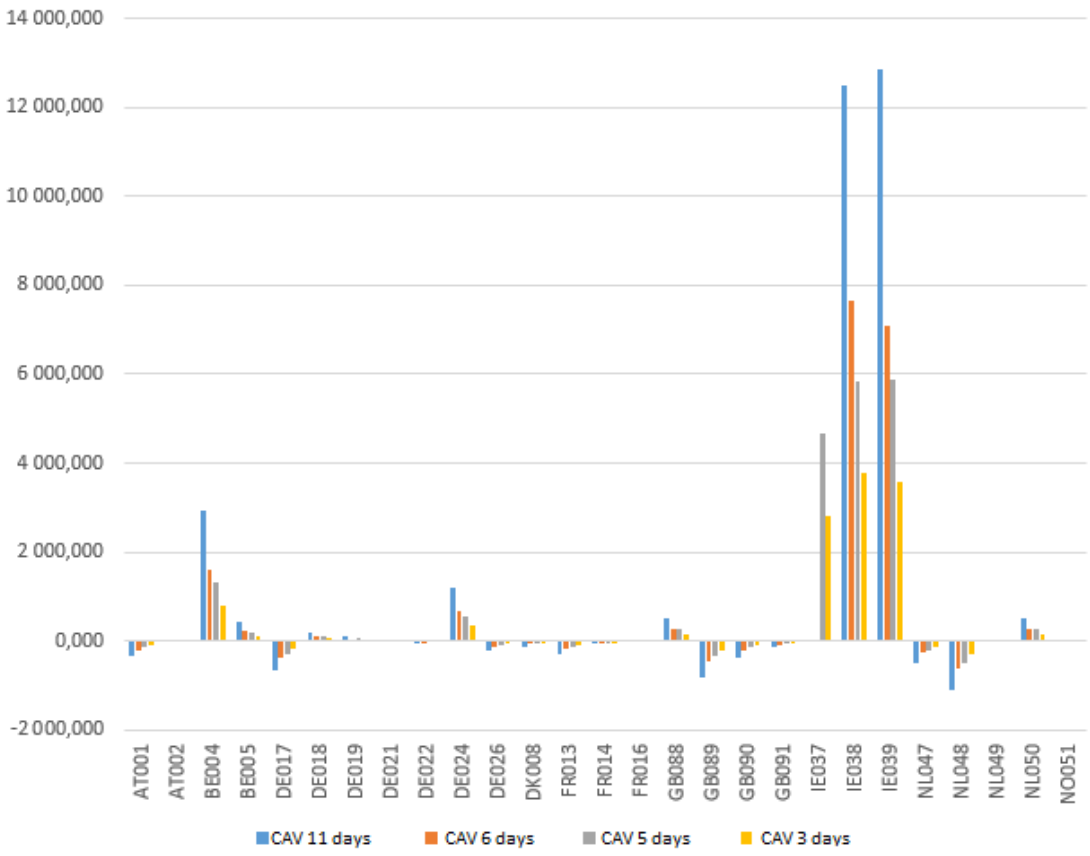
CAV 5 days
CAV 3 days

Table 2.31 : CAV CDS event 7



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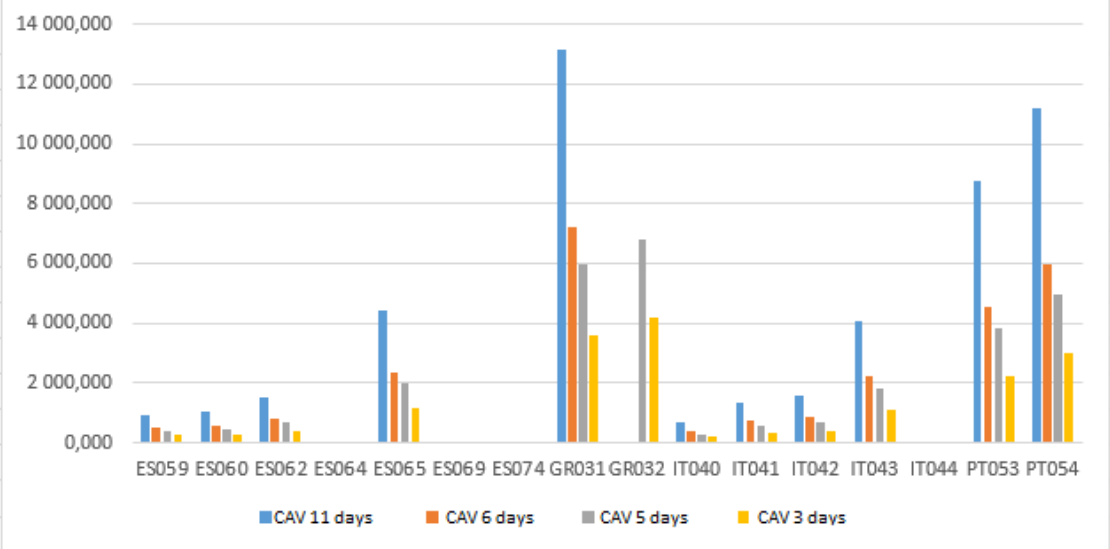
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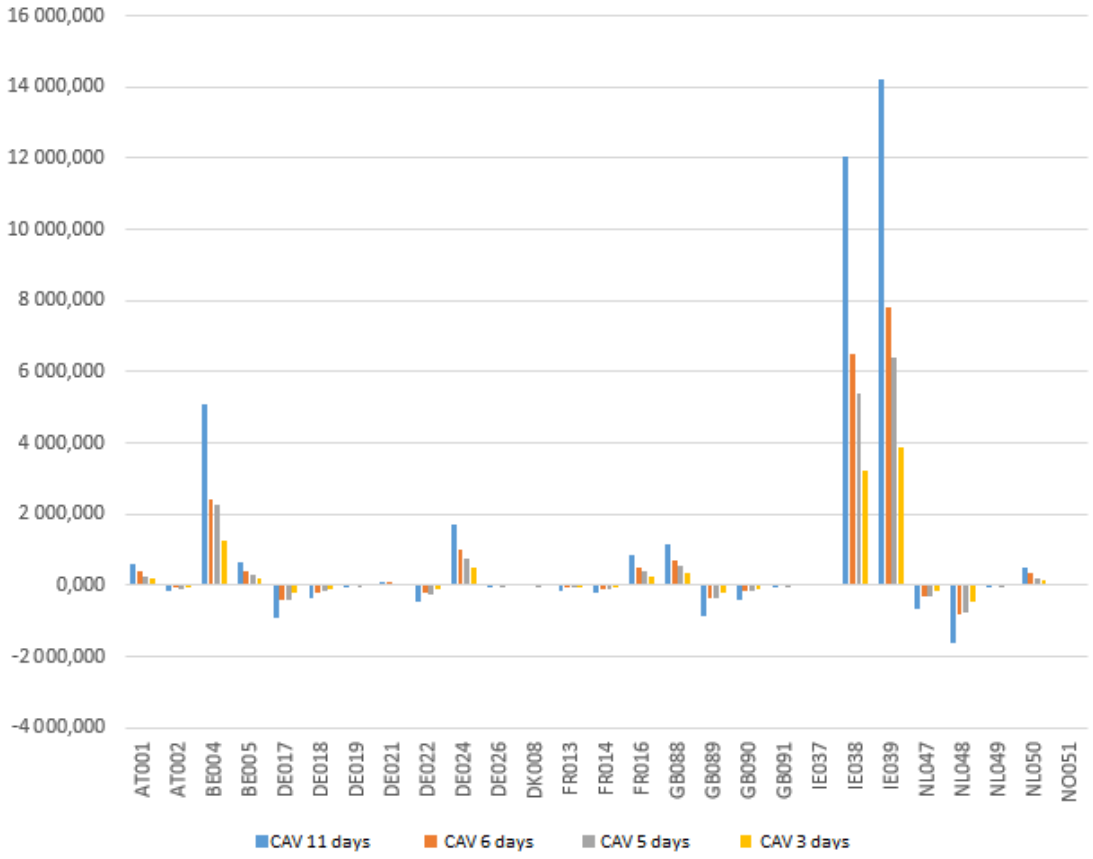

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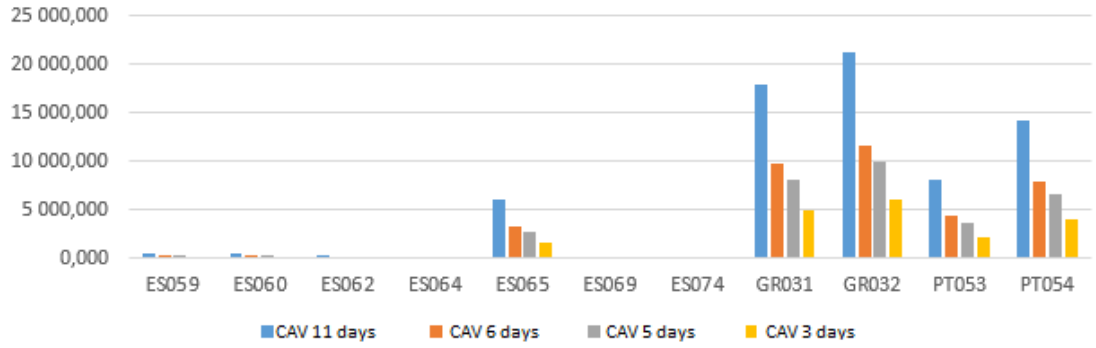

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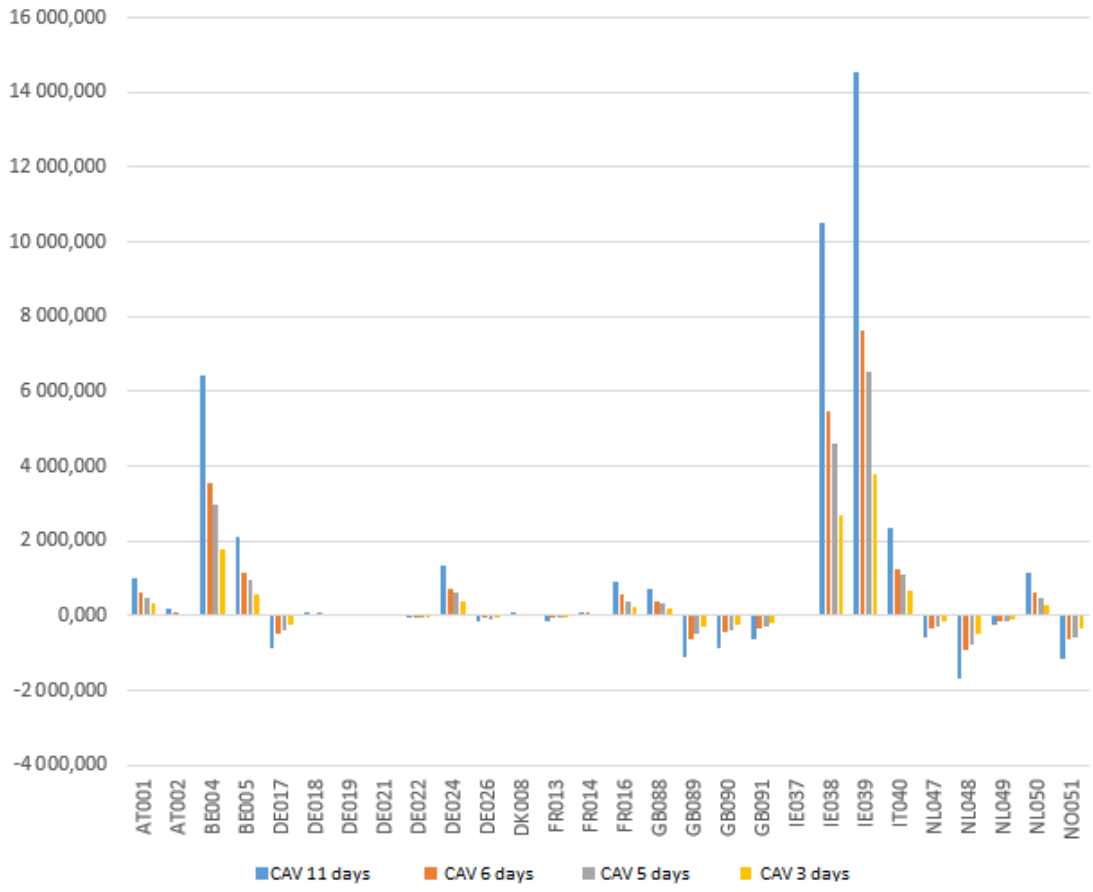

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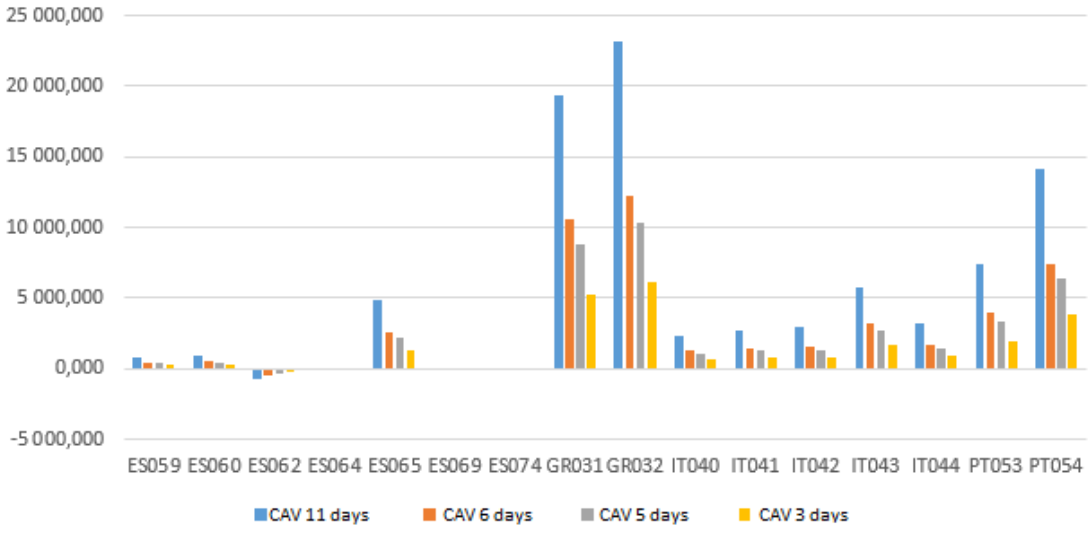
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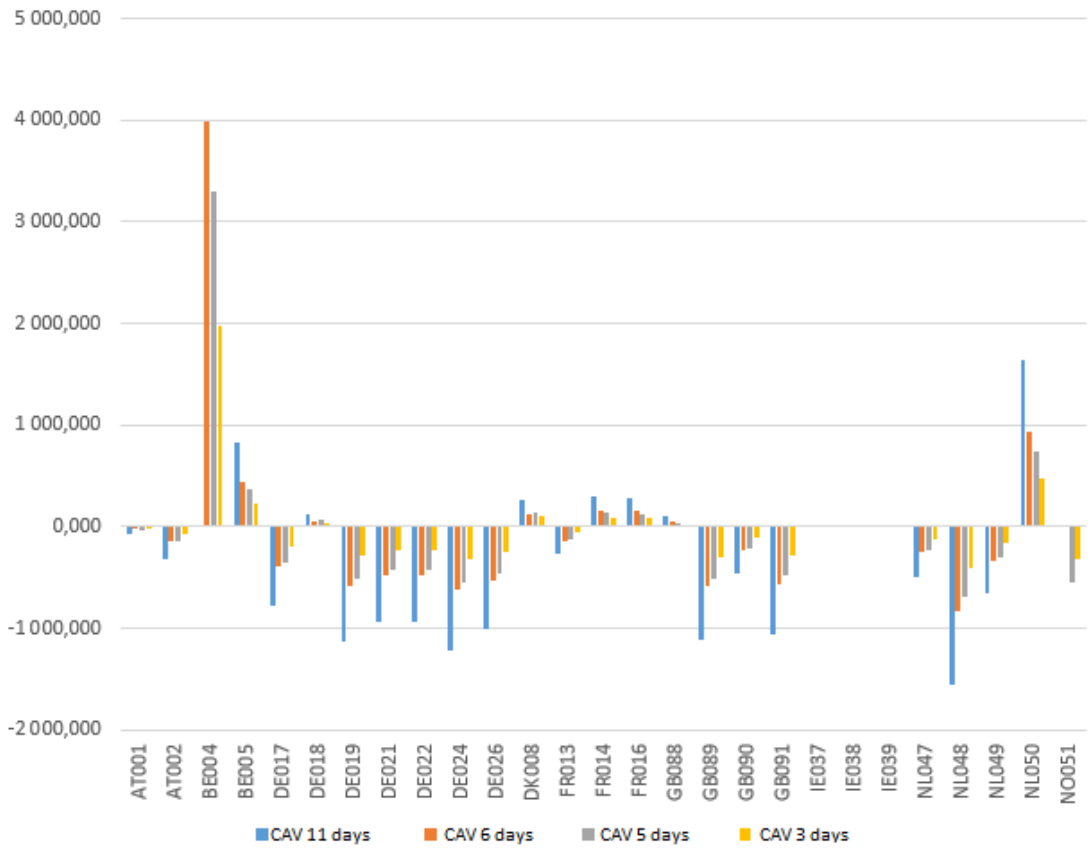

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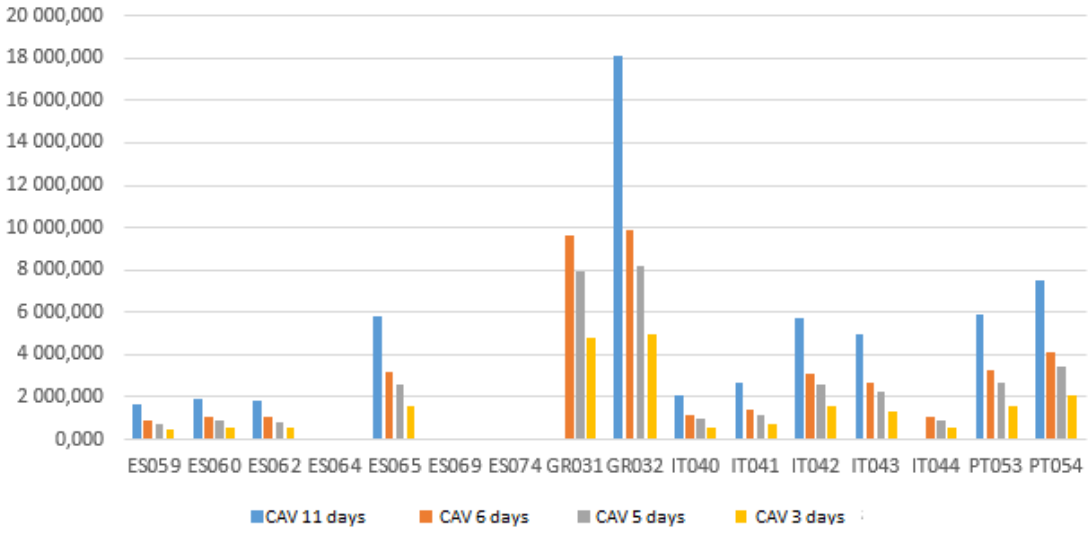
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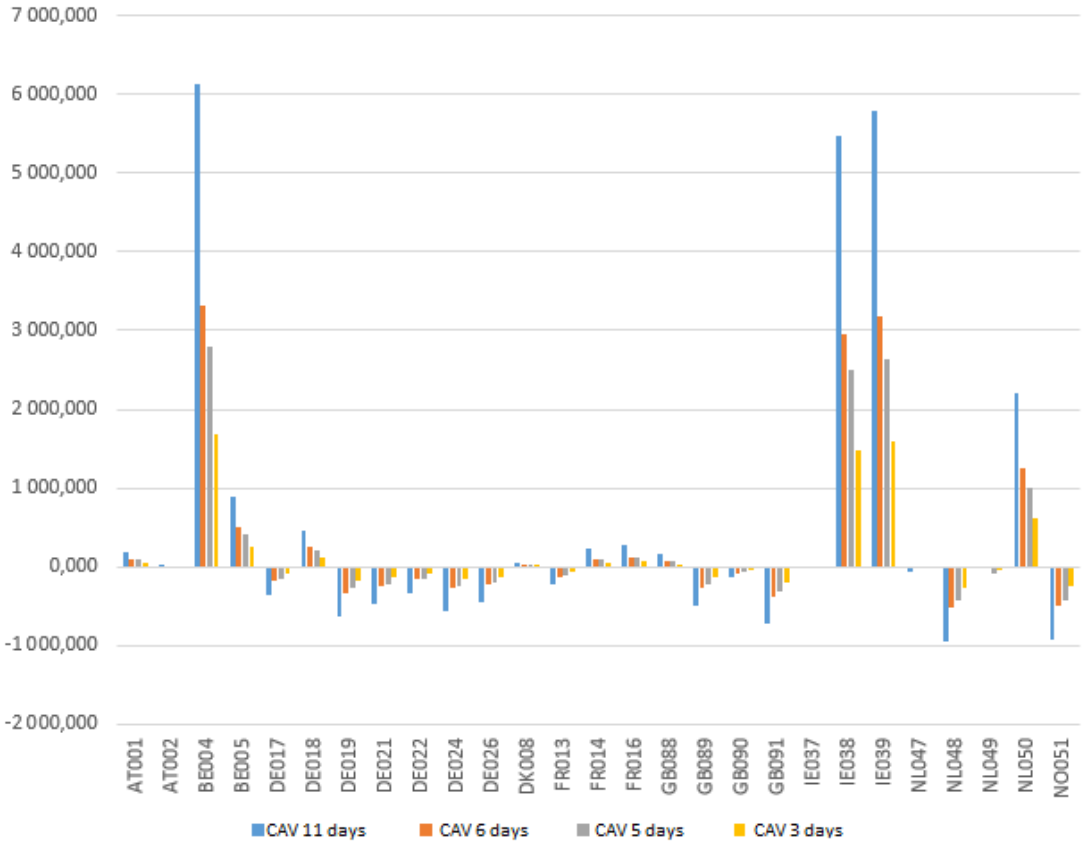

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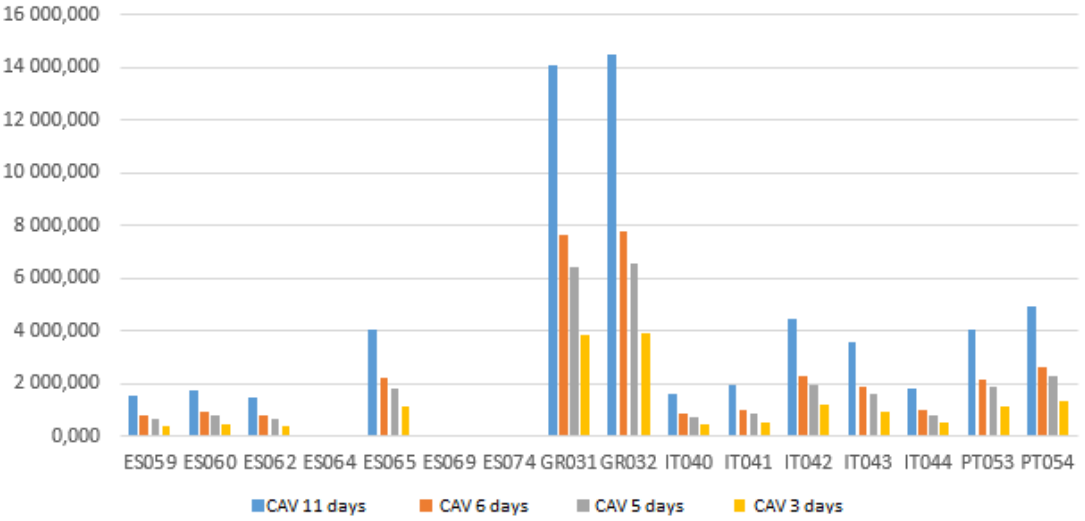

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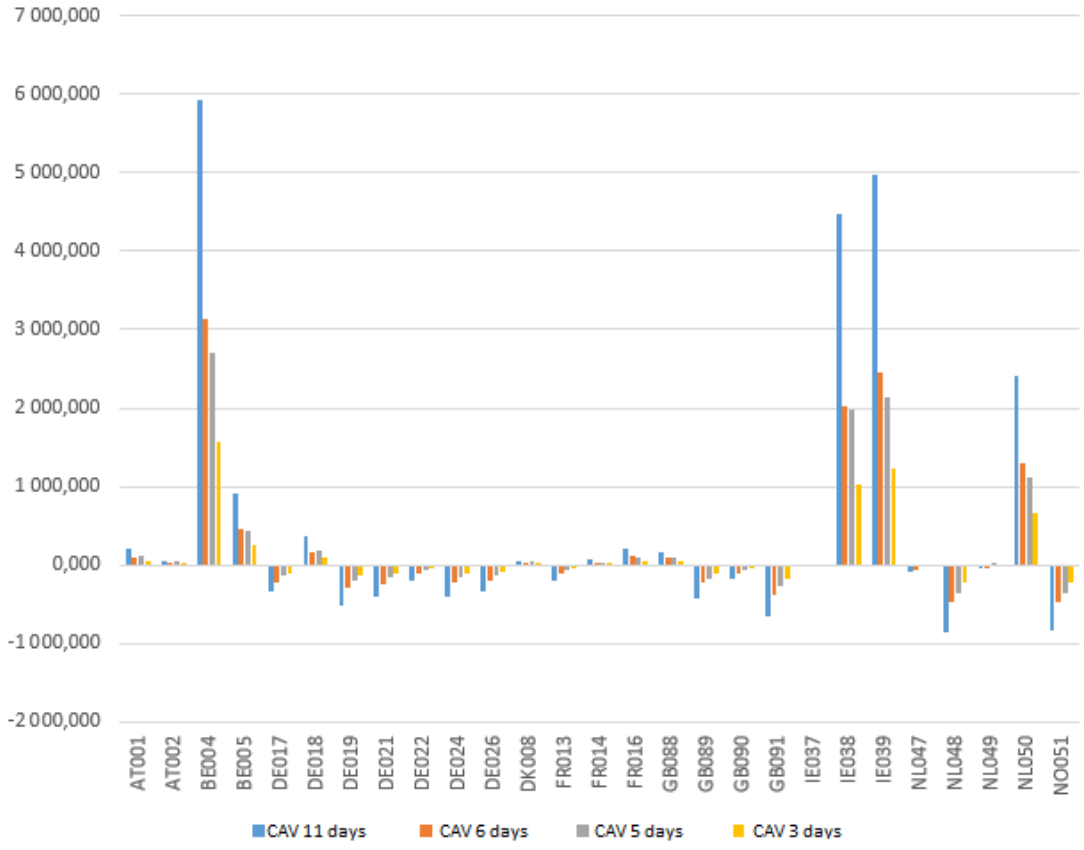

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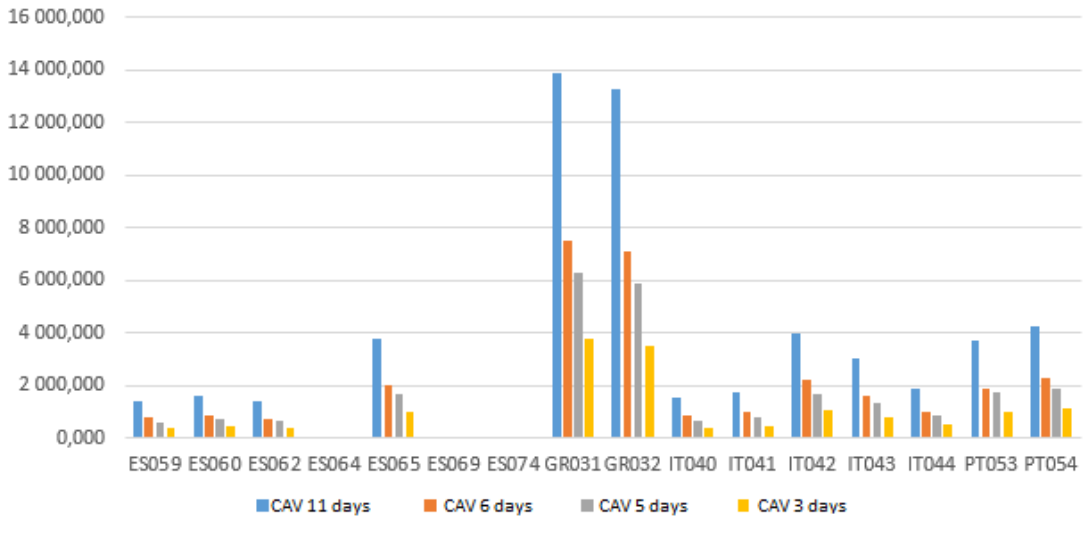

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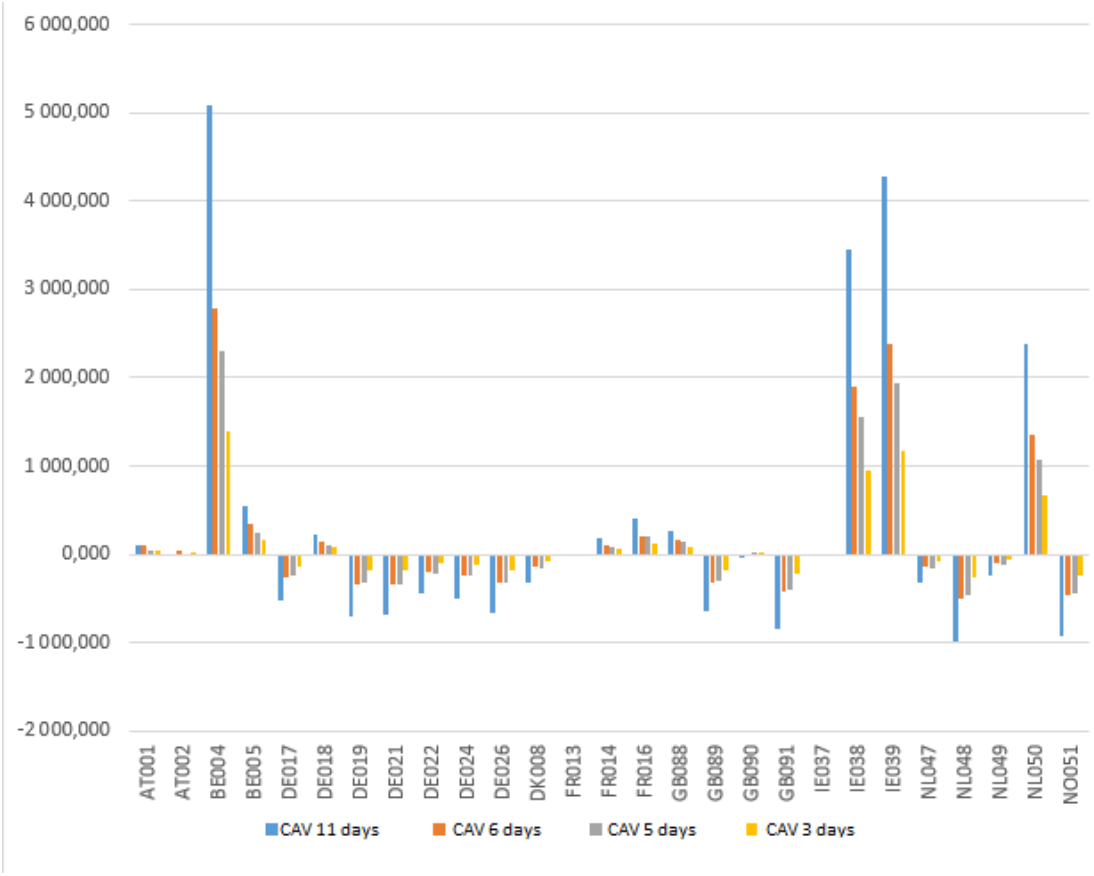

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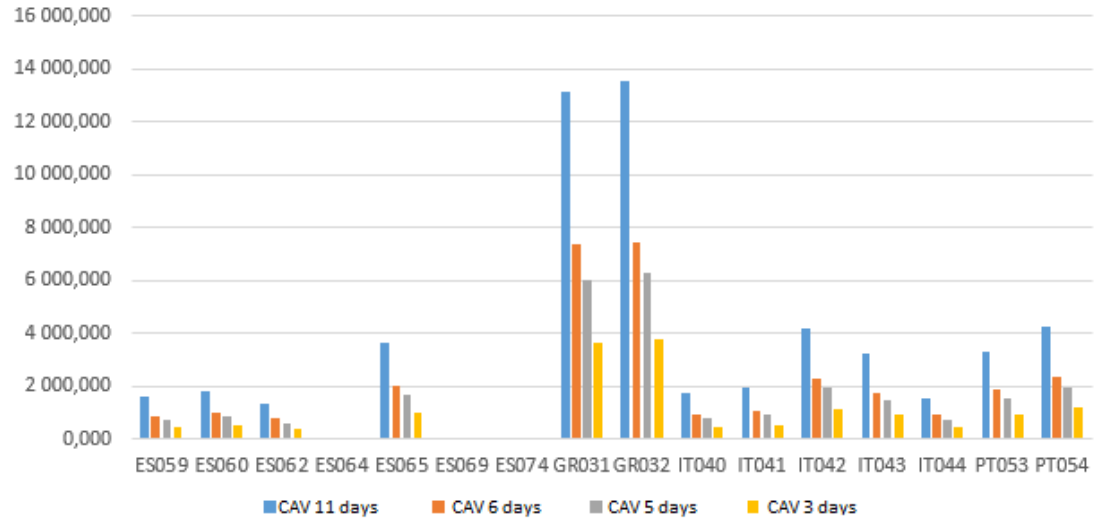

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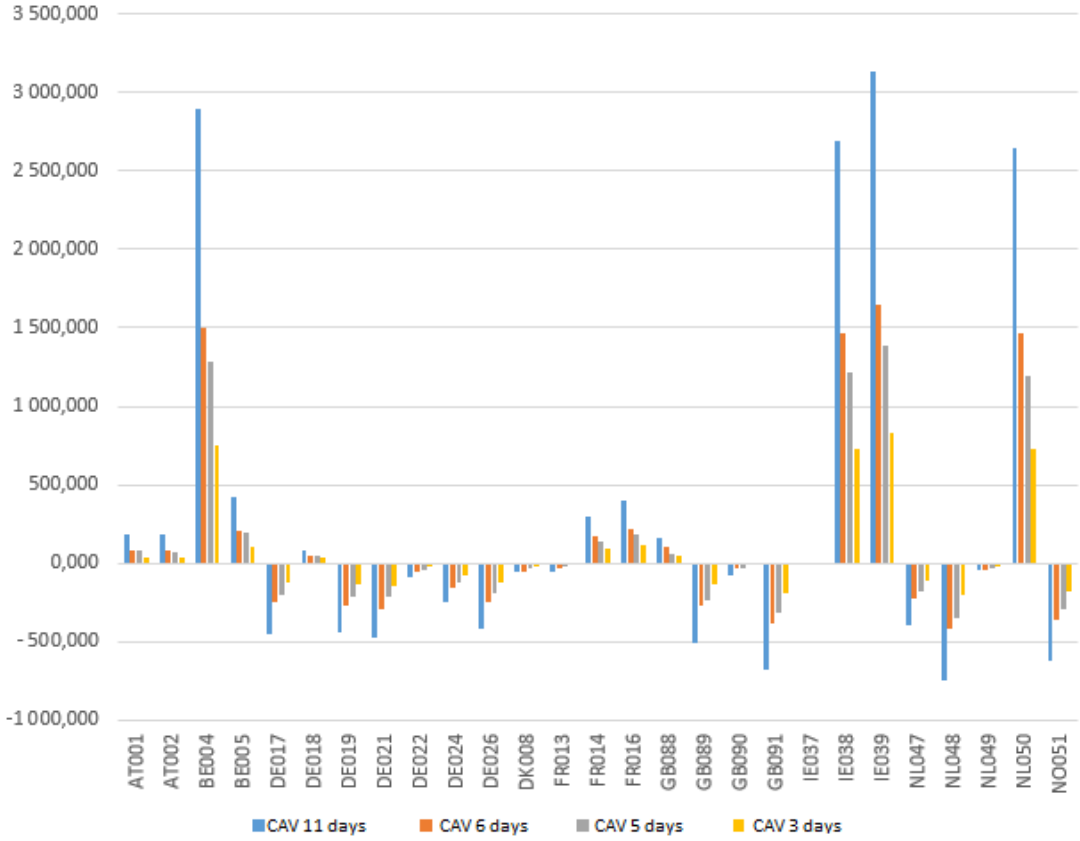

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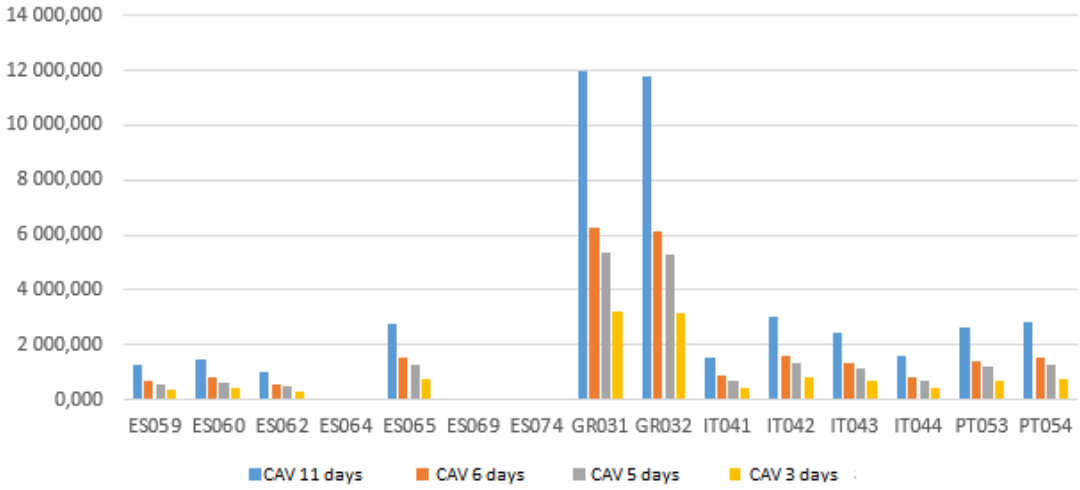

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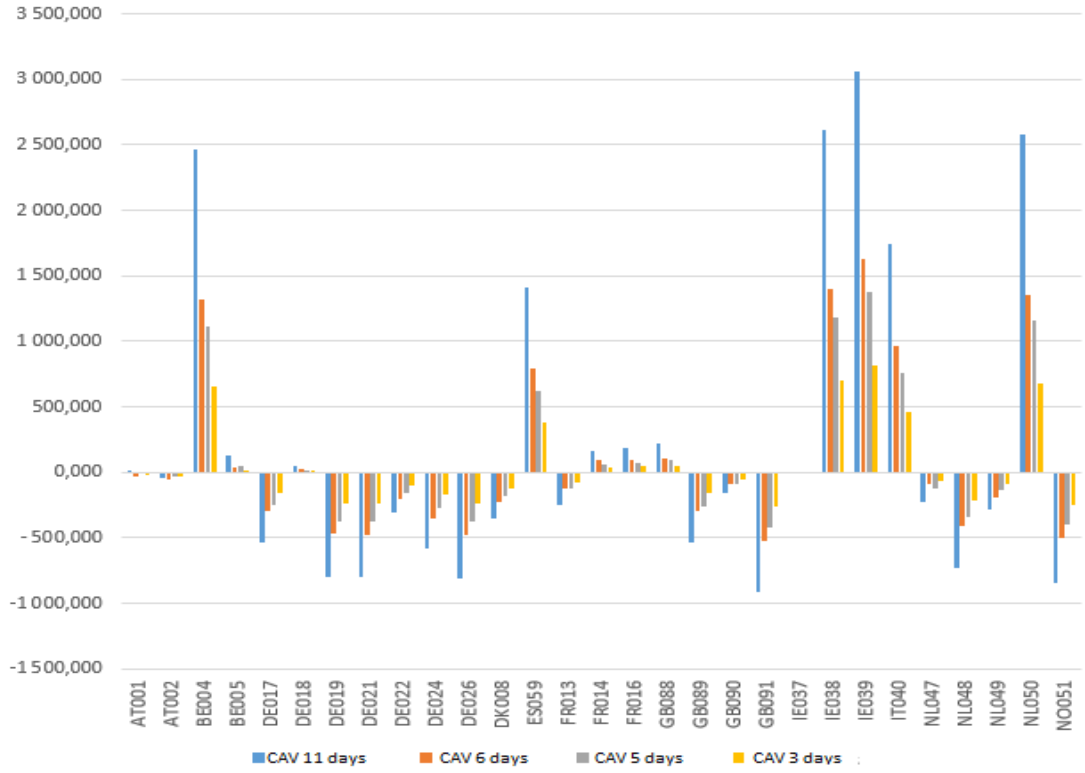

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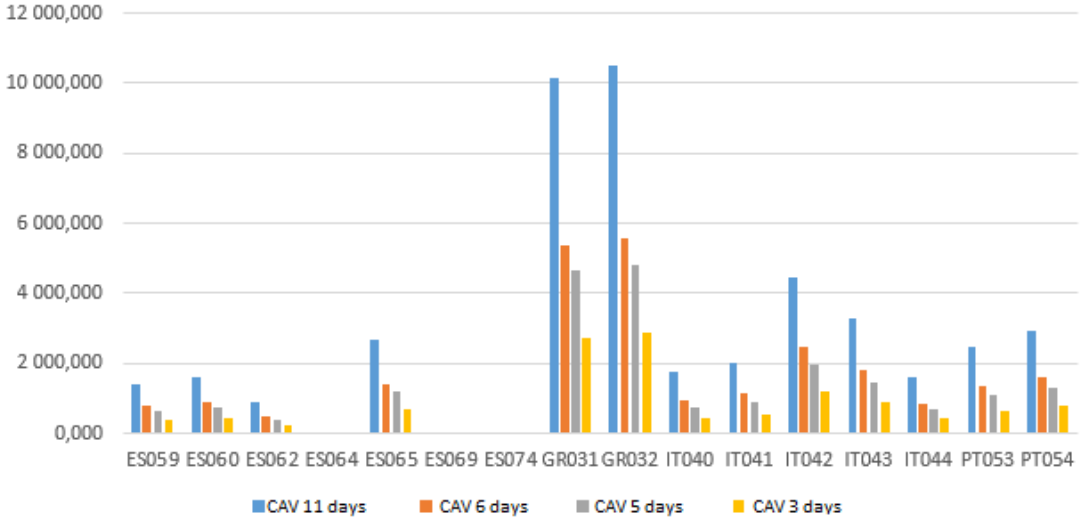

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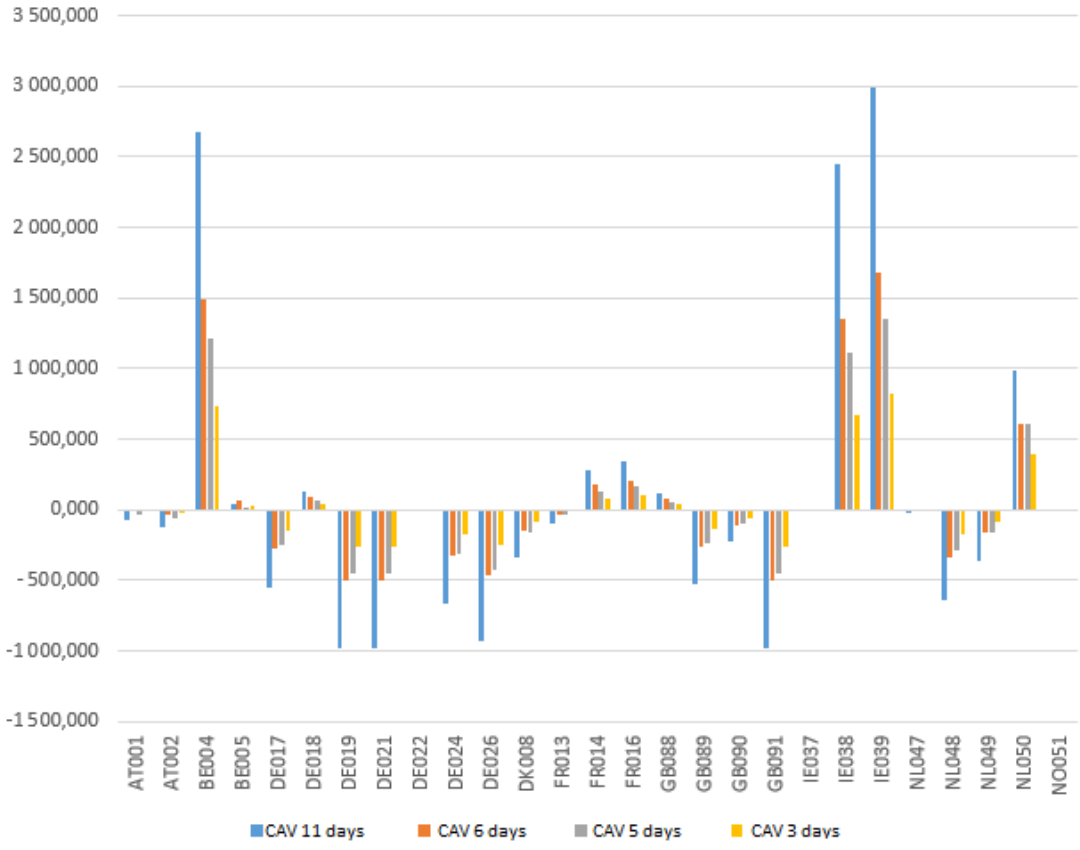

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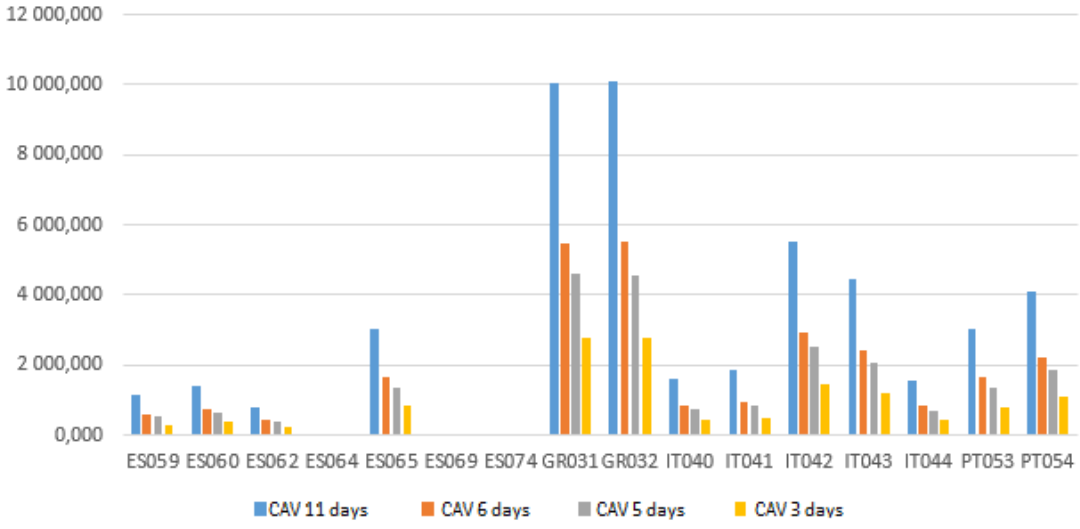


Chapter 3: Governance by depositors, bank run and ambiguity aversion: a theoretical approach

Chapter 3

Governance by depositors, bank run and ambiguity aversion: a theoretical approach

3.1 Introduction

The banking regulation over the last century has worked to avoid depositors bank run and the number of runs is approaching a level close to null, throughout different policies such as deposit insurance implementation or mandatory reserves. The evolution of the literature dedicated to bank runs and its relationship with disclosure has been largely analyzed both empirically and theoretically as in Cordella and Yeyati (1998, 2002), Wu and Bowe (2012) or Chen and Hasan (2006) for instance. A large span of the literature shows two positive effects of disclosure onto this relationship: the occurrence of bank run is decreasing and transparent banks are more attractive for depositors. The contributions of the literature had an impact onto future banking regulation policies, especially Basel II pillar 3 and the Sarbanes-Oxley act. The contributions of the literature and therefore its translation into regulatory policies have contributed to a reduction of the number of bank runs but have also enabled banks and to regulators to learn how to manage situations like this: the case of Cyrpus 2013 is an example of such management.

Those very same contributions, as the large majority of the literature concerning the relationship with depositors, governance or disclosure, base their model onto two hypotheses concerning the nature of the information banks are disclosing: either certain or uncertain. In this chapter, we introduce the concept of ambiguity as a third state of the decision-making process while analyzing the relationship between disclosure and depositors behavior. Frank Knight (1921) first introduced the concept of "Knightian uncertainty" where a third state of decision-making is possible. In this state of information, risk is immeasurable, in other words, not possible to come up with an objective probability of the situation. Knight (1921) explained it as "Uncertainty must be taken in a sense radically distinct from the familiar notion of Risk, from which it has never been properly separated. The essential fact is that 'risk' means in some cases a quantity susceptible of measurement, while at other times it is something distinctly not of this character; and there are far-reaching and crucial differences in the bearings of the phenomena depending on which of the two is really present and operating. It will appear that a measurable uncertainty, or 'risk' proper, as we shall use the term, is so far different from an unmeasurable one that it is not in effect an uncertainty at all." As we will present later on, ambiguity can be considered as another state of the decision-making process under a horse-roulette preference scheme, which differs from certain and uncertain; with releasing the perfect rationality axiom (Machina and Viscusi, 2014). It differs from the two above because agents are not able to come up with a unique objective probability for their decision-making process but come up with several distributions of subjective probabilities. The decision-making process under ambiguity then qualify agents as ambiguous. In this setup, depositors have a variety of vision of the value of the state of the bank contrary to the original case where the state of bank has a unique distribution. Their level of ambiguity then translates into a degree of pessimism or optimism based on non-probabilistic beliefs. It leads then, agents, to have subjective probabilities.

This chapter will be devoted to the introduction of the notion of ambiguity in a context of potential runs while in a situation of asymmetric information between a bank and its depositors, similarly to common literature regarding the issue as in Chen (1999) or Diamond and Dybvig (1983). This is particularly innovative

because it will answer new concerns of depositors behavior when those can act without being fully rational. In this present case, we provide an extension of the Gorton (1985). The initial purpose of this article is not the to analyze the direct impact of disclosure, as in Cordella and Yeyati (1998) for example, but to analyze the role of the bank suspension of convertibility in order to reduce bank runs under a scheme of incomplete information between the bank and its depositors. In this chapter, we do not focus on the suspension of convertibility in itself but the model proposed in Gorton (1985) allows us to introduce the notion of ambiguity. Unlike Gorton (1985), Diamond and Dybvig (1983) do not take into account incomplete information in its model even if the model as been largely extended. Diamond and Dybvig (1983) has largely contributed to the literature concerning depositors with their original model and throughout the different extensions proposed by different authors until now: Cooper and Ross (1991), or more recently He and Manela (2012). Those two authors contribute to the literature concerning bank runs already available in the chapter 1. He and Manela (2012) studies the effect of information acquisition on withdrawal decision when a spreading rumor exposes healthy bank to a run. The uncertainty motivates depositors to acquire information in order the gradual risk of run. The authors show a reduction in the probability of occurrence of bank run comes along with an increase of private information. In addition to the increase of private information, public regulation can mitigate runs by reducing individual effort to acquire information. In the meantime, Cooper and Ross (1991) focus onto the conditions of a run and then explore the framework to evaluate the cost and benefits of deposit insurance and other forms of interventions such as monitoring. The results show that such implementation allow for a reduction of runs. The articles cited above do not take into account ambiguity and are used as a starter point for the upcoming model.

The literature about ambiguity, in the finance or banking field, is not as flourishing as the literature concerning the depositors governance and its withdrawing action: this chapter is an occasion to . In this chapter we introduce the concept of both disclosure and ambiguity together in order to analyze the decision of depositors to withdraw or not and therefore its consequences for the stability of the banking system. The main research question here concerns the impact of ambi-

guity while studying the decision to withdraw and exert governance by depositors in a situation of incomplete information. The incomplete information scheme is important because it is the only situation is which allow the use of objective or subjective probabilities. The notion of ambiguity under full information is limited. The principal result of this chapter is interesting in a sense that in case of ambiguity, the most ambiguous depositors will withdraw their deposit more than without ambiguity while the least ambiguous depositors delay their withdrawing decision. The result here is innovative and provides significant policy implications onto the necessity of implementing disclosure policy and emphasizing financial stability.

The aim of this chapter is also to provide an extensive analysis of the concept of knightian uncertainty, ambiguity or other definitions regarding a different state of nature of information. The chapter is divided as followed: first we will go around some historical and academic work around ambiguity, throughout Keynes's work, Ellsberg's paradox and also Knight's work itself. Then, we will introduce the original model of Gorton with providing introduction to the model we plan to use. The hypothesis used will also be presented in this section while the last two sections show the results obtained and finally the conclusions and the different policy implications.

3.2 Definitions, historical background and literature

In the upcoming section we are about to explain and survey part of the existent literature. The phenomenon of ambiguity is strongly correlated to attitudes regarding ambiguity and therefore to ambiguity aversion, as Machina (2014) says:

> «ubiquitous in the real-world and violate both the key rationality axioms and classic models of choice under ambiguity».

However, despite the large variety of protocol to test Ellsberg paradox and theoretical framework, it does not exist a unique stable attitude toward ambiguity but a large amount plural attitude toward ambiguity (Cabantous et Hilton, 2006). Preferences of agents regarding ambiguity are complex and influenced by several economic factors and also a set of psychological characteristics (Payne, et al.,

1993). This section will first present a review of early notions of subjective probability and its implication to expected utility maximization: notions and concepts from authors such as Knights, Keynes, Ramsey or Ellsberg will be presented. A different set of models will also be presented. The literature concerning bank runs and more generally literature regarding governance of depositors has already been presented in chapter 1, we will then only remind the important notions quickly and literature in the third section.

3.2.1 Knight's, Keynes' and early notions of subjective uncertainty of ambiguity

Historically speaking, Knight is often granted of the first distinction between situations were probabilistic beliefs and non-probabilistic beliefs exist. In his work (Knight (1921)), he used the term risk instead of uncertainty to qualify the absence of objective probabilities. In a sense, Knight' notion of risk refers to "a prior probabilities", theoretically deduced, or empirically observed while "uncertainty refers to situations that did not provide any objective probability measures. He then emitted the idea that agents can still create "subjective probabilities" under the situation of "uncertainty". With the following quotation, Knight was able to provide the first explicit notion of newer probabilistic hypothesis under conditions of subjective uncertainty.

> "we must observe at the outset that when an individual instance [i.e., a one-time event] only is at issue, there is no difference for conduct between a measurable risk and an measurable uncertainty. The individual, as already observed, throws his estimate of the value of an opinion into the probability form of 'a successes in b trials' (a/b being a proper fraction) and 'feels' toward it as toward any other probability situation."

Knight uses the notion of "estimate" instead of subjective probability. Knight contemporary, Keynes, also provided some early notions of uncertainty in his work of 1921. Keynes defines a "logical relation" between one event and another in situa-

tions where the first event is no longer logically assured or is excluding the second one. In other words, such relationship looks like a pair of events where "Event X has occurred" and "Event Z will occur."

In Keynes (1921), the probability of an event is defined as "the rational degree of belief" that should be linked to it. Although, Keynes did not consider this degree of belief to be personal or subjective: "The Theory of Probability is logical, therefore, because it is concerned with the degree of belief which it is rational to entertain in given conditions, and not merely with the actual beliefs of particular individuals, which may or may not be rational." Keynes allowed for different kinds of probabilities: numerical, not numerical or even probabilities which cannot be ordinarily comparable: in his expectation of the rain, he used the term "less likely" or "more likely" to estimate the probabilities of rain while going for a walk. To sum up Keynes visions regarding probability: it exists an order where probabilities lie between impossibility and uncertainty, among which there are some "pairs of probabilities" of which no comparison of magnitude is possible. In this situation, there are situations of sub probability where it allows for structures of belief which cannot be represented by numerical probabilities.The non-probabilistic belief makes Keyne's theory one of the earliest works to formally state this concept.

Shackle (1949a, 1949b) introduced another early model of non-probabilistic beliefs and preferences. The fundamental concept of Shackle's theory of belief is the concept of "potential surprise". This concept is materialized by the expectation of experiences upon learning that a particular event has occurred, or that a particular hypothesis is true. He used a recruitment procedure in order to explain his vision concept. For example, he used four equally qualified candidates to which the probability of recruitment could be assigned with the probability 1/4 . In this case, if one candidate is chosen we cannot apply any "surprise" if he is chosen rather than another one. But if you enlarge the selection process to eight candidates among which the last ones are unqualified for, a potential surprise can occur if one of the candidates which is unqualified is recruited. In order to match the equal chance of being selected, a positive potential surprise grade will be added to each "unqualified" candidate.

> "we need a measure of acceptance by which the individual can give to new rival hypotheses, which did not at first occur to him, some degree, and even the highest degree, of acceptance without reducing the degrees of acceptance accorded to any of those already in his mind"

The potential surprise of each candidate cannot be additive, because of the ignore to the entire, whole set, of probabilities. His theory of beliefs departs from traditional additive calculus.

Ramsey (1926), was the first to observe the existence of probabilistic beliefs measurable by strong bizarre bets of agents. Ramsey was interested in the measurements of subjective probabilities and used the term "degrees of belief" to capture attitude towards risk. With his work, imposing Bernoullian principle of expected utility maximization, he was able to assume that "behavior is governed by what is called the mathematical expectation [of utility or value]; that is to say, if P is a proposition about which (the agent) is doubtful, any good or bad for whose realization P is in his view a necessary and sufficient condition enter into his calculations multiplied by the same fraction, which is called degree of belief in P. We define degree of belief in a way which presupposes the use of mathematical expectation." Ramsey in his work is able to identify the set of values with the real numbers. Ramsey work has so limits but since he was the first to characterize probabilistically sophisticated beliefs in terms of choice behavior, he deserves a prominent place in the literature.

Keynes', Knight's and other articles quickly presented here showed early works concerning the notion of uncertainty and more especially subjective uncertainty. Some other principles have not been introduced such as principle of insufficient reason supported by different authors from the 18th century, Bernouilli and Bayes, until the 1980s with Stigler's work. We decided to only mention it because of the distance to the economic field.

3.2.2 Traditionnal model of Subjective probability

The previous section allowed a different vision where the world we are living in is whether certain or uncertain. Later during the 20th century, authors have contributed to this domain of research and proposed different definitions or models of subjective probabilities which will lead later on with ambiguity aversion model.

The difference between objective and subjective probability come from the relative randomness of an event: in other words when you flip a perfectly balanced coin there is no doubt concerning the probability, but when you bet on a horse the probability is not so easy to know. Objective probabilities are defined such as the gain is known and function of explicit probabilities and not expected utilities. The gamble with the gain G looks as follows: $G = (x_1, p_1; ....; x_n, p_{n)}$. The probability p_n is explicitly known and common knowledge and x_n is the occurence of an event: this the case for the roulette wheel or dice rolls. For the purpose of this chapter we will call objective probability roulette wheel lottery. In the case of subjective probabilities, feelings affect the value of such probabilities, and the outcome probabilities are only expected. The gamble gain in this situation therefore is : $G = (x_1, E_1; ....; x_n, E_{n)}$. This kind of probability is typically used for horses races where E_n is the expected performance of the horse based on past performance in events regardless of its actual health. $E_n = \sum_{i=1}^{n} x_i p_i$ where x_i is the event and p_i is the probability of winning in an event. E_n can be revised after the event but the actual probability of the horse winning is uncertain. For the purpose of this chapter we will call subjective probability Machina and Siniscalchi (2014) defines it as the "subjective uncertainty as its finest and most basic level". They also advocate that "outside of gambling halls, most real world uncertainty is subjective rather than objective". The main interest of horse roulette is that subjective probabilities can appear and translate into ambiguity.

Both objective or subjective probabilities can be resolved or modelized. The different models go from something traditional, the objective expected utility model, to some less classic ones. The objective expected utility has been proposed by Bernoulli in the mid 18^{th} century and was formalized later mid 20th century by

von Neumann and Morgenstern (1944) among others. In this model, preferences over objective lotteries can be represented by an ordinal preference function of the form $V(x_1, p_1; ...; x_n, p_n) = \sum_{i=1}^{n} U(x_i).p_i$ or its cardinal function. The research regarding the objective expected utility has become the cornerstone of economic analysis when in a risky environment. The core properties of this model which resulted on being the cornerstone of our analysis is the independence axiom. This axiom allows agents to rank their preferences.

During the mid 1950s, Savage (1954) proposed a first model of subjective expected utility. In this model, preferences over subjective acts are represented by an ordinal function of the form $(W(x_1, E_1; ....; x_n, E_n) = \sum_{i=1}^{n} U(x_j).\mu(E_j)$ or its cardinal function where $\mu(.)$ is the subjective probability measure and E_j is the expected probability of an event. It represents the beliefs of the likelihood of the different states of nature. Each decision maker or participating agents have then different subjective probabilities depending on their knowledge and information they got. The different axioms announced by Savage also translate different notions of preferences. The second axiom of Savage model, the "Sure-Thing Principle" somehow acts like the independence axiom of the objective expected theory. It states that preferences over subjective acts are separable across mutually exclusive events. This axiom still allows ranking preferences. But another axiom comes confirming the previous one. With the weak comparative probability axiom, decision makers have a well-defined comparative likelihood ranking over events, still subjective. Both of these axioms are the core interest of the subjective expected utility model of Savage.

Anscombe and Aumann's (1963) tried an approach to joint objective and subjective approach. The point in this model is to represent an uncertain event. This is the key feature of the ambiguity research question which involves both objective and subjective uncertainty. It will also be the key part of the ambiguity aversion analysis in Ellsberg's paradox which will be presenting in the following sections. By joining both objective and subjective probabilities, the authors were able to simplify Savages's work concerning axiomatic derivation on subjective probabilities. The two assumptions in their model is that an objective probability lottery

is weakly preferred to subjective probability lottery and in the case when two subjective probabilities are in competition, one's preferences between prizes of those lotteries determine one's preferences. The authors named it "Monotonicity in Prizes." The second assumption concerns the effect of the timing of both lotteries "if the price you receive is to be determined by both a horse race (subjective probabilities) and by the spin of a roulette wheel (objective probabilities), then it is immaterial whether the wheel is spun before or after the races." The authors were able to determine the existence of a utility function where both subjective and objective probability were existent.

3.2.3 Ellsberg Urns and Ellsberg Paradox

Ellsberg's work from 1961 analyzes a paradox in decision theory in which agent's choice violates the postulates of subjective expected utility properties as in Savage (1954) or as in Anscombe and Aumann's (1963). The following example, issued from Coleman (2011), of urns shows Ellsberg paradox. The urn setup involves a single urn.

	30 balls	60 balls	
	Red	Black	Yellow
I	\$1	\$0	\$0
II	\$0	\$1	\$0
III	\$1	\$0	\$1
IV	\$0	\$1	\$1

Table 3.1 : Single Urn Ellsberg Example

In this example, we consider a single urn of 90 balls where 30 are known to be red and 60 are a combination of black and yellow where the proportions are unknown. The payoff I is "Receive \$1 if Red, and \$0 if Black or Yellow". The second payoff II is "Receive \$0 if Red, \$1 if Black and \$0 if Yellow". In the third payoff III, agent receive \$1 if Red, \$0 if Black and \$1 if Yellow. While the fourth payoff IV is "Receive \$0 if Red, \$1 if Black, \$1 if Yellow". Two questions were therefore ask: which do you prefer "Payoff on Red" vs. "Payoff on Black" (I vs. II)? Which do you prefer: "Payoff on Red/Yellow" vs. "Payoff on Black/Yellow" (III

vs. IV)? Ellsberg says that a frequent pattern of response is I preferred to II while IV preferred to III. In other words, in the situation of uncertainty concerning the distribution between black balls and yellow balls, the assorted probabilities are for the first question P(B) $< 1/3$ while the probability for the second question is P(B) $> 1/3$ which is inconsistent.

Ellsberg's discovery illustrated the violation of the sure thing principal property of Savage model, while it also violates the strong comparative probability property. While these two assumptions are considered as being the principal of rationality, Ellsberg's example provoked discussions and reaction among decision theorists. Debreu's response, among others, alludes to Principle of Insufficient Reason in which probabilities are relative frequencies rather than degrees of belief in uncertain propositions, conditional upon state information . Other authors have expressed their concerns where a decision maker is likely to choose uncertain decision while getting in a more uncertain environment.

Some Ellsberg's urns experiment has been conducted to analyze the results of Ellsberg's model. Early experiments have been conducted in the late 50s and conducted till mid 2000. The early work, Fellner (1961) e.g., confirms the choice of the 50:50 choice instead of the unknown odds. While MacCrimon (1968) or Curley and Yates (1989) confirms Ellsberg's work in favor of uncertainty. Most of the experiments have been conducted on students but work during the 80s and 90s.[1] have shown the same results while experimenting on business owners, trade union leaders, managers and executives. Other experimental studies have been conducted on insurance purpose and medical decisions under ambiguity and also on probability of winning in a legal scenario where hypothetical plaintiffs and defendants had to litigate or to go to court. Ellsberg work has been the source of the most recent literature concerning ambiguity aversion.

[1]Kunreuther (1989) or Viscusi and Chesson (1999)

3.2.4 Ambiguity and Ambiguity Aversion

As we have seen in above subsections, extensive works have been done regarding subjective probabilities, ambiguity and ambiguity aversion. Ambiguity aversion is a preference for known risks over unknown risks. This aversion is also known as uncertainty aversion. In other words, an ambiguity-averse individual would rather choose an alternative where the probability distribution of the outcomes is known over one where the probability is unknown (Epstein, 1999). As of Machina and Siniscalchi (2014) "unlike the economic concepts of risk and risk aversion, there is not unanimous agreement on what ambiguity aversion or even ambiguity itself, exactly is." Although, the preferences scheme is a horse-roulette gamble, where the$f = (...; P_j \, if \, E_j; ...) = (...; (...; x_{ij}, p_{ij}; ...), \, E_j; ...), \, P_j$ is the roulette lotteries, from a strate space S and X the set of payoff. The independence property over this act is identical to the independence axiom of objective expected utilities, except for the most general notion of probability mixing it entails. The probability mixtures of the horse-roulette acts are defined statewide: given act
$f = (...; \, P_j \, if \, E_j; ...)$ and $g = (...; \, Q_j \, if \, E_j; ...)$ over a common partition $\{E_1, ..., E_n\}$ of the state space S, and probability $\alpha \, \epsilon \, (0, \, 1)$, the mixture $\alpha.f + (1-\alpha).g$ is defined as the act

$$\alpha.f + (1 - \alpha).g = (...; \, \alpha.P_j + (1 - \alpha).Q_j; ...) \tag{3.1}$$

The axioms that characterize subjective expected utility in this framework are accordingly to Fishburn (1970):

Weak Order: $\succcurlyeq$ is complete and transitive
Non-Degeneracy: There exist acts f and g for which $f \succ g$
Continuity: For all acts f, g, h if $f \succ g$ and $g \succ h$, there exist α, $\beta \, \epsilon \, (0, \, 1)$ such that $\alpha.f + (1 - \alpha).h \succ g$ and $g \succ \beta.f + (1 - \beta).h$
Independence: for all acts f, g, h and all $\alpha \, \epsilon \, (0, \, 1)$, $f \succcurlyeq g$ if and only if $\alpha.f + (1 - \alpha).h \succcurlyeq \alpha.g + (1 - \alpha).h$
Monotonicity: For all acts f, g, if the roulette lottery $f(s)$ is weakly preferred to the roulette lottery $g(s)$ for every state s, then $f \succcurlyeq g$
After taking into account the above axioms, the subjective expected utility repre-

sentation of the agents preferences over the horse roulette gamble is:

$$W(f) = \int_S U(f(s))d\mu(s) \ = \sum_{j=1}^{n} U(P_j).\mu(E_j) \ = \sum_{j=1}^{n} \left[\sum_{j=1}^{n} U(x_{ij})p_{ij} \right] .\mu(E_j) \quad (3.2)$$

$U(.)$ is a classic von Neumann-Morgenstern utility function expected objective probability utility function. μ is a finite additive probability measure ex-ante as in Savage's axiomization. The independence axiom implies the Sure-thing principle stated before. The definition proposed above imply that any ambiguity model in a horse-roulette act framework must relax independence.

The relaxing of the different axioms allow for the existence of several models of ambiguity aversion which are discussed in the following sections.

3.2.5 Maxmin expected utility

A variety of models which relaxes some of the axioms stated above exists and we will be trying to introduce the ones which provides the strongest implications for this chapter. The model which applies the most to our research questions were proposed by Gilboa and Schmeidler (1989) and suggest that the agent facing ambiguity aversion, or also known as uncertainty aversion, "takes into account the minimal expected utility while evaluating a bet." The author's statement is justified by the lack of information of the subsequent agent. The model proposed by the authors is called Maxmin Expected Utility (MEU) and is an extension of Ellsberg work. This model and axiomization are a common reference for the applied literature around ambiguity aversion schemes.

If we reuse the one-urn Ellsberg paradox of the section 2.3, it would mean that an individual evaluates the bet on the appearance of a black ball (60 balls out of 90 are a combination of yellow and black balls) as if absolutely none of the unknown ball in the urn were black. The associated utility is as follows:

$$W(f(.)) = \rho. \int U(f(.))d\mu_0 + (1-\rho).\min_{\mu \epsilon D} \int U(f(.))d\mu \quad (3.3)$$

Where $\rho\epsilon(0,\ 1)$represents the individual's "degree of confidence" in the estimate ofμ_0 . Gilboa and Schmeilder (1989) axiomatize the MEU decision criterion based on horse-roulette axioms presented above. Ellsberg proposed that, by careful deliberation, an in agent faced with an ambiguous situation may nevertheless "arrive at a composite 'estimated' distribution μ_0 that represents all his available information on relative likelihood". But in presence of ambiguity, instead of one distribution of probability, the agent is facing set of probability distribution that seems 'reasonable' and reflecting his judgments. Those judgments can come from already made decision or from information gathered confidentially. Gilboa and Schmeilder (1989) weaken the Independence axiom and replace it with the following ones:

Certainty Independence: For all acts f, g, all constant acts x, and all $\alpha\epsilon(0,1)$:
$f \succcurlyeq g$ if and only if $\alpha.f + (1-\alpha).x \succcurlyeq \alpha.g + (1-\alpha).x$

Uncertainty Aversion: For all acts f,g and all $\alpha\,\epsilon\,(0,\ 1) : f \succcurlyeq g$ implies $\alpha.f + (1-\alpha).g \succcurlyeq g$

The relaxing of the Independence axiom allow this model to be in line with the Ellsberg type preference. The uncertainty aversion axiom, on the other hand, reflects a preference for hedging. The quasi-concavity of the axiom preference's representation offers a convenient analytic property. The authors show that the axioms are both necessary and sufficient for the existence of the MEU representation. A generalization of the MEU model is the α -maxmin or α -MEU model:

$$W = \alpha.\min_{\mu\epsilon C} \int U(f(.))d\mu + (1-\alpha).\max_{\mu\epsilon C} \int U(f(.))d\mu \tag{3.4}$$

Based upon the attitudes toward ambiguity, the generalized MEU model can be reduced to the original MEU model when $\alpha = 0$. Unfortunately, axiomization has not been possible unless for maximum and minimum value of α.

3.3 Gorton (1985): hypothesis and results

Bank run can arise when depositors make the decision to withdraw a subsequent number of their deposits. When depositors are incompletely informed about as-

set quality of the bank or the leverage, related to the potential capital losses, a banking panic can occur. Gorton (1985) presents a model showing a relationship between banks, depositors and governance. The author analyzes the power of the suspension of convertibility on this exact relationship. The governance by depositors is here based on capital losses and depositors will withdraw if they expected capital losses from the bank.

The model presented by Gorton is a three-period model in which depositors maximize its utility in the first two periods and then the game end with during the third period. During the last period, depositors are retired and live off their savings from the earlier periods. Depositors have an initial endowmentM_0 and are risk neutral. With the original endowment, depositors have the choice between holding currencies at a rate λ_{di} or depositing in a bank. The banking sector is a competitive sector with a two-period investments where debt (deposits) Δ and equity Q are collected. Debt may face capital losses but cannot incur capital gains. The author assumes depositors to be risk-averse with respect to lotteries on consumption during the two first period, but remain risk-neutral with respect to retirement wealth. Depositors have the ability to withdraw at the end of the first period. The uncertainty in this model is dual: first the rate of return to holding currency is random, then the rate of return on banks' investments is random as well. The return on currency is the rate of appreciation or depreciation against goods. Meanwhile, the return on bank investments is part random and part contingent to real shocks on output. The link between banks returns and real shocks is not random and is linked to real sphere activity: banks invest the collected deposit in industries which compose the real sphere. Therefore, if a negative shock on output occurs, it will be transmitted to banks through the investment channel and decreases the bank return.

3.3.1 Gorton (1985) benchmark: depositors behavior under full information scheme

The rate of return on demand deposits at the end of the first period is $(1+r_{d1})(1-\pi_1(\theta_1))$: the predetermined rate of return on deposits r_{d1} is discounted by the potential capital loss on demand deposit $\pi_1(.)$, determined itself by the state of the bank (θ_1). θ represents the risk that the bank is unable to repay the deposit to depositors. If a bank is not able to repay depositors at the initially agreed return, the value of deposit is therefore reflecting the value of the bank's asset, throughout π and θ.

$$\begin{cases} 1-\pi_1(\theta_1)=1 & if\ \theta_1^* \leq \theta_1 \leq \bar{\theta}_1 \\ 1-\pi_1(\theta_1)=\frac{\theta_1 L}{(1+r_{d1})\Delta_1} & if\ \underline{\theta}_1 \leq \theta_1 \leq \theta_1^* \end{cases} \tag{3.5}$$

where L is the amount of bank's investments, r_{d1} is the first period rate of return earned by depositors and $\Delta_1$is the bank level of debt for the first period. The critical value, θ_1^*,is

$$\theta_1^* = \frac{(1+r_{d1})\Delta_1}{L}$$

At this point, it just permits satisfaction of the claims against the bank at the fixed price. If depositors hold deposits until the end of the world, then the two-period rate of return on deposits r_{d2} is:

$$(1+r_{d1})(1+r_{d2})(1-\pi_2(\theta_2)) = min\left[(1+r_{d1})(1+r_{d2}),\ \frac{(1+r)\theta_2 L}{\Delta_2}\right] \tag{3.6}$$

While the critical value is:

$$\theta_2^* = \frac{(1+r_{d1})(1+r_{d2})\Delta_2}{(1+r)L}$$

Therefore, the capital loss on deposits at the end of period 2 is, similarly to period 1 (eq. 3.6) above which capital losses do not occur, i.e., $\pi_2(\theta)$:

Table 3.2 : Full information case, extrated from Gorton (1985).

	Beginning of period 1	Beginning of period 2	End of period 2
Commun Knowledge	Rate of return on currency for period 1 λ_{d1}	λ_2, r_{d2}	θ_2, $\pi_2(\theta_2)$
	Rate if return of deposits for period 1 and $2r_{d1}$, r_{d1}	state of bank investment $\theta_1$and capital losses $\pi_1(\theta_1)$	
Depositor's action	Portfolio choice (currency or deposits) period 1 C_1, D_1	Decision to withdraw or not (C_2, D_2)	Receive end of world health
Banks' actions	Equity choice (Q), given r_{d1}, r_{d1} such as $banks' investment = Q + debt$	If $\underline{\theta}_1 \leq \theta_1 \leq \theta_1^*$ then set $\pi_1(\theta_1) > 0$	If $\underline{\theta}_2 \leq \theta_2 \leq \theta_2^*$ then set $\pi_2(\theta_2)$

$$\begin{cases} 1 - \pi_2(\theta_2) = 1 & if\ \theta_2^* \leq \theta_2 \leq \bar{\theta}_2 \\ 1 - \pi_2(\theta_2) = \frac{(1+r)\theta_2 L}{(1+r_{d1})(1+r_{d2})\Delta_2} & if\ \underline{\theta}_2 \leq \theta_2 \leq \theta_2^* \end{cases} \tag{3.7}$$

where r is the rate of return of bank's investment after the end of the investment program, r_{d2} is the rate of return of deposits at the end of the second period if depositors did not early withdraw and Δ_2 the level of debt of the bank during period 2. The author uses two types of information structure in his model to assess the interest of the suspension of convertibility. The table 3.2 shows the structure of information under full information scheme.

The decision to withdraw is based on comparing the prospective returns associated with different portfolios, and will utilize all available information. Under the scheme of full information, depositors know the state of banks' investment θ_1. Therefore, depositors use $\theta_1$to compute $\pi_1(\theta_1)$. The state of bank reflects the shocks of the real sphere. When the industrial sector faces shocks, banks will be facing the same shocks, transmitted through the investment channel.

An observation of the state of the bank in the first period θ_1 allows an inference

about what final outcome will be realized at the end of period 2. This inference is a noise and is materialized $\tilde{\theta}_1$ and $\tilde{\theta}_2$. In the meantime, a correlation between $\theta_1$and $\theta_2$is possible, when the exogenous shocks are persistent. Equation (3.7) materializes this correlation

$$\theta_2 - \tilde{\theta}_2 = \gamma\left(\theta_1 - \tilde{\theta}_1\right) + \mu \tag{3.8}$$

where $\gamma > 0$, $E(\theta_1) = \tilde{\theta}_1$, $E(\theta_2) = \tilde{\theta}_2$, $\tilde{\theta}_2 \gg \tilde{\theta}_1$, and μ is a white noise.

The correlation between the two states of banks are known by depositors and banks. Once depositors have observed θ_1, the new depositor's expectation of θ_2 is

$$E_1(\theta_2) = E(\theta_2|\,\theta_1) = \tilde{\theta}_2 + \gamma(\theta_1 - \tilde{\theta}_1) \tag{3.9}$$

Using equations 3.3.3 and 3.3.4, the expected capital loss at the end of the second period, conditional to observing θ_1, is

$$E_1[\pi_2(\theta_2)] = \int_{\underline{\mu}}^{\mu*} \left\{1 - \frac{(1+r)L[\tilde{\theta}_2 + \gamma(\theta_1 - \tilde{\theta}_1) + \mu]}{(1+r_{d1})((1+r_{d2})\Delta}\right\} Z(\mu)d\mu \tag{3.10}$$

where

$\mu* = \theta_2^* - \tilde{\theta}_2 - \gamma(\theta_1 - \tilde{\theta}_1)$

3.3.2 The depositor's decision to withdraw under full information: 1st best.

At the beginning of the game, depositors have to choose a portfolio to get a consumption path for all the three periods. In other words, depositors are facing the following maximization problem with three constraints:

$$max\, V_0 = E_0\left\{U(X_1) + \beta U(X2) + \beta^2\Lambda(W)\right\} \tag{3.11}$$

where X_1 is the consumption at period 1, X_2 is the consumption at period 2under the constraints

$$X_1 + C_1 + D_1 \leqslant M_0 \tag{3.12}$$

$$X_2 + C2 \leqslant (1 + \lambda_1)C_1 + (1 + r_{d1})\left[1 - \pi_1(\theta_1)\right](D_1 - D_2) \tag{3.13}$$

$$W = (1 + \lambda_2)C_2 + (1 + r_{d1})(1 + r_{d2})\left[1 - \pi_2(\theta_2)\right]D_2 \tag{3.14}$$

Equation 3.11 is a limitation constraint where the sum of the consumption in period 1, the currency holding of an individual and deposit holdings of an individual for the first period must be inferior or equal to an individual's initial wealth endowment. Equation 3.12 requires the consumption and the currency holdings of the second period to be financed by the value of the depositor's portfolio realized at the end of period 1. The constraint applies the capital loss on deposits only to the amount of deposits withdrawn at the end of the first period $(D1 - D2)$. In the meantime, the last constraint (eq. 3.13) determines the representative depositor's end of world wealth as a function of returns realized at the end of period 2.

The author assumes depositors to be risk-averse with respect to lotteries on consumption during the two first period, but remain risk-neutral with respect to retirement wealth. The author justifies this assumption to simplify the analysis and focuses attention on the problem of interest. The assumption causes depositors to choose portfolios which are cornered solutions; depositors hold either currency or deposits, but not both. Therefore, if depositors choose the deposit, their whole wealth will be in this form. If they withdraw their deposits at the end of period 1, they withdraw all their deposits, switching completely from deposits to currency holding. If depositors start the world holding deposits, they will withdraw their whole deposit if:

$$(1 + \lambda_2)\left[1 - \pi_1(\theta_1)\right] > (1 + r_{d2})\left[1 - E_1(\pi_2(\theta_2)\right] \tag{3.15}$$

Result 1 : according to equation 3.3.11, depositors will withdraw their deposits if the known rate of return to currency over period 2 is greater than the expected rate of return to holding deposits over period 2, with taking into account the potential capital loss associated with withdrawing.

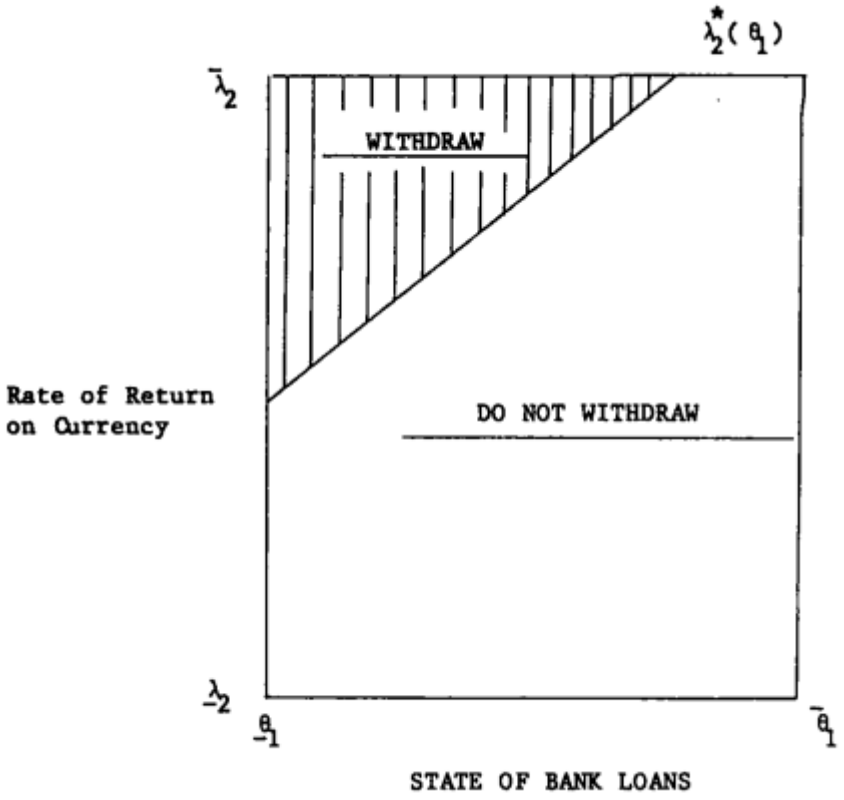
It exists, for each θ_1, a critical value of the rate of return on currency, $\lambda_2^*(\theta_1)$, at which level depositors are indifferent between withdrawing or not.

$$[1 + \lambda_2^*(\theta_1)] = \frac{(1 + r_{d2})\,[1 - E_1(\pi_2(\theta_2)]}{1 - \pi_1(\theta_1)} \tag{3.16}$$

Result 2: depositors will withdraw if and only if, $\lambda_2 > \lambda_2^*(\theta_1)$.

The figure 1, provided by the author, shows the withdrawal border.

Figure 3.1 : Full information withdraw rule, source Gorton (1985)



Result 3 : the slope of the above figure depends on the level of realization of θ *for each level of return on deposits at the end of the second period. The higher* θ*, the steeper the slope.*

$$\frac{\partial \lambda_2^*(\theta_1)}{\partial \theta_1} = \frac{(1+r_{d2})\gamma\Gamma}{\theta_{*2}} \qquad if\ \theta_1^* \leqslant \theta_1 \leqslant \bar{\theta}, \tag{3.17}$$

$$\frac{\partial \lambda_2^*(\theta_1)}{\partial \theta_1} = \frac{(1+r)\gamma\Gamma}{\theta_2^*} - \frac{(1+r_{d2})\left[1-E_1(\pi_2(\theta_2))\right]}{\left[1-\pi_1^*(\theta_1)\right]^2\theta_1^*} \quad if\ \underline{\theta}_1 \leqslant \theta_1 \leqslant \theta_1^*, \tag{3.18}$$

where

$\Gamma = 1 - \int_{\underline{\mu}}^{\mu^*} Z(\mu)d\mu$

and is the probability of the banking sector to not fail at the end of period 2. The slope is positive with respect to an increase in θ_1. The author, regarding the stated results, proposed an analysis of the deposit market equilibrium under full information. At the end of the first period, banks and depositors observe λ_2, the rate of return on currency for the second period, and the state of the bank investment, θ_1. At this point in the scenario, depositors are re-evaluating their original portfolios and decide whether or not to withdraw their deposits. θ_1 gives depositors information concerning the likelihood of capital losses at the end of the second period and is rationally used by depositors to make their withdrawal decision. Depositors ends the bank's investment process if they decide to withdraw. The decision to withdraw by the end of period 1 is an optimal decision in the presence of full information.

The result proposed by the author gives an important vision concerning the level of "risk" a depositor is ready to accept, in a situation where he can fully visualize the state of the bank's portfolio. The next subsection will introduce Gorton (1983) sections under incomplete information scheme, from which we will start tan extension.

3.3.3 The incomplete information equilibrium

As presented above, under full information, depositors know the random process of occurrence of shocks to bank investments in equation (3.3.4), they observe the realization of θ_1 at the end of the first period and then decide to withdraw or not during the same period. Under the incomplete information scheme, depositors can make mistakes relative to the case of full information: they can withdraw when the

situation does not need a withdrawal, or they can choose not to withdraw when it is an optimal decision.

In this condition θ_1 is only observed by banks and depositors do not know θ_1 at the end of the first period. Without knowing the value of θ_1, depositors are enable to compute the level of capital losses $\pi(\theta_1)$ and therefore depositors cannot revise their expectation of $\pi_2(\theta_2)$. The depositors are only able to guess or to have a noisy signal indicator of the value of θ_1. As we have seen in eq. (3.3.8), λ_2 is still negatively correlated to $\theta_1$but depositors are able to observe λ_2 at the end of period 1. This hypothesis translates a preference for currencies during times when $\theta_1$is low.

Therefore, the depositors, under the incomplete information scheme, maximize the second-period utility conditioned by having observed λ_2:

$$max\, V_2 = E\left[U(X_2) \mid \lambda_2\right] + \beta E\left[\Lambda(W) \mid \lambda_2\right] \tag{3.19}$$

which are the similar constraint than under the full information scheme (equation 3.3.8 and 3.3.9). Depositors will behave as in the full information by holding all either currency or all deposits over the second period. The withdrawing decision of depositors is given by:

Result 4 : Depositors decide to withdraw if $\lambda_2 > \lambda_2^{**}$ with λ_2^{**} is the rate of return of currency above which depositors start to withdraw.

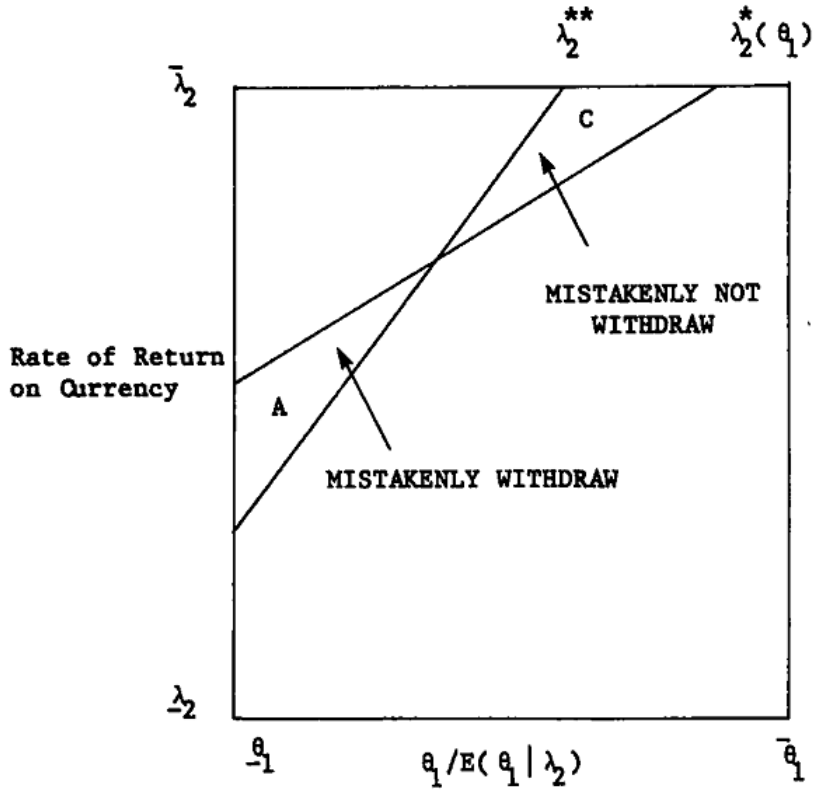
$$(1+\lambda_2^{**})\, E\left\{\left[1-\pi_1(\hat{\theta}_1)U'_{x2}\right]\right\} = (1+r_{d2})\left[1-E\left[\pi_2(\hat{\theta}_2)\right]\right] E\left[U'_{x2}\right] \tag{3.20}$$

By opposition to the full information scheme where λ_2^* equates the marginal utility of withdrawing with the marginal utility of not withdrawing, λ_2^{**} is chosen to equate the expected marginal utilities of not withdrawing and withdrawing. Under full information, θ_1 is known and second period utility is therefore certain. Meanwhile, under incomplete information, θ_1 is not known, leading to the second uncertain period utility and expected marginal utilities within the decision to

withdraw. With this result, banks choose a different value for their choice of equity. With the combination of the bank's rule for choosing equity and the rule of withdrawal, depositors, at the beginning of the world, choose a level of deposit and an initial degree of remuneration, r_d .

The following figure represents both informational scheme:

Figure 3.2 : Full and incomplete information rules, source Gorton (1985)



As we can see, the incomplete information scenario is not able to replicate the full information decisions. Depositors are worse off due to the two areas, A and C, where they mistakenly withdraw for the area. A and where they mistakenly not withdraw for areas C. Both mistakes are the result of asymmetric information about the sate of bank investment in the second period, λ_2 .

Gorton (1985) is not dedicated to the analysis of disclosure but to the possibility of banks to the creation suspension of convertibility contracts in order to reduce the

level of mistakes made by depositors while under incomplete information scheme. The article provides a striking base regarding the incentives of depositors to withdraw during a bank investment process. We provide extensions to this article. In the following section, we will introduce the new hypothesis to implement the notion of ambiguity on the state of bank investments under incomplete information scenario.

3.4 Ambiguity and the decision to withdraw

3.4.1 Optimal withdrawing decision

The core value of this chapter concern the implementation of the ambiguity notion in Gorton (1985). In this contribution, we are using independent state of the bank: the state of banks in the second period is not correlated with its previous state in period 1. We will apply to the Gorton (1985) model the Maxmin expected utility regarding ambiguity aversion model introduced in section 3.2.4. The ambiguity model exposed in the section will be used for this contribution. The Maxmin expected utility ambiguity model is one possible ambiguity model which could be used in this type of model. As exposed by Machina (2014) in a survey concerning ambiguity models, this model has several advantages among which its readability and its accessibility to be understood by every depositor. The choice for the this specific model is also justified by its applicability to the real world. The Maxmin expected utility allow depositors to compute a value of the state of bank investment which will we expect to reduce the size of the mistakes made by depositors, as presented by Gorton (1985). The decision to implement the notion of ambiguity is justified by the natural aversion of depositors to risk introduce in the Gorton (1985) model and by the high level of withdrawing incentive presented by Chen and Hasan (2006) and Chen and Hasan (2008). By implementing the ambiguity notion, we model the withdrawing incentives of depositors. Depositors' decision to withdraw is based on the information they have and have not: depositors are sensible to not only trustworthy information coming from banks or regulators but also to hearsay and rumors. In order to allow depositors reaction to be the closest to what we would expect in a real environment, we are using a framework where

information is incomplete: the bank knows the state of its investment, while depositors are unable to know the state of the bank. Incomplete information will allow us for further extension including partial information release in direction to depositors. The situation of ambiguity is not compatible with the full information scheme because of the observability of the state of bank investment.

As mentioned, we are extending the Gorton (1985) model under asymmetric information conditions. Therefore, it is only compatible with the asymmetric information scheme where hearsay cannot affect depositors decision process. The maximization problem is here as in Gorton (1985), as in equation 3.10. The model remains similar to Gorton (1985) incomplete information scheme but the constraint is modified to take into account the perception of ambiguity. The ambiguity aversion is here modelized by the different probability distribution of α.

$$max\, V_3 = E[\beta U(X_1) + \beta_1 U(X_2 \mid \lambda_2] + \beta_2 E[\Lambda(W) \mid \lambda_2] \tag{3.21}$$

under the following constraint

$$X_1 + C_1 + D_1 \leq M_0 \tag{3.22}$$

$$X_2{+}C_2 \leq (1{+}\lambda_1)C_1{+}(1{+}r_{d1}) \left[1 - E\left(\alpha min \int_{\underline{\theta}_1}^{\bar{\theta}_1} \hat{\pi}(\hat{\theta}_1) d\hat{\theta}_1 + (1-\alpha)\, max \int_{\underline{\theta}_1}^{\bar{\theta}_1} \hat{\pi}(\hat{\theta}_1) d\hat{\theta}_1\right)\right](D_1{-}D_2) \tag{3.23}$$

$$W = (1{+}\lambda_2)C_2{+}(1{+}r_{d2})(1{+}r_{d1}) \left[1 - E\left(\alpha min \int_{\underline{\theta}_2}^{\bar{\theta}_2} \pi(\hat{\theta}_2) d\hat{\theta}_2 + (1-\alpha)\, max \int_{\underline{\theta}_2}^{\bar{\theta}_2} \pi(\hat{\theta}_2) d\hat{\theta}_2\right)\right] D_2 \tag{3.24}$$

The difference between Gorton (1985) and this model are the constraint. We implement the expected utility model instead of the expected function of the original model. The change of expectation materialize the ambiguity by using a parameter α. The model is contingent to the observability of 2 as in Gorton (1985) . In

equation 3.4.3, we introduce a replacement function to integrate the ambiguity problem in the model:

$E\left(\alpha min \int_{\underline{\theta}_1}^{\bar{\theta}_1} \hat{\pi}(\hat{\theta}_1) d\hat{\theta}_1 + (1-\alpha)\, max \int_{\underline{\theta}_1}^{\bar{\theta}_1} \hat{\pi}(\hat{\theta}_1) d\hat{\theta}_1\right)$ represent the value that depositors are expected for capital losses to be at the first period. The expected value of capital losses in the first period is based on depositors' expectation regarding the sate of banks' investment $\hat{\theta}_1$.

We replaced the original capital losses with a Maxmin ambiguity function concerning the capital losses during the second period, affecting the decision of depositors in equation 3.7 in order to capture deposit. With these functions, we endogenize the value of θ_1 and θ_2 in the decision model of depositors. In this setup, depositors have a variety of vision of the value of the state of the bank contrary to the original case where the state of bank has a unique distribution. The multiplicity of banks' state distribution is permitted with the "sentiment" of depositors, throughout the parameter. The parameter is a component of the level of confidence depositors have. In other words, when they are more optimistic than pessimistic, tend to be close to 1 while on the mean time when depositors are pessimistic about the condition of the bank, then tend to be closer to 0. When is equal to 1/2 , then depositors are not considered as ambiguous and their behavior will follow the Gorton (1985) model.

In order to introduce the study the impact of ambiguity, we have to stay in a similar framework to the one where there is no ambiguity. The resolution of the depositor's decision to withdraw is conditional to observing λ_2. At the beginning of the second period, if depositors are able to have intelligence on the value of λ_2, they are able to compute their anticipation concerning the state of the bank. In Gorton (1985), the author insists on the negative correlation between λ_2 and θ_1. λ_2"serves as the indicator of the value of banks' portfolios", therefore when the financial situation of the bank is difficult, the price of the holding currency arise. By being able to observe the value of λ_2, depositors are able to visualize the state of the bank and if we generalize the number of banks, then λ_2 can give macroeconomic information about the macroeconomic situation.

The hypothesis of our model are the following:

H_1: depositors are fully rational before the introduction of ambiguity. They base their optimal withdrawing decision on the rate of return of currency, λ_2, the contracted interest rate payment, r_{d2}, and the expected state of banks investment (Gorton, 1985).

H_2: depositors under ambiguity are not fully rational anymore.

The certainty independence axiom and the uncertainty aversion allow depositors not to remain fully rational. Not only depositors base their withdrawing decision onto to common criteria as interest rates, currency rate or state of the bank. They also base their withdrawing on individual evaluation of their own ambiguity, which translates into confidence, in the bank it deposited in and in the environment surrounding.

The α parameter materialized this ambiguity value. A high value of α translate a high level of confidence in the game environment and in the bank the depositor deposited in. We use a backward induction method at the end of period 1, where depositors are in a situation of incomplete information. Therefore they maximize the expected utility of the second period conditional on having observed λ_2. The constraints (eq. 3.22 and eq. 3.23) remains.

$$max\, V_3 = E[\beta U(X_2 \mid \lambda_2)] + \beta E[\Lambda(W \mid \lambda_2)] \tag{3.25}$$

As in Gorton (1985), depositors hold either only currency with their endowment or deposit all their endowments over period 2.

The withdrawal decision happen when $\lambda_2 > \lambda_2^{***}$, where λ_2 is observed and λ_2^{***} is the optimal level of currency remuneration of currency during the second period under the ambiguity hypothesis.

Result 1: The critical value is given by the following expression:

$$(1+\lambda_2^{***}) = \frac{(1+r_{d2})\left[1-\left(E\left(\alpha min\int_{\underline{\theta}_1}^{\bar{\theta}_1}\hat{\pi}(\hat{\theta}_1)d\hat{\theta}_1+(1-\alpha)\,max\int_{\underline{\theta}_1}^{\bar{\theta}_1}\hat{\pi}(\hat{\theta}_1)d\hat{\theta}_1\right)\right)\right]}{E\left(\alpha min\int_{\underline{\theta}_2}^{\bar{\theta}_2}\pi(\hat{\theta}_2)d\hat{\theta}_2+(1-\alpha)\,max\int_{\underline{\theta}_2}^{\bar{\theta}_2}\pi(\hat{\theta}_2)d\hat{\theta}_2\right)} \tag{3.26}$$

The withdrawal decision is conditional on having observed λ_2. Since depositors are unable to know the θ_1 and θ_2, the decision to withdraw is formed with the expected marginal utility based on expected value of $\hat{\theta}_1$ and $\hat{\theta}_2$.

The withdrawal decision by depositors is impacting the bank choice for its equity, Q^F and therefore the stability of the overall banking sector. Deposits and equity are the only source of finance for a bank in this model and a reduction of deposit levels will impact negatively bank sources of finance. Banks must decide a level of equity function of the result as a function of the depositor's decision critical value. Ambiguity plays a role onto the level of equity of the bank. As in Gorton (1985), the level of equity chosen is the solution of the following problem:

Result 2: the bank level of equity is a function of the degree of ambiguity

$$\frac{Q^F}{\Delta} = \frac{E_0\left[(1+r)\mid NW\right]-E_0\left[(1+r_d)^2\mid NW\right]}{1+r_q-E\left[(1+r)\mid NW\right]} \tag{3.27}$$

Where:

$$E_0\left[(1+r)\mid NW\right] = G(1+r)\int_{\mu*}^{\overline{\mu}}\left[\hat{\theta}_2+\mu\right]Z(\mu)d\mu$$

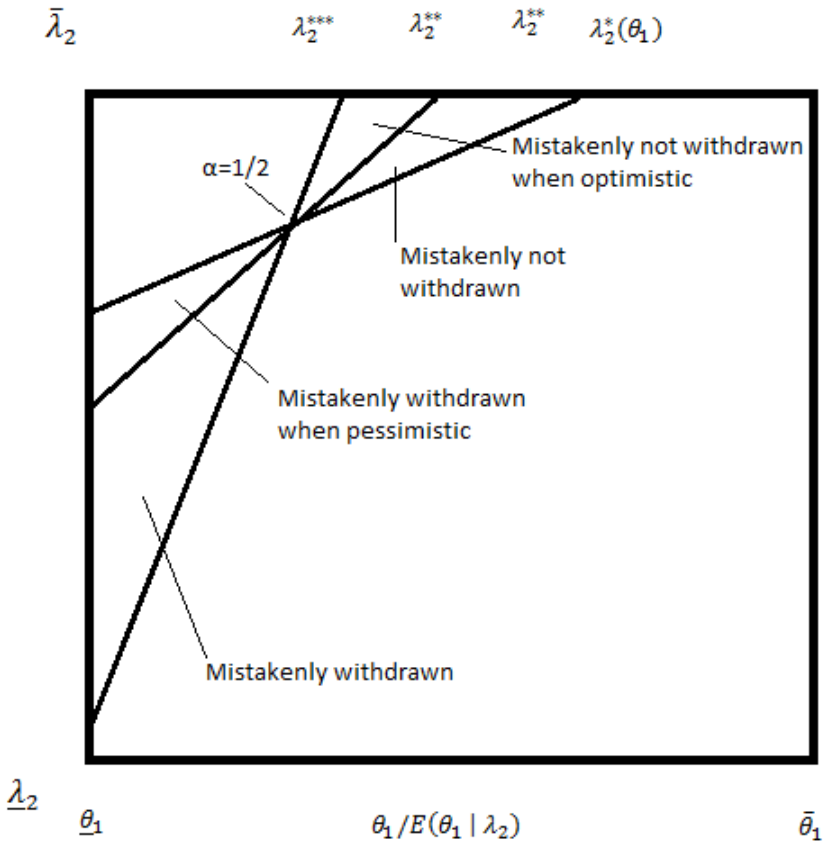
$$E_0\left[(1+r_d)^2\mid NW\right] = G(1+r_d)^2\hat{\theta}_1\int_{\mu*}^{\bar{\mu}}Z(\mu)d\mu$$

$$G=\int_{\underline{\theta}_1}^{\bar{\theta}_1}\int_{\underline{\lambda}_2}^{\lambda_2^{***}(\hat{\theta}_1,\alpha)}\alpha g(\lambda_2)f(\theta_1)d\lambda_2 d\theta_1 \tag{3.28}$$

Where E_0 indicates the expectation at the beginning of the world and Δ is the amount of debt collected by the bank in form of deposits. NW indicates conditional on not withdrawing. μ is a noise indicator of the quality of θ following a distribution $Z(\mu)$. Under incomplete information, each bank chooses an amount of equity, Q^I, the same way as in the full information frame but the condition on λ_2^* changes.

Given both depositor's decision to withdraw and bank's decision regarding the level of equity, the situation can be summarized in the following figure:

Figure 3.3 : Withdrawing decision under ambiguity



In this figure, we can observe a change in the optimal decision to withdraw. In Gorton (1985), the author explained already that due to the structure of the information scheme some depositors can choose to mistakenly withdraw when the situation is unnecessary or the opposite when the situation is necessary. In the ambiguity situation the same result can be visible and also increased depending

on the degree of optimism or pessimism of the depositors. In case of optimism, the size of the area when depositors mistakenly do not withdraw increase and is a function of the degree of optimism. When pessimistic, the same opposite effect arises and reinforces the decision to withdraw.

3.4.2 Effect of ambiguity on the withdrawal decision and depositors' expectation distribution

α, the parameter of ambiguity, represents the degree of optimism or pessimism coming from our depositors. The level of optimism concerns the level of optimism onto the state of the bank and onto the environment of the game. In a non-ambiguous situation, depositors only have one distribution of $\hat{\theta}$ and therefore one distribution of $\pi(\hat{\theta})$. But in the ambiguity situation, they have multiple distribution of both $\hat{\theta}$ and π. In order to verify the properties of α, we are going to make a hypothesis on the distribution of $\hat{\pi}(\hat{\theta})$, which is the expected capital loss based on the expected state of the bank. We expect α to have a positive influence on the decision not to withdraw. In other words, the more optimistic the depositors, the less likely they are to mistakenly withdraw.

In order to analyze the effect of α on the withdrawing threshold, we use the envelope theorem. As we change parameters α of the objective function (here the maximization of depositor's utility function), the envelope theorem shows that changes in optimizer of the objective do not contribute to the change in the objective function. At the threshold level, the envelope theorem indicates how the optimum fluctuate regarding the variation of a parameter (here α). For little variation of α, we can analyze the variation of $1 + \lambda_2^{***}$ by using $\frac{\partial V_3}{\partial \alpha}$.

Result 3: the less pessimistic the depositors, the less likely they are to mistakenly withdraw

$$\frac{\partial V_3}{\partial \alpha} = (1+\lambda_2)(1+r_{d1})\left[E\left(max\int_{\underline{\theta}_1}^{\bar{\theta}_1}\hat{\pi}_1(\hat{\theta}_1)d\hat{\theta}_1\right) - E\left(min\int_{\underline{\theta}_1}^{\bar{\theta}_1}\hat{\pi}_1(\hat{\theta}_1)d\hat{\theta}_1\right)\right](D_1 - D_2) \tag{3.29}$$

$$+D_2(1+r_{d1})(1+r_{d2})\left[E\left(max\int_{\underline{\theta}_2}^{\bar{\theta}_2}\hat{\pi}_2(\hat{\theta}_2)d\hat{\theta}_2\right) - E\left(min\int_{\underline{\theta}_2}^{\bar{\theta}_2}\hat{\pi}_2(\hat{\theta}_2)d\hat{\theta}_2\right)\right] > 0$$

Based on the distribution function of $\hat{\pi}_i(\hat{\theta}_i)$, we have a positive effect of α onto the withdrawing threshold. In other words, the higher the level of optimism, the higher the withdrawing threshold will be. This situation is possible when the distribution of $\hat{\pi}_i(\hat{\theta}_i)$ is growing with the value of $\hat{\theta}_i$. As a reminder, to be considered more optimistic than pessimistic, depositors must have $\alpha > \frac{1}{2}$, while the opposite is necessary to be considered rather pessimistic than optimistic. In the case where $\alpha = \frac{1}{2}$, they are considered as indifferent to optimism or to pessimism. Depositors also never deposit more than which it did at the end of period 1, implying $D_1 > D_2$.

3.5 Conclusion and Policy implications

The conduct of this analysis shows interesting results concerning withdrawing decision of depositors and the concept of ambiguity. The relationship between these two is negative. When ambiguity translates a situation of confidence, a negative relationship exists between withdrawing and ambiguity. In other words, when depositors are pessimistic, the decision of withdrawing is anticipated and lead to a situation where depositors withdraw mistakenly: in this situation depositors which withdraw generate an inefficient bank run as presented by Chen and Hasan (2007). Those bank run does not trigger any governance implication and emphasize banking instability.

This chapter answers the question regarding the nature of the impact between ambiguity and the governance: the relationship is negative. The results above are showing interesting results in terms of economic implications. Based, on the degree of optimism of each depositor, the decision to withdraw can be delayed or

postpone with regulating tools to avoid contagion and a severe bank run: the first come, first serve rule has still some implication in the overall decision of withdrawing. The degree of optimism is relying on the observance, direct or not, of the macroeconomics shocks onto production.

The observability of the rate of return on currency (as a "risk-free asset") is crucial and allow depositors to behave and whether or not to withdraw. The results proposed in this chapter are consequences of underlying macroeconomic shocks and therefore if the shock is negative depositors are more likely to become more pessimistic as ambiguity capture both at a macroeconomic level and at a microeconomic level (one bank). The presence of ambiguity also reduces the possibility of banks to anticipate its equity needs. The ambiguity aversion of depositors actively play a role in the bank equity level, leading to potential financial instability.

In order to reduce the probability of depositors rushing while being pessimistic and mistakenly withdraw, we recommend banks two options: firstly banks should provide high and permanent level of disclosure to reassure depositors even before shocks, and secondly banks should still use disclosure to calm depositors behaviors and smooth the withdrawing process. The ex-ante and ex-post decision of banks to provide information about its health and about the quality of its investment program are a key to stabilization. The ex-ante decision to disclose participates to the creation of both disclosure culture and market discipline. If banks have a history of being transparent, actors of governance will be able to modify their level of confidence in times when the economic situation is stable and it will reduce the number of deviant agents (from the greater good) due to their pessimism. Then when the economic situation becomes more unstable, transparent banks will send a more positive signal to agents of governance than banks who decide not to disclose.

According to the empirical literature concerning its impact on financial market investors, Kunt, Detragiache and Tressel (2008) for e.g., banks are better off being transparent in a competitive banking sector than being opaque. The signal sent while disclosing information, even if it translates a negative situation for the bank, has a more positive impact on banks than no disclosure at all. The effect is

even more powerful for a signal translating a positive situation for banks. The following chapter has the purpose to analyze this effect and to corroborate the results obtained in theory.

Chapter 4: Disclosure, Ambiguity and Depositors' discipline in European banking system

Chapter 4

Disclosure, ambiguity and Depositors' discipline in European banking system

4.1 Introduction

Over the recent decades, a substantially rich literature has been developed about the relationship between banking transparency and depositors behavior: sizable amount of this literature analyze occurrence probability of bank runs. Most of the literature is inspired from Diamond and Dybvig (1983), the cornerstone of the development of the literature around the depositors, banks and early withdrawal.

The relationship between disclosure and bank's decision-making, in the literature, is not unequivocal. In chapter 1, we show the existence of a complex relationship between disclosure and each component of the governance of a bank. In the chapter 2, we were able to show that disclosure enhances market discipline applied by financial market participants. Here, we are going to analyze the relationship between disclosure and depositors. When the banking sector is considered as a whole, the consequences of disclosure depends on the type of risk banks are facing: if banks are facing manageable risk during the process of portfolio investment, disclosure appears to allow depositors to exert their governance onto bank's managers

in order to avoid excessive risk taking. Disclosure is also socially optimal to ensure financial stability (see Cordella and Yeyati, 1998). While they deposit in banks, depositors exert pressure on banks through the deposit canal: if banks' decision makers interest are not aligned with the one from depositors, then depositors can decide to withdraw their endowments and deposit them in other institutions, as presented in chapters 2 and 3. In presence of disclosure, depositors passively exert governance pressure onto bank's decision makers to coordinate their interest. Depositors' decision to withdraw is affected by the quality and the quantity of available disclosure. Depositors are sensitive to information and will decide to early withdraw if either they have actual information about the bank or even in presence of rumors. In a competitive banking sector, according to Chen (2008), depositors do not have incentive to withdraw when the bank discloses precise and informative signals while banks' competitors are also transparent and disclosing informative signal. With financial globalization and deregulation, banks are facing an increase in operating risk. Financial disclosure participates to the mitigation of the effect of financial opening (Cordella and Yeyati, 2002). Disclosure has therefore beneficial characteristics. The mechanical effect of disclosure plays a role onto depositors decision. Disclosure modifies depositors decisions to withdraw before the term of a deposit contract. The chapter 3 has helped us conducting the analysis in this chapter.

Some part of the literature has shown that disclosure is not perfectly optimal and can lead to inefficient bank run. When systemic risk is taken into account and when banks are not able to manage the risk of their portfolio, disclosure appears to be less efficient from a social point of view than when a bank is able to manage the risk of its investment portfolio (Cordella and Yeyati, 2001). A bank run may occur even when depositors have access to information about banks' health and if depositors are rational. This type of bank-run is an information-based bank run. Information-based bank runs may be inefficient because of the design of the deposit contract created by the bank for the depositors, leading to excessive incentives to withdraw. An increase of banks transparency may reduce depositors welfare by increasing the probability of occurrence of an information-based run (Chen and Hasan, 2006). In a competitive environment, not only the quality (precision or the

nature of the signal disclose) of the disclosure is responsible for withdrawal procedures by depositors: depositors may also be running from a bank which decides to be opaque when competitors are transparent (Chen, 2008).

There are two possible roles regarding the relationship between disclosure and depositors. The first one burdens the discussion to a role where the level of disclosure is an exogenous variable explaining the amount of deposits. In other words, it answers the question: do most transparent banks are able to attract more depositors than opaque banks? The second role involves more directly the occurrence of bank run: does disclosure reduce the probability of bank run? In this chapter we are testing for the first role of disclosure. Bank runs are and will likely remain one of the regulator top priority because it confronts the very first concept behind money: trust. Regulators, throughout regulation, implemented mandatory disclosure to ensure future market discipline which could be applied through the first role of disclosure. One of the latest examples of bank run related to the disclosure of information has shown that the event had been carefully managed by regulatory authorities to avoid contagion and collateral damages.[1].

Even if a subsequent section of the theoretical literature looks for the second role of disclosure, we can see that disclosure reduce the asymmetry of information between bank and depositors. The bank, in the theoretical literature, discloses the risk profile of its investment plan to ensure its business. The pay off of such investment allows the bank to distribute interest to depositors. This change in the knowledge of depositors favors the movements of depositors from a bank to another if the disclosed signal is not satisfying enough for depositors (unless the deposit contract does not allow for withdrawal). Transparent banks attract depositors eager for transparency (Wu and Bowe (2012) unlighted these results for Chinese banks). Ungan et al. (2008) also empirically shows that more capitalized and more liquid Russian banks have attracted depositors. Pessarossi and Weill (2015) also enlisted the link between capital requirements and bank efficiency. Semenova (2011) emphasize the need of Russian depositors to monitor the financial health of the banks they deposited in. The governance of depositors is supposed to exert a

[1]See Northen Rock, UK, 2007

control, a means of pressure, on banks' behavior throughout different canals such as the interest rate and through other information canal such as mandatory communication, press conferences or company-related policies. Excessive risk should be avoided when banks are the most transparent which would lead to a safer banking sector (Cordella and Yeyati, 1998). Banks are becoming safer with the increase of disclosure: disclosure improves banking regulatory control via the market discipline channel (Flannery 2001).

In this chapter, we analyze the effect of disclosure on the amount of deposit and we assume that depositors are not informed enough about the macroeconomic situation and the individual situation of the bank. The eagerness of depositors to be informed, Semenova (2011), proves the only brake for depositors to be informed is located in the lack of available information. The opaque nature of banks can be reduced by two forms of disclosure: either voluntary or mandatory. The eagerness of depositors is also combined to the various disclosure obligations implemented by within international agreements acts in favor of an opaque nature of the banking sector. Thence we assume that banks are insufficiently transparent and that the macroeconomic situation is not well enough integrated by depositors in their decision to lead them to perfect rationality. In order to capture the effect of voluntary disclosure correctly, we introduced in our analysis the concept of ambiguity. The idea behind the concept of ambiguity is that, except in some situation, decision makers, here depositors, facing a decision problem under uncertainty do not have enough information to come up with a precise probability distribution on an event according to Ellsberg (1963), as presented in chapter 3. The author does not show any result about depositors but provide behavioral results which could be applied to depositors. In addition, according to Knight (1921) when a decision maker, based on available information, is able to come up with a probability distribution, he is facing a decision problem under risk; in all other cases, the decision-making is facing a decision problem under ambiguity (Chateauneuf and Faro, 2009). This concept is particularly interesting because it allows nuance to the perfect rationality of depositors, opening new research questions concerning the effect of disclosure. The use of the ambiguity notion allows us to release the hypothesis of perfect rationality of depositors: it allows us to capture the behavioral differences

between an ambiguous environment and a non-ambiguous one. This relates to the conclusion expressed by Chen and Hasan (2006, 2007) which express the low rationality of depositors. In chapter 3, we were able to introduce in a theoretical model the notion of ambiguity and show that the more pessimistic depositors are the more likely they are to early withdraw. The ambiguity, as presented in chapter 3, can be then associated to a confidence feeling, regarding both the bank our depositors deposited in and the real world there are part of. The upcoming chapter is a way to test some of the theoretical results obtained in the previous chapter.

This chapter answers different research questions assessing the effect of disclosure and ambiguity onto the amount of deposit in European banks over the last 25 years. Is disclosure able to attract depositors? Is this effect persistent when controlling for ambiguity? The previous chapter provided extended details concerning the variety of ambiguity materialization which can apply. The literature related to ambiguity and its empirical applications are still in progress and the introduction of ambiguity in our analysis is the main contributions of this chapter to literature. The second main contribution of this chapter concerns the analysis of European deposit data with regards to disclosure: we are here analyzing the effect of disclosure and ambiguity over 25 years (1989-2014) with 117 pan-European banks. In this chapter, we analyze the variation of total deposits while taking into account variables such as disclosure, ambiguity and regulatory variables. We computed a proxy of different variable to capture the degree of ambiguity of depositors. We took into account the employment expectation of households, production expectation and finally an indicator of economic climate. To compute the proxy we used the variance of those expectations to capture ambiguity. The variable capturing ambiguity act as an indicator of confidence: the higher the ambiguity factor, the more pessimistic depositors are.

The results obtained are interesting and provide alternatives to existing literature relating disclosure and deposit behavior. First, we show a negative correlation between disclosure and the amount of deposit. This first result allows us to confront Chen (2008) results and open a new opportunity to analyze the effect of ambiguity onto disclosure. This result contrasts with the existing literature already existing

such as Wu and Bowe (2012) or Bourgain et al. (2013) which showed positive relationship between both which are respectively focusing onto the Chinese banking sector and MENA countries. We also tested the attractiveness of interest rates paid on deposits: the results do not appear to trigger a positive attractiveness of high-paid deposit contracts. The second result shows a negative effect of ambiguity onto deposits level. This is particularly interesting about depositors because of their sensitivity to perceived rumor. Banks are complex entities, therefore introducing disclosure to analyze the attractiveness of transparent banks while having ambiguous agents is particularly interesting to understand the mechanics of depositors in case of withdrawing.

The chapter is divided as follows: first we review the related literature around both notions of disclosure and ambiguity. Then we introduce the data we used to conduct this analysis while we next show the results obtained. The last section will be dedicated to conclusion.

4.2 Related litterature and contributions

4.2.1 Governance by depositors, decision making under ambiguity in the theoretical litterature

In this chapter, we analyze the effect of disclosure on deposit levels and its ability to attract more depositors. To analyze this effect, we are looking into the effect of disclosure on depositors decision-making process, throughout their governance power. We are also analyzing the effect of ambiguity on the decision-making of depositors. As seen in chapter 3, the concept of ambiguity can be summed up as a situation where the decision maker, based on available information, is not able to come up with a unique distribution of probability. The perception of ambiguity then translates into a situation where agents are optimistic or pessimistic regarding the multiple distribution of probability they are facing. In this section, we present the theoretical framework behind our research questions with, first, the theory behind governance of depositors and then we will present the decision theory under ambiguity.

4.2.1.1 Governance by depositors

This chapter analyzes the effect of disclosure on the decision of agents to withdraw from a bank. The existing literature has shown that depositors are eager to monitor the bank they deposit in. In chapter 1, we present a significant share of the literature relating those two issues. The value of market discipline exercised by bank's creditors (here it will be especially applied to depositors) results in a choice of safer and less risky project (Rochet, 2008 and Flannery, 2001). Cordella and Yeyati (1998) explained that disclosure has powerful effects on risk management especially when the risk of bank's investment portfolio manageable: disclosure triggers passively incentives to bank's decision makers to orient the bank's investment portfolio to a healthier portfolio. In other words, bank's decision as a maker CEO, shareholders, or even depositors are making safer choice in order to avoid potential withdrawals which could invalidate the investment business program of a bank. Based on the limits of their model, the authors have proposed an extension[2] which provides interesting conclusion about the relationship between disclosure and depositors. As presented in chapter 1, the introduction of banking competition on the capture of depositors shows important results on the disciplining effect of disclosure on bank risk-taking behavior throughout the depositor's governance. The effect of competition creates incentives to implement disclosure in order to avoid the weakening of the market. Depositors are not only eager to manage banks' private information but reward the most transparent bank, by reducing the volatility of deposit movement across banks. The overall, direct and indirect, effect of disclosure has consequences on market discipline. Market discipline constitutes a substitute for financial supervision and thus reduces the need for banking supervision. Even if Basel II Pilar 3 is complementary to the second Pilar, by emphasizing market discipline regulators might expect a reduction of mandatory rules to enhance free market. The depositors' governance mechanics can here be used for both mentioned points and deserves more analysis in order to assess its empirical power.

[2]See Cordella and Yeyati (2002)

Contrary to the conclusion of Cordella and Yeyati (1998) , some authors have concluded that disclosure is not able to fully make bank runs disappear. Chen (1999) shows that disclosure greatly reduces the incentives of depositors to withdraw while it is unnecessary (in other words it reduces the heard effect on banks) but he also insists on the fact that bank runs can still occur: the author defines them as information-based bank runs. Information based bank runs can be seen as a positive tool to discipline banks' decision maker, but sometimes those runs can be triggered through over incentives to withdraw based on rumors. The theoretical results obtained by the author are confirmed by several studies from Chen and Hassan (2006 and 2007) or Allenspach (2009) which shows, empirically, that depositors are not fully rational and have over incentives to withdraw. Those incentives can trigger inefficient bank runs which do not discipline banks when they are facing temporary financial difficulties. The self-fulfillment of such difficulties into bankruptcy is not able to enhance market discipline. In addition to the result presented above, perfect disclosure does not fully allow banks to avoid bank runs. Hyytinen and Takalo (2002) also provided the same conclusion where they argue that bank regulation comes at a cost which could increase the fragility of the banking sector. Partial disclosure is less costly than full disclosure and also participate to a significant reduction of the occurrence of bank run probability. Yorulmazer (2003) also advocates for the same consequences and insist on the important costs of disclosure to avoid runs. Disclosure is also a disciplining tool but can also be inefficient.

4.2.1.2 Decision theory under ambiguity

The theoretical literature regarding the impact of ambiguity on financial activities has not been developed largely over the recent years but is growing rapidly, so we use the ambiguity general concept and applications in other fields to base our research. Ellsberg (1961) is regularly cited as evidence for unknowable "ambiguity" versus computable and probabilist risk. He also provides interesting critics concerning Savage axioms about expected utility maximization. The author crit-

ics' open then the possibility of subjective or "belief-type" probabilities (Coleman, 2011). Those findings suggests that a different state of the decision-making process is possible, different from uncertain and certain. This decision-making process is likely to affect the decision of agents, in the same proportions as with the certain and uncertain state of decision. As mentioned in chapter 3, ambiguity can be considered as another state of the decision-making process, which differs from the two others: certain and uncertain ; with the releasing of the perfect rationality axiom. For example, when a depositor decides to deposit in a bank, his withdrawing decision is not only based on one probability distribution of the bank's default leading to not be able to pay deposits back.

Etner et al. (2012) proposed a presentation of a general approach to a decision problem under uncertainty where they surveyed the ongoing literature and its potential applications. They argued that portfolio choice has been a first instance of an application of the Choquet expected utility model, where it is used as a way of measuring expected utility of uncertain events. The authors also used Choquet integral to accommodate Ellsberg paradox and Allais paradox. The effect of ambiguity and uncertainty aversion on equilibria have been also discussed in Chen and Epstein (2002) where beliefs are materialized as distributions of probability. The author's results show that ambiguity aversion is increased by the ignorance of some parameters by gents, and therefore increase risk premium. Epstein and Schneider (2008) shows that expected excess returns are higher when information quality is more uncertain. The field and the cross disciplinary research nevertheless needs more applications in order to test the optimality of these theoretical approach onto portfolio.

By using ambiguity in the decision process of depositors, they are now facing a decision of withdrawal with a variety of distribution of probability which will be representing the level of optimism or confidence he might be experiencing. As presented in chapter 3, the most common type of decision modulation with ambiguity is the maxim expected utility model which takes into consideration the less optimistic probability distribution (most pessimistic outcome for the depositor) and the more optimistic (most optimistic outcome for depositors about the probability

of the bank to be able to pay back deposits). This type of ambiguity is close to an optimistic/pessimistic situation regarding the risk of default. For more details regarding the various types of ambiguity, the third chapter provides a wider set of explanations.

4.2.2 Empirical evidence of governance by depositors

As of the theoretical literature, there are significant empirical results which investigate the relationship between governance by depositors, disclosure and deposits. Semenova (2011) created a survey on moscovian depositors. This analysis confirmed the eagerness of depositors to monitor banks they deposit in. In order to be able to monitor their banks, depositors need to be able to collect data and information from a bank. So depositors reward most transparent banks when larger depositors tend to reduce the exercise of their governance. Contrary to Chen (2006) and similar articles, Gilbert and Vaughan (2001) shows that disclosure does not appear to trigger runs but confirms the reduction of the probability of runs occurrence. Such results are consistent with other literature were poorly managed banks appear to benefit strongly from disclosure, as shown by Hasan et al. (2013). The article also emphasizes the eagerness of depositors to monitor banks fundamentals.

A large analysis of the Chinese banking sector conducted by Wu and Bowe (2012) emphasized the quality of disclosure when applied to depositors. Disclosure participates in the increase of the deposit base of banks, when they are considered as the most transparent. In other words, and as mentioned previously, depositors value transparent institutions and financially strong banks. Bourgain et al. (2012), after calculating a bank disclosure index à la Baumann and Nier (2004), tries to analyze how international competition, between developed countries and emerging, for deposits can prevent excessive bank risk-taking in emerging countries. It specifically studies the interaction between transparency in bank-risk taking and the disciplinary role of depositors. The results show that financial openness affects the liquidity variables negatively and positively the leverage. But what matters most for us is the relationship between risk-taking and disclosure. The disclosure index influences positively the liquidity variables and the z-score (universal

measures of soundness in banking related studies), while it affects the leverage negatively. Disclosure increases the likeliness that the banking sector will opt for a sound risk management in the case of sufficient financial openness.

The empirical literature concerning the relationship between disclosure and deposits is larger than the presented here. The proposed articles are just a hint of the available literature. For further reading, the chapter 1 provides a larger analysis. Anyhow, we decided to choose these articles due to several factors: first they provide interesting result in most geographic zones, secondly they integrate the latest changes of regulation while providing a long period of analysis. A broader vision of the literature is also available in the first chapter.

The ambiguity problematic has not been as largely studied by authors than the effect of disclosure on depositors' behavior. Puri and Robinson (2007) does not clearly talk about ambiguity but the authors created a measure of optimism which correlates with positive beliefs about future economic conditions. If we consider ambiguity as an optimistic-pessimistic relationship, the author shows that moderate optimists display reasonable financial behavior while, the most optimistic shows are more careless. Another close related studies in the financial topic concern portfolio choice by Dow and Werlang (1992). They analyze the problem of optimal investment decisions by seeking to distinguishing between "quantifiable risk" and "unknown uncertainties." In other words, the authors compare the empirical results between the classic risk-neutrality theorem of Arrow (1965) and the use of non-additive subjective probability. While using non-additive subjective probability, to capture the "unknown uncertainty," it exists an interval of prices of investment in which agents neither buys nor sell short the asset. The authors' work can be completed with Routledge and Zin (2009), which shows an aversion to uncertainty increases the market-makers bid ask spreads and reduces liquidity.

Experimental investigation is also available in the literature. Madiès (2006) tests the realization of self-fulfilling banking panics under an experimental protocol. The author studies a panic-based run but not information based protocols. The results show that runs are a persistent phenomena that are difficult to prevent

but seems possible to limit throughout a learning effect. The learning effect is realized by a temporary suspension of the deposit availability, increasing therefore bank liquidity. Lastly, the author insists on the fact that deposit must be fully covered to prevent runs.

4.2.3 Testable hypothesis

The purpose of this paper is to analyze whether or not disclosure and ambiguity have an impact on the decision to deposit measured by the level of deposit. The theoretical literature shows a positive relationship between disclosure and the level of deposit. When an increase (or a drop) in the level of disclosure is noticed by depositors, the depositors can decide to modify its deposit depending on the level of transparence of the bank. A reduction of disclosure provides incentives of depositors to exert its governance and therefore, as a sanction, increasing the withdrawing decision from the current bank to another bank considered as more "transparent" than the one the depositor just left according to Cordella and Yeyati (2002). In addition to sanction from depositors, we can observe another phenomenon where depositors are unable to with enough information to exert its governance and therefore proceed to withdrawing. Both scenarios have similar consequences on the relationship between disclosure and the amount of deposit.

The disclosed information can give two types of signal: a good signal, which provides evidence of a favorable health of a bank, or a bad signal which provides the other kind of evidence. If a bank does not disclose, in order to potentially hide poor performance, depositors have a preference for a "bad signaling" than an absence of signals. This behavior is only possible if the depositor is fully rational and informed according to Chen and Hasan (2006). Disclosure provides either a wide range of information about the risk of the bank or in case of an absence of disclosure, provides the riskiness of the bank. A rational informed depositor knows the distribution probability of default of the bank he deposited in if the bank is fully transparent. We suppose that the depositors are fully able to manage the information disclosed. The first hypothesis which we will be testing is the avail-

ability of disclosure to have a positive impact on the amount of deposits. If the hypothesis is validated, the most transparent banks will have the highest amount of deposits.

- *H1: banking disclosure has a positive impact on the amount of deposit*

Depositors do not know the perfect distribution of events and are then unable to determine the correct probability of default of a bank. The situation is a case of ambiguity. They will then determine a "subjective" probability of default based on the level of disclosure of the bank, the volatility of the macroeconomic environment and the "supposed" resilience of the bank it deposited in. Therefore, the "subjective probability" express a level of confidence from the depositors. According to chapter 3 where we introduced in our analysis the concept of ambiguity in the original Gorton (1985) model, optimistic depositors tend to reduce their withdrawing decision while pessimistic depositors are more likely to withdraw. Ambiguity is, in our analysis, considered as negative for stability. In presence of ambiguity, the stability of the decision-making process is reduced and can lead to inefficient decision-making. The higher the level of ambiguity, the more complex depositors' decision-making is. Bank's decision makers are then unable to come up with a clear state of its depositors' base: the computation of the deposit contract is then more complex. With the hypothesis, we are able to relate to the result in the third chapter.

- *H2: ambiguity regarding the macroeconomic environment has a negative impact on the amount of deposit*

The third hypothesis in this analysis concerns the risk of a bank and its ability to attract depositors when the bank is known to be safer. The first influence of governance is ability to force a bank decision maker to behave in the way of the actor of governance, which in this case here is to behave safe enough for depositors to be able to get the amount of their deposit back whenever they feel the need to withdraw.

- *H3: the risk of the bank has a negative impact on the amount of deposit*

We want to test the reaction of depositors to the remuneration of their deposits. Both empirical and theoretical literature took in consideration in the various models the remuneration of deposit (throughout the interest rate canal) as a counterpart of a deposit contract. Interest rate and therefore the remuneration of the deposits are the opportunity cost of a deposit contract. Our fourth hypothesis assumes depositors are attracted to the remuneration of their deposit. In the literature, stated above or available in the first chapter (Cordella and Yeyati (1998), e.g.) , we can observe depositors arbitrage between a paid interest rate when they deposit in a bank and a risk-free asset investment with a null payoff. Here, the interest payment of the deposit become therefore a variable of choice.

- *H4: interest paid on deposit has a positive impact on the amount of deposits*

Lastly, in most of the theoretical literature (Gorton, 1985 or Chen and Hasan 2006, 2007) the arbitrage of depositors must be made between depositing in a bank or invest the deposit in a risk-free asset. The hypothesis 5 test for the alternative choice of depositors. This hypothesis allows us to relate this chapter more with the theoretical literature and also to chapter 3 and it is captured throughout the long-term treasury bond rate. We expect the long-term treasury bond rate to have a negative impact on the level of deposit.

- *H5: long term treasury bond rate has a negative impact on the amount of deposit*

4.3 Dataset

The following subsections will introduce the empirical model, the dataset we use and will be followed by an extensive statistical analysis regarding the variables.

4.3.1 Empirical Model

This section proposes to explain the empirical model we use to conduct our analysis. The dependent variable is the amount of total deposits during several periods:

first for the overall period 1989-2013, then for the period before the implementation of Basel II (1989-2005) and finally the period after the implementation of Basel II (2006-2013). We decided to split our data to enable temporal comparisons before and after the introduction of mandatory rules concerning disclosure for all the banks located in countries which ratified the treaty. Even if the recommendations of Basel II were on June 26th 2004, we chose the date of January 1st 2006, as the implementation of the McDonough ratio.

Due to the panel structure of our data, a stacked panel, we controlled for presence of random or fixed effects and it appeared that no random effects were present when using the overall period according to the Breusch-Pagan test. The same conclusion was also consistent for the two sub-periods. In the meantime, no test was able to significantly reject that fixed effect was more powerful statistically than the OLS form. So we ran a pooled OLS regression. We were not confronted to any kind of heterosckedasticity nor to the problem of collinearity.

The regressions model is as follow:

$$Deposit\,Variable_{i,T} = \alpha + \beta_1 Disclosure + \beta_2 Ambiguity + \beta_3 Interest\,Rate + \beta_4 Bank\,Risk + \beta_5 Controls + \epsilon_{i,T}$$

for bank i at date T.

The disclosure variable is in fact compose of several sub-variables which allows to capture different dimensions of the bank's communication. Financial performance, reputation, strategy or accounting is taken into account for the disclosure variable. This score allows us to rank banks from the least transparent, to the most transparent. It also allows us to capture a variety of points in our variable which covers different subjects such as financial performance, accounting practices or the composition of the directing board. Concerning the ambiguity variables, we are going to use 2 types of variables in the different regressions: in the first one, we are using a unique variable to capture individually each unresolved issue of depositors such as employment prevision, consumption confidence or prevision about economic indicators. Then, we aggregate those independent variables to

create a variable which embraces each individual factor. We decided to use both individual and aggregate variables to capture ambiguity for two reasons: individual characteristics allow us to identify clearly sources of ambiguity while computing an aggregate value allows us for a more general opinion regarding the effect of ambiguity.

4.3.2 Sample description, endogenous variables and explanatory variables

We are using a wide time period to measure the attractiveness of transparent banks: we computed a database from 1989 to 2013. We use for this analysis different databases than in the chapter 2. We used Factset[3] database and the Eurostat[4] database. The first database provides a wide set of information about companies governance and information about the banking sector such as banking key data (amount of total assets, amount of deposit, capital ratio, leverage, etc.) or corporate governance information (list of executive officers for e.g.). The second database provided by the European Commission has the purpose to harmonize and aggregate national statistics in order to allow comparison at a European level. Eurostat does not collect the data, it is actually done by Member States statistical authorities.

The sample of this chapter is composed of major systemic banks and regional banks. We decided to use both types of banks to capture the majority of the European banking system. We selected them based on the size of their assets: we only have in our sample banks which have a total asset up to 10,000 million euros. It allows us to have a set of a large bank, systemic or not, public or private. The use of this brink allows us to be able to obtain detail information about banks even for privately own banks. Under this threshold, the availability of data such as amount of deposit or even total assets is not sufficient. The original sample was composed of 203 banks from which we remove banks which did not provide enough information during the period. Finally, we end up with a sample of 117

[3]http://www.factset.com/
[4]http://ec.europa.eu/eurostat

large European banks located in 23 different countries coming from the European Union, Switzerland and Norway. The first table of the appendix section shows the list of the participating banks of our analysis and the country they are located in.

As we can see, the population of banks is relatively spread in between European Union members (21-member countries) and non-members. This choice in our sample selection allows to integrate countries which are relatively close, in terms of levels of development and in terms of geography. We also choose to integrate non-Eurozone members to our sample. The distribution of banks among countries is available in the statistical analysis (Figure 4.1). The choice of integrating non-European members is justified by the geographic and economic proximity, by the predominance of the banking sector in both Norway and Switzerland and by the ratification of those countries to the SEPA agreement.

Before running any econometric regression, we should dedicate some of our time to have a closer look to the distribution of our data for each variable. Since our range of data is spread over 25 years, we will not run statistical analysis for each year, but only for the global set of years. This section focuses on the distribution set of our banks then we will take more time on discussing each variable.

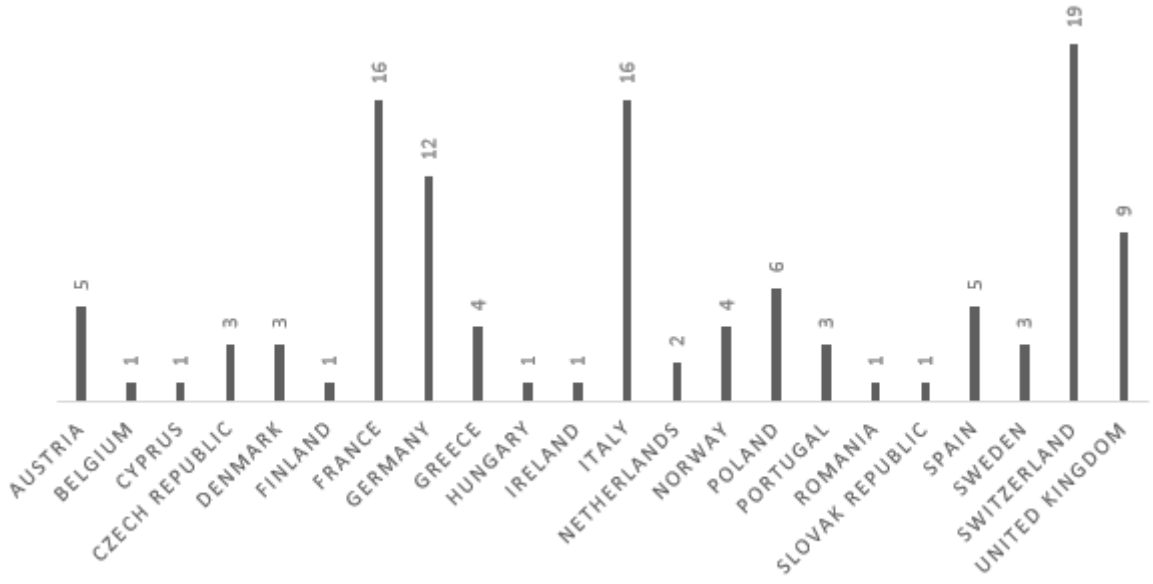
As we showed previously our dataset is composed of 117 European banks. The following chart and tables provide information about the distribution of banks we use for our analysis. Our set of banks is composed of mostly national bank leaders for each country. The largest bank of our distribution in terms total of assets is HSBC with 2,176,884.29 million Euros, while the smallest one is the French bank CRCAM d'Ille et Vilaine with 10,243.83 million Euros worth of total assets for the year 2013.

The geographical distribution of banks among Europe is rather uniformly distributed but gives a high representativeness to German, Italian, and Scandinavian banks. The largest banks are located in France, UK and Germany.

Table 4.1 : Total Assets for the year 2013

In million euros	Minimum Total Assets	Maximum Total Assets	Mean Total Assets
Sample (117 banks)	10,243.8	2,176,884.3	235,229.5
Banks in countries in crisis (13 out 117 banks)	57332.9	1,266,296.0	256152.8
Banks in Eurozone (71 out 117 banks)	10,243.8	2,077,759.0	248,255.8
Non EU banks (23 out of 117)	10,367.9	844,217.3	83,669.5

Figure 4.1 : Geographic distribution of the sample



In the following sections, we describe and then analyze the different variables we use for the rest of this chapter. The variables are divided in three categories: endogenous deposit variable, disclosure variables and then ambiguity variables. The following subsections are going to present those categories but first we present our empirical model.

4.3.3 Variables

4.3.3.1 Exogenous variable: deposits.

As mentionned above, we analyze the effect of disclosure on the amount of total deposit, expressed in percentage.

$$Total\ Deposit\ ratio_{i,T} = \frac{Total\ Deposit_{i,T}}{Total\ Asset_{i,T}} \text{for bank } i \text{ and year } T.$$

The total deposits variable does not take into account money market deposits but only commercial deposits. As we said earlier in this chapter and earlier in previous chapters, the governance by depositors is a pressure mechanism on banks: if depositors are not satisfied by a bank risk strategy and if the bank risk is observable, they can individually choose to withdraw their deposits and to either deposit in another bank that they qualify "safer" or in a "risk-free" asset. This sort of action passively pressure banks to behave safer to be able to attract depositors. In order to capture the governance exerted by depositors, we decided to use the data concerning the total deposit for our set of banks[5][6]. To avoid any potential capture of a size effect, we use total deposits over total asset ratio as an endogenous variable.

[5]For non Eurozone member countries, the exchange rate used is the exhange rate at the date of event.

[6]For Eurozone member, the official conversion rate, from national to euro currency, is applied for the years before 1999

4.3.3.2 Exogenous variables

4.3.3.2.1 Disclosure and transparency variables

We analyze the behavior of depositors in presence of disclosure from the bank to depositors. As a reminder, in chapter 2 we compute a disclosure index to capture both global and specific disclosure. In this chapter we compute a different index to capture different dimensions of disclosure, for each year based on the data extracted from the Factset database.

The disclosure index is one of the contributions of this chapter. For each year of our sample we assembled a disclosure variable composed of different variables. Each sub variables are weighted equally in the disclosure variables. The disclosure variable is composed of 21 sub variables which take the value 1 when the value of such variables is known. Figure 4.2, available on the next page, presents the index we use for our analysis.

$$Disclosure_{i,T} = \frac{1}{21} \sum subvariables_{i,T}$$

Our disclosure index is divided in different sections containing accounting data, corporate strategy, financial performance and finally a section concerning the reputation and background of the members of the board or executive leaders. The exact composition of our index and sub indexes is available on the next page. The fixed variables methods used in this analysis is standard in the literature and is close to the papers Nier (2003 and 2004), Poshakwale and Courtis (2005) or Wu and Bowe (2012).

The notion of disclosure is somehow complex and often needs to take into account the two dimensions of disclosure: quantitative disclosure and qualitative disclosure. In order to simplify the analysis of this chapter and with the conclusions of chapter where there is no significant difference between the use quantitative and qualitative disclosure variables, we only decided to orient our analysis around quantitative disclosure. In other words, we prefer having a situation more accountable data than more qualitative data.

The use of different categories allows us to compute a disclosure index which covers different question depositors could wonder. We build those categories based on the Semenova survey (2011) which expressed the needs of depositors in terms of communication. We also added personal subcategories to come up with an original index. The accounting section captures the effect of accounting standardization. It participates to the increase of communication readability. The strategy section is used to enhance the preference for the future of the bank, while using financial performance as well. The reputation of board members and chairman are also taken into account to assess the decision-making capacity of the bank managers.

Figure 4.2 : Disclosure Index Composition

1. ACCOUNTING Section
    a) Accounting Standards
    b) Auditor's Opinion
    c) Top Tier Auditor
    d) Audit Fees
2. STRATEGY Section
    a) Type of Provided Services
        i. Financial Services
        ii. Commercial Services
    b) Long Term Investment
    c) Total number of holders
    d) Presence of minor interest.
3. PEOPLE AND REPUTATION Section
    a) List of Board Member
    b) Age of All Board Member
    c) Current Employment of Board Member
    d) List of Chairmans
    e) Age of Chairman
    f) Level of Education of the Chairman
    g) Chairman and PhD
4. FINANCIAL PERFORMANCE AND POSITION Section
    a) Equity in affiliates
    b) Efficiency of Earning
    c) Investment in Unconsolidated Subsidiary
    d) Dividend Yield
    e) Dividend per Share

For each sub variable of our disclosure index, we applied the value 1 when the

data was available in Factset database and 0 otherwise. Some of our criteria are fixed throughout the years of our sample. This is the case for Top Tier Auditor criteria, the Type of Provided Services, the information related to People and Reputation and the number of holders. But other than those criteria, we used yearly data for each criterion. We applied the following treatment to our variables: the variables take the value 1 if we were able to extract a value for the criteria for the desired year in the Factset database and 0 otherwise. We then computed an index based on the formula above. The result will be exposed in the following section which will also present the statistical analysis of the different variables. Some variables are built in a different way. For example, concerning the accounting standards we granted the value one to banks which were using either IFRS or European standards as an accounting standards and 0 when banks were still using local standards. Similarly for the Top Tier auditor sub-variable we grant the value 1 when the auditor of the bank is one of the top three audit leaders. The downside of such index resides in the necessity of sufficient reporting by the bank to the service provider and in the stability of the reporting to the same provider. Those downsides can be counter balanced by the choice of the sample: by choosing large banks in the sample we can avoid most of those downsides due to the fact that analysts follow with interest publications and figures about larger banks.

The choice of the disclosure categories allows us to cover the various sets of questions that depositors can wonder about the bank they decided to deposit in. The accounting section covers the certification which can interest depositors. The strategy section concerns the governance of the bank by insider decision makers. The people and reputation section provides information to depositors regarding the composition of the board and the level of education of bank leaders. Lastly, the financial performance section provides information about the efficiency of the bank. We expect depositors to react positively to disclosure. The higher the level of disclosure, the more depositors deposit in, as expressed in hypothesis 1.

4.3.3.2.2 Ambiguity variables

In order to analyze ambiguity, we need to use different variables which capture the difficulty of depositors to obtain objective probabilities regarding bank default. To do so we extracted different data aggregated at a European level by the European Union for our set of countries. The main contribution of this chapter is located in this section. To capture ambiguity, we focus our analysis on the volatility of households' expectations. We used data about households' expectations within a range of three months from which we used the standard deviation to compute a yearly measure of ambiguity. We gathered data for different sectorial information subcategories as follows: employment, production and the economic climate. All of the subcategories are consistent with the second hypothesis.

Employment situation

We used employment expectations provided by the Eurostat database. Employment and labor income is one component of the depositors income and is therefore important to take into account. If ambiguity concerning employment rises, depositors are likely to be more cautious regarding bank's decision-making. The data is available at Eurostat.eu and is labeled employment expectation indicators within the upcoming three months. We computed a yearly measure out of the monthly data.

$$Ambiguity\,about\,Employment = \frac{\sum_{n=1}^{12}(\hat{\theta}_n - \bar{\theta})^2}{12}$$

Where $\hat{\theta}$ represent the value of employment expectations at the date n. It captures the volatility of the expectation within a year: the variance captures the volatility of such indicator within the year. The higher the volatility, the less likely depositors can be able to compute objective probability regarding bank's probability of default.

$\bar{\theta}$ is the mean value of the expected employment situation within a year. By using the variance we are able to capture how the expectation about employment evolve. If the variance is high, it translates that the agents are not able to have

expectations stable around the mean. We expect this variable to have a negative impact on deposits.

Ambiguity about production

In the theoretical literature, once banks collected deposits they invest into a portfolio which is related to either industrial production (Cordella and Yeyati, 2002) or to an industrial technology (Gorton 1983). In order to be the closest from the theoretical literature, we decided to integrate the questions concerning the production confidence data. The data are provided by Eurostat as well and gives value for each month for a upcoming three-month period. The similar method is applied to capture the ambiguity concerning the production expectations for a year.

$$Ambiguity\,about\,Production = \frac{\sum_{n=1}^{i} (\hat{\alpha}_n - \bar{\alpha})^2}{12}$$

$\hat{\alpha}$ is the confidence data of the industrial sector for the upcoming three months. With higher level of confidence, the employment level should then be positively correlated. Similarly to the previous variable, which concerned the employment, we will use the variance within a year to measure the volatility of the expected production data and capture ambiguity.

We expect this variable to reduce the amount of deposit while ambiguity rises. As a macroeconomic point of view, when ambiguity concerning production rises, producers are not able to properly anticipate the demand they are facing. Therefore, producers might produce a quantity which is either under or above the optimal level, leading to employment volatility and stock volatility. If depositors have concerns about the production, they are more likely to withdraw and transferred it in safer location due to the on-going portfolio investment of the bank it originally deposits in. Production and production expectation is linked to the economic health of the country and therefore to the one of banks. A high variance of the expectations translates an incapacity of agents to know the right probability of default of a bank.

Economic Environment indicator.

We applied the same method to the indicator of economic climate provided by the European commission. We computed a variable to capture the ambiguity within the whole economy using the variance. The expected signs are negative for the confidence in economic climate.

$$Ambiguity\,about\,Economic\,Environment = \frac{\sum_{n=1}^{i}(\hat{\pi}_n - \hat{\pi}_{n-1})^2}{12}$$

Where π represent the economic environment expectation variable.

Table 4.2 : Ambiguity and macroeconomic indicators

Variables	**Expected Sign**
Ambiguity about Employment	Negative
Ambiguity about Production	Negative
Ambiguity about Economic Environment	Negative

4.3.3.2.3 Interest rate payment on deposits

Another important vector of bank relationship with depositors is the interest rate a bank will have to offer to depositors in order to attract them. We use data which gives us information about the volume of interest expenses paid by the different banks onto deposits. In order to avoid collinearity between the deposit payoff and the amount of total deposit, we expressed the deposit remuneration as an interest rate payment per each individual deposits.

$$Deposit\,Remuneration_{i,T} = \frac{Interest\,Expenses\,On\,Deposits_{i,T}}{Total\,Deposit_{i,T}}$$

According to H4, $Deposit\,Remuneration_{i,T}$ is assumed to have a positive impact on the evolution of deposit in a bank.

4.3.4 Statistical Analysis.

4.3.4.1 Endogenous Variables

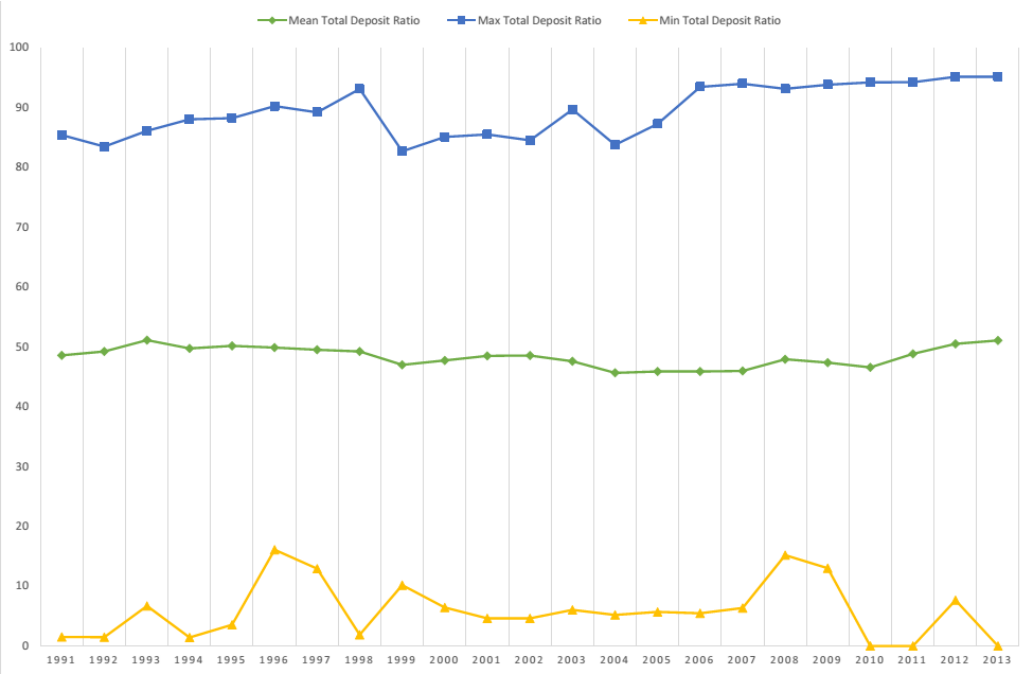
The first variable we are about to analyze is our dependent variable which is here the variable $Total\ Deposit_{i,T}$. The table 4.3 provides the basic statistics for the variable. This quick analysis shows a great disparity among the different banks. The average total deposit among our 25-year-long series and with the set of 117 banks is up 61,276 to millions euros. We can also see a strong disparity within our data set. The standard deviation certainly appears high. This can be explained by the sample. Some of the banks are specialized in commercial banking which collects a large amount of deposit even if the bank is not a national leader. Investment banks have the tendency to hold less deposit than commercial banks. In addition to those previous remarks, the presence of several systemic banks, among which BNP Paribas, HSBC or Crédit-Agricole, indubitably increase the standard deviation. The minimum deposit is located in the Italian bank Credito Emiliano SpA for the year 1992 with a value of 15.49 million euros of deposits ; while the maximum is for HSBC in 2013, for the third consecutive year, with a value of 1,116,186.86 million euros.

In order to visualize country effect and also time effect in the variable statistics, we used graphical tools to materialize the substantial evolution across time and across space. The figure 4.3 provides interesting statistical analysis to understand the difference among countries concerning each endogenous variable.

Table 4.3 : Total Deposit statistics over total period

	Overall Period		1989-2005		2005-2013	
Statistics	**Total deposit (in Millions Euros)**	**Total Deposit over Total Assets Ratio**	**Total deposit (in Millions Euros)**	**Total Deposit over Total Assets Ratio**	**Total deposit (in Millions Euros)**	**Total Deposit over Total Assets Ratio**
Mean	61,276.00	48.23	48,459	48.02	90,485.00	48.72
Standard Deviation	1,24e5	18.28	96,933	17.77	1.6e5	19.38
Min	15.49	1.40	15,492.00	1.41	132.00	6.59
D1	2,337.05	24.60	1,255.70	24.72	4,649.30	24.49
Q1	4,580.14	34.51	3,932.30	35.46	8,237.60	32.73
Median	11,614.85	47.48	9,118.40	47.72	21,210.00	47.15
Q3	46,303.76	61.32	41,256.70	60.07	64,946.22	65.22
D9	204,461.76	73.36	2.63e5	72.57	323,375.00	74.65
Max	1,116,186.86	95.16	9.29e5	94.01	1.11e6	95.17
Number of Observations	2246	2117	1561	1467	685	650

Figure 4.3 : Total deposit over total asset ratio temporal evolution



The Figure 4.3 represents the evolution of the total deposit over total asset ratios by using the mean, the maximum and the minimum. We notice a rather stable effect throughout our sample period. The average evolution of the ratio is very weak and oscillates from 45.6% for the years 2004 to 51% for the year 2013. The maximum of total deposits to total asset ratio is capped to 95.17% for the year 2013. We can also notice a slight increase for this ratio all along our sample period. Due to the large banks selection in our sample, we are confronted to banks which do not hold a significant amount of deposits: the minimum of the total deposit to total asset ratio is in between 1.5% and 16%. We do not observe a significant change around the implementation of Basel II.

The different geographic and time series statistics show the disparity in our sample. Eastern European countries have the tendency to have a higher total deposit ratio over total assets than the rest of the European Union. Finally, even if we will not use this variable in our model, the following figure represents the evolution over time of the total deposits in the percentage of the total assets, in

our sample.

Figure 4.4 : Total deposit over total assets ratio per country

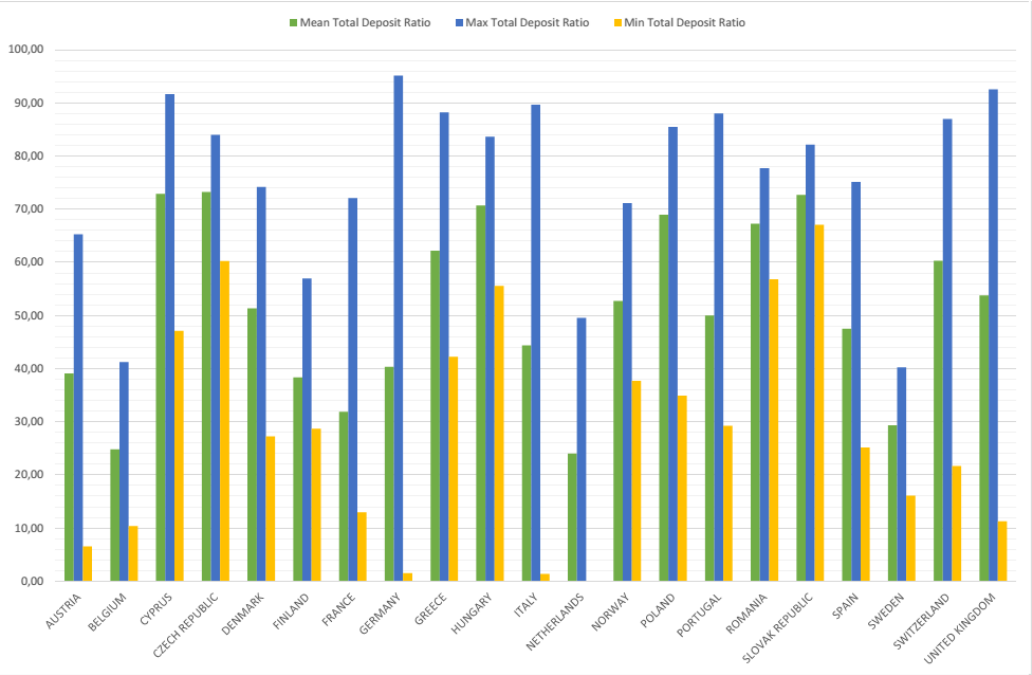
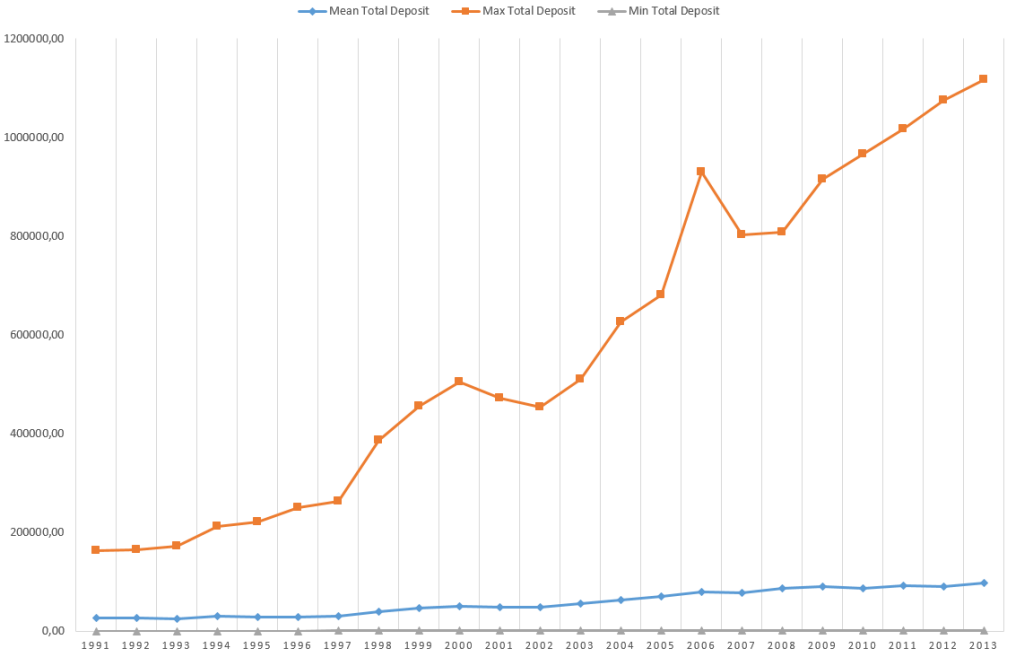


Figure 4.5 : Total deposit evolution overtime



Contrary to the overall stability of the total deposit over total assets, we notice a substantial increase in the amount of deposit across time which is likely to be the consequences of interbank mergers after the subprime crisis and during the European Sovereign debt crisis. The maximum of the total deposit has been skyrocketing since the beginning of the 1990s. The mean total deposit also increase during the same period. To make temporal comparison easier, the above table report the value of the figure 4.5.

4.3.4.2 Disclosure variables

The table 4 shows the statistical analysis for the transparency index we computed. The figure 4 is a graphical representation of the table 4.4. The value of disclosure is a percentage of the selected criteria summed.

The average rate of disclosure is slowly increasing year after year to reach its maximum in 2010, 2011, 2012 and 2013. For the year 2013, we also see the minimum ratio of disclosure reaching its maximum. The different recommendations for an increase in disclosure has gone far enough for financial firms to become more and more transparent. The recommendations after the subprime crisis does not appear to have changed significantly the bottom part of our disclosure ratio. The Basel II implementation does not trigger signification change to disclosure level but contribute to the general increase. As a reminder, Basel II was implemented in January 2006 while the third pillar was introduced in 2009.

The maximum value is somehow an excellent indicator of the decision of disclosure. Concerning the banks that are willing to disclose information even before recommendations and regulation is implemented. The Barclays bank is the most transparent bank during the early years of the sample, the Deutsche Bank, Banco De Sabadell SA and the HSBC are the top 4 banks in terms of disclosure for the early years. The disclosure rank in our set is also to relate to the status of the bank and to the fact that those banks were or are still quoted on the stock market. The stock market regulation concerning disclosure of important financial data has been implemented during the early 90's and it appears rather logical that quoted

banks are in the top rank. The only exception concerns the KBC bank. Most of the banks are publicly quoted and the previous comment is not innocent in a way that even in the end of the 80's the pressure of analysts forces firms, here banks, to disclose information. On the other hand, we have a certain number of banks which are traditionally more opaque such as the Espirito Santo Financial Group S.A. and the Banca Popolare Dell Etruria Del Lazio SCARL. The value is rather volatile and confirms that the variable is discriminant.

When we take a look to the level of disclosure per countries we can observe that the average level of disclosure is mostly in between 50% and up to 80% with a maximum average level of 74% in Ireland.Countries in distressed during the European sovereign debt crisis are among the most transparent countries in Europe during the period. This phenomenon is maybe due to the number of banks in these countries: there is only one bank Irish banks in the sample and it is a public company. It can also be explained by need of information of investors during harder financial time or it could be asked as a counterpart of financial help. In the meantime, countries with a large diversity of banks as of Germany are not ahead even if it has a disclosure tradition.

Figure 4.6 : Disclosure variable over time

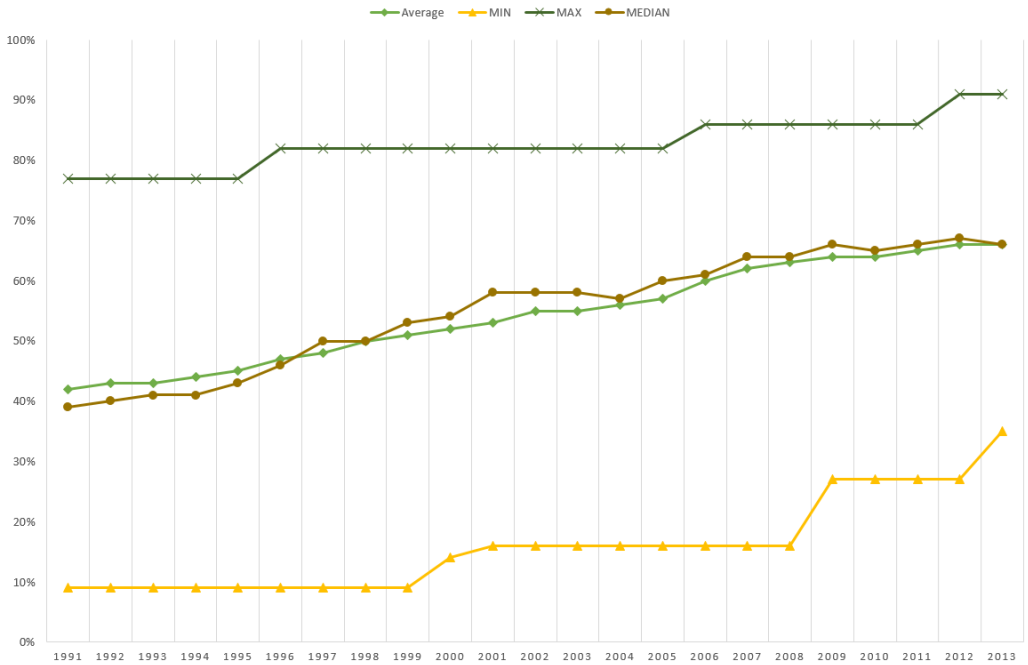
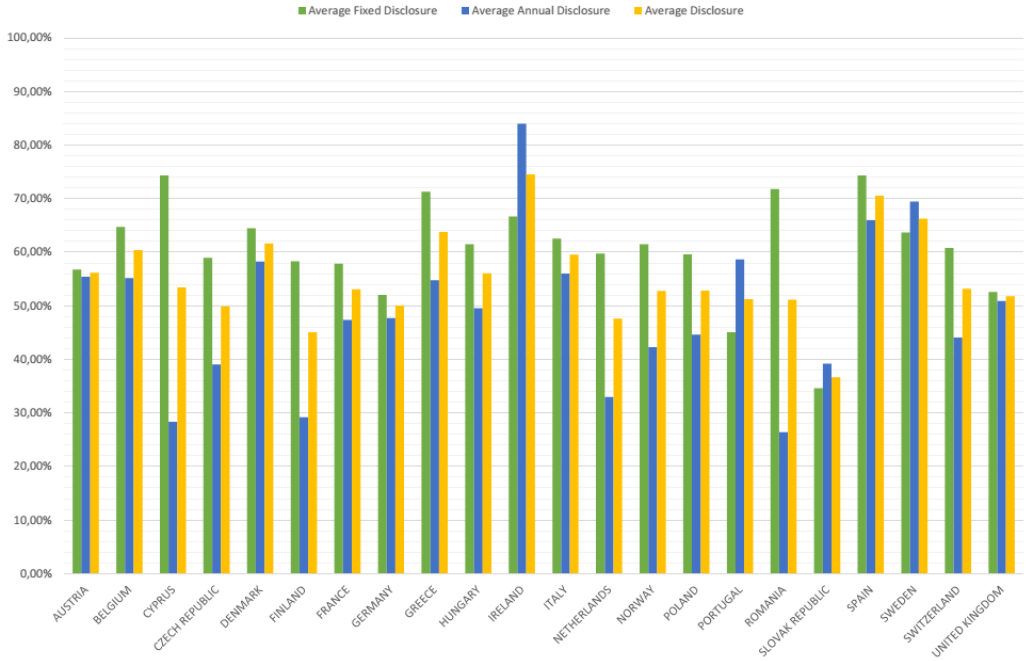


Table 4.4 : Disclosure variable over time

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Mean	42%	43%	43%	44%	45%	47%	48%	50%	51%	52%	53%
Standard Deviation	**15%**	**15%**	**15%**	**15%**	**16%**	**16%**	**17%**	**17%**	**17%**	**17%**	**16%**
Minimum	9%	9%	9%	9%	9%	9%	9%	9%	9%	14%	16%
Maximum	**77%**	**77%**	**77%**	**77%**	**77%**	**82%**	**82%**	**82%**	**82%**	**82%**	**82%**
First Quarter	31%	32%	32%	32%	33%	34%	34%	35%	36%	37%	39%
Median	**39%**	**40%**	**41%**	**41%**	**43%**	**46%**	**50%**	**50%**	**53%**	**54%**	**58%**
Third Quarter	53%	54%	53%	55%	56%	59%	62%	64%	66%	66%	68%
First Decile	**27%**	**27%**	**27%**	**27%**	**27%**	**27%**	**27%**	**27%**	**27%**	**27%**	**29%**
Last Decile	64%	64%	64%	64%	68%	68%	71%	72%	72%	72%	73%

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Mean	55%	55%	56%	57%	60%	62%	63%	64%	64%	65%	66%	66%
Standard Deviation	**16%**	**16%**	**15%**	**15%**	**15%**	**16%**	**15%**	**14%**	**14%**	**14%**	**14%**	**13%**
Minimum	16%	16%	16%	16%	16%	16%	16%	27%	27%	27%	27%	35%
Maximum	**82%**	**82%**	**82%**	**82%**	**86%**	**86%**	**86%**	**86%**	**86%**	**86%**	**91%**	**91%**
First Quarter	42%	41%	45%	47%	50%	50%	53%	55%	55%	56%	58%	58%
Median	**58%**	**58%**	**57%**	**60%**	**61%**	**64%**	**64%**	**66%**	**65%**	**66%**	**67%**	**66%**
Third Quarter	68%	68%	68%	68%	73%	73%	76%	76%	75%	76%	76%	76%
First Decile	**31%**	**31%**	**34%**	**35%**	**35%**	**37%**	**41%**	**43%**	**46%**	**49%**	**49%**	**50%**
Last Decile	73%	73%	73%	73%	77%	81%	81%	82%	80%	80%	82%	82%

Figure 4.7 : Average Disclosure level per country

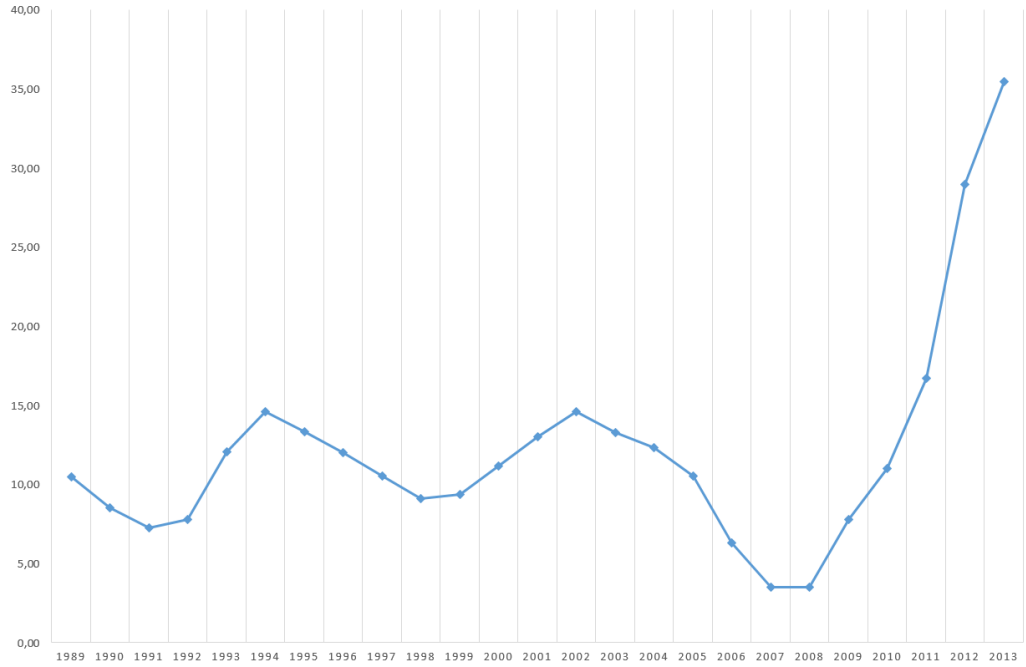


4.3.4.3 Ambiguity variables

The previous subsection showed, respectively, how the evolution of the different deposit over total asset ratios and how the different disclosure rate among the sample are distributed. We are going to provide the same analysis for our different ambiguity variables.

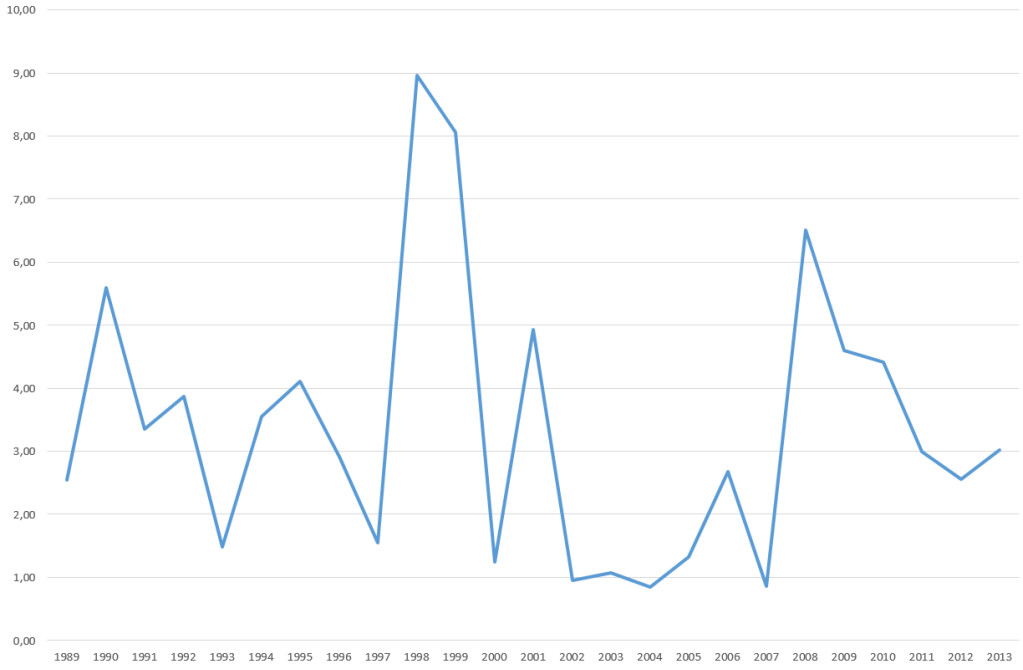
The figure 4.8 shows the yearly fluctuations of ambiguity variables regarding employment. When we take into account only the variance of this variable, the dispersion of the sample has a significant increase since 2007 while the confidence regarding employment was hitting its lowest point in 2007. From 2007 to 2013, the employment situation in Europe has shown a strong increase in the disparity across Europe.

Figure 4.8 : Ambiguity about Employment



The figure 4.9 shows that the ambiguity variable about the production confidence is the most volatile.

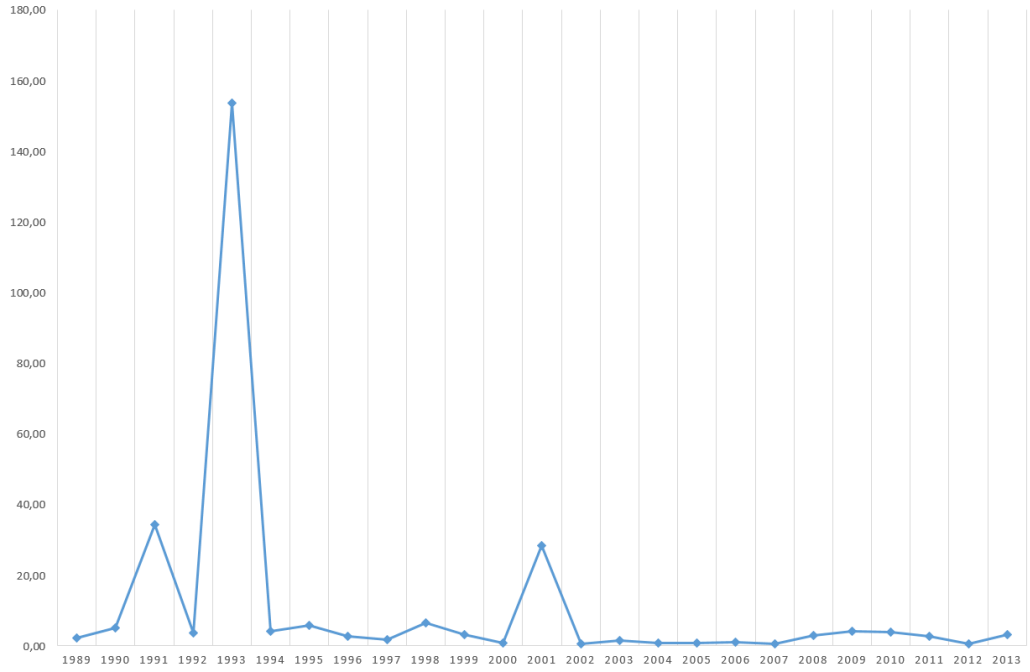
Figure 4.9 : Ambiguity about Production



Countries which suffered from the recent financial crisis are among the top countries where ambiguity concerning employment is the highest: they either have a history of high ambiguity level or the last crisis has left significant scar on the data, as we can see in figure 4.11.

Figure 4.10 show intelligence concerning the economic climate confidence variable. We expected that the variable would peak at the neighborhood financial and economic crisis. 1993 represent the year where ambiguity concerning the confidence in the economic climate is the strongest. It can be explained by the signature timing of the Maastricht Treaty: the economical possibility of the treaty are various but the economic environment within Europe were various at the time. It can also be explained by the 1993 economic crisis. The NTIC crisis of 2001 also raises the ambiguity level in Europe on the economic climate confidence level.

Figure 4.10 : Ambiguity about the Economic Climate



Concerning the economic climate ambiguity variable, the same reasoning is only applicable for Cyprus while Eastern European countries complete the list of countries with the highest level of economical ambiguity as we can see in figure 12.

Figure 4.11 : Ambiguity about Employment per country

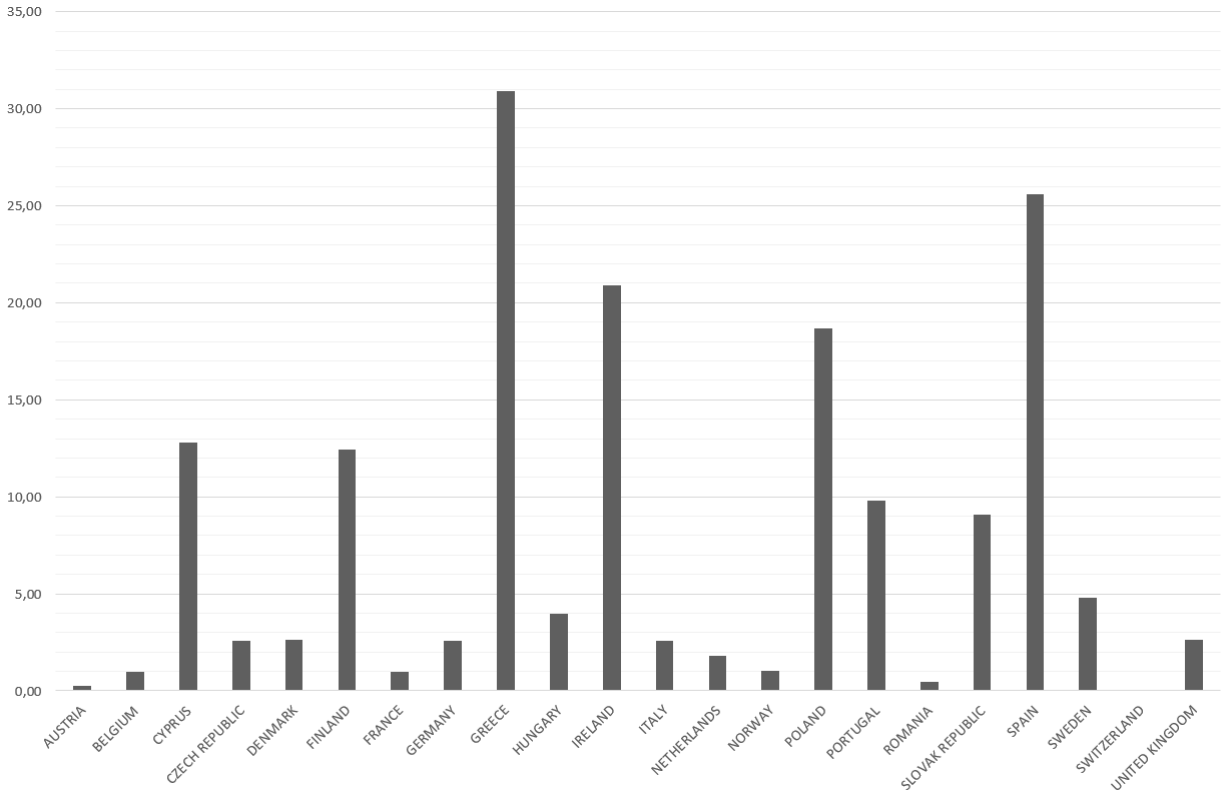


Figure 4.12 : Ambiguity about Production per country

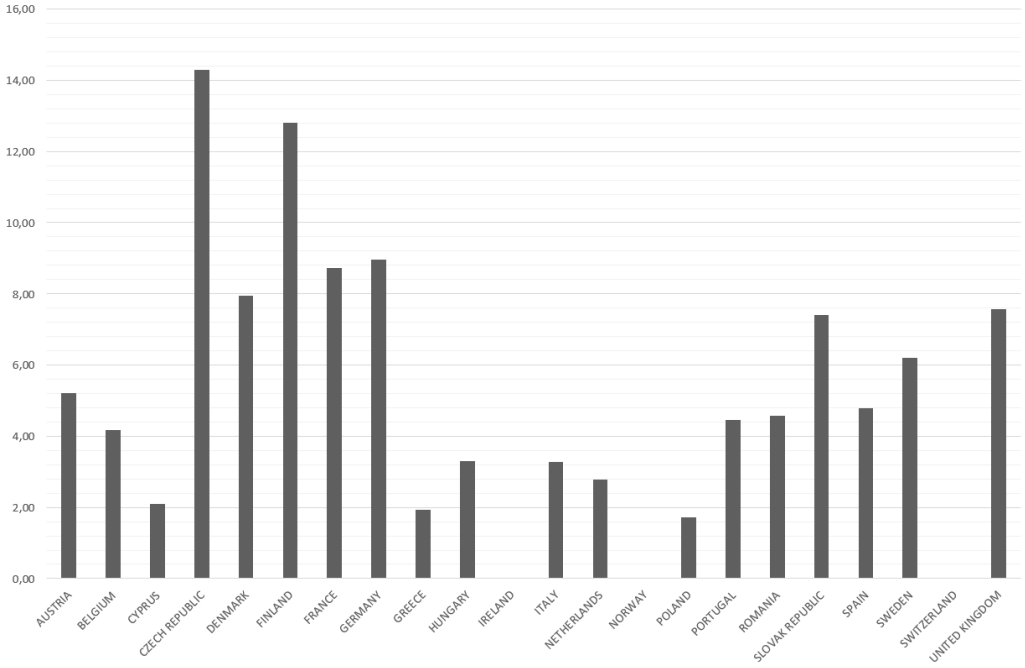
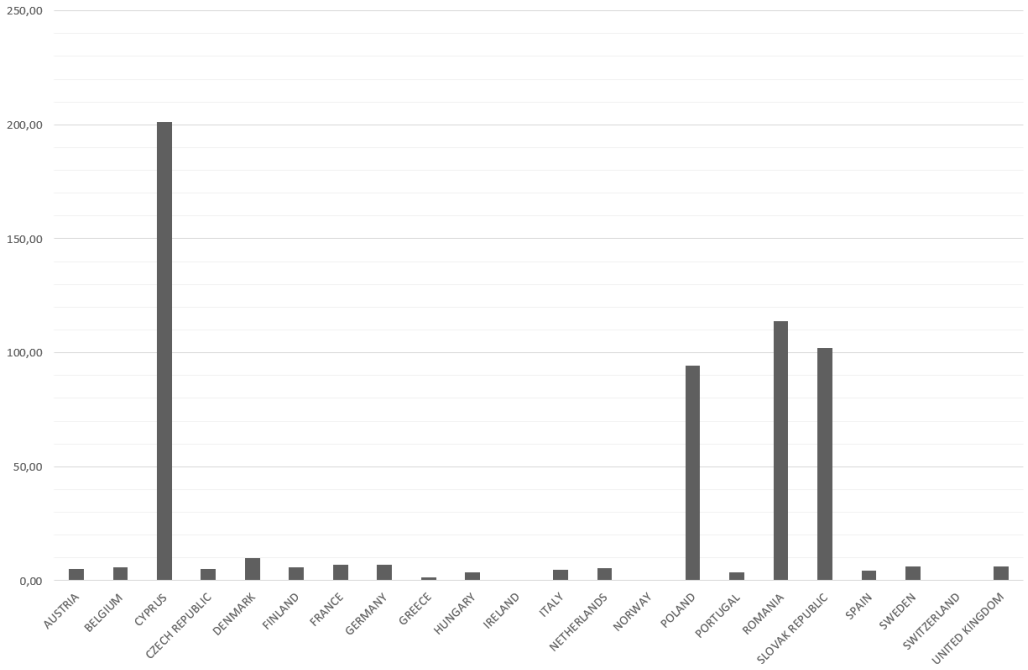


Figure 4.13 : Ambiguity about Economic Climat per country



4.3.4.4 Bank risk statistical analysis

4.3.4.4.1 Volatility Index

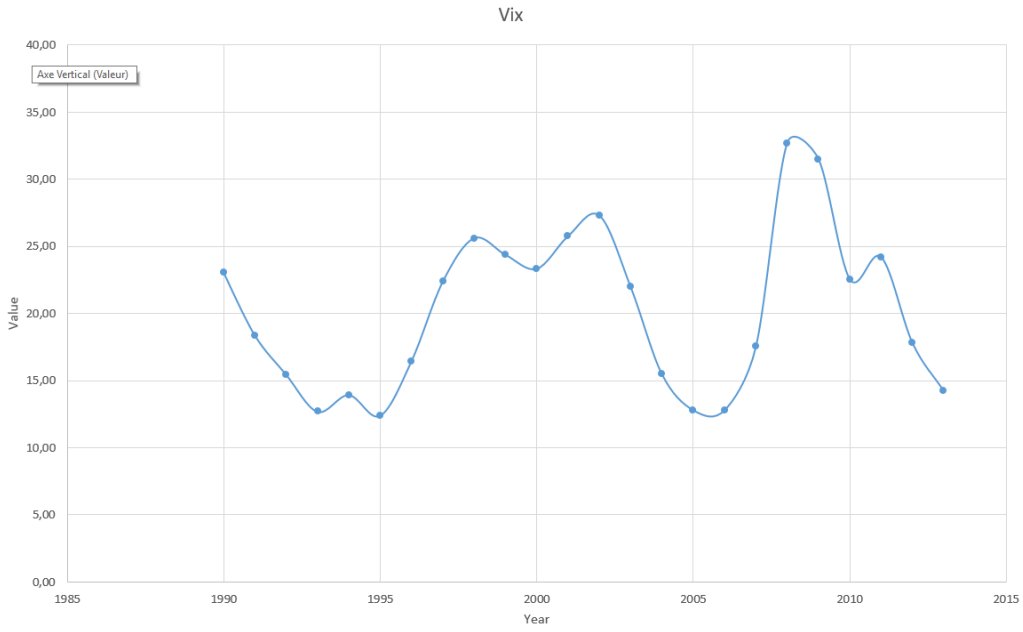
As control variables, we use different variables such as macroeconomic volatility, geographic variables and prudential variable. The macroeconomic volatility is here controlled by the trademarked ticker CBOE Volatility Index (ViX) part of the S&P 500. The ViX represents one measure of the market's expectation of stock market volatility over the next 30-day period. Since we are using yearly data we averaged it for the period, the volatility is less than if we would use a daily date. The table 5 show details about the ViX variable.

The figure 4.14 and table 4.5 shows the evolution of the ViX variable across the sample period. As if we would have used the daily quotations, we obtained for 2008 the highest value for the ViX variable at the surroundings of the subprime crisis. We expect this variable to have a negative impact onto deposit levels.

Table 4.5 : Vix Statistics

Statistics	**ViX**
Mean	20.19
Standard Deviation	34.79
Minimum	12.39
Maximum	32.69
First Decile	12.81
First Quarter	15.15
Median	21.98
Third Quarter	24.24
Last Decile	27.29

Figure 4.14 : ViX evolution



4.3.4.4.2 Long Term Debt and Tier 1 Capital Ratio

We use two prudential variables at a bank individual level such as a the long-term debt and the tier 1 capital ratio in order to test hypothesis 3. The long-term debt

variable consists of loans and financial obligations lasting over one year. Company with too much long-term debt will find it hard to pay off these debts and continue to thrive, as much of their capital is devoted to interest payments. This variable has two potential effects: first it can negatively affect the attractiveness of the bank because of the thrive expressed above. The second effect expected is therefore positive in case of a bank "too big to fail." We use data expressed in million Euros.

While being more financed by the financial market, market discipline can exert governance power throughout another branch of disclosure. It represents the ratio between core equity capital and total risk-weighted assets. The tier 1 capital ratio variable is also used in the analysis but allow us to control for better capitalized banks. It also measures the risk of the bank, H4. We expect the sign of the coefficient to be positive. Most capitalized banks are supposedly more attractive to the eyes of depositors because they can provide more safety cushions to depositors in case of financial disturbances.

Table 4.6 : Statistical analysis of Tier 1 Capital Ratio variable and Long Term debt variable

Statistics	**Tier 1 Capital Ratio**	**Long Term Debt in million Euros**
Mean	11.3%	21,335.80
Standard Deviation	**6.7**	**46,445.72**
Minimum	0.6%	0.02
Maximum	**126.1%**	**383,756.56**
First Decile	6.5%	166.98
First Quarter	**7.7%**	**1,076.37**
Median	10.0%	3,311.87
Third Quarter	**13.2%**	**17,515.18**
Last Decile	17.0%	58,686.51

The results above confirm the diversity of our sample in terms of the type of

banks. The bank with the largest long-term debt is UniCredit S.p.A. for the year 2004. While having a closer look to the highest long-term debt , we see that UniCredit S.p.A. is the bank with the historically highest level of long-term debt. While continuing the analysis, we also observe the biggest banks, in terms of total assets, in the sample are also the ones with the highest level of long-term debt. This result is not surprising and tends to emphasize the concept of too big to fail. In the meantime, the minimum of the long-term debt variable is ING Bank Slaski S.A. for the year 2004.

Concerning the Tier 1 Capital Ratio (T1CR), which is used by the regulator to grade firm's capital adequacy, the results are slightly different. If we have a look to the average, we can see a significant majority of our sample can be qualified of "well capitalized" with an average T1CR of 11.3%. As a reminder, a firm is qualified of "well capitalized" when its T1CR is above 6% and does not pay any dividends or distributions that would affect its capital. The lowest T1CR is Bank of Cyprus Public Co. Ltd. for the year 2009, while the maximum is Virgin Money Holdings UK PLC for the year 2008.

4.3.4.4.3 Treasury Bonds, Mandatory reserves, Eurozone and In crisis countries

A treasury bond is a marketable, fixed-interest government debt security with a maturity of more than 10 years. We use this variable as theoretical counterpart of depositors. In the theoretical literature (Gorton 1985 for e.g.) and in chapter 3, a risk-free asset is used as the arbitrage choice proposed to depositors: they have the choice to either deposit in a bank or to invest in a risk-free asset. The theoretical framework of those models are in, our opinions, difficult to be done in real conditions. Therefore, we use this variable as an indicator of the solvability of governments and their abilities to bail banks out. In addition to this statement, banks are usually the largest holder of local government debt. If the interest rate and the risk of the asset increase, the risk of the bank will also rise. We expect this variable to have a negative impact onto total deposits. The variable long term,

in our analysis, Treasury bond rate has a maturity of 10 years the following table shows its variation per year and per countries:

Table 4.7 : Long term Treasury Bond Rate Annual mean in percentage

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
AUSTRIA	7,15	8,77	8,56	7,37	6,7	7,03	7,14	6,32	5,68	4,71	4,68	5,56	5,08
BELGIUM	8,66	10,01	9,29	8,65	7,23	7,75	7,48	6,49	5,75	4,75	4,75	5,59	5,13
CYPRUS													7,62
CZECH													6,31
REPUBLIC													
DENMARK	9,7	10,63	9,27	8,99	7,3	7,83	8,27	7,19	6,25	4,94	4,91	5,64	5,08
FINLAND	12,09	13,3	11,23	11,98	8,83	9,04	8,79	7,08	5,96	4,79	4,72	5,48	5,04
FRANCE	8,79	9,94	9,05	8,59	6,78	7,22	7,54	6,31	5,58	4,64	4,61	5,39	4,94
GERMANY	7,35	8,73	8,45	7,84	6,51	6,87	6,85	6,22	5,64	4,57	4,49	5,26	4,8
HUNGARY													7,95
ITALY	12,79	13,54	13,17	13,28	11,19	10,52	12,21	9,4	6,86	4,88	4,73	5,58	5,19
NETHER-	7,21	8,92	8,74	8,1	6,36	6,86	6,9	6,15	5,58	4,63	4,63	5,4	4,96
LANDS													
POLAND													10,68
ROMANIA													
SLOVAK													8,04
REPUBLIC													
SWEDEN	11,18	13,15	10,7	10,03	8,57	9,7	10,24	8,03	6,62	4,99	4,98	5,37	5,11
UNITED	10,19	11,8	10,11	9,06	7,55	8,15	8,32	7,94	7,13	5,6	5,01	5,33	5,01
KINGDOM													
Total	9,69	10,93	10,13	9,65	7,99	8,20	8,74	7,36	6,19	4,85	4,71	5,43	5,59

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
AUSTRIA	4,96	4,14	4,13	3,39	3,8	4,3	4,36	3,94	3,23	3,32	2,37	2,01	5,15
BELGIUM	4,99	4,18	4,15	3,43	3,81	4,33	4,42	3,9	3,46	4,23	3	2,41	5,51
CYPRUS	5,7	4,74	5,8	5,16	4,13	4,48	4,6	4,6	4,6	5,79	7	6,5	5,44
CZECH REPUBLIC	4,88	4,12	4,82	3,54	3,8	4,3	4,63	4,84	3,88	3,71	2,78	2,11	4,13
DENMARK	5,06	4,31	4,3	3,4	3,81	4,29	4,28	3,59	2,93	2,73	1,4	1,75	5,51
FINLAND	4,98	4,13	4,11	3,35	3,78	4,29	4,29	3,74	3,01	3,01	1,89	1,86	6,03
FRANCE	4,86	4,13	4,1	3,41	3,8	4,3	4,23	3,65	3,12	3,32	2,54	2,2	5,32
GERMANY	4,78	4,07	4,04	3,35	3,76	4,22	3,98	3,22	2,74	2,61	1,5	1,57	4,94
HUNGARY	7,09	6,82	8,19	6,6	7,12	6,74	8,24	9,12	7,28	7,63	7,89	5,92	7,43
ITALY	5,03	4,25	4,26	3,56	4,05	4,49	4,68	4,31	4,04	5,42	5,49	4,32	7,09
NETHER-LANDS	4,89	4,12	4,1	3,37	3,78	4,29	4,23	3,69	2,99	2,99	1,93	1,96	5,07
POLAND	7,36	5,78	6,9	5,22	5,23	5,48	6,07	6,12	5,78	5,96	5	4,03	6,12
ROMANIA					7,23	7,13	7,7	9,69	7,34	7,29	6,68	5,41	7,31
SLOVAK REPUBLIC	6,94	4,99	5,03	3,52	4,41	4,49	4,72	4,71	3,87	4,45	4,55	3,19	4,84
SWEDEN	5,3	4,64	4,42	3,38	3,7	4,17	3,89	3,25	2,89	2,61	1,59	2,12	6,03
UNITED KINGDOM	4,91	4,58	4,93	4,46	4,37	5,06	4,5	3,36	3,36	2,87	1,74	2,03	5,89
Total	5,17	4,40	4,56	3,75	4,10	4,56	4,57	4,08	3,62	3,89	3,16	2,75	5,77

The above table is summed up in a chart in figure 4.15. We can observe a reduction in the treasury bond rate for every member country during the sample period. At the surroundings of the economic and financial crisis, we observe a general and slight increase followed by a general decrease.

Figure 4.15 : Long term Treasury Bond Rate Annual mean

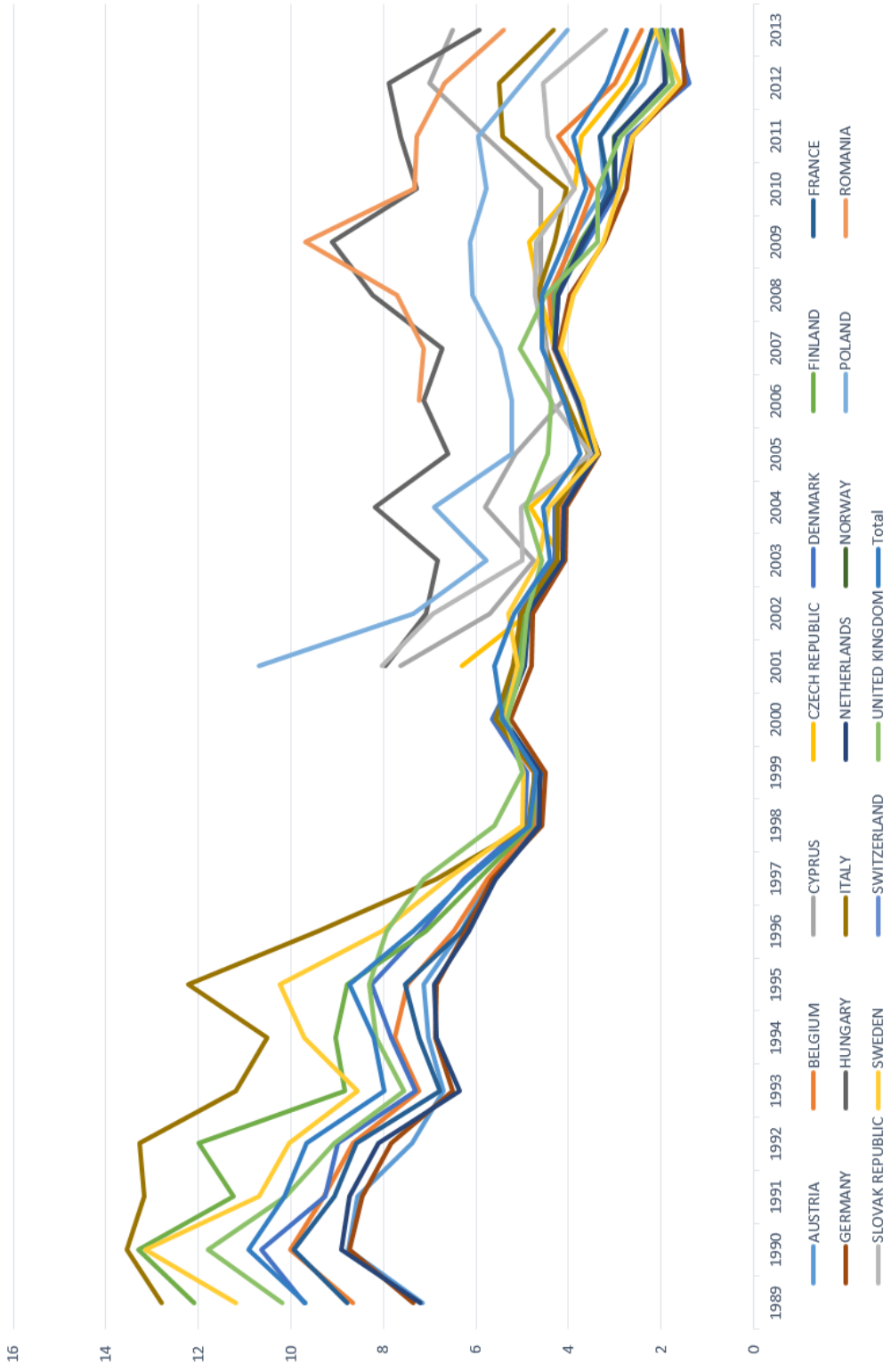


Table 4.10 : Summary of the mandatory reserve variable

Mandatory reserves	Repartition among dataset
0%	49%
1%	5%
2%	28%
Above 2%	18%

Another prudential variable we use is a macroprudential variable: mandatory reserve. The variable allows us to control for countries where mandatory reserves are implemented. The variable takes the value 0 if no mandatory reserves are implemented in the country, and takes the percentage value if present. Countries which signed the European Monetary System (E.M.S.) arrangement must hold 1% of total deposits as a mandatory reserve deposit at the ECB. This rate has been decreasing since its implementation, passing from 2%, in 1999, to 1% since January 18th 2012. Some countries do not have any mandatory reserves which is the case of the UK, Norway or Sweden. For data before 1999, we research the value in percentages for each country at this time. We expect this variable to have a positive impact onto deposit amounts because it acts as a guarantee and can delay the problematic of first come first serve in case of panic run.

The case of mandatory reserve shows that banks within the Eurozone have to cover 1% of total deposits in reserve since 2012, previously up to 2% from 1999 till 2012. Switzerland imposes a 2.5% mandatory reserve rate. Poland has a 10% mandatory reserve rate since 2011 but none before. Countries like United Kingdom, Sweden, or Norway do not impose mandatory reserve.

We use two geographic dummies to control for the affiliations to the Eurozone and countries which suffered from the European Sovereign debt crisis of 2010. The last control we use is to control for systemic banks. To do so we extracted dates from 2015 update of list of global systemically important banks (G-SIBs)[7] from the Financial Stability Board. In our sample, among the 117 banks, we have 10

[7]http://www.fsb.org/wp-content/uploads/2015-update-of-list-of-global-systemically-important-banks-G-SIBs.pdf

financial institutions which are considered as systemic.

Table 4.11 : List of systemic banks and total assets

Banks	**Total Assets for the year 2013 (in million Euros)**
Barclays PLC	1,749,774.64
BNP Paribas SA	2,077,759.00
BPCE SA	1,223,298.00
Credit Agricole	1,589,044.00
Deutsche Bank Aktiengesellschaft	1,718,872.00
HSBC Holdings plc	2,176,884.29
Royal Bank of Scotland Group plc	1,353,995.38
Societe Generale S.A.	1,308,138.00
UBS Group AG	883,655.88
UniCredit S.p.A.	844,217.39

We expect the sign of the coefficient for this variable to be positive because of their status of "too big to fail". The following table sums up the different expected signs we are expecting in this analysis.

Table 4.12 : Summary of variables used

Variables	Expected Sign of coefficient	Status
Disclosure level	Positive	H1
Ambiguity about Econcomic Climat	Negative	H2
Ambiguity about Production expected Levels	Negative	H2
Ambiguity about Employment	Negative	H2
Deposit Remuneration	Positive	H4
Long Term Debt	Negative	H3
Tier 1 Capital Ratio	Positive	H3
Long Term Treasury Bond Rate	Negative	H5
Mandatory Reserves	Positive	H3
Systemic Banks	Positive	Control
Eurozone	-	Control
In Crisis Countries (ICC)	-	Control
ViX	Positive	Control

4.4 Results

The following section presents the different results of the regressions. We start the analysis with a benchmark situation to test for the hypothesis which concerns interest rates. We, then, introduce disclosure in the model and ambiguity.

4.4.1 Benchmark

In the benchmark situation, we investigate only the statistical significance of the deposit remuneration on the overall period without taking into account the disclosure of banks in the regression. The benchmark situation allows us to test the sensitivity of depositors to deposit remuneration. As mentioned previously mentioned, we expect deposit remuneration to be a factor of attractiveness for banks. We also control for banking activities, prudential measures and therefore regulatory environment: the long-term debt, the Tier 1 capital ratio, the treasury

bond rate, the percentage of mandatory reserves, the eurozone member variable and finally the variable measuring the fact that some banks can be systemic. In order to control for macroeconomic instability, we use the ViX index.

Table 4.13 : Total Deposit over Total Assets Benchmark

This table provides results about the mean of total deposit over total assets change. 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.

Variables	**Overall Period**	**1989-2005**	**2006-2013**
const	40.21***	38.23***	40.91***
	(7.16)	(6.22)	(5.72)
Deposit Remuneration	-123.25***	-97.50***	-233.79***
	(-8.79)	(-10.04)	(-6.39)
Long Term Debt	-6.94E-05***	-6.29e-05***	-7.22e-05***
	(-8.50)	(-5.18)	(-5.96)
Tier 1 Capital Ratio	0.55	1.12***	0.41
	(1.47)	(5.44)	(0.94)
Long term Treasury Bond rate	0.90**	-0.16	1.27***
	(2.35)	(-0.21)	(2.83)
Mandatory Reserve	5.61	-55.73	9.16
	(0.07)	(-0.50)	(0.07)
Systemic Bank	-1.57	-0.36	-3.30
	(-1.44)	(-0.24)	(-1.57)
Eurozone	-0.53	-2.04	1.51
	(-0.42)	(-1.20)	(0.78)
ICC	5.62***	6.36***	5.46***
	(5.31)	(3.26)	(3.21)
ViX	-0.04	0.10	-0.04
	(-0.40)	(0.67)	(-0.37)
p-value	2.89e-22	8.86e-22	9.84e-22
R^2	0.224	0.283	0.217
Adjusted R^2	0.215	0.267	0.199
F(9, 82)	29.70	30.53	27.22
Number of Observations	819	418	401

The first result of this regression indicates that interest remuneration on deposits has a negative and significant impact on the amount of total deposit for the overall period and the each sub period. A 1% increase in the interest rate devoted

to deposit reduce the total deposit ratio by 123%. This relation is interested in a sense that depositors do monitor the amount of interest on their deposit even when it has a negative relationship with the total deposit ratio. This negative relationship translate the feeling that depositors expect banks to pay more interest on deposits when they need to attract depositors. If they need to pay interest to attract deposits, depositors feel that the health of the banks can be unsure. Waldo (1985) showed similar result explaining the rise in short-term interest rates during bank runs.

Concerning the rest of the variables, we notice that the long-term debt variable have a negative and significant relationship with the long-term debt. We had no expectation concerning this variable due to the versatility of the variable itself. The relationship between deposit levels and long-term debt is negative and significant. Banks with the highest amount of long-term debt are listed banks and most of their debts are marketed debts. In the meantime, quoted banks are considered by depositors to generate a better governance because of market implication in terms of regulation. The market discipline for those banks should be an efficient way to control banks' risk but seems to generate the fear of "too big to fail" behavior and the moral hazard of such situation. Contrary to expectations, the relationship between deposit and treasury bond rate is positive and significant. Theoretical literature (Cordella and Yeyati, 1998 or Chen, 1999, for e.g.) usually confront the decision of deposits with an arbitrage between a risk-free asset and a deposit contract with remuneration. Here when the interest rate of the "risk-free" asset increase, the amount of total deposit rises.

Countries which suffered from the recent financial crisis have banks which collect on average more deposits per unit of total assets. Mandatory reserves do not seem to significantly trigger any deposit movement and confirm the actions made by several central banks to reduce or to suppress them. In the meantime, we notice that systemic banks do not attract significantly more or less depositors than non-systemic banks. The macroeconomic situation does not seem to modify deposit behavior.

4.4.2 Disclosure

In this section we are going to introduce the variable of disclosure in our regression.

Table 4.14 : Total Deposit over Total Assets and Disclosure
This table provides results about the mean of total deposit over total assets change. 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.

Variables	**Overall Period**	**1989-2005**	**2006-2013**
const	47.89***	52.03***	45.34***
	(6.82)	(4.69)	(5.08)
Disclosure Level	-11.72**	-17.94*	-7.43
	(-2.19)	(-1.98)	(-0.89)
Deposit Remuneration	-139.51***	-121.14***	-241.72***
	(-8.86)	(-5.05)	(-6.322)
Long Term Debt	-6.42e-05***	-5.90e-05***	-6.77e-05***
	(-8.94)	(-5.05)	(-6.04)
Tier 1 Capital Ratio	0.54	1.10	0.39
	(1.42)	(4.98)	(0.91)
Long term Treasury Bond rate	0.90**	-0.31	1.29***
	(2.29)	(-0.39)	(2.85)
Mandatory Reserve	5.06	-94.09	22.22
	(0.07)	(-0.88)	(0.17)
Systemic Bank	-0.98	1.06	-3.15
	(-0.27)	(0.63)	(-1.46)
Eurozone	-0.26	-1.83	1.83
	(-0.21)	(-1.16)	(0.94)
ICC	6.49***	7.50***	6.08***
	(5.56)	(3.68)	(3.32)
ViX	-0.05	0.05	-0.04
	(-0.45)	(0.33)	(-0.36)
p-value	2.16e-22	9.20e-23	4.82e-21
R^2	0.231	0.300	0.219
Adjusted R^2	0.221	0.282	0.199
F(9, 82)	27.92	30.75	24.09
Number of Observations	819	418	401

The result of this last regression indicates that disclosure has a negative impact on the relationship with total deposits. The effect of disclosure is diminishing over

time and does not appear to be statistically significant after the introduction of Basel II. This finding is unexpected but the increase of the disclosure in every bank across time and the reduction of the dispersion in the disclosure levels during this sub period, can explain this result. The overall stability between depositors and the remuneration of their deposit is still negative and significant translating the feeling that, even in presence of disclosure, depositors are less attracted to banks which offer higher interest rates onto deposits. The coefficient concerning the treasury bond rate denies the majority of the theoretical literature where depositors make an arbitrage between depositing in a risk-free asset and depositing in a bank with a financial compensation: the stability and negative sign of the treasury bond confirm this statement.

4.4.3 Ambiguity and disclosure

The benchmark situation proposes very interesting results which confirms the remuneration and disclosure on depositors reaction. In this subsection, and as key components of this chapter, we will be introducing the notion of ambiguity in between the relationship amount of deposits and disclosure. As a measure of ambiguity here, we used the ambiguity about employment with the method explained in the earlier sections.

4.4.3.1 Ambiguity about employment

Table 4.15 shows the results obtained when we regress the total deposit ratio with both disclosure and ambiguity. Disclosure is negatively significantly correlated to the amount of total deposits as in the benchmark situation. The results here confirm the results expressed above where the most transparent banks are not able to have the higher amount of total deposit and confirms the different impact of disclosure onto deposits. Concerning the employment ambiguity variables, it is not significant. As in the benchmark situation, and as in every other regression, depositors worship banks with the highest level of deposit remuneration: the coefficient for deposit remuneration to total deposit ratio is also significantly positive. Meanwhile, the systemic bank variable is still having a positive impact on the amount of

total deposit. The spread between the individual remuneration of deposits and the long-term treasury bond rate is in this situation, as in the benchmark, positively significative. The result confirms the third hypothesis where, depositors monitor the amount of remuneration of their deposits but modify their deposit behavior negatively.

Table 4.15 : Total Deposit over Total Assets, Disclosure and Ambiguity: employment

This table provides results about the mean of total deposit over total assets change. 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.

Variables	**Overall Period Coefficient**	**1989-2005 Coefficient**	**2006-2013 Coefficient**
const	47.11***	50.65***	45.56***
	(6.11)	(4.47)	(4.69)
Disclosure Level	-12.07***	-19.12***	-7.42
	(-2.25)	(-2.16)	(-0.88)
Ambiguity about Employment	0.06	0.78	-0.51
	(0.13)	(1.27)	(-0.09)
Deposit Remuneration	-137.42***	-117.10***	-241.34***
	(-8.67)	(-6.97)	(-6.22)
Long Term Debt	-6.34e-05***	-5.77e-05***	-6.77e-05***
	(-8.84)	(-4.87)	(-5.99)
Tier 1 Capital Ratio	0.54	1.15***	0.39
	(1.39)	(5.157	(0.90)
Long term Treasury Bond rate	1.19**	0.35	1.27**
	(2.36)	(0.29)	(2.31)
Mandatory Reserve	-3.44	-96.63	22.37
	(-0.05)	(-0.92)	(0.17)
Systemic Bank	-1.14	0.55	-3.15
	(-1.00)	(0.32)	(-1.46)
Eurozone	-0.17	-1.61	1.83
	(-0.14)	(-1.00)	(0.95)
ICC	6.28	6.36**	6.04***
	(5.39)	(2.59)	(3.41)
ViX	-0.06	-0.05	-0.05
	(-0.58)	(-0.26)	(-0.39)
p-value	1.97e-21	1.01e-22	1.43e-20
R^2	0.233	0.307	0.219
Adjusted R^2	0.222	0.288	0.197
F(11, 87)	25.749	30.827	21.846
Number of Observations	814	413	401

4.4.3.2 Ambiguity about production

Table 4.16 : Total Deposit over Total Assets, Disclosure and Ambiguity: production

This table provides results about the mean of total deposit over total assets change. 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.

Variables	**Overall Period Coefficient**	**1989-2005 Coefficient**	**2006-2013 Coefficient**
const	46.90***	44.94***	45.38***
	(6.70)	(4.05)	(5.09)
Disclosure Level	-12.16**	-18.84**	-8.06
	(-2.23)	(-2.13)	(-0.95)
Ambiguity about Production	-0.14	0.17	-0.30
	(-0.58)	(0.53)	(-0.57)
Deposit Remuneration	-137.17***	-118.39***	-238.04***
	(-8.91)	(-7.24)	(-6.00)
Long Term Debt	-6.31e-05***	-5.68e-05***	-6.76e-05***
	(-8.86)	(-4.83)	(-6.07)
Tier 1 Capital Ratio	0.55	1.14***	0.40
	(1.42)	(5.15)	(0.92)
Long term Treasury Bond rate	1.41***	2.24*	1.20***
	(2.75)	(1.90)	(2.64)
Mandatory Reserve	-24.41	-43.37	8.18
	(-0.34)	(-0.38)	(0.06)
Systemic Bank	-1.14	0.57	-2.92
	(-1.01)	(0.35)	(-1.32)
Eurozone	-0.064	-1.54	1.89
	(-0.05)	(-0.97)	(0.97)
ICC	5.92***	7.39***	5.82***
	(5.06)	(3.72)	(2.93)
ViX	-0.05	-0.23	0.06
	(-0.32)	(-1.18)	(0.29)
p-value	7.13e-22	1.56e-22	1.06e-20
R^2	0.237	0.314	0.221
Adjusted R^2	0.227	0.295	0.198
F(9, 82)	26.653	30.806	22.059
Number of Observations	813	412	401

In the table 15, disclosure has a significantly negative impact on the amount of the total deposit ratio over total assets. The results are stable by comparison to the benchmark, when we introduce the variable of ambiguity upon production in our regression. The stability of the result obtained in the benchmark concerning systemic banks do not allow us to confirm the attractiveness of systemic banks. The result is also stable for the tier 1 capital ratio variables by comparison to the benchmark situation when we introduce the notion of ambiguity in our regression. Ambiguity of the production is not impacting significantly the level of deposit. The result does not confirm the original assumption where the more ambiguous the situation, the more likely deposits would increase to face emergency situations. The mandatory reserve variable is not significant as well in presence of production ambiguity.

4.4.3.3 Ambiguity about macroeconomic climate

Table 4.17 : Total Deposit over Total Assets, Disclosure and Ambiguity about macroeconomic climat

This table provides results about the mean of total deposit over total assets change. 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.

Variables	**Overall Period Coefficient**	**1989-2005 Coefficient**	**2006-2013 Coefficient**
const	47.41***	52.04***	44.56***
	(6.73)	(4.68)	(5.05)
Disclosure Level	-11.52**	-17.94*	-8.32
	(-2.14)	(-1.98)	(-1.00)
Ambiguity about economic climate	-0.42	-0.008	-0.64
	(-1.48)	(-0.03)	(1.08)
Deposit Remuneration	-140.28***	-121.15***	-236.15***
	(-9.067)	(-7.21)	(-6.00)
Long Term Debt	-6.36e-05***	-5.90e-05***	-6.67e-05***
	(-8.87)	(-4.98)	(-5.94)
Tier 1 Capital Ratio	0.56	1.11	0.40
	(1.44)	(4.98)	(0.93)
Long term Treasury Bond rate	0.80**	-0.31	1.18**
	(2.02)	(-0.39)	(2.57)
Mandatory Reserve	-1.55	-94.11	2.76
	(-0.02)	(-0.88)	(0.02)
Systemic Bank	-1.16	1.06	-3.07
	(-0.98)	(0.63)	(-1.41)
Eurozone	-0.28	-1.83	1.99
	(-0.23)	(-1.15)	(1.02)
ICC	6.04***	7.49***	5.38**
	(5.18)	(3.58)	(2.58)
ViX	0.07	0.05	0.17
	(0.45)	(0.31)	(0.72)
p-value	2.33e-22	1.83e-23	1.06e-20
R^2	0.233	0.300	0.223
Adjusted R^2	0.223	0.281	0.201
F(9, 82)	26.162	30.502	22.057
Number of Observations	819	418	401

When we introduce the notion of ambiguity concerning the economic climate, the effect of disclosure is still negatively correlated to the amount of total deposit ratio for the period we analyze. These results are important because ambiguity does not alter the effect of disclosure onto governance of depositors as comparison to the benchmark situation in section 4.2.

Concerning the ambiguity about the economic climate, it appears that it does not significantly have an impact on the total deposit. As in the benchmark situation, the results are stable concerning the regulatory variables and treasury bond. The results for those two variables are stable with the benchmark and are not consistent with the expected signs and hypotheses (H4), where the variable should affect negatively the amount of deposits concerning the treasury bond and positively for the Tier 1 Capital ratio. Sounder banks should be more attractive for depositors than riskier banks. Lastly, and similarly to the benchmark situation, we have no significant impact of mandatory reserves on the amount of total deposit even in presence of ambiguity. The stability of this result tends to show that mandatory reserves to cover deposits are not a solid measure to attract depositors, due to national and supranational effect, but do translate a lack of interest in the eyes of depositors. Concerning the significative of systemic banks variables, it still does not appear significant.

4.4.3.4 Compilation of ambiguity

We computed another ambiguity variable which take into account the state of the macroeconomic situation and each ambiguity sub variable expressed squared to emphasize the difference between each value.

$$Ambiguity = [\, ViX * \sum (ambiguity\,about\,employment + ambiguity\,about\,production + ambiguity\,about\,economic\,climat)^2 \,]$$

Table 4.18 shows that the results obtained in all previous regression are stable even when we introduce the variable of ambiguity. When we compute the ambigu-

ity variable composed of a volatility index and from other ambiguity sub variables, we observe a negative and significant relationship between the amount of deposit. In other words, when we emphasize the ambiguity during a "difficult economic situation" we observe a reduction of total deposits in banks. This result confirms the second hypothesis was ambiguous economic situation tend to see a decline of total deposits in banks. The use of the volatility index allow us to introduce a variable translating the general instability of the financial market. The combination of both the volatility index and the sum of ambiguity variables.

In the meantime, and due to the overall stability of our results, we refute the first and third hypothesis where disclosure has a negative impact onto the amount of total deposit, while the compensation of deposits as also a negative impact onto deposit behavior.

Table 4.18 : Total Deposit over Total Assets, Disclosure and Ambiguity
This table provides results about the mean of total deposit over total assets change. 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.

Variables	**Overall Period**	**1989-2005**	**2006-2013**
const	45.02***	45.82***	42.43***
	(6.32)	(4.07)	(4.95)
Disclosure Level	-12.26**	-18.87**	-9.22
	(-2.29)	(-2.13)	(-1.12)
Ambiguity	-1.20e-05**	5.19e-06	-1.57e-05**
	(-2.21)	(0.47)	(-2.05)
Deposit Remuneration	-137.85***	-118.04***	-227.93***
	(-9.17)	(-7.24)	(-5.57)
Long Term Debt	-6.23e-05***	-5.67e-05***	-6.71e-05***
	(-8.78)	(-4.77)	(-5.86)
Tier 1 Capital Ratio	0.56	1.14	0.40
	(1.51)	(5.14)	(0.95)
Long term Treasury Bond rate	1.22**	2.16*	1.16**
	(2.46)	(1.77)	(2.53)
Mandatory Reserve	-25.55	-54.05	-6.13
	(-0.36)	(-0.49)	(-0.04)
Systemic Bank	-1.23	0.53	-2.64
	(-1.08)	(0.32)	(-1.18)
Eurozone	-0.20	-1.54	1.84
	(-0.16)	(-0.96)	(0.34)
ICC	5.79***	7.33***	5.36***
	(4.73)	(3.74)	(2.79)
p-value	1.43e-23	1.42e-23	2.98e-21
R^2	0.242	0.314	0.230
Adjusted R^2	0.232	0.295	0.208
F(11, 76)	30.755	34.046	22.978
Number of Observations	812	411	401

4.4.4 Robustness check

To test the robustness of the results and the validity of the variables we used, we are adding two more regressions: in the first one we use a crossed variable ambiguity times disclosure and in the second one we will run the same regression

with saving deposits. The use of a cross variable allows us to test the combined effect of disclosure and ambiguity inside the same variable. It also expresses the impact of disclosure when ambiguity rise.

Table 4.19 : Total Deposit over Total Assets and Crossed variable

This table provides results about the mean of total deposit over total assets change. 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.

Variables	**Overall Period**	**1989-2005**	**2006-2013**
const	40.06***	35.12***	41.19***
	(7.61)	(5.02)	(3.96)
Compiled Ambiguity * Disclosure	-0.01**	-0.01	-0.02*
	(-2.20)	(-1.237)	(-2.05)
Deposit Remuneration	-124.33***	-101.71***	-249.41***
	(-9.32)	(-10.30)	(-1.40)
Long Term Debt	-6.44e-05***	-5.65e-05***	-6.86***
	(-8.28)	(-4.48)	(-5.37)
Tier 1 Capital Ratio	0.5	1.07	0.36
	(1.41)	(5.24)	(0.84)
Long term Treasury Bond rate	0.68*	0.08	0.99
	(1.73)	(0.08)	(0.84)
Mandatory Reserve	-78.74	-83.29	-59.02
	(-3.90)	(-15.99)	(-3.06)
Systemic Bank	-1.58	-0.23	-4.26**
	(-1.46)	(-0.13)	(-4.25)
Eurozone	-17.65***	-37.40***	-13.98***
	(-4.31)	(-16.11)	(-3.44)
ICC	6.03***	–	–
	(5.79)	–	–
ViX	0.14	0.21	0.30
	(0.85)	(1.07)	(0.35)
p-value	4.39e-26	2.57e-44	9.35e-16
R^2	0.261	0.317	0.252
Adjusted R^2	0.251	0.299	0.231
F(10, 76)	39.51	233.167	18.14
Number of Observations	812	338	333

The result shown in table 4.19 confirms the result obtained in table 19. Both disclosure and ambiguity have a negative impact onto total deposits while com-

bining both variables. The result in table 4.17 shows a negative and significant relationship between deposit levels and remuneration onto deposits. It shows that depositors start becoming suspicious when banks are raising the level of interest paid onto deposits. In the theoretical literature, banks deposit contract is designed around an interest rate paid onto deposits. But in empirical tests we can observe that banks try to raise interest rates to attract more depositors while having trouble attracting them without interest payment.

4.5 Conclusion

This chapter provides results about the relationship between the amount of deposits, the effects of disclosure and the effects of ambiguity. The results tend to outline interesting empirical evidence concerning the impact of disclosure on deposits. They confirm the empirical literature where depositors actively monitor banks, but the level of disclosure participate in a reduction of the number of total deposits. The results confirm the literature where disclosure has a negative impact on deposit levels, leading eventually to bank runs (Chen and Hasan, 2006 and 2008). Disclosure in this analysis appears to have a significant negative effect on the amount of total deposit.

Concerning the hypothesis related to the relationship between interest rate and amount of deposit, we observe that depositors pay attention to the interest payment on their deposits due to the significative of the coefficient. Although, the sign of the coefficient is negative translating an aversion of depositors, to banks which offer higher interest rates. The results although show depositors scorn payment of interest by comparison to the long-term treasury bond rate. Indeed, we were able to obtain a positive and significant sign, with or without ambiguity taken into account: contrary to expectations, the increase in the long-term treasury bond rate has a positive effect on the amount of deposit.

Once we introduced the variables of ambiguity in our model, we realized depositors are not sensible to each source of ambiguity. But when we compute a variable

which emphasizes the effect of ambiguity during difficult financial period, we establish a relationship between deposits and ambiguity. The effect of ambiguity onto the amount of deposit is negative. This empirical evidence is an important contribution to the growing literature about ambiguity.

This analysis also provides interesting results on the impact of mandatory and prudential rules. Mandatory reserve rules do not seem to have a significant impact over the amount of total deposit. Concerning the risk profile of banks and its relationship with the amount of deposits, we can see tier 1 capital ratio has a positive impact on the amount of deposit. Well capitalized banks seem to be able to attract more depositors while markets financed banks are able to attract more deposits. This result outlines the power of governance by depositors.

The outlined results confirm the effect of disclosure onto depositors behavior and corroborate the ongoing literature where disclosure can affect negatively depositors behavior and the governance exercise which come with. The European data proposed in this chapter does not confirm the results obtained by other authors onto MENA countries, Russia or China in Bourgain et al. (2012) or Wu and Bowe (2012) which outlined a positive effect of disclosure onto deposit levels. This chapter shows different behaviors among depositors in Europe where regulation and the strength of institutions are more emphasized.

Appendix

Table 4.20 : Participating banks and country of residence

Name	Country of Residence	EU Member	Eurozone Member
Erste Group Bank AG	Austria	1	1
Vorarlberger Landes- und Hypothekenbank Aktiengesellschaft	Austria	1	1
Oberbank AG	Austria	1	1
Die Raiffeisen Bank International AG	Austria	1	1
Immigon Portfolioabbau AG	Austria	1	1
Dexia SA	Belgium	1	1
Bank of Cyprus Public Co. Ltd.	Cyprus	1	1
Ceska sporitelna as	Czech Republic	1	1
Ceskoslovenska obchodni banka, a.s.	Czech Republic	1	1
Komercni Banka as	Czech Republic	1	1
Jyske Bank A/S	Denmark	1	0
Spar Nord Bank A/S	Denmark	1	0
Sydbank A/S	Denmark	1	0
Aktia Pankki Oyj	Finland	1	1
HSBC France S.A.	France	1	1
Credit Lyonnais SA	France	1	1
BPCE SA	France	1	1

Name	Country of Residence	EU Member	Eurozone Member
Credit Agricole	France	1	1
BNP Paribas SA	France	1	1
CRCAM Paris & Ile de France	France	1	1
Credit Industriel & Commercial SA	France	1	1
CRCAM d'Ille et Vilaine	France	1	1
CRCAM du Nord de France	France	1	1
CRCAM Alpes Provence	France	1	1
CRCAM Atlantique Vendee	France	1	1
CRCAM Brie Picardie	France	1	1
CRCAM du Languedoc	France	1	1
CRCAM de Sud Rhone-Alpes	France	1	1
CRCAM de Touraine Poitou	France	1	1
Societe Generale S.A.	France	1	1
HSH Nordbank AG	Germany	1	1
Volkswagen Bank GmbH	Germany	1	1
Landesbank Berlin Holding AG	Germany	1	1
Berlin Hyp AG	Germany	1	1
Commerzbank AG	Germany	1	1
comdirect bank Aktiengesellschaft	Germany	1	1
Deutsche Bank Aktiengesellschaft	Germany	1	1
Deutsche Postbank AG	Germany	1	1
DVB Bank SE	Germany	1	1
Deutsche Hypothekenbank AG	Germany	1	1
Oldenburgische Landesbank AG	Germany	1	1

Name	Country of Residence	EU Member	Eurozone Member
HSBC Trinkaus & Burkhardt KGaA	Germany	1	1
Alpha Bank AE	Greece	1	1
National Bank of Greece S.A.	Greece	1	1
Eurobank Ergasias SA	Greece	1	1
Piraeus Bank S.A.	Greece	1	1
OTP Bank Nyrt	Hungary	1	0
Allied Irish Banks p.l.c.	Ireland	1	1
Banco di Napoli SpA	Italy	1	1
Banco di Desio e della Brianza S.p.A.	Italy	1	1
Banca Monte dei Paschi di Siena S.p.A.	Italy	1	1
Banca Popolare dell'Emilia Romagna Societa Cooperativa	Italy	1	1
Banco Popolare Societa Cooperativa SCRL	Italy	1	1
Banca Popolare di Sondrio SCRL	Italy	1	1
Banco di Sardegna SpA	Italy	1	1
Credito Bergamasco S.p.A.	Italy	1	1
Credito Emiliano SpA	Italy	1	1
Banca Carige S.p.A.	Italy	1	1
Intesa Sanpaolo S.p.A.	Italy	1	1
Mediobanca S.p.A.	Italy	1	1
Banca Popolare dell Etruria e del Lazio SCARL	Italy	1	1

Name	Country of Residence	EU Member	Eurozone Member
Banca Popolare di Milano Societa Cooperativa a r.l.	Italy	1	1
Unione di Banche Italiane SpA	Italy	1	1
UniCredit S.p.A.	Italy	1	1
Espirito Santo Financial Group S.A.	Portugal	1	1
Cooperatieve Centrale Raiffeisen-Boerenleenbank B.A.	Netherlands	1	1
N.V. Bank Nederlandse Gemeenten	Netherlands	1	1
SpareBank 1 SMN	Norway	0	0
Sparebanken Sor AS	Norway	0	0
SpareBank 1 SR-Bank ASA	Norway	0	0
Sparebanken Vest	Norway	0	0
Bank Handlowy w Warszawie S.A.	Poland	1	0
Bank Zachodni WBK S.A.	Poland	1	0
ING Bank Slaski S.A.	Poland	1	0
Bank Millennium SA	Poland	1	0
Bank Pekao SA	Poland	1	0
PKO Bank Polski SA	Poland	1	0
Banco Comercial Portugues S.A.	Portugal	1	1
Banco Espirito Santo S.A.	Portugal	1	1
BRD Groupe Societe Generale SA (Romania)	Romania	1	0
Vseobecna uverova banka, a.s.	Slovak Republic	1	1

Name	Country of Residence	EU Member	Eurozone Member
Banco Bilbao Vizcaya Argentaria, S.A.	Spain	1	1
Bankinter SA	Spain	1	1
Banco Popular Espanol SA	Spain	1	1
Banco de Sabadell SA	Spain	1	1
Banco Santander S.A.	Spain	1	1
Skandinaviska Enskilda Banken AB	Sweden	1	0
Svenska Handelsbanken AB	Sweden	1	0
Swedbank AB	Sweden	1	0
Zurcher Kantonalbank	Switzerland	0	0
Julius Baer Gruppe AG	Switzerland	0	0
Bank Coop AG	Switzerland	0	0
Banque Cantonale de Geneve SA	Switzerland	0	0
Banque Cantonale Vaudoise	Switzerland	0	0
Berner Kantonalbank AG	Switzerland	0	0
Basellandschaftliche Kantonalbank	Switzerland	0	0
Bank Sarasin & Cie AG	Switzerland	0	0
Basler Kantonalbank	Switzerland	0	0
EFG International	Switzerland	0	0
Liechtensteinische Landesbank Aktiengesellschaft	Switzerland	0	0
Luzerner Kantonalbank AG	Switzerland	0	0
Neue Aargauer Bank AG	Switzerland	0	0

Name	Country of Residence	EU Member	Eurozone Member
Edmond de Rothschild (Suisse) S.A.	Switzerland	0	0
Thurgauer Kantonalbank	Switzerland	0	0
UBS Group AG	Switzerland	0	0
Valiant Holding AG	Switzerland	0	0
Walliser Kantonalbank	Switzerland	0	0
Zuger Kantonalbank AG	Switzerland	0	0
HSBC Bank plc	United Kingdom	1	0
National Westminster Bank Plc	United Kingdom	1	0
Barclays PLC	United Kingdom	1	0
Nationwide Building Society	United Kingdom	1	0
HBOS Plc	United Kingdom	1	0
HSBC Holdings plc	United Kingdom	1	0
Royal Bank of Scotland Group plc	United Kingdom	1	0
TSB Banking Group Plc	United Kingdom	1	0
Virgin Money Holdings UK PLC	United Kingdom	1	0

Table 4.22 : Correlation Matrix For the overall period

Total Deposit Ratio	Deposit remuneration	Ambiguity	Long Term Debt	Tier 1 Capital Ratio	Treasury Bond	Mandatory Reserve	Systemic Bank	Eurozone	ICC	ViX	Variables
1,00	-0,17	-0,04	-0,33	0,25	0,21	-0,03	-0,15	-0,03	0,04	0,01	**Total Deposit Ratio**
-0,17	1,00	-0,08	-0,02	-0,16	0,11	-0,15	-0,02	0,03	0,07	-0,08	**Deposit remuneration**
-0,04	-0,08	1,00	0,05	0,17	-0,13	0,05	0,02	0,02	-0,09	0,59	**Ambiguity**
-0,33	-0,02	0,05	1,00	-0,05	-0,19	0,04	0,47	0,04	0,00	0,00	**Long Term Debt**
0,25	-0,16	0,17	-0,05	1,00	-0,08	0,04	-0,09	0,00	-0,12	0,11	**Tier 1 Capital Ratio**
0,21	0,11	-0,13	-0,19	-0,08	1,00	-0,40	-0,05	0,00	0,19	-0,12	**Treasury Bond**
-0,03	-0,15	0,05	0,04	0,04	-0,40	1,00	-0,07	-0,01	0,09	0,10	**Mandatory Reserve**
-0,15	-0,02	0,02	0,47	-0,09	-0,05	-0,07	1,00	0,03	0,01	0,00	**Systemic Bank**
-0,03	0,03	0,02	0,04	0,00	0,00	-0,01	0,03	1,00	0,05	0,00	**Eurozone**
0,04	0,07	-0,09	0,00	-0,12	0,19	0,09	0,01	0,05	1,00	0,01	**ICC**
0,01	-0,08	0,59	0,00	0,11	-0,12	0,10	0,00	0,00	0,01	1,00	**ViX**

General Conclusion

General Conclusion

The last two financial crises have opened again the debate on the effect of corporate governance onto banks and more specifically onto financial stability and economic growth. The aim of this dissertation was therefore to investigate whether the level of disclosure and transparency of banks participates to the enhancement of financial stability. Specifically, we tested the effect of various levels of disclosure on two branches of the banking governance in the European Union: first throughout the external investors branch and secondly throughout depositors. To this end, this dissertation resolves a certain amount of empirical and theoretical issues.

In the first chapter, we investigated the available literature to state the effect of disclosure onto banking governance and risk taking. This chapter is important because it participates to analyze the first causality between enhancing disclosure and financial stability. The results observed in this survey enlight the necessity of continuing further research in this area: disclosure has a dubious impact on bank's behavior and therefore onto financial stability in both theoretical and empirical literature. If we only pay attention to governance by depositors, a consistent part of the literature shows that disclosure has a positive impact on the reduction of potential bank run resulting from risky behavior from banks. Depositors are attracted, in most cases, by transparent banks because those transparent banks convey positive and qualitative signals about the bank resilience ability. The signaling of a bank allows actors of its governance to exert market discipline throughout the information perceived. The most transparent banks are considered safer, due to incentives for banks to disclose intelligence rather than being opaque. On the other hand, we were also able to notice that disclosure can harm depositors and banks

by generating over incentives to exert governance even in presence of disclosure (Chen and Hasan, 2007 or chapter 4 of this dissertation for instance). Most of all, the literature insists on the necessity to implement disclosure in addition to other regulator practices to avoid the negative effect of disclosure onto depositors, banks and therefore financial stability. We also looked into the governance by external investors. The effect of disclosure on financial market governance is less dubious and confirms expectations were different effects are expected based on the type of governance it is directed to. One of the consequences of disclosure is the immediate reduction of the cost of capital for the most transparent bank in both theoretical and empirical literature. The second consequences effect of disclosure is that it emphasizes the effect of market discipline. Those results are important enhance financial stability.

The second chapter investigates the impact of bank disclosure on the evolution of their CDS spreads during the EMU sovereign crisis. The European sovereign debt crisis proposes a timely case to explore the effect of disclosure on banking stability for three reasons: first, the macroeconomic environment is fragile; secondly, state and soundness of the banking industry is also fragile ; and finally this period match with periods when regulatory and publicly available stress tests were conducted. When uncertainty is rising, agents become more fearful and then start to need to be reassured. During this exact period, the increasing default risk for banks and countries led us to conduct analysis concerning disclosure and derivative instruments, pointed out during the EMU crisis as an origin. To analyze the relationship between disclosure and financial stability throughout CDS spreads, we computed two original disclosure indexes to capture this effect of disclosure: the first one is a global index, while the second one only focuses on sovereign exposure disclosure. We collected official publication data, such as financial reports or financial appendixes, and analyzed the overall quantitative and qualitative disclosure. In addition to these indexes, we were able to extract data from the publicly available capital exercises of 2011 and 2012 to capture bank's position regarding their exposure to sovereign debt. To conduct this analysis we used a sample of 59 European banks which participated to the EBA stress test in both 2011 and 2012 to cover a period from 01/01/2011 to 30/06/2013.

This chapter provides original results concerning the impact of bank disclosure onto to the behavior of CDS market participants. We showed in this chapter that too global or too large disclosure does not enhance stabilizing effect and do not reduce the volatility of CDS spreads. This result is consistent with an important part of the theoretical and the empirical literature which underline the negative consequences of an excessive disclosure. In addition to the consistency with this part of the literature, the result can as well be explained by the fact that the financial situation and the state of European banks were not stable enough leading investors to be looking for other types of communication, not only a general one but also a more specific one. The second result confirms this previous interpretation: we show that the strategy for banks to disclose intelligence about the sovereign exposure helps reducing the cumulative abnormal variation of the spread. A specific, or contextual, disclosure increases the stability on the CDS market, during period of macroeconomic and financial instability. This effect is particularly strong at the time where uncertainty is high, especially for the most exposed banks located in Greece, Ireland, Portugal or Spain. Since the spread of CDS measures the probability of default of a bank, disclosure participates indirectly into the reduction of the probability of default of banks by a reduction of the information premium. Lastly, the second chapter shows interesting data concerning the overall stability of the Eurozone. Banks located in the Eurozone have endured a stronger increase of their spread than non-Eurozone banks. The increase of their spreads is the consequence of the weakening of the Eurozone during this period and translate well enough the fear of financial markets regarding sovereign credit risk as a European systemic risk and not only an idiosyncratic.

After investigating the effect of disclosure on one part of the corporate governance of a bank, we decided to investigate another branch of a bank's governance: the effect of disclosure onto governance by depositors. The third chapter does not directly relate with disclosure but gives interesting research perspective around the notion of ambiguity and the consequences of ambiguity aversion in terms of policy implications. In the third chapter, we present the various literature around ambiguity and then theoretically the effect of governance by depositors onto banks

under ambiguity and in an incomplete information scheme. Depositors exert their governance on banks throughout the withdrawing mechanism. In order to understand the mechanism of governance of depositors under ambiguity, we extended the original model of Gorton (1985) to implement ambiguity into the maximization of the utility function of depositors. The model is a three periods model in which depositors have an endowment with which they choose to either deposit in a bank or to hold currencies at the beginning of each period. At the beginning of the second period, depositors can choose to withdraw or to maintain its deposit in the bank. The bank in the model collects the deposit and invest it in an industrial activity in exchange of a return. The depositors are risk neutral and maximize their utility on the overall period. If depositors decide to withdraw their original deposits, the bank is unable to conduct the whole investment portfolio and can lead to capital losses to depositors in case of failure of this investment.

The result of the third chapter provides original results concerning governance of depositors. The first result shows that an optimal level of withdrawing incentive exists under ambiguity and is a function of the degree of ambiguity of depositors. The ambiguity of depositors can be assimilated to a level of confidence in the ability of the bank to be able to pay back deposits. If the degree of ambiguity rise among depositors, they then become pessimistic and if the degree of ambiguity decrease, depositors become then optimistic. The result has an implication on the level of equity chosen by the bank to allow it to pursue its activity. The degree of ambiguity actively play a role on the amount of debt the bank hold upon its depositors. Since the only form of financing for a bank in this model is debt and equity, the debt level will affect the bank need of financing. The second result of this chapter concerns the degree of ambiguity and its role on the exercise of governance by depositors: the more pessimistic the depositors, the more likely they are to withdraw mistakenly from a bank and vice versa. This result is the most important in terms of policy implication for regulators. Since we have a decision-making process under incomplete information, we think that more research relating disclosure and ambiguity and its effect onto governance by depositors should be considered to investigate if the mistakenly withdrawn deposit or mistakenly not withdrawn deposit can be reduced when implementing disclosure. All of the results also have

a potential effect onto financial stability, via the bank run resulting from banks being unable to pay back deposits. The third chapter is an important introduction to the fourth chapter.

The fourth chapter of this dissertation studies empirically the amount of deposits, the effects of disclosure and ambiguity. To conduct this analysis we used the deposit data of 117 European banks, from 23 different countries, over a period of 25 years (1989-2013). The sample is composed of banks which have a total asset of more than 10,000 million euros and is composed of systemic banks, regional banks, investment banks and smaller commercial banks. The chapter outlined interesting results which emphasize some of the literature results (Wu and Bowe, 2012 or Bourgain et al., 2013 for e.g.). The first result shows that depositors actively monitor banks and are sensitive to the disclosure operated by a bank. However the level of disclosure is negatively correlated to the amount of total deposit. This result is important because it outlined a difference in the results compared to the recent empirical literature which analyzes the same problematic using countries in development (Wu and Bowe, 2012 or Bourgain et al., 2013 for e.g.) and confirms the negative effect of some theoretical part of the literature (Chen and Hasan, 2006 and 2008). The second result of our analysis concerns the relationship between the amount of total deposits and the effect of ambiguity. Depositors appear to react negatively to a situation of ambiguity. This result is important to the growing literature regarding the notion of ambiguity in the decision-making process.

The results of this dissertation allows us to understand better the various mechanisms behind exerting governance, disclosure and financial stability. As mentioned earlier, banks are complex institutions and so is its governance. The different actors of the governance of a bank have incentives of their own and the implication in terms of financial stability can lead to opposite behavior. The overall result concerning disclosure and its impact on financial stability cannot be simplified to one answer but this dissertation tries to provide enough keys to assess the role of disclosure upon financial stability.

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