The Determinants of Bank Cost of Capital

Taking into account measures of opaqueness and external support

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University of Piraeus, January 2013

Abstract:

The purpose of this work is to determine how does bank opacity and implicit or explicit external support may affect the bank cost of capital. The major difficulty in the valuation process comes from the fact that banks are, by nature, opaque organisms. Moreover, regional governments are able to intervene in difficult times to rescue a bank providing the necessary liquidity. Similarly, rescue may come from a corporate partner such as a mother-company. The present work, following previous literature, uses the disagreement between credit rating agencies as a proxy for bank opacity. Additionally, uses the Moody's Joined Default Analysis to introduce a proxy for potential external support. Finally both measures, along with other potential factors such as relative size, GDP growth and capital adequacy, are examined through a multiple regression model with banks' implied equity risk premium used as independent variable. The results of this study indicate that both opacity and external support, and also leverage and in some cases general economic conditions have an important contribution in the determination of bank cost of capital.

Keywords: bank opacity, bank valuation, credit ratings, implied cost of equity, government deposit guarantee, moral hazard

Περίληψη:

Ο σκοπός της εργασίας αυτής είναι η διερεύνηση της επιρροής της αδιαφάνειας των τραπεζών, καθώς και της εξωτερικής υποστήριξης στο κόστος κεφαλαίου των τραπεζών. Η μεγαλύτερη δυσκολία στη διαδικασία αποτίμησης προέρχεται από το γεγονός ότι οι τράπεζες είναι, από τη φύση τους, αδιαφανείς οργανισμοί. Επιπλέον, οι περιφερειακές κυβερνήσεις είναι σε θέση να παρέμβουν σε δύσκολες στιγμές για να διασωθεί μια τράπεζα, παρέχοντας την αναγκαία ρευστότητα. Ομοίως, η διάσωση μπορεί να προέλθει από ένα εταιρικό συνεργάτη, όπως μία μητρική εταιρεία. Η παρούσα εργασία, ακολουθόντας την προηγούμενη βιβλιογραφία, χρησιμοποιεί τη διαφωνεία μεταξύ των οργανισμών αξιολόγησης πιστοληπτικής ικανότητας ως υποκατάστατο για την αδιαφάνεια της τράπεζας. Επιπλέον, χρησιμοποιεί την ανάλυση της Moody's για την αξιοπιστία των τραπεζών, για να εισάγει ένα υποκατάστατο μέτρο πιθανής εξωτερικής υποστήριξης. Τέλος, και τα δύο μέτρα, μαζί με άλλους πιθανούς παράγοντες, όπως το σχετικό μέγεθος, η αύξηση του ΑΕΠ και την επάρκεια των ιδίων κεφαλαίων, εξετάζονται μέσα από ένα μοντέλο πολλαπλής παλινδρόμησης χρησιμοποιόντας το επιπλέον πρίμιουμ κινδύνου των τραπεζικών μετοχών ως ανεξάρτητη μεταβλητή. Τα αποτελέσματα αυτής της μελέτης δείχνουν ότι τόσο αδιαφάνεια και η εξωτερική υποστήριξη, καθώς επίσης και τη μόχλευση και σε μερικές περιπτώσεις γενικά οικονομικές συνθήκες έχουν μια σημαντική συνεισφορά στον προσδιορισμό του κόστους κεφαλαίου της τράπεζας.

Λέξεις Κλειδιά: Αδιαφάνεια τραπεζών, αποτίμηση τραπεζών, οίκοι αξιολόγησης, κόστος κεφαλαίου τραπεζών, εγγυηση καταθέσεων, ηθικός κίνδυνος.

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1. Introduction

Bank financing is one of the most important determinants of the viability and performance of the banking system. The determination of the factors that affect the cost of financing and especially the cost of equity financing for the banks is a far more complicated procedure than the corresponding one for non-banking firms.

The reasons for this lie in specific characteristics that can be easily recognized if someone compares a balance sheet of a typical bank to the one of a non-banking firm. The first difference that will be easily observed is the much higher leverage of the bank. The second one is that the major bulk of the bank's assets are loans. These features may be easily observed but they are also the source of many complicated obstacles in the efficient pricing of the bank's value which is the implicit procedure for every willing financier of the bank through the market channel. The pricing of a non-banking firm's assets can be done with relatively higher efficiency because many of the firm's assets have a known value. On the contrary, it may sound as an exaggeration but the fact is, that even the bank managers, and much less the bank's investors, cannot be absolutely sure about the value of the bank's assets.

The first goal of this work is to examine whether the bank's opacity, (the level of the ignorance of the real value of a bank), affects the decisions of investors, and more specifically the return the investors demand in order to finance the bank through stock markets.

Another factor that distinguishes banks from other firms is the role the banks play in the viability of the financial system and by extension, to the real economy. From a simplistic view, the consequences from a bankruptcy of a bank are much higher than those of a distressed non-banking firm, for the real economy. This can be easily realized from the observation of the liability side of a bank balance sheet, where the major source of financing is a great number of small depositors. A bank in distress constitutes a high probability of loss for a lot of depositors' money. Such a fact may cause great disturbance in the cohesion of society and that is the reason why, governments aim in the avoidance of such conditions. In order to intervene effectively they have two basic instruments which are a) the regulatory framework of the banking system and b) the government support in case of distress.

Additionally, bank support may not come only by a local or regional government but also from a corporate alliance. Financial liberalization has led in the expansion of banks activities over the borders of a state. Multi-national banks may engage in the protection of a distressed conglomerate in order to avoid further looses.

The potential external support seems to be of high importance for the operations of a bank because it provides insurance for financiers of the bank, so that it could continue to take the risks associated to lending and also create profit from this procedure. On the other hand, external and especially government support may create pervasive incentives for the banks, for excess risk taking which may lead in great looses. The bearers of those looses are mainly the bank's stockholders. Both aspects of external support may affect the valuation of a bank by external financiers. That fact creates the motivation to examine, throughout the present study, whether government support actually affects the decisions of investors and if so, what is the direction of this factor's influence in the determination of the required return of the banks' equity.

In order to provide sufficient justifications in the examination of the determinants of the cost of bank's capital, and especially in the examination of opacity and external support, the study uses the following structure: First, it provides an introduction in the structure and the functions of the financial system, in order to built a sufficient background for the role and the functions of the banks. In the second part, there is a description of the structure and the operations of the banking system. In this section, the concepts of bank opacity and external support will be better justified as the reader will have a more detailed image of the banks operations and the role they play in the financial system. In this chapter, the measures that have already used in previous studies in the determination of bank opacity will be presented. Moreover, the present chapter introduces a proxy measure for the determination of the level of external support and is based on the bank-specific ratings of Bank Financial Strength, and Long Term Deposit Rating, both of them provided by Moody's. The fourth chapter of the study presents a series of approaches that have developed for the valuation of a bank. Finally, in the last part, a regression model is used in multiple alterations, in order to determine the factors that affect the investors' required return of bank capital. The specific model combines proxy measures of opacity and external support with factors that have previously been used in other researches for the determination of the cost of capital. The conclusions of the empirical research are presented in the final chapter.

2. An introduction to financial architecture

2.1. Financial Institutions

The prime function of the financial system is to issue and safeguard the common mean for all payments which is money. The second, even more complex, function is the evolution of a payments mechanism which enables every party to transfer money among each other without taking the risk of delivering it in coin or currency. These are the basic domain of banks which are the most important institution that evolves in any economy. In a fully developed economy, next to the banks intermediation, the financial system includes also securities firms, finance companies, mortgage brokers, as well as institutional investors such as mutual funds, pension funds and insurance companies. Institutions as those mentioned, play a large and sophisticated role in the evolution of a mechanism of money transfers and payments. More specifically, it encourages and mobilizes private saving and investment, and channels the capital that is created into its most productive uses. Individual and institutional investors are able to choose among a broad range of investment options according to the amount of risk they are willing to be exposed to, or the time frame, in which they are willing to expose themselves in investment risk.

Financial intermediation is the productive activity in which institutional units such as those mentioned, incur liabilities on their own account for the purpose of acquiring financial assets by engaging in financial transactions on the market; the role of financial intermediaries is to channel funds from lenders to borrowers by intermediating between them.

When financial intermediation is performed effectively, firms compete for savings by offering financial returns. That competition is beneficial both for savers and creditors because when the former enjoy the return of their deposit, the latter are able to acquire the necessary funds to proceed in value creating projects. The result is that society's savings are being put to the best possible uses wile savers are offered the most desirable feasible combination of expected return, limited risk and access to liquidity (Calomires and Beim, 2001).

There are two basic ways that savings and investment are connected. The first is through securities and *market intermediation* where corporations compete for capital by offering stocks, bonds and other securities directly to individuals and institutional investors. Another way to

connect savings and investment is through *bank intermediation* where individuals and institutions deposit their savings in banks, and the banks offer loans to the corporations.

The effectiveness of those two channels of funding depends heavily in the institutional environment where the financial system activates. The most basic foundation is the element of law. Financial transaction either through markets or banks, create contractual claims among strangers making investors vulnerable in the deliberate or unintentional mismanagement of their money. Intermediation can only work well when investors have confidence that their claims will be honored. This requires laws fairly and uniformly enforced that protect the rights and interests of investors in those claims. Securities markets, for example offer massive opportunities to defraud investors (see for example, Jensen & Meckling 1976). Additional to the cultivation of proper incentives, strong laws, fairly enforced are an effective way to control market manipulation, insider trading and outright fraud. Banks also depend on laws to enforce loan covenants, to provide adequate procedures for registering and enforcing collateral interests in land, structures equipment and working capital, and to establish bankruptcy codes that help resolve problems of financial distress fast enough and in a predictable way.

The importance of the legal system in the growth of financial system is emphasized in the work of La Porta, Lopez-de-Silanes, Shleifer, and Vishny (2000). In their paper they imply that that finance is a set of contracts. These contracts are defined – and made more or less effective – by legal rights and enforcement mechanisms. From this perspective, a well-functioning legal system facilitates the operation of both markets and intermediaries. It is the overall level and quality of financial services – as determined by the legal system – that improves the efficient allocation of resources and economic growth. While focusing on legal systems is not inconsistent with banks or markets playing a particularly important role in stimulating economic growth, La Porta *et all*, clearly argue that laws and enforcement mechanisms are a more useful way to distinguish financial systems than focusing on whether countries are bank-based of market-based.

Additionally, they recognize two basic roots in the development of the legal system. Legal rules of *civil law* countries are derived from Roman law and are conceived as rules of conduct intimately linked to ideas of justice and morality. These rules are usually developed by legal scholars, and incorporated into commercial codes. In contrast, *common law* is British in origin, and was formed primarily by judges who tried to resolve specific disputes. Furthermore, there are only three major civil law traditions or families that modem commercial laws originate

from: French, German, and Scandinavian. The conclusion of their research was that civil laws give investors weaker legal rights than common laws do. Moreover, common law countries, which give both shareholders and creditors the strongest protections, and French civil law countries, which protect investors the least. German civil law and Scandinavian countries fall between common law and French civil law countries in the strength of legal investor protection. The quality of law enforcement is the highest in Scandinavian and German civil law countries, next highest in common law countries, and again the lowest in French civil law countries (Gorton and Winton, 2003).

Despite the fact that the work of La Porta *et all*, emphasized in the distinction of financial systems according to the legal institutions and the level they protect investors and creditors property rights, they provided an explanation why some countries have based their economic growth on the development of the banking system while others have developed a more market-based financial system. For example, in countries such as Germany and Japan, banks play a leading role in mobilizing allocating capital, overseeing the investment decisions of corporate managers and providing risk management vehicles. On the other hand countries such as England or United States, securities markets play the central role in the direction of society's savings to firms exerting corporate control and easing risk management. Demircguç-Kunt and Levine (2000), in an effort to determine which orientation is best for economic growth, they reached the conclusion that countries with Common Law tradition, provide strong protection of shareholder's rights, good accounting regulations, low level of corruption and no explicit deposit insurance tend to be more market based. On the other hand, countries with French Civil Law tradition perform poorly in the protection of shareholder and creditor rights and also have poor contract enforcement, high levels of corruption, poor accounting standards and restrictive banking regulations. The few countries with German Civil law tradition, which offers strong protection for creditors, tend to have more developed bank-based financial systems.

According to a balance sheet approach, bank-based or relationship-based financial systems follow the commitment paradigm. This involves companies having exclusive financing relationships with a small number of creditors and equity holders. The prevalent form of external finance is in the form of bank loans. Accordingly, households depend on the banking system to provide them both liquidity and indirect diversification in the investment of their funding surplus. Firms depend their funding mainly on internal finance which they obtain from retain earnings and other balance sheet reserves. On the equity side, banks participate in the

firm's management because, apart from their role as leverage providers, they hold also significant portions of the firm's share, which gives them the ability to exert corporate governance via their control rights as creditors and also via their voting rights, some of them conferred by custody of bearer shares of individual investors who have surrender their proxies (Allen and Gale 2000). In the financing of corporations, bank lending dominates while securities markets are of minor importance, with corporate bond issues and equity issues not playing a major role in fund raising by firms so, the influence of non-bank financial shareholders is often limited by voting restrictions.

Additionally when the bank is the major shareholder of the firm, is attributed with the important task of monitoring of the manager. In practice, individual equity holders are often discriminated in the advantage of creditors in decisions such as dividends payout. Generally, there are conflicting opinions about whether a bank provides efficient monitoring because the bias towards other shareholders of the firm may slow the development of a securities market as institutional investors may be unwilling to participate (Davis and Steil, 2001). Moreover, there is evidence that banks may be inadequate as monitors, as they do not seek to discipline the managers as long as the firm is far from default (Harris and Raviv, 1990). On the other hand, banks, by using economies of scale and scope in acquiring information, are able to improve capital allocation and corporate governance in a firm (Diamond1984). Also, Boot and Thakor (1997) argue that banks – as coordinated coalitions of investors – are better than uncoordinated markets at monitoring firms and reducing post-lending mismanagement of capital and the case of inability or unwillingness to repay the loan. This behavior is called moral hazard and will be analyzed in further section. In the case of countries with underdeveloped institutions such as weak contract enforcement or institutions of information, banks play an additional role as, without their enforcing in repayment of debt and information collection ability, external investors may be reluctant to finance industrial expansion (Rajan and Zingales 1998).

Market oriented financial systems, most commonly typified by the US and UK systems have as common characteristic the existence of a liquid and deep financial market that provide the range of financial instruments that economic agents need. Liquidity is necessary to reduce investment risk and to open up the scope for diversification for investors. Monitoring of the funding part is provided by specialists such as rating agencies or venture capital firms, as well as commercial and investment banks. Short-term spot transactions are predominating on long term relationships, with external financing of corporations to take place by short term bank

ending and bond issuance, as well as equity issuance. Debt financiers are protected only by explicit contracts and legal enforcement while creditors may intervene only when liquidation is threatened. Public information is predominant. Institutional investors, most of them pension funds or investment funds, are more important than banks, with households accumulating funded pension claims with them.

From the corporate governance perspective, the conflicts of interest between management and shareholders are resolved through hostile takeover activities which are a distinguishing mark of market-based systems. The firm that deviates most extensively from shareholder's objectives has also lower market value as shareholders dispose of their holdings and also a greater likelihood to be acquired. In that way, the threat of takeover, acts as a constraint on managerial behavior. Institutional shareholders, both directly and via non-executive directors, can have an important role to play in this context both in complementing takeover pressure as monitoring constraint on managerial behavior and in evaluating takeover proposals when they arise (Allen and Gale 2000).

Levine (2002) points out some advantages of market based systems, comparing to bank-based, such as the fact that well-functioning markets foster greater incentives to research firms since it is easier for them to get funding in an open liquid market. Additionally, corporate governance is tied to the performance of the firm and not to the probability of default as it is in the bank-based system, so monitoring by investors is done in a continuous basis through takeovers or performance-based compensation of managers. In contrast to banks, that may protect established firms with close bank-firm ties from competition, capital markets play a positive role in aggregating diffuse information signals and effectively transmitting this information to investors, with beneficial implications for firm financing and economic performance. Thus, proponents of the market-based view stress that markets will reduce the inherent inefficiencies associated with banks and enhance economic growth.

Until now, the empirical research (i.e., La Porta *et all*, 1999, Wurgler, 1999, Demircguç-Kunt and Levine 2000, Levine 2002) converge in the conclusion that the development of an effective financial system in the way of leading the available funding in the most productive uses, is irrelevant to the orientation of the system (market-based or bank based). Financial markets depend on the legal system i) in the definition of property rights, ii) in the specification of which contracts are permissible and the means for enforcing penalties for failure to comply with contractual promises, iii) in the establishment and enforcement of company law, by

specifying the range of rights and liabilities of corporations, their officers and directors, and how corporations can be governed, and iv) through laws and regulations that define and restrict specific aspects of the financial system itself: the legal means for purchasing and selling securities and for operating securities exchanges, the procedures required for chartering banks and the regulations to which banks are subject, the mechanisms for pledging collateral, and the process for resolving financial distress when firms become insolvent such as bankruptcy law.(Calomires and Beim, 2001)

Countries that want to have value-creating growth need strong financial systems to allocate capital. Strong financial systems, in turn need strong legal foundations which must be explicitly constructed with a view to protecting investors so that they will be encouraged to invest. Countries that emphasize shareholder protection, such as the United States, end up with strong stock markets and strong market control on management misbehavior. Countries that emphasize creditor protection, such as Germany, end up with strong banking systems and bank related controls on management misbehavior.

2.2. Market frictions and financial structure

A second foundational element for the effective function of financial system is the access in information about counterparties in the transactions among the participants of financial system. Lack of access in those information, provides a justification for the existence of financial system.

The existence of financial system needs to be justified in economic terms because in an Arrow–Debreu world the financing of firms by households can occur directly in a frictionless manner, a fact that leaves no role for financial intermediaries. In such a perfect world, participants behave under the law of one price where all information is available about an asset's return and risk, and thus, all investor's bid price converges to a single price under the arbitrage mechanism. If the price of a security, commodity or asset is different in two different markets, then an arbitrageur will purchase the asset in the cheaper market and sell it where prices are higher. The increase in supply in the more expensive market will reduce the asset's price while in the cheaper market the asset's price will rise due to increase in demand. In the

end of this dynamic procedure, the price will converge into a single one in both markets without the need of a central directed pricing system (Allen and Gale 2000).

The possibility of using the price mechanism to decentralize efficient decisions as the pricing of an asset has important implications for many of the functions of the financial system: First, there is an unambiguous objective for any firm, which is the maximization of its value. According to this objective, first, firms are guided to make the right choices, regarding production and financing decisions. Second, efficient allocation of recourses can be decentralized to value maximize managers of individual firms. Third, there is unanimity among shareholders of the firm about the goal of firm maximization of the value of the firm, which in a perfect world goes along with the maximization of shareholders wealth. Fourth, in such a world, financing decisions, according to Modigliani-Miller proposal (1958) is irrelevant between the choices of debt or equity financing, as the law of one price implies that the sum of the claims of the firm is equal to the value of its production plan.

Nevertheless, the traditional theory of financial intermediation is focused on the real world market features where the assumptions needed to support the market's features described previously are absent. Among the strongest assumptions of the perfect world are the absence of *transaction costs*, and *information* asymmetries (Allen and Santomero, 1998).

The idea of transaction costs was first developed in the context of the theory of the firm by Coase (1937) and was introduced as a key form of friction in financial markets by Gurley and Shaw (1960). Accordingly, economies of scale which benefit intermediaries result from invisibilities and non-convexities in transactions technology which restrict diversification and risk sharing under direct financing (Allen and Gale 2000). For example, consider an investor who holds the amount of $5000 and is willing to invest in the stock market. The small amount he owes allows him to purchase a relatively small number of stocks and also the brokerage commission for buying the stock will be a large percentage of the purchase price of shares. If instead the investor decides to by a bond, the problem is even worse because the smallest denomination for some bonds is much higher than the amount he holds (Mishkin 2007).

Financial intermediaries can provide an effective solution in the transaction cost's problem. First, they have the ability to bundle the funds of many investors together so they can take advantage of economies of scale. Economies of scale exist because the total cost of carrying out a transaction in financial markets increases only a little as the size of the transaction grows. Economies of scale are also important in lowering the costs of things such as

computer technology that financial institutions need to accomplish their tasks. Once a large mutual fund has invested a lot of money in setting up a telecommunications system, for example, the system can be used for a huge number of transactions at a low cost per transaction.

Additionally, the liquidity insurance which financial intermediaries provide to depositors and borrowers (whereby, deposits can be cashed on demand while bank's assets are mainly long term and illiquid) also results from scale economies in risk pooling The Diamond and Dybvig model (1983) assumes that the payoffs from the available investment opportunities are inconsistent with the possible consumption paths desired by consumers. In particular, consumers have random consumption needs, and satisfying these needs may require them to prematurely end investments unless they save via intermediation so that they can to some extent diversify these consumption shocks.

Information asymmetries, is the central information problem of financial markets. The problem appears when the user of the capital knows far more about his prospects and problems than the supplier of the capital. The definition of information asymmetries can uncover the most obvious impact which is the reduced confidence of capital suppliers. Additionally, empirical researches have uncovered the impact of information asymmetries in the financial system and the control mechanisms that have been developed in order to deteriorate this impact. Those mechanisms include appropriate contracts and courts to enforce them and there, appears again, the importance of the legal system that has been mentioned above. They also include corporate governance rules that limit the motivation for the users of the capital to diverge from the objective of maximizing the value of the firm and thus the investor's return (Jensen and Meckling 1976) and financial intermediaries that are willing to act as corporate monitors (Diamond 1984).

The impact of information asymmetries can be examined better through the distinction of the basic information-related tasks that financial system provides to access the problem. The first one is the screening, and the second is the monitoring of the applicant of funding.

Screening refers to the tasks that are made before an investment decision is made. When investors want to make a funding decision it's not always easy to distinguish the ability and willingness of the funded part to return the provided capital. Also, even when the funding decision is made, the supplier should set an appropriate price for the capital, or to determine the cost of capital. Both cases of screening and pricing are subject to the problem of adverse selection.

The problem of screening and its impact to the markets was first presented in the example of George Akerlof's paper: ''The market For Lemons" (1970). In this work the adverse selection is resembled to the problem that is created by "lemons" or bad quality cars in the used car market. Potential buyers of used cars are frequently unable to assess the quality of the car; that is, they can't tell whether a particular used car is a good car that will run well or a lemon that will continually give them grief. The price that a buyer pays must therefore reflect the average quality of the cars in the market, somewhere between the low value of a lemon and the high value of a good car. The owner of a used car, by contrast, is more likely to know whether the car is a peach or a lemon. If the car is a lemon, the owner is more than happy to sell it at the price the buyer is willing to pay, which, being somewhere between the value of a lemon and a good car, is greater than the lemon's value. However, if the car is a peach, the owner knows that the car is undervalued by the price the buyer is willing to pay, and so the owner may not want to sell it. As a result of this adverse selection, very few good used cars will come to the market. Because the average quality of a used car available in the market will be low and because very few people want to buy a lemon, there will be few sales. The used-car market will then function poorly, if at all (Mishkin 2007)

To illustrate adverse selection in credit markets, Akerlof uses the example of India, an emerging financial market where the village money lender charges his clients the extremely high rates of 15, 25, and even 50 percent. The reason for this large disparity is that the money lender is the only potential lender that personally knows the quality of the village borrowers and even he may be unable to distinguish between good and bad risks. The extend that moneylenders spend resources to identify low risk borrowers they must be compensated for those information investments through higher interest rates. Higher interest rates, therefore, are not just source of high profitability but also reflect the lack of information for some lenders relatively to the most informed ones and the compensation for their much higher expected rate of loan losses.

The problem of adverse selection provided also an explanation for credit rationing. Credit rationing refers to the situation where lenders limit the supply of additional credit to borrowers who demand funds, even if the latter are willing to pay higher interest rates. If the falling price of the used cars will be replaced by the rising rate that borrowers pay, high-risk borrowers will be more willing to pay higher rates than low-risk borrowers just as the sellers of "lemons" will be more willing to accept low price than sellers of good cars. As the interest rate rises, the

proportion of low quality borrowers also rises as the high quality borrowers drop out of the loans market. Lenders, knowing this behavior, realize that rising interest rates will cause their expected profit to fall, so they have to choose to limit interest rates to a maximum level to ensure a higher average quality of borrowers, even though this rate is higher than the one implied from the equilibrium of the demand for loans. So, adverse selection has two negative effects on debt markets: It makes them more expensive, and it closes them off to borrowers above a certain level of risk. That is the reason why high quality borrowers often seek to avoid rationing and excess risk premiums by attempting to signal that their quality is higher than the average. This motivates them, for voluntary disclosure of information associated to their investment project, or for extended use of collateral.

In equity funding, investment is more information intensive than debt investment. Equity investors own the residual claim on the company and so, must understand the full range of risk and opportunities facing the firm. Furthermore, when a company raises new equity, markets recognize mixed signals as there is the possibility of demand for excess funding of a new investment project but also the need for excess equity funding to avoid a potential bankruptcy. In average, the negative signal prevails so in new equity issues most of the times, stock price falls. Private equity investors are an exception in the above behavior because they are usually well informed about their investment prospect, so making their own screening, they retain much greater control of the firm and thus, they are less exposed to the problem of information asymmetry (Calomires and Beim 2001).

Monitoring refers to the task of following the fortunes of an investment after it is made. Investors need to be assured that the firm is not acting in ways that are detrimental to investor interests which are the maximization of the value of his investment which in equity funding is translated into the maximization of stockholder's wealth. When the seller of a security has incentives to hide information and engage in activities that are undesirable for the purchaser of the security, there appears the problem of *moral hazard.*

Equity contracts, such as common stock, are claims to a share in the profits and assets of a business. Equity contracts are subject to a particular type of moral hazard called *the principal–agent problem*. When managers own only a small fraction of the firm they work for, the stockholders who own most of the firm's equity (called the principals) are not the same people as the managers of the firm, who are the agents of the owners. This separation of ownership and control involves moral hazard, in that the managers in control (the agents) may act in their own

interest rather than in the interest of the stockholder-owners (the principals) because the managers have less incentive to maximize profits than the stockholder-owners do. By determination, the principal–agent problem would not arise if the owners of a firm had complete information about what the managers were up to and could prevent wasteful expenditures or fraud. The principal–agent problem, which is an example of moral hazard, arises only because a manager has more information about his activities than the stockholder does that is, there is asymmetric information (Mishkin 2007).

Several institutions have been developed that may assist in the reduction of moral hazard through several ways. *Government regulation* is the contribution of the legal system in the confrontation of moral hazard. Governments everywhere have laws to force firms to adhere to standard accounting principles that make profit verification easier. They also pass laws to impose stiff criminal penalties on people who commit the fraud of hiding and stealing profits. Apart from governments' participation, the financial system, through its structure has developed its own mechanism to minimize this problem and that is, *financial intermediation*. Financial intermediaries such as venture capital firms help in the reduction of the moral hazard arising from the principal–agent problem because they are able to pool large amounts of capital the providence of which goes along with excessive monitoring and control of the financed firms' operation in order to be consistent with the value maximization goal. Despite the effectiveness of intermediaries' role in monitoring firms, moral hazard arises with an equity contract, which is a claim on profits in all situations, whether the firm is making or losing money. If a contract could be structured so that moral hazard would exist only in certain situations, there would be a reduced need to monitor managers, and the contract would be more attractive than the equity contract. The *debt contract* has exactly these attributes because it is a contractual agreement by the borrower to pay the lender fixed dollar amounts at periodic intervals despite the extend of its profitability. If the managers are hiding profits or are pursuing activities that are personally beneficial but don't increase profitability, the lender doesn't care as long as these activities do not interfere with the ability of the firm to make its debt payments on time. Only when the firm cannot meet its debt payments, thereby being in a state of default, is there a need for the lender to verify the state of the firm's profits.

2.3 The Role of Banks

The role of banks in resolving information asymmetries problems that mentioned above is crucial for the financial system. The idea that banks "monitor" firms is one of the central explanations for the role of bank loans incorporate finance. Bank loan covenants can act as trip wires signaling to the bank that it can and should intervene into the affairs of the firm. Unlike bonds, bank loans tend not to be dispersed across many investors. This facilitates intervention and renegotiation of capital structures and more specifically, especially in bank based financial systems, where bankers are often on company boards of directors. (Gorton and Winton, 2003).

Individual lenders, instead of bearing the cost of information in order to make the necessary screening and the monitoring respectively before and after their investment decision, they delegate those functions in an intermediate financial institution, which, most of the times, is a bank. Banks perform screening by investing in information. Their staff of lending officers can call on a wide variety of firms, elicit private information about their business and prospects and make decisions based on the quality of that private information. Borrowers, on the other hand are willing to provide those information in order to receive the necessary funding from the bank.

After the loan contract is made, the bank has established a relationship with the borrower based on a continuous supply of information that is used by the bank to monitor the borrower's performance and alter the debt contract's terms accordingly to this performance in order to ensure the debt's repayment. They may help the firm in a difficult period providing the necessary liquidity with more convenient terms of repayment but also they are able to recall the loan in case they doubt about the firm's ability or willingness to repay the loan. The cost of screening and monitoring, along with the legal cost of enforcing debt contracts is easier for a bank than any individual lender to be undertaken because banks can allocate the cost by charging interest rates and fees to their lenders that cover those costs.

This is the standard framework that explains why banks exist and how they structure their contracts with borrowers. However, the above analysis has ignored an information asymmetry problem that appears on the funding side of the bank. The problem that appears there, is that individual lenders do not have to worry about the repayment of their funding as they transfer the sovereign risk of their investment in the bank but then, they cannot be sure enough about the

quality of the loan portfolio in which the bank has invested their deposits because it is based on private information held by the bank. The opacity observed there has created the problem of "monitoring the monitors" as mentioned in Diamond's paper (1984).

To be more precise, the problem of "monitoring the monitor" is this: lenders to the intermediary can reduce monitoring costs if the costs of monitoring the intermediary are lower than the costs of lenders lending directly to borrowers and directly incurring the monitoring costs. Diamond's fundamental result is to show that as an intermediary grows large, it can commit to a payment to depositors that can only be honored if, in fact, the intermediary has monitored as it promised. If not, then the intermediary incurs non pecuniary penalties, interpreted by Diamond as *bankruptcy costs* or *loss of reputation*.

Both costs can be observed in practice in depositor's behavior. When doubts about a bank's ability to safeguard and properly invest the depositors' money rise, the bank gradually loses its reputation as a going concern firm and depositors begin to withdraw their money. The negative expectations may become self-fulfilling, even if they are not consistent with the bank's real economic position and more and more depositors participate in the withdrawal wave which may turn into a *bank run*. The reason for this behavior is that economic factors do not have the convenience wait the evolution of the facts so they have to act prudentially. Their expectation affects their decisions and their decisions, in turn, may start the spiral of bank run which will force the bank to liquidate most of its assets at a loss and then led to bankruptcy.

When considering mechanisms that limit bankers' incentives to misbehave, it is important to distinguish market based monitoring and control from regulatory monitoring and control. *Market based discipline* relies on the suppliers of funds to banks, primarily depositors. Fear of bank runs tends to keep banks from excessive risk, and this is the point of market discipline. Many depositors are of course individuals with little capacity to monitor the banks, but there are also larger, institutional and more informed depositors, most of them larger banks. There are also other institutions of information useful to market based monitoring such as stock analysts, independent accountants, financial press, and credit rating agencies (Calomires and Beim, 2000).

Independent accountants, or auditors, are among the most fundamental institutions of information in financial markets. Unless financial results are fully disclosed according to a well-understood set of rules and have been audited and certified by outside accountants, the numbers will be opaque and suspect and the work of credit and stock analysts will become a frustration.

Of course, audits require specific accounting standards but these are insufficient without the local support from local governments in monitoring the application of these rules.

Stock analysts exist wherever there is a stock market. Stockbrokers and traders, typically hire stock analysts to supply them with ideas and recommendations for clients. It is well known that because of this connection, sell side stock analysts are biased toward optimism. Somewhat more reliable are the by-side analysts within mutual fund management companies and other institutional investors, but their recommendations are not usually available to the public. Nevertheless, stock analysts play a significant role in a healthy stock market. They are tenacious in chasing management and ferreting out details of complex risks and opportunities of the firms they track. They study the financial statements at a level of detail not usually possible for private individuals without a great deal of training and experience. Their business is communication and they are quick to make their recommendations known. Their work can be used to indirectly inform bank depositors about the financial position and credibility of their bank under the condition that part of the bank's equity is public traded in a stock exchange.

Financial press plays also an important role in the information of public investors and also bank depositors. There is a large market for business and financial newspapers and online services. Those who invest significant amounts of money, as long as bank depositors, are able to have everyday information about the earnings prospects or important facts that may affect a firm's future economic position. Bank depositors are able to use the information provided from the press for multiple uses. They may have an image of the performance and the prospects of their bank, but also they can monitor the banks' loan portfolio, at least for the major corporate loans on large companies.

Credit rating agencies role as information providers for depositors and bank investors will be analyzed more extensively, as they play a major role in the construction of the following empirical research. Their functions are of major importance in promoting the smooth working of public debt markets. There are in general two types: Those that rate public securities and base their views on public information supplemented by meetings by companies and those that rate private companies based on whatever private information they can accumulate including primary reports from trade creditors concerning the promptness of the firm's payments. Both types amount to a sharing of information among trade creditors who are both the primary source of the data and the primary users of the reports.

Historically, in 1909, John Moody published the first publicly available bond ratings, focused entirely on railroad bonds. Moody's firm was followed by Poor's Publishing focused entirely on railroad bonds. Moody's firm was followed by Poor's Publishing Company in 1916, the Standard Statistics Company in 1922, and the Fitch Publishing Company in 1916. These firms evolved over time and through mergers and acquisitions, at the end of the year 2000, Fitch Ratings, Moody's, and Standard & Poor's (S&P) had established global approval as the leading players in the rating industry. Still, today, there are 74 CRAs worldwide. In the United States, the Securities and Exchange Commission recognizes 10 of these as nationally recognized statistical rating organizations (NRSROs). Similarly, the European Central Bank recognizes the big three as well as DBRS as "external credit assessment institutions," while in Japan the big three as well as the two Japanese CRAs that also are NRSROs are considered "designated rating agencies" by the Financial Services Agency. However, only the big three CRAs are truly global and broad in their product coverage ("global-full spectrum"), the rest being either regional or product-type specialists (IMF, Oct 2010).

Sovereign ratings are assessments of the relative likelihood that a borrower will default on its obligations. According to their own definition, they provide a "current opinion of an obligor's overall financial capacity (its creditworthiness) to pay its financial obligations"(S&P 2009). Most of them have long had their own system of symbols –some using letters others using numbers, many both –for ranking the risk of default from extremely safe to highly speculative.

The emergence of the credit rating agencies is a classic example of how market institutions evolve to deal with asymmetric information in the absence of government intervention. The "good" that they provide is to evaluate financial claims according to standardized creditworthiness categories (L.J.White, 2010). Over time, the agencies have expanded the depth and the frequency of their coverage. The three leading agencies rate, not only the long term bonds issued by governments or large corporations but also a wide variety of other debt instruments: municipal bonds, asset backed securities, preferred stocks, medium term note programs, self registrations, private placements, commercial paper programs and bank certificates of deposit. More recently apart from sovereign risk, ratings have been applied to other types of risks including the counterparty risk posed by derivative products companies and institutions, the claims paying ability of insurance companies, the performance risk of mortgage services and the price volatility of mutual fund and mortgage–backed securities.

In the early 1970s, the basic business model of the large rating agencies changed. In place of the "investor pays" model that had been established by John Moody in 1909, the credit rating agencies converted to an "issuer pays" model, whereby the entity issuing the bonds also pays the rating firm to rate the bonds. Many reasons were proposed for this change of model: one is that the printed version of ratings lists could easily be copied allowing many investors to obtain this information for free. Another one is that the bond rating business, like many information industries involves a "two-sided market," where payments can come from one or both sides of the market in that the information can be paid for by issuers of debt buyers of debt, or some mix of the two and the actual outcome may sometimes shift in idiosyncratic ways the door to potential conflicts of interest: A rating agency might shade its upward so as to keep the issuer happy and forestall the issuer's taking its rating business to a different agency. However, the rating agencies' concerns about their long-run reputations apparently kept the actual conflicts in check for the first three decades of experience with the new business model (L.J.White, 2010).

Another important change for the credit ratings industry is the incorporation of the agencies ratings in the regulation framework of the financial system. As ratings have gained acceptance in the marketplace, regulators of financial markets and institutions have increasingly used ratings to simplify the task of prudential oversight. The early regulatory uses drew only on the agency distinctions between investment grade securities, or those rated by BB and above, and speculative securities, or those rated BBB and above (Cantor and Packer, 1994). Credit ratings have typically been used to prohibit certain institutions from holding low-rated securities, to modify disclosure requirements (with investment-grade issuers allowed to use simplified disclosure statements), and to adjust capital requirements (with holdings of low-rated securities being subject to higher capital requirements). Such requirements have been viewed as a vehicle for increasing creditworthiness awareness, limiting imprudent behavior, and introducing elements of market discipline. Since 1975, in the United States, ratings were matter only if they were issued by an NRSRO. The first recognition included only three agencies but in the future their number was increased. However the US SEC's procedures and condition of recognition of ratings organizations have been quite obscured. In 1999 the Task Force on the Future of Capital Regulation of the Basel Committee on Banking Supervision has proposed using ratings to help determine sovereign and private sector risk weights in a revision of Basel capital requirements.

The use of ratings in the regulatory process has been subject to some controversy, and the major rating agencies have concerns about using ratings in this way. In part, there are concerns about how accurately credit ratings reflect underlying risks (particularly for sovereigns). Moreover, it has been argued that the linkages between regulatory requirements and rating changes can have a sharp impact on market dynamics, both within national markets and across borders. For example, one concern is that if a sovereign is suddenly downgraded from investment to non-investment-grade in the midst of a crisis, then a number of institutional investors could be faced with either higher capital charges or prohibition on continued holdings of the sovereign's securities. The ensuing portfolio adjustments could limit the funding available to sovereigns or impose higher borrowing costs (IMF Sep.1999). The bankruptcies of Enron in 2001 and WorldCom in 2002, both of which had maintained high investment grade ratings before their collapse, triggered a wave of controversy about the effectiveness and the prudential value of ratings, as they were unable to warn the investors about the downfall of those companies. The major rating agencies still had "investment grade" ratings on 'Lehman Brothers' commercial paper on the morning that Lehman declared bankruptcy in September 2008.

However, the agencies argument was that their ratings should avoid frequent fluctuations in order to avoid procyclicality in the way that a downgrade of a systematically important could trigger a potential chain reaction that could lead in recession. Additionally, the stability of ratings was justified by the argument that is driven by an aversion of market participants to the potential transaction-related costs that would be triggered by frequent rating changes (Cantor and Mann, 2007). One of the ways in which CRAs achieve this stability is by rating "through the cycle" (TTC) instead of at a "point in time" (PIT), thereby attempting to avoid procyclicality. In more practical terms, ratings are typically based on the ability of an issuer to survive a cyclical trough. Once the rating is set, it is changed only in response to changes in fundamental factors, such as secular trends or unanticipated policies. Under this approach, a recession or tightening of global liquidity should not, in itself, trigger a downgrade (IMF GFSR, 2010). On the other hand, the sluggishness of the ratings raised questions about their informative value and their quality. Empirical researches (e.g. Cantor and Packer, 1996, Creighton, Gower, and Richards, 2007) found that when a major rating agency changes its rating on a bond, the markets react. But White (2010) also notices that this reaction by the financial markets might be due to the concomitant change in the implied by the financial

markets might be due to the concomitant change in the implied regulatory status of the bond. Generally, the question of what true value the major credit rating agencies bring to the financial markets remains open and difficult to resolve.

Despite the general doubts, the recent crisis of 2008 was a chance for partial changes in the regulation system regarded to the credit rating agencies. For example, they were prohibited from participating in the design of asset backed securities that then were asked to rate them. Additionally, in US, an attempt was made to increase the transparency of the recognition framework by allowing more agencies to be officially recognized. However, to this point the SEC's belated efforts to allow wider entry during the current decade have had little substantial effect. The inherent advantages of the "Big Three's" incumbency could not quickly be over-
inherent advantages of the "Big Three's" incumbency could not quickly be overcome by the subsequent NRSRO entrants. After all, the regulators could not ignore that historically, lower credit ratings were highly correlated with default probabilities (Cantor and Packer 1994), so they maintained the role the use of ratings in the regulatory framework. That indicates that despite the impact of the disability to predict the recent collapses of systemically important institutes that led to the 2008 crisis, the information they provide still matter a lot for market discipline of firms and in particular, financial institutions.

3. Banks – Risk and the government safety net

The previous section provided a theoretical foundation to support the importance of the financial intermediaries and more specifically of the banks in the financial system. The first part was oriented in the financial intermediaries' contribution in the financial growth and the presumptions needed for the financial system to contribute in economic growth. The second part presented the basic problems that appear in the transactions among the participants of financial system. Issues such as adverse selection were able to be overcome though the existence of financial intermediaries. We also saw that other problems emerged because banks subjected to new information asymmetries problems; they had to be monitored through the market discipline or regulation-based monitoring.

In the present section, the role the banks play will be better understand through the structure and the functions of a typical bank. The structure and the functions of a typical bank, in turn, will support a brief analysis about the bank's opacity. Additionally both, bank opacity and the information asymmetries that affect the depositors' behavior towards their bank will provide justifications for the existence of the government safety net. At the end of this section, the role of the bank's capital will be examined as long as the regulatory framework that defines the extend and the quality of the bank's capital.

3.1. The functions of a typical bank

The best tool for anyone who has the most elementary accounting knowledge, to understand the functions of a typical bank is a simplified balance sheet (figure 3.1).

Assets	**Liabilities**
RESERVE • Cash • Deposits in Central Bank LOANS OTHER INVESTMEND • Bond s • Stocks	DEPOSITS MONEY MARKET FUNDING Part of it in foreign currency EQUITY

Figure 3.1: Balance sheet of a typical bank

On the asset side, the main elements are the *liquid reserves*, the *loans*, and the bank's *investments*. Liquid reserves include cash in bank's safe box, and the bank's deposits in the central bank. These are the money available to the bank to make any payment, or, they are, according to the financial terminology, the banks most liquid assets. The bulk of a bank's assets consist of loans to households, firms, government organizations and other financial institutions. Unlike reserves, loans are characterized from very low liquidity.

Regardless the bank's need for cash, the bank is unable to request the immediate repayment of the loan before its maturity. Additionally loans are not negotiable in an organized market as stocks and bonds so the bank is unable to sell them directly in order to gain some additional liquidity. Finally, investments include stocks, corporate or government bonds, real estate, participations in other companies and other kinds of investment. Their composition depends on the regulatory framework in which the bank is subjected to and also in the competitive environment and the bank's strategy.

On the liability and capital side, the higher proportion consists of *deposits*. Other liabilities are the bank's funding from money markets. It could be short term, for example interbank funding, or long term, through the capital markets. Part of money market funding could be in foreign currency and there is the bank's exposure to currency risk that will be analyzed below.

Finally, equity or net worth is the real value of the bank, or, the wealth of its owners-stockholders. A bank with positive net worth is able to receive money by the liquidation of their assets, and then repay all its obligations to depositors, short term lenders and bond holders and what remains, should be returned to the bank's stockholders as a payout.

A *solven*t bank is the one that has a positive net position at present and is expected to have a positive net position in the future. The time dimension of solvency has to do with the fact that all the transactions either belong in the asset side or they consist of a liability, have two important moments: the present time where depositors place their money in the bank or borrowers enter a loan contract and a time in the future when correspondingly depositors would ask their money back and borrowers will repay their loan. Both parts involved, but especially depositors, are interested in the bank's ability to repay its liabilities in that time in the future.

Generally, the liability side represents the sources of funding for the bank. In that way the bank becomes a borrower whose lenders are the depositors and investors, and the owners of the

bank have the total amount of money available to the bank to make its own investment which is represented by the asset side. The general equality that holds is:

(Value of Assets) = (Value of Liabilities) (3.1)

The above identity reveals an important aspect of the functions of commercial banks: the money they have comes from somewhere. One consequence of this is that the bank's ability for lending depends on the ability to attract funding either from depositors or other investors. Whatever limits that ability, limits also the ability of the bank to provide loans which has a direct effect on the overall economy as it affects consumption, investment and development. The limitations of this ability can come from the market discipline that was analyzed in previous chapters. If the markets are not sure for the bank's insolvency, they will not trust their money in this bank, and so, it will not be able to provide new loans. Additionally the limitations could come from the regulatory framework which in an attempt to reduce the bank's probability to default from a bank run, sets upper limits in the banks' leverage which by approximation, is the amount of money the bank is allowed to borrow for every unit of its equity. Higher leverage means higher borrowing for the bank, more loans on the assets side, higher profitability but also higher risk.

In order to complete the presentation of the banks' functions it would be useful to present the way how the typical bank makes its profit. Another accounting statement would be used and that would be the typical banks income statement (figure 3.2):

A. Net interest income:
   Proceeds
   Minus interest expenses

B. Net non-interest income:
   From commission
   From insurance activities
   From brokerage
   From dividends and other non interest income from investment portfolio

C. Other expenses:
   Personnel costs
   Management costs
   Depreciation

D. Loan- Loss Reserves

E. PROFIT BEFORE TAXES: A+B-C

Figure 3.2: income statement of a commercial bank

From figure 2 we can see that a bank makes its primary source of income by the interest it charges on loans minus the interest paid on depositor (interest rate spread). Additionally, an important part of the bank's income comes from other services the bank provides to customers such as brokerage or consulting services or from its investment activities. The rest operational or other costs are usually lower relatively to other costs. Part of the profit after taxes is paid as dividend to the stockholders while the remaining amount adds up in the bank's net position. In case of losses, net position is reduced at equal amount (A.A. Antzoulatos 2011).

Generally, based on the banks income statement, when markets refer to the banks' profitability, they focus on the percentage of net income to shareholder's equity, or to the Return on Equity (ROE):

$$ROE = \frac{Net\ Income}{Shareholder's\ Equity} \quad (3.2)$$

Net income is for the full fiscal year (before dividends paid to common stock holders but after dividends to preferred stock.) Shareholder's equity does not include preferred shares.

Due to the restrictions of regulatory framework banks used to limit their sources of profitability to the traditional banking activities of loan providence which was funded by deposits. From the 70'sonward, financial system followed a more liberal path. Since then, the relaxation of regulatory framework along with the increased competition and with the assistance of technological revolution in systems information systems, banks begun to engage more in trading and service providence that increased their potential sources of profitability.

Today's largest banking organizations engage in a variety of nonbanking activities. These include the traditional investment banking activities of securities underwriting, merger and acquisition advice, and a variety of other activities. Among these other activities are securitization, securities lending and borrowing, prime brokerage, market making in securities and derivatives, and customer and proprietary trading. Banking organizations benefit from these additional activities because they can provide additional revenue and increase the diversification of assets and revenue streams. However, the benefits can be outweighed if the additional complexity makes it more difficult for the market, bank management, and regulators to assess, monitor, and control risk taking that endangers financial stability and expands the costs of and risks to the public safety net (Morris 2011). Additionally, DeYoung and Rice in an empirical

study found that the increase in non-interest income was accompanied with an increase in the banks' earnings volatility (DeYoung and Rice 2004b).

3.2 Intermediation and risks

The operations of the banks as financial intermediaries can be summarized in three transformations: risk transformation, maturity transformation and size transformation. Because of them, banks face many inherent risks in their activities and that makes them vulnerable in any change of the economic environment or in the behavior of their clients.

On the other hand, banks are able to proceed with higher effectiveness in the transformations mentioned above than other institutions or individual participants in the financial system. Their competitive advantage lies in the fact that they can use their joint expertise through economies of scale and scope in order to reduce the costs of those transformations. More specifically, they use economies of scale by increasing the production volume. When their services are provided in a large scale they are able to reduce the cost of production. Additionally, the products and services they provide are usually standardized, for examples loans and deposit contracts have the same terms for many clients, so they are able to develop economies of scale to reduce the development costs of those products.

From these transformations, the *size transformation* is the only one that does not expose the bank in any risk. Briefly, banks are able to collect small amounts of cash from many depositors and then join them in large bulks of money that can be used to fund a major expensive investment project. Without the bank, it could be immensely costly for each individual depositor to fund the project by themselves.

The transformation that adds the higher value in the banks role in the financial system is the *risk transformation*. When an individual lends money directly in a household or a firm, both the lender and the borrower may avoid the costs of bank intermediation. However because of the problems of asymmetric information and moral hazard, the lender is exposed in *credit risk* which is the probability that the borrower will not return the money either because of unwillingness or inability. A bank is able to take that risk and minimize the cost and the consequences of the problems caused by information asymmetries. Through the screening process, a bank is able to ex-ante reject borrowers that have a high potential of non compliance with their obligations, and

with ex-post monitoring and mandatory contracts, can force the borrower to comply with his obligations. The bank depositor, who is the provider of the funding, has replaced the uncertainty of direct lending with the certain return of his deposit along with the interest payment.

In the bank's balance sheet, we saw that the bulk of the bank's liabilities were the deposits that are considered to be short term liabilities. On the assets side, loans are long term claims. The process of transformation of short term liabilities into long term claims is called *maturity transformation*. Due to this transformation, banks are subjected to two other risks, which are, the interest-rate *risk* and liquidity risk.

Deposits are concerned to be short term because they are able to withdraw their money whenever they want without any warning. Even in case of term deposits they have the same ability by paying a penalty to the bank. The other major liabilities, the money market funding is also considered to be short term because their maturity ranges from one day to a few months. On the contrary, loans have long term maturity; For example, mortgages usually last more than thirty years. Additionally, many of these loans are of fixed rate. While in most deposits, the rate is determined by the competitive environment, economic conditions or other bank specific conditions and is quite volatile.

As a result, the maturity transformation exposes the bank to liquidity risk and also interest-rate risk. *Interest rate risk* comes from the volatility of deposit interest rates relatively to the stability of lending interest rate. Because of this risk, a raise in market interest rate, could lead in a raise in deposit rates. According to the analysis of income statement, a raise in deposit ratings along with the fact that most long term loans are of fixed rate, could lead in a drop of the interest rate spread that, in turn could lead to a drop in the bank's profits or even net loss.

Under normal circumstances banks are able to replace withdrawals with new deposits, and so, maintain their necessary liquidity needed to repay other obligations that derive from securities held in the liabilities side of the bank's balance sheet. In case of liquidity, banks become unable to comply with their obligation and also are unable to provide new loans to maintain their profitability. The disorder may come from a variety of reasons, such as a disorder in financial markets or even negative expectations of depositors about the solvency of the bank. The implications of such a disorder in the liquidity levels or the *liquidity risk*, confirms the fact that banks are fragile organizations. Liquidity risk is also one of the reasons of intervention of regulatory framework through the government safety net that protects banks from liquidity issues.

Some additional risks that the banks are exposed to, come from the liberation of financial system or the high reliance on technology. Briefly, the liberation of financial system has led banks to expand their activities to other countries by providing loans or receive funding in foreign currency. That makes them exposed in *country risk* and *exchange rate risk*. Moreover, the technology the banks use in order to respond in the operational complexity needed for a bank in order to participate in a highly competitive and liberated financial system, makes them vulnerable to malfunctions of equipment or errors whose implication could hurt the banks' profitability. That's why banks are also exposed in *technology risk* and *operational risk*. Finally, the investment activities the banks have engaged the last years and have increased their non-interest income have exposed the bank in risks related to the volatility of the value of their securities portfolio. That makes them exposed in *market risk* (A.A. Antzoulatos 2011).

3.3. Bank opacity –Definition and measures

Definitions

Opacity is the lack of clear, accurate, formal, easily discernible, and widely accepted practices in the broad arena where business, finance, and governments meet. As the globalization of economic life advances, all participants recognize that the relative opacity *or* transparency of capital markets varies enormously. A widely shared view has emerged that greater opacity raises greater obstacles to the economic progress of countries and their citizens. Similarly, a view prevails that greater transparency across many dimensions of capital markets encourages investor confidence and keeps the costs of doing business under control (PriceWaterhouseCoopers 2002).

Jin and Myers (2006) define firm opacity (or opaqueness) as reduced firm information available to outside investors. Two implications flow from their definition. First, opacity reduces firm-specific information available to outside investors and affects the division of risk bearing between firm insiders and outside equity holders. Second, outside investors, in the presence of limited firm-specific information, replace unknown firm-specific information with its expected value, conditioned on the information available to outsiders

Many theoretical and empirical articles have indicated that banks are, by nature opaque organizations. For example, Diamond (1984) mentions that banks hold few fixed assets, and the

risk of their mostly financial assets are relatively hard to observe or easy to change. Their primary assets, loans, are often made to borrowers who require substantial screening and monitoring. Holding these claims on hard-to-monitor borrowers may make banks themselves opaque. Additionally, the wave of financial liberalization has led many banks to engage in investment activities including trading of liquid securities and derivatives. The increase in their investment portfolio may shrink the banks' debt capacity (the amount of debt that a firm can bare without increasing its corporate value) because the risk of trading is hard for borrowers to track (Myers and Rajan 1995).

As mentioned previously, a bank can be considered as solvent when its net position is positive now and also expected to remain positive in the future. For the second, is necessary for the bank's sum of present net position and the expected future earnings to be and remain positive. If a bank is expected to be profitable in the future, its net position is expected to be increased. On the contrary, if the bank is expected to suffer losses its net position is reduced gradually and at some point in the future, it will become negative, so, all the stockholders will lose their capital and the bank will be led in bankruptcy.

The difficulty in evaluating the actual state of a bank at present, lies on the fact that it is difficult to evaluate the real value of its net position, because of the asymmetric informational context of the bank's assets relative to the liability. More specifically, the liabilities, deposits and money market funding, are evaluated at face value. On the contrary, loans and other investments, which consist of the most part of the assets' side, are evaluated in their real value. On the asset side, cash and deposits in central bank, are the only elements that are priced in their real value. Because of the difficulty to evaluate the real value of loans and investment, there is an objective difficulty in evaluating the net position of a bank.

In greater detail, banks are obliged to repay depositors and other financiers according to the terms of their funding contract, regardless the return of the existing loans or other assets of the investment portfolio. Not repaying the depositors would lead the bank in bankruptcy because the side of depositors would turn in courts in order to claim the previously agreed return or to capture back the most they are able to (A.A Antzoulatos 2011).

On the other hand, there is a high difficulty in the determination of the real value of the loans portfolio. Bank insiders may possess valuable information about loan customers' credit condition or the bank's monitoring procedures. On this topic, Federal Reserve Board ex-chairman Alan Greenspan mentions that bank loans are customized, privately negotiated

agreements that, despite increases in availability of price information and in trading activity, still quite often lack transparency and liquidity. This unquestionably makes the risks of many bank loans rather difficult to quantify and to manage (Greenspan 1996).

The fair value of any marketable security can be easily determined if there is an organized market where that security can be priced and traded or in accounting terms, their value can be determined through a mark-to–market procedure. Such securities are stocks, bonds and derivatives traded in organized markets. On the other hand, assets such as real estate investments or loans cannot be priced by the same way because each one is unique and cannot be compared to the price of another similar asset. Additionally, these assets are not tradable in organized markets so their value is determined from complicated statistical models (Saunders and Cornett 2006) of which the accuracy and credibility is questioned. In accounting terms, their valuation follows the mark-to-model method. As a consequence, there is an objective weakness in the determination of the fair value of assets such as loans, as long as the collaterals that are subjected to those loans. Additionally, non-payable and doubtful loans will have lower price than their nominal price. Their real value is the money that the bank expects to receive after the loan renegotiation or in case of bankruptcy for the borrower after the liquidation of his assets. The estimation is difficult even for the bank itself that had already made a thorough analysis in the borrower's assets; let alone the depositors and other financiers that neither have the expertise nor the access in relative information.

The opacity of a bank can be more intense in an unstable economy infected by high inflation. For example, the depreciated book value of fixed assets tends to understate the market and present value of existing assets and its replacement cost. Moreover, the bank's general reserve may fail to keep up with inflation. The purchasing power of financial assets diminishes so that interest rates will be high if the real value of the principal is to be maintained. Even when the bank requires collaterals to protect itself when making a loan, the market value of the collateral will change with economic conditions (Lindgren, Garcia and Saal, 1999). Under inflation, the real value of the loaned companies is hard to be measured as the viability of those companies along with the probability to repay their loans at full extend is under doubt. Generally, in unstable economic conditions, the state of every economic factor, including banks, may change unfavorably in very short time. For example, a sudden drop of demand, will lead many companies in bankruptcy and the non payable loans will be increased.

On the other hand, banks recognize all these issues, so they attempt to prepare themselves for the impairments of non payable loans. Using their experience along with statistical methods, they estimate a percentage of expected loss that is added in every new loan they offer. That percentage is clearly shown in the state of income statement where is deducted from the bank's profits. So, if the losses are within this figure there is no reason for depositors and investors to worry about the bank's future. The problem there lies in the fact that there is high uncertainty that the estimations for this percentage are correct (A.A. Antzoulatos, 2011). Additionally, bank managers have incentives to manipulate that percentage depending on the general economic conditions, and more specifically, in good times they overestimate it and present lower profitability than the real one but in bad times where the losses are higher, they underestimate that percentage and their accounting statement shows that despite the bad economic conditions the bank has minimized its looses.

D. Morgan (1997) using the disagreements of rating agencies as a proxy for bank's opacity, made a first attempt to determine the bank-specific factors that affect the banks 'opacity. Some of them have already mentioned in the analysis above, but it may be useful to provide a more concentrated image that will be helpful in the understanding of the empirical part of this work in the next section:

Loans: Banks may be opaque because of the loans they hold. The role of banks is to screen and monitor borrowers so that savers (depositors and other lenders) do not have to. If banks are doing their jobs as delegated monitors, they should know more about the risk of their loans than depositors or other outside investors. The fact that investors bid up a firm's share price after its bank loan commitment is renewed suggests that banks are better informed about their borrowers than market participants.

Trading: Increased trading may also make banks more opaque. Much of the trading banks now do involve complex derivative instruments whose risk may be hard to measure. Trading in general, even in plain vanilla securities, also leads to the classic agency problem of asset substitution since traders can change their position without the knowledge of even to their own managers, much less outsiders like creditors and regulators. A series of spectacular losses has highlighted the risk associated with trading by banks. Barings Bank, a venerable British institution, was brought down by losses resulting from trading in currency derivatives by a single trader. At Daiwa Bank, a senior

bond trader managed to lose over $1 billion while maintaining secret accounts for eleven years.

Fixed assets. If more liquid trading assets increase uncertainty about risk, it follows that fixed assets like premises should reduce it. While trader can quickly and privately change their positions, the position of fixed assets is harder to change; a bank's vault is hard to move. The value of fixed assets fluctuates of course, but the fluctuations are more likely due to market changes and less likely due to the actions of the owners and managers.

Leverage. The opaque or easily substitutable nature of banks' assets gives them opportunities for risk shifting and their high leverage gives them incentive to do so. All else equal, leverage increases risk because such firms have a smaller capital cushions against the risks that are inherent to the firm, or against market risk. But leverage also invites risk-taking, since creditors bear more of the down-side risk. Once debt has been sold, the owners of the leveraged firm have the incentive to take on more risk than creditors expected when they bought the debt. Risk-shifting not only increases risk it will also make the banks' risk harder to judge to the extent banks have incentive to conceal their risk-taking (D. Morgan, 1997).

Iannotta (2004), using similar same methodology (split ratings on bond issues), adds also capital structure in the above factors that affect the levels of a bank's opacity. More specifically, the increasing the ratio of capital to total assets increases the likelihood of a split rating (by about 15 percentage points). This finding might be explained by the role of capital in banks. Banks are required to hold a certain minimum level of capital as a percentage of risk-adjusted assets. A higher level of capital reduces risk, which is the main reason for regulators to set a minimum capital requirement.

Apart from capital levels, regulators attempt to increase the transparency of banks by demanding analytical disclosure. The Basel Committee on Banking Supervision has recognized the role of market discipline in supplementing traditional supervisory methods. In the Basel II Accord (BIS 2004), market discipline is one of three pillars on which the future banking oversight should be based. While the first two pillars focus on capital regulation and national banking supervision, the third pillar is aimed at improving banks disclosure for an effective market discipline. Among other conditions for an effective market discipline, investors should

have complete information on bank risk and promptly impound this information into the banks stock and bond prices. This condition can be undermined by bank opaqueness (Iannotta 2004).

On the other hand, bank regulations can undermine bank transparency through insufficiencies in the regulatory framework. For example, the ambiguity in the determination of specific securities that can be used as contingent capital, such as subordinate debt instruments, has raised doubts about the capital adequacy of many banks (Maes and Schoutens 2012). Additionally, the way that weights are calculated for the determination of risk weighted assets is another source for opacity. Especially, large banks that have the sufficient human capital along with the corresponding expertise develop internal models for the determination of the incorporated risk level in their assets portfolio. Markets especially after the 2008 crisis have increased their doubts about the effectiveness of those models and have turned to the conclusion that these methods increase the banks' opacity.

Measuring opacity

In the paragraphs above, it was explained through examples and theoretical arguments why banks are, by nature opaque organizations. We indicated some bank-specific sources of opacity such as the lending procedure, trading activities and manager's decisions, but also mentioned external sources of opacity that may come from government intervention, or the structure of the regulation framework. Markets are aware of this issue. Investors and depositor's decisions are affected from the depth of a bank's opacity, in ways that could actually harm one bank's viability. More specifically, poorly informed investors and depositors could subject the banking system to destabilizing runs, or liquidity problems that may derive from inadequate equity funding. Moreover, opacity could cause destabilizing expectations even when the bank's real condition is not problematic. So, it is important for banks to willingly provide transparent information to the markets through reliable accounting disclosure. Motivation for transparency should not be based only on the compulsory character of the regulatory framework but also on the fact that markets can turn against a bank, not only because of bad performance, but also due to lack of transparency.

On the other hand, markets consider bank's opacity as a qualitative characteristic, the level of which can be affected from many factors such as a negative for the bank announcement, a change in government's policy towards the banks, or even a bad rumor derived from a competitive bank and spread through press and other channels of information. That qualitative

measure attempted to be quantified by academic researchers in order to derive conclusions about the level of bank's opacity, or the impact that has in financial markets.

First, Cantor, Packer and Cole in 1997 investigated the pricing of bonds relatively to the disagreements upon credit ratings agencies and found that the predictive power of the average rating was falling as the size of disagreement was increasing, indicating that investors could not rely as much on the raters when there is more disagreement between two ratings. Disagreements among rating agencies had already been analyzed in Cantor and Packer (1994). Some of the observed differences were attributed to different rating methodologies, while others are results of the judgmental element of the rating process. Many of the differences, however, reflect systematic differences among agencies in the acceptable level of risk in any ratings category. In the same paper, they also mentioned that rating agencies disagree more in their measurement of credit risks for banks than in the risk measurement for other industries. Morgan (1997) also found significant disagreements upon rating agencies opinions for the banks. By running multiple regressions he determined a series of factors that could affect this disagreement such as the leverage of the bank, the substitution of loans with securities or the substitution of cash with fixed assets or premises. Iannotta (2006) found similar results by comparing the ratings of bank's bond issues and added another factor that affects the ratings split which was the level of use of subordinate debt.

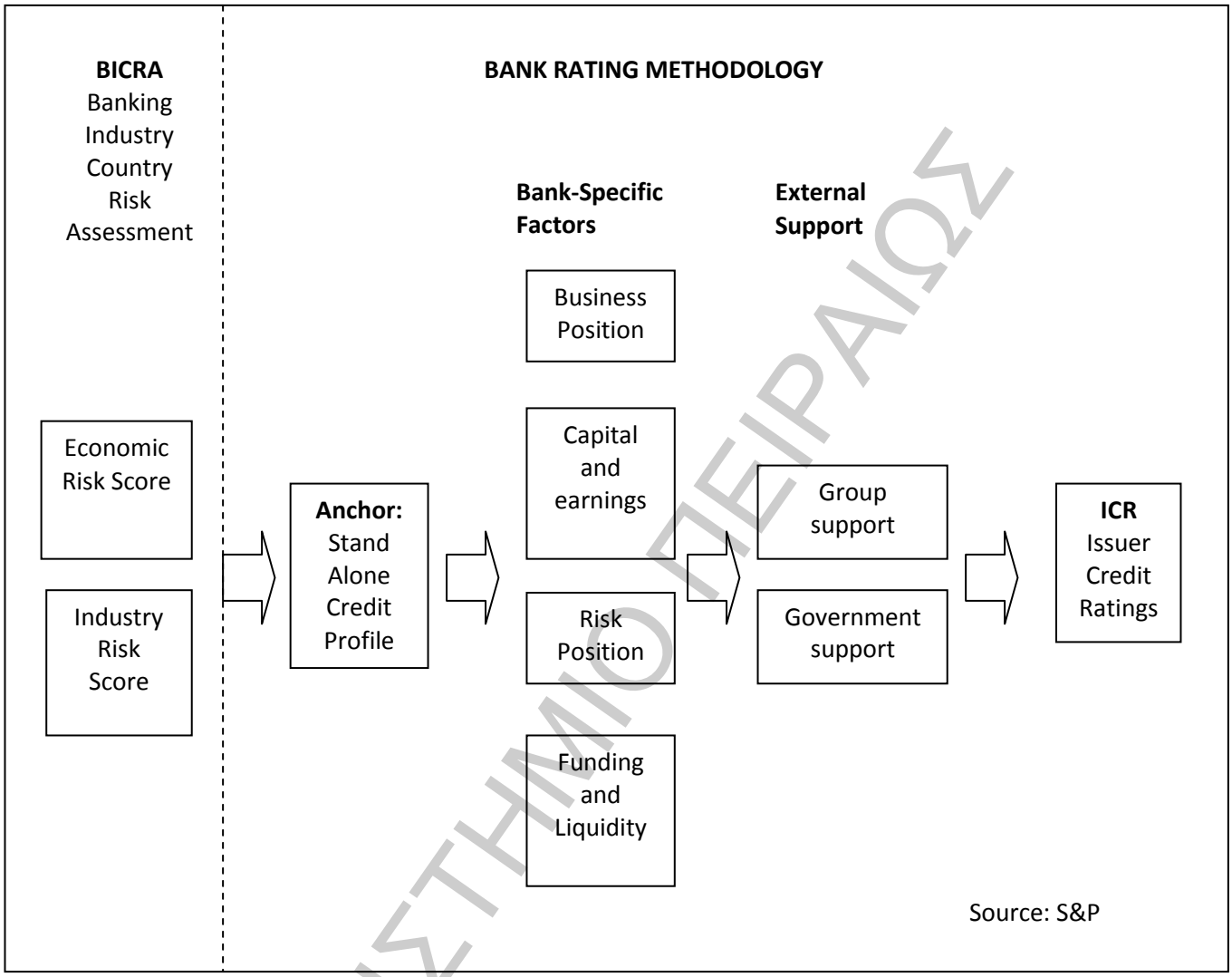
Yet, papers based on other proxies such as elements of microstructure of bank's equity didn't have as clear conclusions as the disagreements upon agencies at the determination of bank's opacity. Flannery Kwan and Nimalendran (2002) examined proxies such as the adverse selection component of the bid-ask spreads, the trading volume and the return volatility. They conclusions were that small banking companies traded in the NASDAQ index, had low bid-ask spreads, low return volatility, and low trading volume. They characterized them as "boring" with the conclusion that opacity is not a prominent feature of these banking firms. Additionally comparing large banking companies with non banking firms, they concluded that investors valuate large banks as readily as they evaluated the nonfinancial firms. Their conclusion was explained on the basis that regulatory framework worked effectively in minimizing the opacity effects on the behavior of the investors.

The present work following Cantor and Packer (1994) and Morgan (1996) will also use the split between the ratings of the two most systematically important rating agencies, Moody's and Standard and Poor's (S&P). More specifically the comparison will be between the Moody's

long term foreign deposit rating (LTDR) and S&P's long term foreign deposit rating. Both agencies in their ratings assess. Moody's methodology on the assessment of LTDR will be presented at following chapter, so, it could be useful to provide a summary of the corresponding method by S&P.

For S&P, stand alone risk profiles are based on anchor profiles that derive from their Banking Industry Country Risk Assessments (BICRA). A BICRA analysis for a country covers rated and unrated financial institutions that take deposits, extend credit, or engage in both activities in a particular country. The analysis incorporates the entire financial system of a country by considering the relationship of the banking industry to the financial system as a whole. It also incorporates the influence of government supervision and regulation of the banking system, including existing emergency system-wide support programs. It excludes the potential for targeted government intervention and rescue of specific financial institutions. The BICRA methodology is divided into two components: "economic risk" and "industry risk." The analysis is then further divided into six "factors" (economic resilience, economic imbalances, credit risk in the economy, and industrial framework, competitive dynamics, system wide funding), that result in an economic and industry risk score for each country. Then using the economic and industry scores produced by the BICRA analysis the agency determines an anchor which acts as a starting point for determining a bank's stand-alone credit profile (SACP). Next, the methodology consists of two key steps: determining the SACP and assessing extraordinary government or group support. Once the likelihood of extraordinary support is established, then the criteria establish a bank's indicative issuer credit rating (ICR). The summarized methodology can be presented in the following scheme (figure 8.1). (S&P, Rating Methodology and Assumptions, Nov, 2011)

Figure 8.1: Summarized bank ratings methodology by S&P



The agency plans to accomplish the establishment of a bank's indicative issuer credit rating by placing less emphasis on diversification benefits and more on the risks related to off-balance sheet derivatives and structured finance instruments. Earnings analysis will focus on risk-adjusted performance and ability to use retained profits to increase the bank's level of capital. In addition, in determining the role of extraordinary external support in all-in ratings (including both government and group support), Standard & Poor's will pay particular attention to banks' systemic importance and governments' tendency to support banks. All else equal, greater systemic importance would lead to a better all-in rating. (Packer and Tarashev, 2011)

3.4. Government safety net

The positive effects of deposit insurance schemes now seem generally agreed, at least by government and international officials. One important benefit is consumer protection, for those deemed incapable of adequately assessing the riskiness of individual banks themselves. But a still more important benefit has to do with the increase in systemic stability generated by the reduced likelihood of bank runs. Following on the original article by Diamond and Dybvig (1983), banks are inherently fragile and that the decision to "run" can be perfectly rational behavior in the face of uncertainty as to possible (if unlikely) outcomes. Supposing for some reason that financial problems have begun to emerge, deposit insurance reduces the uncertainty that might otherwise be generated about the safety of deposits. In turn, this reduces the collateral damage that might otherwise follow if the failure of a single institution were to generate concerns about the safety of the system as a whole. Nakaso (2001) makes the case for deposit insurance in a rather different way. He argues that in the absence of either an adequate explicit or even an implicit deposit insurance scheme in Japan in the early 1990s, the official sector was fearful of a sudden collapse of confidence in the banking system. Such concerns led to an alternative reliance on official forbearance and generalized infusions of liquidity to maintain stability (W.R. White 2004).

Here is an example of how deposit insurance works in the United States banking system. Deposit insurance is provided by the Federal Deposit Insurance Corporation. There, the depositors are paid off full on the first $100.000 they have deposited in a bank if the bank fails, an amount that rose to $250.000 during the subprime crisis of 2008. With fully insured deposits, depositors don't need to run to the bank to make withdrawals because their depositors will be worth 250 cents on the dollar no matter what. The advantages of this measure can be measured as from 1930 to 1933, the years immediately preceding the creation of the FDIC, the number of bank failures averaged more than 2000per year. After the establishment of FDIC in 1934, bank failures averaged fewer than 15 per year until 1981 (Mishkin 2004).Several countries have also adopted or expanded deposit insurance during crises. For example, after two crises in the 1980s, Argentina abandoned deposit insurance in 1992, only to adopt a system of limited coverage in 1995 in response to the Tequila crisis. Thailand moved to blanket insurance in 1997, including coverage of deposits at finance companies. Mexico is the first developing country recently to

have put in place plans to reduce blanket coverage, following its experience with the 1994 crisis, so experience with this transition is necessarily limited among emerging markets.

It is not hard to see why explicit deposit insurance systems have become increasingly popular. The political calculus is in their favor. For one thing, they can appear to be a direct and seemingly costless solution to the problem of bank panics and runs. Protection of small depositors is also politically attractive. There are other political forces favoring the introduction of deposit insurance, too. For example, a deposit insurance scheme can help small local banks in emerging markets acquire or retain their market share of deposits that might, in the absence of insurance, migrate to large and especially to foreign-owned banks. Additionally, by providing a deposit insurance scheme, the government may feel that, in political terms, it is also buying the right to step in with regulatory intervention, as necessary, including the right to close un-sound or insolvent banks (WB 2001).

It is worth there to mention that the government deposit guarantee does not have the same effectiveness among the countries that have adopted this measure. In poor institutional settings, generous design features tends to destabilize the banking system and to undermine market discipline. Demircguç-Kunt and Kane, (2002), show that weak institutional environments undermine deposit-insurance design. More specifically, Demircguç-Kunt, Kane and Laeven (2006) found that high-income, institutionally more advanced countries and those that experience a financial crisis are also more likely to adopt a measure deposit protection. Income and institutional quality, external pressures and internal politics, also play significant roles. Countries with more-democratic political systems prove more likely to adopt an government deposit insurance measure and to incorporate inadequate risk controls, all the more so if adoption occurs during or in the wake of a crisis.

The lender of last resort (LOLR) instrument is another form of government safety net and is defined as comprising emergency lending by central banks to individual institutions. This instrument of crisis management was first discussed at the beginning of the 19th century and has been part of the central banker's potential ever since. The initial rationale for this mean of intervention, was runs on banks by retail depositors but, in more recent years, the official sector has tended to put greater focus on failures in the interbank market where lending is typically unsecured. The concern is that, faced with uncertainty about the solvency of counterparty, there could be a withholding of credit even from a sound bank. While dangerous enough in itself, should the payment system also be compromised the collateral damage might be even greater. In

such circumstances direct liquidity support of the individual bank in question would seem to be essential.

The use of the LOLR instrument does seem to have changed over recent years, but in the direction of less use rather than more. In both Europe and North America, banks increasingly prefer to rely on market sources of funding lest it be inferred from their recourse to public funds that they might be having difficulties. On the other side of the transaction, central banks also seem to have backed away from Bagehot's dictum[i] of lending freely on good collateral (W.R. White 2004).One important exception among the central banks of the industrial countries has been the behavior of the Bank of Japan. Over the last decade, and in sharp contrast to earlier behavior, the Bank of Japan has used its LOLR instrument repeatedly to help support individual institutions that were no longer able to turn to the interbank market (Nakaso 2001). However, this trend changed in the recent subprime crisis of 2008 where the Federal Reserve Bank in United States, through the Trouble Asset Relief Program, provided liquidity to troubled financial institutions by purchasing premium shares of troubled institutions in order for them to find the necessary liquidity. Similar projects of liquidity support during a particularly virulent phase of the subprime financial crisis were adopted by governments and central banks in many developed countries during the subprime crisis.

Although a government safety net can help protect depositors and other creditors and prevent, or ameliorate financial crises, has also created many concerns about its potential repercussions in the financial system. The most serious drawback of the government safety net comes from the previously mentioned issue of *moral hazard* where the incentives of one party to a transaction engage in activities that may harm the interests of the other party. Moral hazard is an important concern in insurance arrangements in general because the existence of insurance provides increased incentives for taking risks that might result in an insurance payoff. When governments provide the safety net to the financial institutions, they should carefully concern of moral hazard. With a safety net depositors and creditors know they will not suffer losses if a financial institution fails, so they are not motivated enough to impose market discipline discussed above (see section 2.2) by withdrawing funds when they suspect that the financial institution is taking on too much risk. Consequently, financial institutions with a government safety net have an incentive to take on greater risks than they otherwise would with taxpayers to be charged with the cost of the partial recovery of deposits if the bank faces liquidity issues that will lead it closer to bankruptcy. Financial institutions in the end seem to face a win-win situation where in good

times enjoy the profitability of their risky investments, while in bad times their loss is eased with the taxpayers' money.

A further problem with a government safety net like deposit insurance arises because of *adverse selection*. People who are most likely to produce the adverse outcome insured against, which in the case of financial intermediaries is a bank failure, are those who most want to take advantage of the insurance. Following the previous example of car insurance, bad drivers are more likely than good drivers to take out automobile collision insurance with low deductible. Because depositors and creditors have so little reason to impose market discipline on financial institutions, risk-loving entrepreneurs might find the financial industry a particular attractive one to enter as they know that they will be able to engage in highly risky activities. Even worse, because protected depositors and creditors have so little reason and access to information to monitor the financial institution's activities, in case of absence of government monitoring, bank managers are able even to engage in illegal activities at the expense of taxpayers.

The moral hazard created by a government safety net and the desire to prevent financial institution failures are the one side of a particular tradeoff for financial regulators: Because the failure of a very large financial institution makes it more likely that a major financial disruption will occur, financial regulators are reluctant to allow a big institution to fail and cause losses to its depositors and creditors. This dilemma is more widely known as the *''too big to fail"* problem. This term is nowadays applied to a policy in which the government provides guarantees of repayment of large uninsured creditors of the largest banks, so that no depositor or creditor suffers a loss, even when they are not automatically entitled to this guarantee.

One consequence of the "too big to fail" policy is that it increases the moral hazard incentives for big banks. At the absence of this policy, in case of collapse of a large bank, small depositors will receive the government guarantee while those depositors whose deposits exceed the limit of the guaranteed amount will suffer large losses. Under these conditions, large depositors have the incentive to examine the bank's activities closely and pull their money out if the bank is taking on too much risk. To prevent such a loss of deposits, the bank would more likely to engage in less risky activities. However, once large depositors realize that their bank have become too big to fail, they have incentive to less monitor the bank as, in good times they may be benefit from the higher rent they may receive as part of the return of the risky activities that the bank is engaging, when in bad times their deposits are protected from the government

policy. As a result, big banks have no constraints to take on even greater risks, thereby, making bank failures more likely to happen (Mishkin 2004).

3.5. Bank Capital and Regulation

The problem of monitoring the monitors through market discipline has provided a solution which is the deposit withdrawal and the leading of a bank that loots depositors' money in bankruptcy. However, the importance and the interconnections in of banks in the financial system indicate that a bankruptcy of one bank could lead in a systemic crisis. Additionally, governments, whose role is to ensure the stability of the economy and, by extension, the stability of financial system, intervene through regulation to limit the fragility of banking system.

On the role of bank capital, Diamond and Rajan (2000) provided an explanation for government intervention, through the role of a bank as liquidity provider for entrepreneurs. In their model, each entrepreneur has a project that needs funding. Banks are able to provide the liquidity needed by issuing demand deposits. Moreover, by financing the project at the early stages, bank creates commitment relationship with the entrepreneur in the way that can have higher liquidation threat of the entrepreneur's project. Additionally, when the bank is funded with demand deposits, it cannot hold up depositors and has to pay them the promised amount.

Depositors, because of the sequential service constraint, when they doubt the bank's ability to return the promised amount; they run to withdraw their deposits. That is the reason why the banker will not attempt to exert the rent of depositors but instead, will pass all the collections from lending to them. In the world of certainty, the bank is able to maximize the amount of offered credit by financing with a rigid and fragile all deposit capital structure. However, the uncertainty about the real value of assets could lead to bank runs even without the misbehavior of the banker. So the banker has to tradeoff credit and liquidity provision against the cost of bank run. In Diamond and Rajan's model, the equilibrium can be achieved by introducing a type of funding that would not be subject to the immediate collective action problem and also, its return could be renegotiated in bad times while it buffers the bank against shocks to asset value. Such a claim could be the bank's *capital* as a long term claim, without a first-come, first-served right to cash flows. In equilibrium, the optimal capital structure, trades off three effects of capital: More capital, increases the rent absorbed by the banker, increases the buffer against asset shocks and changes the amount that can be extracted by borrowers.

In the discussed model, bank runs can cause real economic damage rather than simply lead insolvent banks to resolution. That's why, contracts such as government safety net such as deposit insurance, or the central bank discount window are able, at least in theory, to maintain capital adequacy of banks and make them able to produce superior contracts among bankers, depositors and lenders.

In practice, the ideal form of capital has the following characteristics: First it doesn't have to be repaid as any requirement of repayment reduces or eliminates the ability to absorb losses. Second, there is no requirement for periodic dividend or interest payments because they would reduce the value truly available in the long term to absorb losses. Third, it has low bankruptcy priority. In bankruptcy claimants are paid out in a priority order depending on the nature of their claim. Capital provides the most protection to other parties if it ranks last.

The most common financial instruments that can represent capital are the "common stock" and "preferred stock". Common stock is the purest form of capital because there is no requirement to ever pay it back, nor is there a legal requirement to pay dividends. It has also the lowest repayment priority in case of bankruptcy. Preferred stock can also be considered as capital because it may have common characteristics with a bond or a loan in the way there is a fixed claim on the assets of the company and also an agreed dividend that is expected to be paid periodically, but it is considered as equity because of the low repayment priority (lower than bonds). Additionally, contrary to bondholders, preferred shareholders are unable to force a company in bankruptcy. From a wider point of view, some kinds of debt are similar enough to preferred stock and can count as capital, in a weak sense. They usually, have long maturity and are subordinated to other debt. At the other extreme, "tangible common equity" is common equity minus the value of intangible assets. Because intangible assets such as goodwill are unable to be liquidated, investors prefer to treat them as worthless when evaluating capital adequacy. (D. Elliot 2010).

The problem with capital is that is the more expensive form of funding. In Modigliani and Miller (1958) theorem, under idealized conditions the total cost of capital is irrelevant to the breakdown on stock and debt. But because of the existence of asymmetric information there are agency conflicts between managers and stockholders that make the second to demand a higher return due to the unlimited exposure to the banks looses that may come from decisions of the managers (Jensen and Meckling 1976). In real life, the preference of public corporations for internal financing, and the relative infrequency of stock issues by established firms, has long

been attributed to the separation of ownership and control, and the desire of managers to avoid the discipline of capital markets (Myers and Majluf, 1984). Additionally, implicit government guarantee of deposits shifts risk from depositors to equity holders, which makes the latter require even higher returns by making issues of equity even more expensive.

In a Modigliani-Miller world, bankers would prefer the higher possible equity funding in order to reassure analysts, investors, credit ratings and other participants that exercise market discipline, about the banks safety. On the contrary, in real world, because of the high cost of equity, bankers try to minimize equity funding and increase the bank's leverage. Generally, capital requirements are a compromise between capital efficiency and bank safety. Banks and their shareholders have little interest in earning lower returns on equity while policymakers and regulators know that if they require excess capital the bearer of the excessive cost will be the bank's borrowers by paying higher interest rates and that would be another friction cost to lending transactions (Elliot 2010).

Regulatory capital requirements are the most binding capital requirements for banks, since they are legally required to pass specific tests of capital adequacy by holding sufficient capital or a series of regulatory actions will be taken that ultimately result in the seizure of the bank. Each country sets those after the coordination of central bankers with government officials. In the U.S. there are several banking regulations. These are the Federal Reserve Bank, the Federal Deposit Insurance Corporation, and the Office of the Comptroller of the Currency. In practice, these institutions have coordinated their regulatory capital requirements in order to avoid regulatory arbitrage behavior[2] from the banks. In Europe, regulatory process is under the responsibility of European Commission and the directions of CRD, CRD2 and CRD3. Despite each country's individualities of their financial system, the need for global coordination of regulatory framework, especially in recent times where most of financial institutions are operating in a global financial environment, there is a need for impose of globally consistent regulatory standards. That is the role of the Basel Committee which is associated with the Bank for International Settlements and is a coordinating organization for central bankers around the world.

Basel Accord has defined two tiers of capital: Tier 1 consists mainly of common stock and those forms of preferred stock that are most like common. Tier 2, ads in certain types of preferred stock that are less like common stock and most like debt, as well as, certain subordinated debt securities, such as convertible bonds. In addition it includes some accounting

reserves which provide a protective function similar to other forms of capital. Apart from the determination of capital adequacy, referred as the Pillar 1 of the Basel accord, the regulatory framework focuses in two more topics. Pillar 2, focuses in the efficient supervision and particular in assessing the quality of risk management in banking institutions and evaluating whether they have adequate procedures to determine how much capital they need. Pillar 3, focuses in improving market discipline through increased disclosure of details about a bank's credit exposures, its amount of reserves and capital, the officials who control the bank, and the effectiveness of its internal rating system.

Regulators, who follow the Basel Accord, determine a bank's capital ratio as the Tier1 capital to risk weighted assets which should be at least equal to 8%[3]. Risk weighted assets is the risk weighted amount of assets held by the bank. That is the total value of each asset multiplied by a percentage reflecting its risk level and this adjusted amount is added across all assets to produce a total risk-weighted asset figure. The percentage weights range from 0% for extremely safe investments such as cash and specific government securities, to 100% for riskier classes of assets. In a few cases the levels exceed 100% for certain very risky assets, such as loans in default or imminent danger of default and the riskier tranches of securitizations.

The determination of the risk weights has raised many concerns among investors and markets about the effectiveness in the allocation of risk and, besides this, the fact that Basel II (that followed Basel I in 2001) accord has suggested several methods to calculate weights, which have created issues of comparability (see for example, Le Lesle and Abramova 2012). In particular, banks have to choose among a standardize approach based on the credit rating agencies assessment of each asset risk, and an internal risk based method, based on statistical models such as the Value at Risk method that counts the average level of loss under a certain probability. It is easy to assume that every bank will choose the method that result in the lowest capital ratio. As a result of the different methodologies, bank regulators and markets could lead in distrust of each other's reports about the calculation of risk weighted assets.

The Basel II accord has attempted to introduce a more flexible regulatory framework but along with flexibility, it increased the opacity of regulatory capital bases, a fact which was added to the overall opacity of the banks and will be analyzed further in chapter 5 of this work. Some specific characteristics that contributed in the reduction of the transparency and have to do with the denominator of the capital ratio are: First, The formula for calculating RWAs is very complex in itself and leaves large potential for different interpretations. Second, it is Difficult for

markets to gauge the quality of internal models and the robustness of methodologies used by IRB banks (a difficulty also faced to a certain extent by supervisors). Third, large cross-border banks often rely on a myriad of models, each measuring a small portion of the assets under specific rules of various jurisdictions, and it is not unusual for global systemically important institutions to employ several dozens of models simultaneously (Le Lesle and Abramova 2012). Other parts of the accord were also sources of transparency. The definition of capital suffered from several fundamental flaws: First, the lack of a precise boundary between different capital components, second, inconsistent definition and application of regulatory adjustments such as the deduction of goodwill and third weak, transparency of the regulatory capital bases for example, the precise boundary between core Tier 1 and additional Tier 1 instruments was sometimes blurred, as is the case for certain types of preferred stock. Finally, the current disclosures by banks about their regulatory capital bases usually lack quality and detail. This makes it harder for stakeholders of a particular bank to adequately assess the quality of its capital base or to perform meaningful peer analyses (ECB Dec. 2010).

The impact of the lack of transparency in the regulatory framework was sound enough in the recent financial crisis in 2008. That led the G20 leaders in 2009 to make a series of proposals that were endorsed in September 2010 by the Group of Governors and Heads of Supervision (GHOS), the oversight body of the Basel Committee. The result was the Basel III framework that will begin to be applied by the beginning of 2013. Regarding capital adequacy (Pillar 1), Basel III has redefined capital base, in order to improve the quality and quantity of Tier 1 Capital which will only comprise common shares (or the equivalent for non-joint stock companies) plus retained earnings. Tier 2 instruments in order to be loss absorbent on a "gone concern" basis, eligible instruments will need to be subordinated to depositors and general creditors, and have an original maturity of at least five years. In order to meet the stated objective of improving transparency of the capital base, banks will be required to make enhanced disclosures about their capital base. In addition to raising the quality of the capital base, the Basel Committee considerably strengthened the rules underlying counterparty credit risk, thus providing a more comprehensive treatment of exposures arising from derivatives, repos and securities financing activities. Against the background of the excessive leverage in the banking sector prior to the onset of the financial crisis, the Basel Committee developed a simple, transparent and non-risk-based measure as a credible supplementary measure to the risk-based requirements. The leverage ratio will comprise a Tier 1 capital measure (numerator) and a total exposures measure

(denominator). Finally, Basel III introduces macro-prudential policy which is the focus on the system-wide risk of financial institutions. One of the instruments to implement this policy is a form of counter–cyclical capital buffer where banks required to build up capital buffers above the required minimum in good times so that they can be drawn down in periods of stress. The objective of the counter-cyclical buffer is to protect the banking sector from periods of excessive aggregate credit growth. In this context, mitigating the credit cycle is considered only as sides benefit (BIS, Dec 2010).

4. Valuing a bank

4.1. Models

The value of a bank can be easily recognized, in accounting terms, as the difference between the value of assets and its debt liabilities but if someone wants to go further and try to determine the exact value of an institution many formidable difficulties arise. There is much uncertainty for the value of assets most of them are loans. Besides, a crisis period in economy may affect all the value of both assets and liabilities of the institution. During normal times in economy, valuation follows specific techniques in order to provide information about the fair value of assets. Methods such as *historical cost, market value or realizable value,* cannot provide the exact fair value as many of the assets are not marketable so, as also mentioned in the opacity analysis, we cannot imply a market value to compare, and also the methods above ignore the uncertainty about the full payment of a loan.

An attempt to provide a more accurate valuation is the method of depreciated historical cost. The present value of a loan integrates the probability of nonpayment and the value reduction then is incorporated in the balance sheet either buy reducing the value of capital or as allowance for loans and lease losses in the assets side. Additionally, loans are classified accordingly to the borrower's ability to perform so that the bank could approximate the fair value of the cash flows from this asset.

Securities are another volatile element of the balance sheet of a bank. Securities that are issued by the bank and belong to the liabilities side of the balance sheet, should be valued at regular basis as they can provide occasional interest rate profits or losses, so it is important for the institution to recognize their fair value. Besides this, securities that are held by a bank and belong to the asset side of the balance sheet are valued according to the intentions of their use. If they are part of an investment portfolio they are valued at historic cost. If they are part of a trading portfolio they are expected to provide income so they are regularly marked to market price provided the existence of a corresponding organized market (Lindgren, Garcia and Saal 1996). Alternatively, securities that are not tradable in organized markets such as over the counter derivatives, as forwards, could be evaluated through specific models of which the presentation is out of the purpose of this work.

The valuation of financial institutions from outside in is an even more difficult procedure. Banks are different in many ways from other companies, for example, the opacity of the banks

makes outside analysts always to unwittingly ignore some critical information about these companies' economics. So they must rely on rough estimates and judgment about the accuracy of the management's accounting decisions.

Among the many ways to value a company the most popular and most exercised by practitioners are: the Discounted Cash Flow Method (DCF) and the discounted economic profit. When applied correctly, both valuation methods yield the same results; however, each model has certain benefits in practice. Enterprise DCF remains the favorite of many practitioners and academics because it relies solely on the f low of cash in and out of the company, rather, than on accounting-based earnings (which can be misleading). Discounted economic profit is gaining in popularity because of its close link to economic theory and competitive strategy. Economic profit highlights whether a company is earning its cost of capital in a given year. Given the methods' identical results and complementary benefits of interpretation, both enterprise DCF and economic profit are recommended when valuing a company.

On the other hand, financial companies' income is based heavily in financial decisions. We can't value operations separately from interest income and expense since they are both important components of their income, so, the use of equity cash flow may be more appropriate than the discounted cash flow method.

Equity cash flow (which is the amount of cash flows to shareholders) is driven by net Income minus the earnings retained in the business:

Equity cash flow = Net Income – Increase in Equity + Other Comprehensive Income (4.1)

Net income represents the earnings theoretically available to shareholders after the company has paid all expenses, including those to debt holders. Increase in equity reduces equity cash flow because they are earnings set aside that could otherwise paid to shareholders. Other comprehensive income consists of several non-cash items that are added or subtracted from the equity account. Specifically, the main items of this term are net unrealized gains and losses on certain equity and debt investments, net unrealized gains and losses on hedging activities, adjustments to the minimum pension liability, and foreign-currency translation items. Equity cash flow may seem equivalent to the discounted cash flow method but in real world dividends may be the largest components of cash flow but also items such as share buybacks and issuances still have material impact.

Both methods require forecasts of future cash flows, but, forecasting is a quite complex procedure because as financial institutions grow and increase their income, they should also increase their equity and not achieve high returns just by operating at unsustainably high levels of leverage. From the perspective of regulators and risk management, the amount of equity a financial institution should have depends on the risks in its portfolio but from an external perspective, analysts are unlikely to know the exact risk capital per business unit. Therefore when valuing an entire bank they must make the assumption that the amount of risk capital employed is equal to the book value of equity.

In forecasting future book value of equity, the key factors that matter are ROE and growth. The approach should begin with forecasting the company's income statement and balance sheet items because along with cash flow and ROE, they interact and drive the value of the company. Instead, an explicit forecast of dividends may change the company's capital structure leading to excess capital or excess leverage.

In building a cash flow model of a bank from an outside analyst must make several simplifications because he cannot truly understand the contribution of mismatch profits to overall net interest income or the quality of loan portfolio, or whether the bank has excess equity. However he is still able to make an equity cash flow model to understand the bank's economics and prospects. From income statement items the interest income and expenses by forecasting margins on future amounts of loans and deposits and also forecast future levels of loan loss provisions, non-interest expense and income taxes can be estimated on a percentage basis. Estimation on future income from trading activities would be need only in case of a large trading portfolio. On the balance sheet, the forecast of deposit growth can be used as a driver for an analyst that then will forecast the ratio of loans to deposits based on historical performance. On the liability side, under the assumption of a stable capital structure the forecast should focus on the required level of equity each year through a rough estimate of the ratio of risk-weighted assets to Tier 1 Capital – set at 8%. Then, adding goodwill results in the required amount of total shareholder's equity. Then equity can be balanced by dividend payouts or share buybacks or share issuance (Koller, Goedhart and Wessels 2004).

Generally, a sound and explicit bank valuation model is a very powerful tool for evaluating decisions and enhancing shareholder value. These decisions include deposit and loan pricing, risk adjusted performance evaluation, and capital management. The previous analysis showed that valuation methods for corporations that are presented in any book of corporate

finance are quite difficult to be applied in the evaluation bank because of the various assumptions an analyst needs to make in order to create forecasts for the bank's economic elements presented in the accounting statements. Dermine (2004) presents the three most used approaches to valuating banks while introducing a fourth method that can be better applied in banks:

1. The application of market multiples, such as price/earnings (P/E) ratio or the market-to-book value (MBV) ratio.
2. The discounted value of future dividends
3. The discounted value of future economic profits
4. A "fundamental" valuation model.

While the first three approaches can be applied in any firm the fourth, the "fundamental" approach is more bank-specific because it can help in the discussion of issues such as fund transfer pricing, risk-adjusted performance evaluation, capital management, loan-loss provisioning and the measurement of interest-rate risk on the banking book.

Market multiples

The most common multiple used by analysts is the Price-Earnings ratio (P/E) which is calculated as the stock price of the bank divided to the earnings per share (EPS). After the analyst forecast the bank's future earnings-per-share and estimate the average P/E of a number of comparable banks, he can evaluate the bank according to the simple formula:

$$Value_{\ bank} = \left(\frac{p}{E}\right)_{comparables} \times forecasted\ EPS_{bank} \quad (4.2)$$

The problem in this method is that high loan loss provisions may reduce substantially the profit of a specific year, making EPS index less stable. Instead, a Market-to-book value ratio (MBV), the ratio of market value of shares to the book value of equity is a much more stable figure. The valuation method is similar to the one mentioned above as it uses the MBV ratio of comparable banks:

$$Value_{\ bank} = MBV_{comparables} \times Book\ Value\ of\ Equity_{bank}\ . \quad (4.3)$$

Both methods are based on the assumption that the stock market values correctly the shares of the banks and also both methods ignore the reality of future cash flows generated by the bank, a fact that would be the basic component of the following valuation methods. An additional difficulty is to find suitable comparables as bank competition has led banks in a differentiation of their activities, so, a simple bank index may not provide us a reliable index (Dermine 2005).

Discounted future Dividends

There are two paths to discounted cash flow valuation: the first is to value just the equity stake in the business while, the second is to value the entire firm, including equity and any other claims in the firm (from bondholders, preferred stockholders, etc.). Both approaches differ at the discount term.

More specifically, the value of equity is obtained by discounting expected cash flows to equity, which is the residual cash flows after meeting all operating expenses, tax obligations, and interest and principal payments at the cost of equity, which is the rate of return required by equity investors in the firm:

$$Value\ of\ Equity = \sum_{t=1}^{n} \frac{C.F.to\ Equity_t}{(1+R_s)^t} \quad (4.4)$$

Where CF to Equity $_t$ is the expected cash flow to equity in period t, and Rs is the cost of equity.

The value of the firm is obtained by discounting expected cash flows to the firm, that is, residual cash flows after meeting all operating expenses, taxes and reinvestment needs, but prior to debt payments discounted at the weighted average cost of capital (WACC) which is, the cost of the different components of financing used by the firm, weighted by their market value proportions:

$$Value\ of\ Firm = \sum_{t=1}^{n} \frac{C.F.to\ Firm_t}{(1+WACC)^t} \quad (4.5)$$

Where CF to Firm $_t$ is the expected cash flow to firm in period t, and WACC = weighted average cost of capital.

Although the two approaches use different definitions of cash flow and discount rates, they provide consistent estimations of the value of equity as long as the same set of assumptions is applied for both. Additionally, both valuation models in order to be applied, need the estimation of four inputs: current cash flows, an expected growth rate in these cash flows, a point in time when the firm will be growing a rate it can sustain forever, and a discount rate to use in discounting these cash flows. Considering of cash flows, there are two choices: dividends or free cash flows to equity (FCFE) for equity valuation models, and free cash flows to the firm (FCFF) for firm valuation models. Discounting dividends usually provides the most conservative estimate of value for the equity in any firm, because most firms pay less in dividends than they can afford to, consequently, the value of equity, based on the FCFE, will therefore yield a more realistic estimate of value for equity (Damodaran 2010)

In order to estimate future cash flows, most practitioners rely on the expected growth rate of the firm's earnings, which, in turn, is related to the expected growth pattern of the firm. Because firms have infinite lives, they estimate a terminal value at a point in time and dispense with estimating cash flows beyond that point. To do this in the context of discounted cash flow valuation, we have to cash flows beyond this point in time, should be considered as constant forever, an assumption known as "the constant growth".

When an investor buys stock, he or she generally expects to get two types of cash flows: dividends during the holding period and an expected price at the end of the holding period. Because this expected price is itself determined by future dividends, the value of a stock is the present value of just expected dividends. The dividend discount model is therefore the most direct and most conservative way of valuing a stock because it counts only those cash flows that are actually paid out to stockholders. In its most general form, the value of a stock in the dividend discount model is the present value of the expected dividends on the stock in perpetuity:

$$Value\ of\ Stock = \sum_{t=1}^{\infty} \frac{Expected\ Dividents_t}{(1+Rs)^t} \quad (4.6)$$

Because of the obvious difficulties in the estimation of the expected dividends, under the assumption of the two stage growth, can be transformed as:

$$Value\ of\ Stock = \sum_{t=1}^{n} \frac{Expected\ Dividents_t}{(1+Rs)^t} + \frac{Dividend_{n+1}}{Rs-g} \quad (4.7)$$

Where R_s is the cost of equity, and g is the expected growth rate in dividends in perpetuity after year n. The period t= 1…n is considered as the high growth period and the terminal value refers to the t= n+1…∞ which is the "constant growth period. Additionally, it is possible for a firm to already be in stable growth, in which case this model collapses into its simplest form:

$$Value\ of\ Stock = \frac{Expected\ \ Divident}{Rs-g} \quad (4.8)$$

This model is called the Gordon growth model and is a special case of the dividend discount model. It can be used only for firms that are already in stable growth.

As for the cost of Equity (Rs), Because of the fact that dividends are risky, shareholders use a higher risk-adjusted rate to discount these cash flows. The higher rate is justified by the risk aversion of investors who need to be compensated for taking some risk so, R_S can be equal to the risk-free rate on government bonds plus a risk premium.

Usually in corporate finance, free cash flows are discounted at a weighted average cost of capital (debt and equity) in order to compute the value of assets of the company. Then by deducting the debt, one can obtain the value of equity. Instead, in banking one focuses directly on the value of equity or through a forecast of future dividends, because the management of the debt is a source of value creation in a bank. When forecasting dividends, the analyst should take into account the growth of deposits and also eventual changes on margins. When, for example, someone extrapolates short term earnings to forecast future earnings and ignores a potential upward sloping interest rate curve, may find a positive interest rate margin in the short term which will turn negative at a later time when the refinancing of short term debt at a higher rate is taking place.

Discounted Value of Future Economic Profits

An alternative approach, fully consistent with the present value of dividends is to relate the share price to the Economic Profit (EP):

$$EP_t = Profit_t - (Equity \times R_s) \quad (4.9)$$

This represents the value created by the bank on top of the opportunity cost of shareholder's equity.

It can be shown that the market value of equity today is equal to current equity (E_0) plus the present value of future economic profits:

$$Market\ value\ of\ Equity_0 = Equity_0 + \sum \frac{(ROE_t \times Equity_0 - Equity_0 \times R_s)}{(1+R_S)^t} \quad (4.10)$$

When equity, dividends and economic profits are growing forever at a constant rate "g" (With g < R_s) the above formula becomes:

$$Market\ value\ of\ Equity_0 = E_0 + \frac{(ROE - R_s) \times E_0}{R_s - g} \quad (4.11)$$

Or, $$MBV = \frac{MV_0}{E_0} = \frac{ROE - R_s}{R_s - g} + 1 \quad (4.12)$$

Where, market-to-book value ratio is driven by the ROE and growth in earnings

Fundamental valuation formula, (No corporate taxes, no risk)

The fundamental valuation formula, in contrast to the previous models, is more specific to bank valuation because it provides a transparent framework to analyze the sources of value of banks. In practice, there are several categories of loans and several types of deposits. As mentioned before, some are recorded at historic value while others can be marked to market. It is also necessary to distinguish between contractual historic interest rates on assets and deposits and the current interest rates hat will be applicable to new assets or deposits of identical maturity.

For instance, for bonds *b* will refer to the historical return on a bond purchased a few years ago. The rate *b** denotes that the current return on a new bond with maturity identical to that remaining for the bond that is currently held. So, the historical contractual returns on loans, bonds and deposits are denoted as *l, b,* and *d.* Correspondingly, the current returns are denoted as *l*, b** and *d**.

In the absence of risk, the discount rate at which shares are valued, or, the investment return available to shareholders, will be the current risk-free bond rate *b**. There can be many reasons why there are different interest rates for assets and liabilities. The longer maturity of assets may command a risk premium, and, given the deposits can be withdrawn at short notice, the posted deposit rate does not include the extra cost of refinancing in the event of deposit withdrawals. However, this, does not explain the differential in Dermine's model. The assumption has been that the return and the cost, *l*,* and *d*,* are net of the price for risk, and it has been postulated that it is imperfect competition, imperfect information or regulation in some markets that creates the interest-rate differentials. Barriers to entry or regulation (such as regulations on interest rates paid on demand deposits) prevent the creation of perfect substitutes that would erase the interest rate differentials. The relevance of imperfect competition can be questioned in a period of global deregulation, but it would seem that market concentration resulting from bank mergers or asymmetrical information can create imperfections in, at least some markets. In any case, Dermine's model is quite general, as perfect competition appears as a special case.

However, in the first, more simplistic form of the fundamental valuation formula taxes and bank risk are ignored and will be taken into account later in the complete form of this framework.

It can be proved mathematically (Deremine 2005, Chapter 5, Appendix C) that the value of the equity of a bank is equal to the sum of *liquidation value* which represents the value accruing to shareholders in case of an immediate liquidation of assets and liabilities of the bank and *franchise value* which is the present value of future economic profits under the assumption of considering the bank as a going concern:

$$MV\ of\ Equity = PV\ of\ future\ dividents = Franchise\ Value + Liquidation\ value$$

This methodology proposes to evaluate the equity of banks in two steps: First focusing on the balance sheet, there will be no need to move from accounting book value figures to current liquidation values and second one will assess the franchise value with a forecast of future loans and deposits.

The notation of the model is based in the following simplistic form of the balance sheet (figure 4.1):

Loans L (l)	Deposits D (d)
Bonds B (b)	Equity E (b^*)
Fixed assets	

Figure 4.1: A simplistic form of a balance sheet

Loans, bonds, deposits are recorded at their historical value, l, b, d are their *historical contractual returns* and the *current return* (the return on a new Loan, Bond or Deposit with identical maturity to the remaining of the existing elements) for each element is: l^*, b^*, d^*. Additionally, the bank is considered as a going concern, so fixed assets are not expected to be liquidated and thus create any cash flows, Due to the assumption of the absence of bank risk the cost of equity will be considered equal to the risk free rate of a government bond b^*. Then, the market value of equity can be derived from the following model:

$$Market\ Value\ of\ equity_0 = L_0^* + B_0^* - D_0^* \quad +$$

$$+\frac{(b_1^* - d_1^*) \times D_1^*}{1 + b_1^*} + \frac{(b_2^* - d_2^*) \times D_2^*}{(1 + b_1^*) \times (1 + b_1^*)} + \cdots$$

$$+ \frac{(l_1^* - b_1^*) \times L_1^*}{1 + b_1^*} + \frac{(l_2^* - b_2^*) \times L_2^*}{(1 + b_1^*) \times (1 + b_2^*)} + \ \ldots$$

$$- \frac{operating\ \ expen\ ses_1}{1+b_1^*} - \frac{operating\ \ expenses_{\ 2}}{(1+b_1^*)\times(1+b_2^*)} - \cdots \quad (4.13)$$

Where $L_0^* + B_0^* - D_0^*$ the liquidation value of assets and liabilities which equals to the current value of assets net current value of liabilities, each one discounted at their own rate (l^*, b^*, d^*).

Where: $\frac{(b_1^*-d_1^*)\times D_1^*}{1+b_1^*}+\frac{(b_2^*-d_2^*)\times D_2^*}{(1+b_1^*)\times(1+b_1^*)}+\cdots$ is the value of future profits from collecting deposits in the future. The profits are derived by the margin $(b_i^*-d_i^*)$ as banks are able to raise debt in a lower cost than markets.

Where: - $\frac{operating\ \ expenses_{\ 1}}{1+b_1^*}-\frac{operating\ \ expenses_2}{(1+b_1^*)\times(1+b_2^*)}-\cdots$ is the present value of future operating (non-interest) expenses.

Fundamental valuation formula, (with corporate taxes, and risk).

The previous framework has ignored the element of risks and the difficulty of choosing a risk-adjusted discount rate for valuating assets and liabilities. As theory of corporate finance indicates dividends should be discounted at the cost of equity, or the expected return of the stock market. In this case the rate is determined with a standard capital asset pricing model (CAPM), a dividend discount model, or a multifactor model (Brealey, Meyers, Allen, 2010).

In principle, a bank has assets with many different types of risk, from very safe to very risky. So, the recommendation of comparing each bank's risk-premium with the corresponding risk premium of the average banking sector return could be tempting. Specialized banks, such as monoline credit card providers, or investment banks, can help in estimating a specific risk premium for some activities for a universal bank. However, the standard corporate finance recommendation is very unlikely to work with lending because banks diversify their risk by lending in multiple industries. The argument here is that rather searching in a stock market for listed banks that lend to specialized industries (portfolio diversification) and compare their risk-premiums with the one of each loan, an alternative could be the use of expected returns on corporate bonds with similar risk to that of loans as an opportunity cost for shareholders.

After this assumption, it can be seen that the margin in the loan franchise is the difference between the return of the loan (*l**) and the return on a similar-risk asset (*b***). In this way, a loan will create a positive franchise value when the expected return on that loan exceeds the expected return on a similar-risk corporate bond that the bank can buy as an alternative investment.

In general, the equity of a bank is a long position in loans and bonds and a short position in debt (using the principle of value additivity of Modigliani and Miller, 1958). The same

framework can be applied to each component to obtain the value of equity of the bank. So, considering of another balance sheet of the bank (figure 4.2):

Loans L (l)	Deposits D (d)
Bonds B (b)	Equity E
Fixed assets	

Figure 4.2: A simplistic form of a balance sheet with a risk adjusted cost of equity

The market value of the equity of the bank is the risk-adjusted value of future dividends, discounted at the overall risk adjusted cost of equity. The alternative there is to use this framework to obtain a fundamental valuation formula. The idea is that the dividend flow can be decomposed into the cash flows link to loans, cash flows linked to bonds, and cash flows linked to debt. Equity then is a portfolio of long positions in assets and short position in debt. Applying the decomposition framework discussed and adding up the results, the valuation formula of a bank's equity becomes:

$$Market\,Value\,of\,equity_0 = L_0^* + B_0^* - D_0^*$$

$$+\frac{(1-t)\times(b_1^{**}-d_1^*)\times D_1^*}{1+b_1^{**}} + \frac{(1-t)\times(b_2^{**}-d_2^*)\times D_2^*}{(1+b_1^{**})\times(1+b_2^{**})} + \cdots$$

$$+ \frac{(1-t)\times(l_1^*-b_1^*)\times L_1^*}{1+b_1^{**}} + \frac{(1-t)\times(l_2^*-b_2^{**})\times L_2^*}{(1+b_1^{**})\times(1+b_2^{**})} + \ldots$$

$$-\frac{(1-t)\times operating\ \ expenses_{\ 1}}{1+b_1^{**}} - \frac{(1-t)\times operating\ \ expenses_{\ 2}}{(1+b_1^{**})\times(1+b_2^{**})} - \ldots$$

$$-\frac{t\times b_1^{**}\times(L_1^*+B_1^*-D_1^*)}{1+b_1^{**}} - \frac{t\times b_2^{**}\times(L_2^*+B_2^*-D_2^*)}{(1+b_1^{**})\times(1+b_2^{**})} - \cdots \qquad (4.14)$$

Where:

$L_0^* + B_0^* - D_0^*$ Is the *after tax liquidation value* of expected cash flows discounted at after tax expected rate on new asset/liability [(1-t) * l^*, (1-t)*b^*, (1-t)*d^*]

$\frac{(1-t)\times(b_1^{**}-d_1^*)\times D_1^*}{1+b_1^{**}} + \frac{(1-t)\times(b_2^{**}-d_2^*)\times D_2^*}{(1+b_1^{**})\times(1+b_2^{**})} + \cdots$ Is *the after tax franchise value of deposits*. In the formula a single adjusted discount factor is used for simplicity but in theory they should be one specific for each asset and liability

$+ \frac{(1-t)\times(l_1^*-b_1^*)\times L_1^*}{1+b_1^{**}} + \frac{(1-t)\times(l_2^*-b_2^{**})\times L_2^*}{(1+b_1^{**})\times(1+b_2^{**})} +$ ... Is the *after tax franchise value of loans.* An indirect implication of the valuation model is that a credit risk adjusted transfer price to evaluate a loan should be, the expected return on corporate bonds with similar risk as that of the loan.

$-\frac{t\times b_1^{**}\times(L_1^*+B_1^*-D_1^*)}{1+b_1^{**}} - \frac{t\times b_2^{**}\times(L_2^*+B_2^*-D_2^*)}{(1+b_1^{**})\times(1+b_2^{**})} - \cdots$ The last term captures the Modigliani-Miller tax effect. As banks are usually net holders of assets their net tax effect according will be negative.

4.2 Proxies / measures of external support

As mentioned in chapter 3.4 banks are highly regulated organizations and government policies about banking system are of high interest for market participants as they heavily influence the banks' profitability and also their franchise value as going concern firms. That is the reason why we may hypothesize in the present work that government implicit or explicit guarantee in the banks' deposits may have some influence in the bank's cost of capital, or expected stock return.

Given the importance of external support, rating agencies generally assign at least two different ratings to banks, which in the remainder of this feature would be referred to as "stand-alone" and "all-in" ratings. A stand-alone rating reflects the intrinsic financial strength of the institution and, thus, its likelihood of default, assuming that no external support is forthcoming.

In addition to accounting for stand-alone financial strength, an all-in rating factors in the likelihood and magnitude of extraordinary external support that the bank may receive if and when it is in distress. While all-in ratings matter to banks' creditors and trading counterparties, stand-alone ratings provide useful information to a prudential authority interested in the underlying strength of institutions. In addition, by comparing the stand-alone rating of a bank with its all-in rating, investors can infer the agency's assessment of external support and, possibly, make adjustments to this assessment for their own use (Packer and Tarashev 2012).

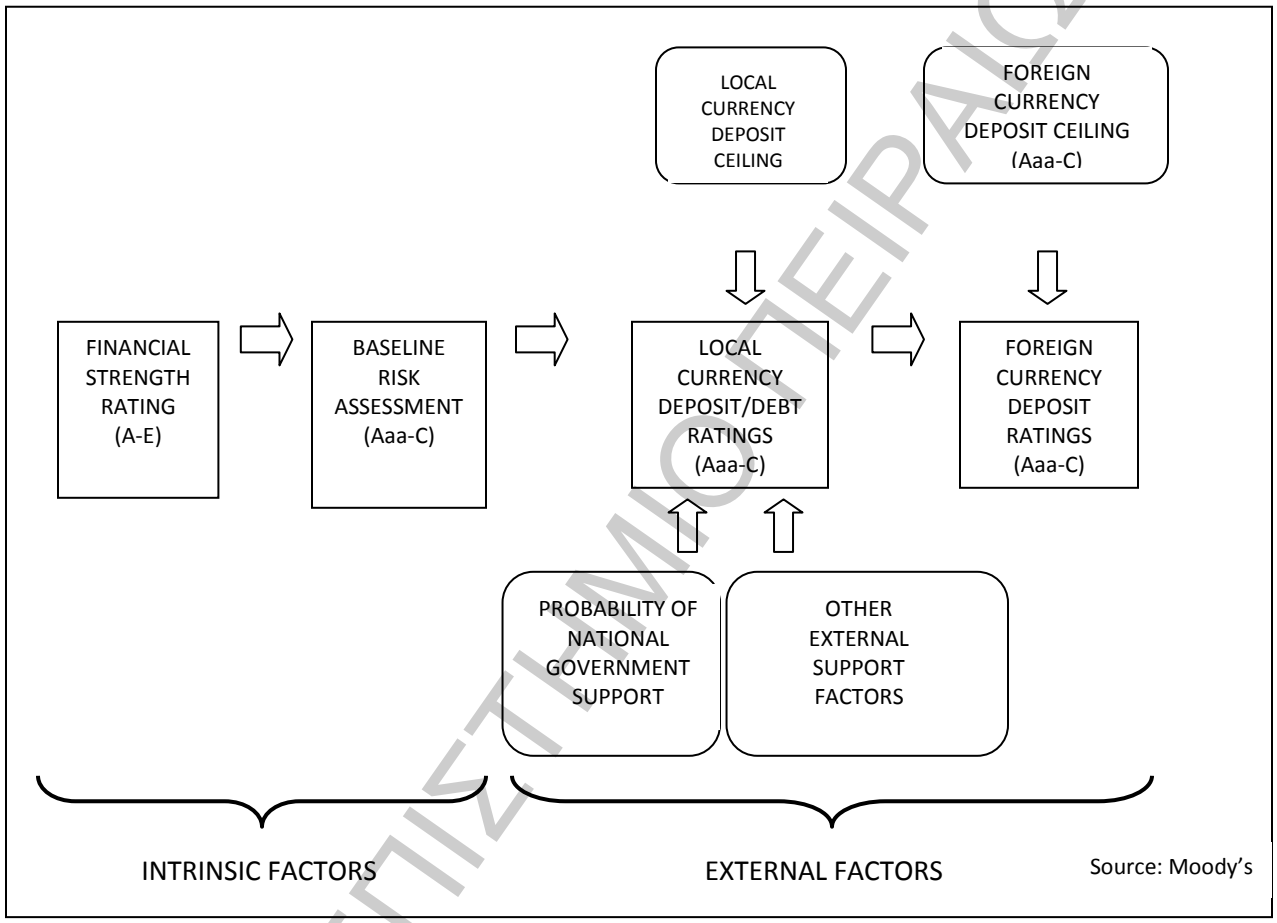
The variable that will be used as a proxy in the following empirical work will be the absolute difference between the stand alone and the all in rating derived by one of the major credit rating agencies, Moody's. More specifically the ratings that will be used are the 'Bank Financial Strength Rating" or BFSR, and banks' "Long Term Deposit Rating", or LTDR. The following lines will describe briefly the Moody's methods for the derivation of these ratings and then, a discussion will follow about the way the rating splits were transformed.

Following an extended outreach program, it has become clear that, due to the inherent uncertainty of non-explicit government support, market participants prefer a rating system that places greater emphasis on intrinsic credit fundamentals, which has the additional utility of revealing differentiation between institutions based on such fundamentals. In that framework, Moody's "Joint Default Analysis" or JDA operates on the principle that the risk of default (and therefore, loss) for certain obligations depends upon the performance of both the primary obligor and another entity (or entities) that may provide support to the primary obligor. This analysis attempts to provide a consistent, transparent approach to the incorporation of (typically uncertain) non-contractual external support based on judgment and not through models. That's why this methodology introduces updated scorecards for the assessment of systemic support. In particular, point values for support probabilities have been replaced by ranges. Support levels will generally be assessed at the midpoint of the range, unless a rating committee determines otherwise.

Generally, Moody's JDA framework for banks evaluates potential support in a sequential process, or "building block" approach. The intention of the Sequential Support Model is to replicate the likely sequence in which external support for a bank would be forthcoming. Each support provider is assessed for its capacity and willingness to support the bank. The first is based on the supporter's own rating. The second is based on Moody's opinion of the probability that support will be forthcoming when needed. The following scheme summarizes the sequential

procedure the agency follows to derive the LTDR beginning from the "stand alone" or 'Bank Financial Strength Rating" (Figure 4.2)

Figure 4.2: Moody's Bank Rating Methodology



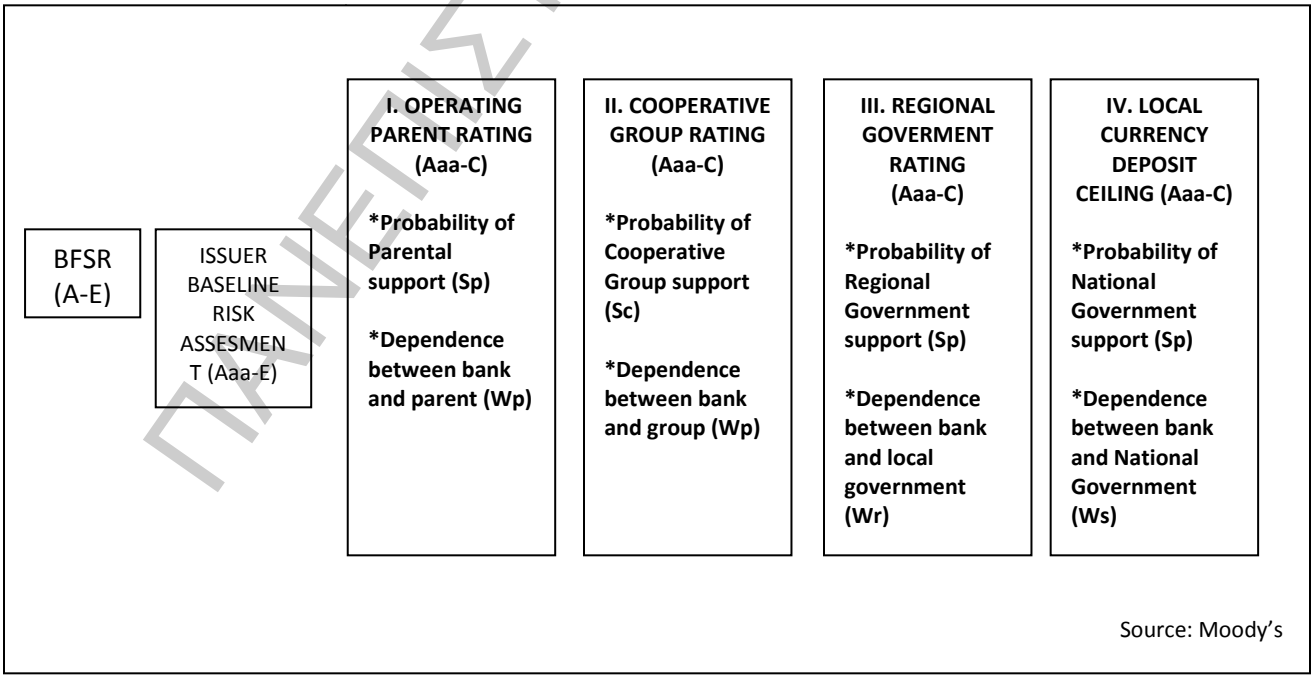
Since 1995, the starting point for Moody's bank rating methodology has been an assessment of a bank's intrinsic financial strength, as captured by a Bank Financial Strength Rating (BFSR). A BFSR measures the risk that a bank will require external support. The BFSR is informed by fundamental analysis and consequently reflects both financial and qualitative measures. The BFSR forms the basis for the bank's deposit and debt ratings, which further incorporate both external support and risk elements. Anticipated external support may lift deposit and debt ratings and sovereign-related risk may cap them.

Moody's JDA sequential support framework is intended to apply to all major forms of potential external support for banks. They have identified four sources of potential external support for banks, each representing one step in the sequential JDA support framework:

i. Support from a parent (operating company or family group),
ii. Support from a cooperative or mutualist group,
iii. Support from a regional or local government, and
iv. Systemic (i.e. national government and/or central bank) support.

Rather than attempt to model multiple supporters with potentially different support probabilities and default correlations, Moody's, has designed a JDA framework that evaluates support in a sequential process, or "building block" approach. The intention is to replicate the likely sequence in which external support for a bank might be forthcoming. Each stage of support has the potential to raise the "underlying" rating that is an input for the next stage of the framework. The final local currency deposit rating thus reflects all forms of potential external support. Each stage is summarized in the following figure (figure 4.3):

Figure 4.3: Sequential Support Model



Source: Moody's

At each stage, in addition to the underlying rating (derived from the prior stage), there are three other JDA inputs:

- The rating of the support provider, an assessment of its ability to support;
- The probability, S, that the support provider will provide support when needed (willingness to support); and
- The default dependence (or correlation), W, between the supporter and the underlying rating for that stage

In summary, BFSRs are intended to provide investors with a measure of a bank's intrinsic safety and soundness on an entity-specific basis. Thus, unlike traditional bond or deposit ratings, BFSRs are assigned to banks as entities and not to specific debt issues. According to Moody's, they are opinions of the stand-alone credit risk of a bank enterprise and are addressed mainly to regulators and investors. Additionally, Moody's BFSRs provide the base for Moody's bank credit analysis. Unlike debt or deposit ratings, BFSRs are not intended to measure directly the risk of credit loss, or expected loss. They do not take into consideration the potential of a "too big to fail" bank, nor do these ratings incorporate the risks associated with a deposit moratorium.

A BFSR is intended to provide a globally consistent measure of a bank's financial condition before considering external support factors that might reduce default risk, or country risks that might increase default risk. Thus, BFSR allows the comparison between banks among different countries as a signal of intrinsic financial strength. Moody's uses an A through E symbol system to distinguish BFSRs from its traditional debt and deposit ratings.

The bank Long Term Deposit Rating (LTDR) incorporates the Bank Financial Strength Rating as well as Moody's opinion of any external support. Specifically, Moody's bank deposit ratings are opinions of a bank's ability to repay its deposit obligations punctually. As such, Moody's bank deposit ratings are intended to incorporate those aspects of credit risk relevant to the prospective payment performance of rated banks with respect to deposit obligations, and include the following: a) intrinsic financial strength; b) sovereign transfer risk (in the case of foreign currency deposit ratings); and c),both implicit and explicit external support elements. Moody's bank deposit ratings do not incorporate the benefits from deposit insurance schemes that make payments to depositors, but they do reflect the potential support from schemes that

may provide assistance to banks directly. The foreign currency deposit rating is derived from the local currency deposit rating and is subject to Moody's country ceiling for foreign currency deposits (Moody's 2007)

To summarize the key elements used to determine Moody's Local Currency Deposit Ratings:

Support from the operating parent refers to the application of parental support for banks that are either wholly or partially owned by other rated entities. The agency there, addresses those banks whose obligations benefit from guarantees or similarly legally binding forms of credit support. Additionally, "parent" refers to any entity (bank, other financial institution, or non-bank) that owns 20% or more of a rated bank.

Cooperative and Mutualist Support comes from cooperative banking groups and other banking groups with similar mutual support characteristics that intervene in the support of members in order to avoid potential damage to the business and reputation of the group or other members. A group's willingness to support its members is best determined by evaluating the cohesiveness of the group. This is based on an analysis of the organization of the group as well as any implicit or explicit support structures that may be in place.

Regional and local governments (RLGs) have also been known to intervene and support banks. They have done this for those that they own, but also for others that are deemed important to the local economy or for those banks linked to the reputation or fiscal standing of the RLG. This support can be provided, for example, by immediate injections of cash, by providing access to additional lines of liquidity, or in the longer term, by authorizing funds for recapitalization, guarantees on deposits or other financial provisions to make good the losses of a failing bank.

National government support is based on two considerations: a) whether or not the institution is considered too important to be allowed to default on its deposits, and b) on the orientation of national policy with respect to failed bank resolutions. Bank creditors look to the national government as a support provider, not in its capacity as a debtor (as measured by its government bond rating), but in its capacity to create liquidity for the benefit of a bank's depositors. However, the government may also be a source of risk for bank depositors. During a financial panic or in times of hyperinflation, the monetary authorities can impose a system-wide local currency deposit freeze, after which depositors may be further injured by a redenomination or other forms of loss.

As described below, both of these features (support capacity and risk of deposit freeze) are captured by Moody's Local Currency Deposit Ceiling. The deposit ceiling caps all local-currency deposit ratings. Consequently, no deposit rating can exceed the ceiling, and therefore no additional rating lift can occur as a result of imperfect default dependence (or correlation) between a bank and systemic support. The country's local currency deposit ceiling is used as a proxy for its capacity to support a distressed bank. Moody's view is that a sovereign's willingness and ability to bail out a bank will often exceed its willingness to pay its own debts. This is because the macroeconomic consequences of a systemic banking crisis will generally exceed the impact of a domestic bond default.

The probability of national government support is largely a function of public policy. Moody's believes that deposit-taking banks wholly owned by the national government (directly or indirectly) will almost always be supported, regardless of size or importance to the country's economy. For deposit-taking banks only partially owned by the government, the probability of government support is still likely to be high, but a number of factors can affect that probability. These may vary from country to country. Such factors include trends in government ownership, as well as the role of other shareholders. Finally, in highly dollarized or euro systems, where there is no lender of last resort, a different situation exists. In these cases, the government's financial flexibility (i.e., capacity to print dollars or euro) and hence willingness to support a failing institution, is much more limited, and the cost of bailing out banks, which quickly becomes prohibitive. In these situations, authorities must rely on regulatory and/or accounting forbearance, private deposit insurance, or other mechanisms of indirect support, such as systemic coordination among banks (Moody’s 2007).

Peresetsky and Karminsky (2008) using a sample of banks in developed and developing countries for the years between 2002 and 2005 attempted to determine which externally observed factors affect Moody’s assignment of external support. The most significant factors in their regressions were country-specific volatility of economic growth, and the corruption index. Moreover, bank-specific size (log of total assets), capital adequacy and assets quality (problem loans to gross loans) bank efficiency (personnel expenses to operation income) and profitability (interest expense to average interest bearing liabilities, were also statistically significant in their model.

In May 2009, the agency published a special comment where they examine the impact of global financial crisis in their assessment of bank credit risk and its more closely alignment with

the government ratings in non-Aaa countries. According to their report, the prolonged global financial crisis, affected the ability of national governments and their central banks to support their banking systems in certain markets. However, the erosion in underlying credit fundamentals and the reduced policy flexibility of many governments had prompted a review of the level of systemic support for banks in countries with sovereign ratings below the triple-A level. This review was expected to result in changes to the bank debt and deposit ratings of some banks in non-Aaa rated countries.

One significant observation was that the Deposit Ceiling may overstate support capacity so their systemic support assumptions would be more appropriately measured by anchoring the input on the government bond rating. However, it is important to stress that the ability of a government to support a bank can be higher than the government debt rating. This opinion in part is supported by the array of tools - financial as well as non-financial - available to governments and their central banks which could be employed to assist banks even if they have difficulties servicing their own debts.

Additionally, they included several new dimensions in their external support reassessment such as, the relative size of the banking system compared to that of the government, the level of stress in the banking system and in the economy, the foreign currency obligations of the banking system relative to the government's own foreign currency resources, the political and historical patterns of government's actions and announcements relative to the confrontation of the crisis, and potential shifts in government priorities in the providence of support to the banks.

Finally, Moody's' May 2009 report provided a more recent mapping of Bank Financial Strength Ratings to Baseline Credit Assessment, that was used in the present work in order to compare BFSR to LTDR (Figure 4.4). After the numerical transform of LTDR scaling from the higher rating beginning from 1 for Aaa to 21 for C, the distance from BFSR was counted by the number of notches higher from the corresponding BFSR. For example, if BFS was C+, the corresponding mapping was A2 or in numerical values "6". If the banks' LTDR was Aa3 or in numerical values "4", the split rating value was "2". Moreover, because some BFS ratings corresponded to more than one baseline credit ratings we choose the higher among them, for example if BFSR was C- the corresponding baseline credit rating was Baa1.

Figure 4.4: Mapping of Bank Financial Strength (May 2009)

Bank Financial Strength Ratings	Baseline Credit Assessment
A	Aaa
A-	Aa1
B+	Aa2
B	Aa3
B-	A1
C+	A2
C	A3
C-	Baa1
C-	Baa2
D+	Baa3
D+	Ba1
D	Ba2
D-	Ba3
E+	B1
E+	B2
E+	B3
E	Caa1
E	Caa2
E	Caa3
E	Ca
E	C

5. Empirical Analysis

5.1 Risk premium of bank equity

Estimating the cost of equity involves estimating the expected return on a firm's common stock. The cost of equity includes a risk premium to compensate shareholders for holding a risky equity security rather than a risk-free security:

$$COE_i = E(R_i) = R_f + RP_i \quad (5.1)$$

Where: COE_i : The bank's *i* cost of equity,

$E(R_i)$: The expected future return on bank's *i* equity, where returns include capital gains and dividends,

R_f : The risk –free rate, and

RP_i : The equity risk premiums for holding a bank's *i* stock

Generally, there are two approaches for estimating the cost of equity at a firm level. The implied approach measures that cost as an internal rate of return that equates the present value of forecasted future cash flows to equity holders with the current stock price. In comparison, the realized returns approach uses information in realized ex-post stock returns to generate a cost of equity (e.g, CAPM). In the present work, the first approach was preferred to avoid the efficient market's assumption which is necessary for the application of the market equilibrium models.

Determining the cost of equity using the implied approach is analogous to determining the nominal yield-to-maturity on a bond; i.e., finding the discount rate t hat sets the bond's price equal to the present value of future cash flows. Similarly, the implied cost of equity is the discount rate that sets the current stock price equal to the present value of expected future dividends per share. The relation between the current stock price (P_0), the cost of equity (r), and future expected dividends per share (D_1, D_2, D_3 ...) is represented by the discount cash flow models that were presented in chapter 4.1(DCF). The simplest form of the DCF, the Gordon Dividend Growth Model, assumes a constant perpetual rate of growth (g) in expected dividends per share. With this assumption, dividends are an infinite geometric series, and the cost of equity

can be written as a function of the dividend yield plus the constant growth rate. Similar to the DCF models, the discount of Future Value of Economic Profit, or the Dermine's Fundamental Valuation method, can be used for the derivation of the implied cost of equity as the interest rate that equals the discounted future cash flows to the present market value of the bank's stock.

Two problems derive from these models. First, they are based on long term forecasting of future cash flows in order to determine the franchise value of the bank. That forecasts are available only in short-term horizon while the cash flows in the long-term horizon are substituted by an unrealistic constant growth rate assumption. Under this assumption, dividends may grow on a rate higher than the growth rate of economy which will lead in dividends larger than the whole economy at some future point (Barsky and DeLong 1992). Additionally, Jensen's inequality[4] shows that substituting expected for realized growth in DCF models induces a downward bias. The empirical relevance of that bias depends in turn on the specification of the underlying process governing dividends (Pages, 1999).

Finite Horizon Expected Return models address the difficulties in estimating a long term growth rate by utilizing accounting information (Gordon and Gordon, 1997). These models equate the current share price to the sum of two components: (1) the present value of expected dividends per share over a short or medium-term horizon(N); and (2) a discounted terminal value, which is the present value of the expected share price at the end of the forecast period, assuming that dividends then grow at a constant rate (g_l) in perpetuity:

$$P_0 = \sum_{t=1}^{N} \frac{D_1}{(1+r)^t} + \frac{D_{N+1}}{(r-g_l)*(1+r)^N} \quad (5.2)$$

Assuming that return on book equity and the dividend payout ratio after time N+1 remain constant, the following constraint is imposed on the long-term growth rate of dividends (g_l) in the following equation:

$$g_l = ROE_{N+1} * (1 - \frac{D_{N+1}}{Earnings_{N+1}}) \quad (5.3)$$

Several previous researches have used these models in order to imply the required rate of return on equity. Claus and Thomas (2001) by setting growth rate equal to the expected inflation rate they derived the expected dividends of the N+1 period (D_{N+1}) from (1) and then, they

implied the cost of equity from a 5-year time period as the value of *r* that solves equation (1). Lee, Ng, Swaminathan (2004) minimized dividends forecasting at the next two years and then they faded the earnings growth (g_l) to the log-run growth of GDP until the 15th year.

The implied models rely on the assumption that analyst earnings forecasts are a reasonable proxy for the market's expectations for future earnings. Research suggests that information in analyst earnings forecasts is incorporated in stock prices and that these forecasts perform better than time series models of earnings. However, analyst forecasts could be both biased and sluggish relative to market expectations. Forecast bias may exist in order to gain an underwriting relationship, to generate trading commissions, or to gain preferential access to management.

In order to avoid a forecasting bias, the present work is based on a simpler discount model as where the present market value of a bank's stock equals to the discounted value of the next period's dividend plus the discounted market value of the stock for the next time period:

$$P_t = \frac{D_{t+1} + P_{t+1}}{1+R} \quad (5.4)$$

Where, P_t = the current market price of the bank's stock,

D_{t+1} = the next period's total dividend payment,

P_{t+1} = market price of the bank's common equity for the next time period, and

R = the required rate of return from the market which also equals to the bank's cost of equity.

By transforming properly equation (5.4) we can derive the cost of equity from the following equation:

$$R_{t+1} = \frac{P_{t+1} - P_t}{P_t} + \frac{D_{t+1}}{P_t} \quad (5.5)$$

Where if we substitute *t* with *t-1* and *t+1* with *t*, the equation (4) can be used in the calculation of the implied cost of equity for each time period of each bank's common equity:

$$R_t = \frac{P_t - P_{t-1}}{P_{t-1}} + \frac{D_t}{P_{t-1}} \quad (5.6)$$

The regression model that follows aims in the definition of bank-specific and economical environment factors that may affect the behavior of investors towards bank stocks and, by extension, the bank stock returns which are also the cost of equity financing for bank managers. Understanding those factors is important for equity market investors, bank managers and regulators. For investors, a better understanding would inform portfolio decisions. For bank managers, the expected rate of return on shareholders' funds represents a key hurdle rate for business decisions. For policymakers, it would shed light on the incentives of bank shareholders and, by extension, bank managers (Tsatsaronis and Yang, 2012). Furthermore, information about the determinants of banks' equity performance can assist in the better decision making for policymakers and regulations concerning the banking sector, as they are more informed about how their decisions affect those determinants. For example, an insight into the determinants of bank equity prices can inform the calibration of policies to shape incentives for banks to build up loss-absorbing buffers in the most efficient way.

5.2 Regression analysis

Relative total assets ratio

The first factor examined would be the relative size of each bank within each country's banking sector and more specifically the ratio of *each bank's total assets to the aggregated total assets of the banking sector of each country* [$ASSETS_t$]. There tends to be more information available for larger firms, given they are generally more transparent and have a greater analyst following. This reduces agency costs: when investors have more information regarding a firm's management and potential earnings, returns are less uncertain. In return for this perceived lower risk, shareholders will demand a lower return, effectively reducing the firm's cost of equity. In addition, large firms are more liquid which also decreases the cost of equity. In previous researches (Witmer and Zorn, 2007) a significant positive relationship was found between the firms' size and the cost of equity funding. On the other hand, Demsetz Saidenberg and Strahan (1997) drew the conclusion that larger banks are more diversified than smaller banks, but they are not less risky overall because they operate with more leveraged balance sheets. In the present work this hypothesis will also be tested for the cost of equity financing for banking firms.

Leverage

Generally, in corporate finance theory, investors require higher return on a levered firm in order to match the increased risk of the firm (Breally, Myers Allen, 2011). As the proportion of debt in the capital structure increases, fixed interest costs rise, so there is more risk to debt holders. But there is also more risk to equity holders: since payments to debt holders have priority, returns to equity holders will be more sensitive to changes in earnings and, in this sense, are more risky. Furthermore, because of the fact that banks are considered to be highly leveraged firms, leverage is important in explaining stock market performance of banks. The results in Cantor and Johnson (1992) suggest a positive relationship between improving capital ratios and stock market performance for bank holding companies. Additionally, Tsatsaronis and Yang (2012) applying a Fama- French three-factor regression model[5] in bank stock returns, they confirmed that higher leverage leads to a higher sensitivity to systematic market risk and also boosts the idiosyncratic risk of the stock. In their paper, they measured leverage using total assets to the market value of equity, and they produced also similar results using total assets to book

value of equity. Alternatively, measures such as the Tier 1 capital ratio to the firm's average total consolidated assets or other more sophisticated capital ratios used in Basel Accords could be used to measure the level of leverage. In the present work we choose the use of capital ratio: *total common equity to total assets*[LEV_t]. The lower the ratio is, the higher the leverage of the bank. Following Estrella, Park and Peristiani (2000), leverage measures such as the risk-weighted capital ratio does not consistently outperform the simpler ratios, particularly in short-term horizons of less than two years. On the other hand, more simple measures have the advantage of being available in every bank's balance sheet regardless the implementation of Basel Accords. In the following regression analysis, we expect a negative relationship of returns to the equity to total assets ratio which is consistent to the theory of higher leverage that goes along with higher cost of equity.

GDP growth

Fama and French (1989) first empirically confirmed that expected returns are lower when economic conditions are strong and higher when conditions are weak. Intuitively, the state of the business cycle can influence bank equity prices through its impact on bank assets. During an economic boom, default rates for loans to households and firms decline. This, in turn, boosts bank earnings and can mitigate investors' perception of the risk in bank profits, thereby lowering their required return on bank stocks. Recessions have the opposite impact on loan values and bank earnings, thereby raising required returns. In fact, the impact is arguably asymmetric. The negative influence near the bottom of the cycle is stronger than the positive influence near the top of the cycle, given that credit losses that materialize a in a recession were typically underpriced during the preceding boom. In the corresponding study of bank stock returns Tsatsaronis and Yang (2012) defined the state of business cycle as the GDP growth deviation from a time trend. Their variable after normalization, takes discrete values of 1-4 on the basis of the quartile of distribution over time. Their work confirmed the procyclicality of bank stock returns and more specifically they found that Bank equity returns are more sensitive to systematic risk near cyclical troughs than they are near the top of the business cycle. In the present model each period's *GDP growth* [GDP_t] indicates the phase of business cycle for each country.

Opacity

Following the methodology used in previous research (as presented in chapter 3.3), the present work uses the *split* (the absolute difference of ratings after the transformation in numerical values) of long term deposit ratings of the two major credit rating agencies, Moody's and S&P [$OPAQUE_t$]. For the construction of the ratings split, both agencies' rating scales were derived from the Bloomberg Database and then transformed in numerical values scaling from the higher rating (Aaa for Moody's and AAA for S&P) translated in "1" to the lower rating ("D" for both agencies) translated into "21". The split rating's value was the absolute difference of the numerical values of the two agencies. For example, if a bank's long term deposit was rated by "Aa2" from Moody's, while at the same time the corresponding rating from S&P was "A+" the opacity level of this bank would be equal to | 3 – 5 | = 2. In figure 3 both rating agencies, rating scales are presented, as long as their numerical transformation (Table 5.1):

Moody's	Standard & Poor's	Numerical values
Aaa	AAA	1
Aa1	AA+	2
Aa2	AA	3
Aa3	AA-	4
A1	A+	5
A2	A	6
A3	A-	7
Baa1	BBB+	8
Baa2	BBB	9
Baa3	BBB-	10
Ba1	BB+	11
Ba2	BB	12
Ba3	BB-	13
B1	B+	14
B2	B	15
B3	B-	16
Caa1	CCC+	17
Caa2	CCC	18
Caa3	CCC-	19
Ca	CC	20
C	C	21

Table 5.1: Bank Long Term Deposit Ratings for Moody's and S&P and corresponding numerical values

External Support

The mean to measure the level of external support that a bank may receive during a stress period will be the numerical transformed distance between Moody's two ratings: the "Bank Financial Strength" (BFS) rating, and the "Long Term Deposit Rating" (LTDR), both of which were described more analytically in chapter 4.2. Summarizing, the BFS rating is an indicator of each individual bank to correspond effectively in a distressed situation with negative impact in the bank's viability. The LTDR assesses the bank's ability to repay all depositors for a long-term time period. In addition, the specific rating incorporates the potential external support that the bank may receive in order to correspond in its obligations to depositors. This support may come either from a partner or mother company or group in case of a subsidiary bank, or from the local or regional government as a government deposit guarantee. As presented previously, external support is measured by the numerical transformed distance between LTDR and BFS ratings, following the most recent mapping (Moody's 2009) of these two ratings by Moody's [$SUPPORT_t$].

5.3 Sample Description

Most of the data were taken from the database of Bureau van Dijk. In particular, BankScope database was used in order to construct a sampling algorithm to determine the sample of the banks used in the present empirical study. First the banks chosen, came from OECD countries, excluding United States due to ambiguities in the specialization of activities (for example banks defined as commercial banks in the database, had extended investment or insurance activities as presented in their consolidated accounting statements). Moreover Republic of Korea, New Zealand and Luxemburg were also excluded due to high unavailability of accounting data. The final sample included data from banks of totally 25 countries.

The next step was to define the consolidation levels of the statements providing the accounting data. The statement of a mother company integrates the statements of its subsidiaries; the method of integration may vary according to the importance of the interest owned by the mother in its daughter companies. BankScope provides the categories C1 and C2 for consolidated statements respectively with or without an unconsolidated companion, and U1 and

U2 for unconsolidated statements respectively with or without unconsolidated companion. Because of the fact that one of the main purposes of the empirical study is to examine external support either it comes from a partner or from the government, all C1, C2, and U1, U2 categories were chosen. Consolidated data from mother banking companies would provide information about government guarantee on deposits while unconsolidated statements of subsidiaries would provide information about external support that may come from either the government or the mother company.

Moreover, BankScope provides 12 categories of banks regarding of their major activity: commercial banks, savings banks, cooperative banks, real estate/mortgage banks, medium and long term credit banks, investment banks/securities houses, Islamic banks, non banking credit institutions, specialized governmental credit institutions, bank holdings and holding companies, central banks and multi-lateral governmental banks. In the next step of selection, from the above categories, the following six were selected: commercial banks, savings banks, cooperative banks, real estate/mortgage banks, medium and long term credit banks and investment banks. The next categories included institutions that may be named as banks but their activities were far from traditional banking. For example central banks such as ECB and multi-lateral governmental banks such as the BIS are responsible for the regulation of the banking system and the determination of monetary policy. Furthermore, Islamic banks and non-banking credit institutions were excluded due to low availability of data, and also, due to the fact that the operational framework they follow is quite different from the common operational framework followed by the other banks.

In addition, the aim of this study is to examine the behavior of bank's stock returns so, obviously, the next step of the sampling procedure was to select living and listed banks in order to include banks of which stock is traded in organized stock markets.

Finally, in order to limit the sample to a manageable size for an MSc thesis, following the database's ranking of banks regarding of the relative size of each bank in each country, the choice was limited in the most highly ranked banks. In some cases the ranking was not available so, instead, the largest banks in each country were selected. For each country at least one to seven banks were chosen depending on the size of the country and the number of the banks currently operating in each country. The final sample ended in the selection of 96 banks that is analytically presented in table 1 (see appendix 1).

BankScope provided also the first two series of independent variables in the following regression model. The "Assets ratio" was constructed as the total assets of each bank for each year[6], divided to the corresponding year's aggregated total assets of all the banks chosen in each country which was derived from the same database. Equity to total assets which is used as proxy of "leverage" was provided also by BankScope in the category of ratios[7]

Additionally, the annual rate of GDP growth for each country was derived in the database of World Bank: World Data Bank[8]. The database defines GDP growth as: ''Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2000 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources."

The remaining data were derived from the Bloomberg database. These were: i) The Moody's BFS and LTDR, and S&P long term foreign deposit ratings, for the years 2001-2011. ii) Historical values of banks stock market price at the end of each year for the years 2000-2011, which were used to calculate the implied cost of equity for each bank each year. iii) Using the Bloomberg function GGR (generic government rates for bonds and bills) we found a series of each year's end, 10-year government bond yield that was used as a risk free rate. There, it should be mentioned that in case of Turkey, due to unavailability of the 10-year bond series, the corresponding yield of the 5-year government bond was used instead.

Finally, using equation (5.6) the implied cost of equity was calculated and after subtracting the risk free rate for each period according to equation (5.1) the following regression model was constructed for each period between 2001 and 2011:

$$RP_t = a_t + b_{1,t} * ASSETS_t + b_{2,t} * LEV_t + b_3 * OPAQUE_t + \\ + c * GDP_{i,t} + d * SUPPORT_t + \varepsilon_t \quad (5.7)$$

Where,

$RP_t = \frac{P_t - P_{t-1}}{P_{t-1}} + \frac{D_t}{P_{t-1}} - Rf_{i,t}$: The excess risk premium that derives from the implied cost of equity

$b_{1,t}$, $b_{2,t}$, $b_{3,t}$, : Are the estimated coefficients of the bank-specific characteristics (relative size, leverage, bank's opacity)

c : Is the coefficient of the systematic factor of GDP growth for each country at the same time period.

d: The estimated coefficient of the impact of the external support in the risk premium of banks' stock market value.

5.4. Regression results

Running the regression model for the full length of the chosen sample of 817 observations for all the years between 2001 and 2009 the following estimations were derived: (table 5.2, column 1).

In order to support the previous regression, the same sample was organized in a two dimension panel where the first dimension was the time variable for the years 2001 - 2011 and the second, cross sectional dimension variables, were the 95 banks used in the sample. After testing for cross sectional fixed or random effects using the Haussmann effect, the regression followed used cross sectional random effects. The results from the panel EGLS regression were the following: (table 5.2, column 2). For the second method, there was no indication for autocorrelation issues (Durbin-Watson stat: 2.05).

Coefficient	(1)	(2)
C_t	-3.756*** (0.0000)	-4.229*** (0.0000)
$ASSETS_t$	-0.020 (0.5042)	-0.001 (0.942)
$LEVERAGE_t$	-0.124*** (0.0048)	-0.066*** (0.010)
GDP $GROWTH_t$	0.068 (0.1258)	0.067 (0.235)
$OPAQUE_t$	-0.222** (0.0278)	-0.1964* (0.057)
$SUPPORT_t$	0.324*** (0.0000)	0.310*** (0.0000)
$\boldsymbol{R^2}$	0.05	0.03

Table 5.2: Regression results for total sample. Values in parenthesis are equal to the p-values for each coefficient. ***: ≤ 1% Statistical importance, **: ≤ 5% statistical importance, *: ≤ 10% statistical importance

In order to have a more detailed image of the impact of the factors examined in the regression model, the previous regression was applied separately for each year between 2001 and 2011. There, it should be mentioned that the specified time period is a transitional period for the financial system as it indicates the end of a high development period for the financial system including banks, and the beginning of the global financial crisis period that begun in the end of 2007 with the collapse of Lehman Brothers and continues until the recent time period. The sample for each period was adjusted in order to exclude the occasions with missing values. In table 5.3 the results of the application of the regression analysis for each year are presented.

Year	Observations After adjustments	C_t	$ASSETS_t$	$LEVERAGE_t$	$GDP\ GROWTH_t$	$OPAQUE_t$	$SUPPORT_t$	R^2
2001	54	-4.939*** (0.0000)	-0.026 (0.2506)	-0.117** (0.0383)	0.379*** (0.0001)	-0.210 (0.1596)	0.218** (0.0170)	0.63
2002	57	-3.866*** (0.0000)	0.045 (0.5494)	-0.133** (0.0512)	-0.385*** (0.0078)	-0.124 (0.5614)	0.171 (0.1268)	0.42
2003	63	-2.736*** (0.0000)	-0.011 (0.4762)	-0.182*** (0.0060)	-0.088 (0.4728)	-0.240 (0.2712)	0.182** (0.0474)	0.27
2004	69	-2.918*** (0.0000)	0.000 (0.9889)	-0.058 (0.2895)	-0.314*** (0.0021)	0.052 (0.7337)	0.142** (0.0280)	0.38
2005	77	-2.428*** (0.0000)	-0.095** (0.0436)	-0.076 (0.1312)	-0.260 (0.0012)***	-0.066 (0.6565)	0.111* (0.1236)	0.30
2006	81	-2.332*** (0.0000)	-0.068* (0.1055)	-0.057 (0.2170)	-0.342 (0.0003)	-0.030 (0.7952)	0.171** (0.0204)	0.35
2007	87	-2.132 (0.5930)	-0.150 (0.7995)	-0.481 (0.5799)	-0.481 (0.5799)	-0.822 (0.2906)	0.839 (0.1184)	0.04
2008	90	-4.679*** (0.0000)	0.015 (0.7349)	-0.083 (0.1533)	-0.318*** (0.0001)	-0.010 (0.8960)	0.293*** (0.0001)	0.39
2009	91	-1.963*** (0.0000)	-0.006 (0.8891)	-0.276*** (0.0000)	-0.064 (0.1527)	-0.170** (0.0137)	-0.124** (0.0221)	0.37
2010	91	-2.866*** (0.0000)	0.035 (0.4815)	-0.265*** (0.0000)	0.223*** (0.0000)	-0.045 (0.6632)	0.029 (0.6652)	0.39
2011	85	-5.909*** (0.0000)	-0.112* (0.0995)	-0.121 (0.1468)	0.401 (0.0000)	-0.226 (0.2194)	0.638*** (0.0000)	0.44

Table 5.3: Regressions per each time period (year). Values in parenthesis indicate the corresponding p-value of the estimation of each coefficient for each year. ***: coefficient with at least 1% statistical significance, **: coefficient with at least 5% statistical significance, *: coefficient with at least 10% statistical significance.

The next step in the present empirical research was the examination of the predictive value of the independent variables towards the value of the risk premium n banks stocks. In order to test that hypothesis the regression model (equation 5.7) was altered as following:

$$RP_t = a_t + b_{1,t} * ASSETS_{t-1} + b_{2,t} * LEV_{t-1} + b_3 * OPAQUE_{t-1} + \\ + c * GDP_{i,t-1} + d * SUPPORT_{t-1} + \varepsilon_t \quad (5.8)$$

In this alteration all independent variables were replaced with the same values with a lag (-1). The results of a simple regression on the total sample for the years 2002-2011 are presented in table 5.4:

Independent variables:	C_{t+1}	$ASSETS_{t+1}$	$LEVERAGE_{t+1}$	$GDP\ GROWTH_{t+1}$	$OPAQUE_{t+1}$	$SUPPORT_{t+1}$	R^2
Coefficient:	-3.352*** (0.0000)	-0.000 (0.9803)	-0.145*** (0.0027)	0.055 (0.4161)	-0.334*** (0.0014)	0.2699*** (0.000)	0.08

Table 5.4: Regression results for total sample with lag(-1) independent variables. Values in parenthesis are the corresponding p-values for each coefficient. ***: at least 1% Statistical importance, ** 5% statistical importance.

Finally, following the previous analysis, the same regression was applied separately for each of the following years: 2002 – 2011. As in table 7.3, the sample for each regression was adjusted in order to exclude observations with missing values. The results are presented in table 7.5

Year	Observations After adjustments	C_t	$ASSETS_{t+1}$	$LEVERAGE_{t+1}$	$GDP\ GROWTH_{t+1}$	$OPAQUE_{t+1}$	$SUPPORT_{t+1}$	R^2
2002	58	-5.22*** (0.000)	-0.020 (0.4387	-0.101* (0.1070)	0.374*** (0.0006)	-0.133 (0.3116)	0.020 (0.8384)	0.38
2003	62	-2.90*** (0.000)	-0.013 (0.5313)	-0.159** (0.0183)	-0.118 (0.3610)	-0.206 (0.3377)	0.148 (0.1862)	0.24
2004	58	-3.61*** (0.000)	0.022 (0.1169)	-0.084 (0.14290	-0.170 (0.1040)	0.036 (0.8358)	0.162** (0.0225)	0.29
2005	69	-3.552*** (0.000)	0.000 (0.9581)	0.012 (0.8249)	-0.314 (0.2016)	0.114 (0.4859)	0.164** (0.0251)	0.17
2006	75	-2.765*** (0.000)	0.022 (0.6290)	-0.06 (0.1899)	-0.277*** (0.0004)	-0.081 (0.5612)	0.151 (0.246)	0.38
2007	82	-8.350*** (0.0281)	-0.234 (0.5410)	0.6513 (0.1270)	-0.868 (0.3032)	3.643*** (0.0006)	-0.062 (0.9182)	0.17
2008	90	-4.679*** (0.0000)	0.015 (0.7349)	-0.083 (0.1533)	-0.318*** (0.001)	-0.010 (0.8960)	0.293** (0.001)	0.39
2009	91	-2.340*** (0.000)	-0.006 (0.8713)	-0.194*** (0.00730	-0.197*** (0.0003)	-0.252*** (0.0008)	0.024** (0.0561)	0.33
2010	91	-2.6827*** (0.000)	-0.005 (0.919)	-0.176*** (0.0007)	-0.084* (0.1066)	-0.124* (0.1168)	0.127** (0.0411)	0.18
2011	90	-4.105*** (0.000)	-0.075 (0.3847)	-0.369*** (0.0000)	0.564*** (0.000)	-0.462*** (0.0100)	0.281** (0.022)	0.56

Table 7.4: Regressions per each time period (year) with lagged (-1) independent variables. Values in parenthesis indicate the corresponding p-value of the estimation of each coefficient for each year. ***: coefficient with 1% statistical significance, **: coefficient with 5% statistical significance, *: coefficient with 10% statistical significance.

6. Conclusions

From the first estimation output concerning contemporaneous observations in the total sample (table 5.2), opacity and external support seem to have a significant impact on the risk premium of banks' stocks. However, *Opacity*'s negative coefficient is in conflict with the expected result that more the more opaque banks investors demand higher return as they undertake more risk. On the other hand, *external support* has a positive impact on bank's stock return indicating that when banks expect higher external support, are able to engage in riskier activities and the moral hazard problem that appears is realized by investors who demand higher risk premium for the riskier activities the bank is expected to engage in. The third statistically important factor, *Leverage*, has a negative coefficient. There, it should be reminded that capital ratio of equity to total assets has been used as proxy of leverage and so, the lower the ratio, the higher the leverage is. Confirming the theoretical expectations mentioned earlier, investors demand higher return for the highly leveraged banks.

In the most detailed examination of independent variables the following conclusions were derived:

The *relative size* factor (ASSETS) seems to be of low zero significance, which cannot lead in a clear conclusion about whether the size of a bank matters for equity investors. The ambiguity in these results is confirmed in previous empirical studies mentioned above (chapter 5.2). Generally, large firms are more liquid and this may reduce the risk taken from equity investors, but in case of banks, high levels in the value of total assets may indicate higher diversification in their activities, many of them are far from traditional banking and are characterized from higher opacity (see chapter 3.3).

The *leverage* factor seems to be significant for the first three years (2001, 2002, and 2003) as long as for the most recent periods (2009 and 2010). The reason for this may be the clarity of the general macro-economical conditions, as for the earliest years the global economy was in a clear development phase while in the more recent years global economy had entered in recession phase. Additionally, in both statistically important and non-statistically important coefficients there seems to be a negative relationship between the leverage levels and the required return from investors that confirms the hypothesis that banks with low capital levels are exposed in higher risk which bears the existing equity holders of the bank.

The factor relative to general economic conditions of each period, *GDP growth* seems to be highly significant for six out of ten time periods examined, but the alteration in the coefficient sign creates difficulties in the interpretation of the results concerning the specific factor.

The *opacity* factor seems to be of no significance in most time periods (with the exception of 2009) for the contemporaneous regressions. Additionally, in the lagged variables regression opacity was statistically important for the years post 2007 crisis, indicating that opacity may be taken under consideration for equity investors in distress periods. Despite that fact, the consistence of the negative sign in the opacity coefficient (with the exception of the year 2007 in the lagged regressions) leads in conclusions that may diverge from the expected theory that opacity increases risk and so, expected return from equity investors.

The last factor which proxies the level of expected *external support* has produced quite interpretable and also interesting results. It seems to be statistically significant in most time periods examined both with contemporaneous and lagged independent variables. This indicates that equity investors pay attention in the level of the expected external support that the bank may receive in case of distress, despite the general economic conditions. Additionally the positive sign of external support coefficient in each time period is a quite clear indication that financial markets are aware of the moral hazard problem that derives from the level of external protection for the banking system. As mentioned in previous chapters (3.4), when banks are able to operate under the protection of an external support in case of distress, are able to engage in more opaque and more risky activities such as investment banking without the fear that a potential high loss may lead in the resolution of the bank. Instead, in case of high looses, they are able to receive the expected support in order to cover their obligations towards depositors while in case of profitability they enjoy the returns of a fictitious profitable strategy.

External support mostly comes from the implicit government guarantee, the level of which is determined by each country's authorities or central banks and consists of funds included in government budgets or more simply formulated, of taxpayers' money. Investors seem to realize the direct impact of external support in the banks' risk-return strategies. Moreover, their behavior may incorporate the indirect impact of implicit government guarantee which is the protection of the bank from a potential distress but also the imminent damage of its reputation towards depositors due to engagement in risky activities, which may affect negatively its future profitability.

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Appendix I:

Sample details: Countries- Banks selected:

	Country Name	Bank Name
1	AUSTRALIA	Suncorp Group Limited
2	AUSTRALIA	Westpac Banking Corporation
3	AUSTRALIA	National Australia Bank Limited
4	AUSTRALIA	Australia and New Zealand Banking Group
5	AUSTRALIA	Commonwealth Bank of Australia
6	AUSTRALIA	Bank of Queensland Limited
7	AUSTRALIA	Bendigo and Adelaide Bank Limited
8	BELGIUM	KBC Groep NV/ KBC Groupe SA-KBC Group
9	CANADA	Royal Bank of Canada RBC
10	CANADA	Bank of Nova Scotia (The) - SCOTIABANK
11	CANADA	National Bank of Canada-Banque Nationale du Canada
12	CANADA	Bank of Montreal-Banque de Montreal
13	CANADA	Canadian Imperial Bank of Commerce CIBC
14	CANADA	Toronto Dominion Bank
15	CHILE	CorpBanca
16	CHILE	Banco de Chile
17	CHILE	Banco Santander Chile
18	CHILE	Banco de Credito e Inversiones - BCI
19	CZECH REPUBLIC	Komercni Banka
20	DENMARK	Danske Bank A/S
21	DENMARK	Spar Nord Bank
22	DENMARK	Sydbank A/S
23	FINLAND	Pohjola Bank plc-Pohjola Pankki Oyj
24	FINLAND	Sampo Plc
25	FINLAND	Pohjola Bank plc-Pohjola Pankki Oyj
26	FRANCE	Crédit Industriel et Commercial - CIC
27	FRANCE	BNP Paribas
28	FRANCE	Société Générale
29	FRANCE	Crédit Agricole S.A.
30	GERMANY	Commerzbank AG
31	GERMANY	Deutsche Bank AG
32	GERMANY	Deutsche Postbank AG
33	GERMANY	IKB Deutsche Industriebank AG
34	GREECE	Alpha Bank AE
35	GREECE	National Bank of Greece SA
36	GREECE	EFG Eurobank Ergasias SA
37	GREECE	Piraeus Bank SA
38	GREECE	Agricultural Bank of Greece

39	HUNGARY	OTP Bank Plc
40	HUNGARY	FHB Mortgage Bank Plc-FHB Jelzalogbank Nyrt.
41	IRELAND	Allied Irish Banks plc
42	IRELAND	Bank of Ireland
43	ISRAEL	Bank Leumi Le Israel BM
44	ISRAEL	Bank Hapoalim BM
45	ITALY	Unione di Banche Italiane Scpa-UBI Banca
46	ITALY	Banca Monte dei Paschi di Siena SpA-Gruppo Monte dei Paschi di Siena
47	ITALY	Banca Popolare di Milano SCaRL
48	ITALY	Banca Carige SpA
49	ITALY	Banco Popolare
50	ITALY	Credito Valtellinese Soc Coop
51	ITALY	Intesa Sanpaolo
52	ITALY	UniCredit SpA
53	JAPAN	Suruga Bank, Ltd. (The)
54	JAPAN	Shizuoka Bank
55	JAPAN	Mitsubishi UFJ Financial Group Inc
56	JAPAN	Sumitomo Mitsui Financial Group, Inc
57	JAPAN	Mizuho Financial Group
58	JAPAN	Shinkin Central Bank
59	JAPAN	Bank of Yokohama, Ltd (The)
60	NETHERLANDS	SNS Reaal NV
61	NORWAY	Sparebanken Vest
62	NORWAY	SpareBank 1 SR-Bank
63	POLAND	Bank Handlowy w Warszawie S.A.
64	POLAND	Bank Polska Kasa Opieki SA-Bank Pekao SA
65	POLAND	Bank Zachodni WBK S.A.
66	POLAND	Powszechna Kasa Oszczednosci Bank Polski SA - PKO BP SA
67	POLAND	Kredyt Bank SA
68	PORTUGAL	Banco Comercial Português, SA-Millennium bcp
69	PORTUGAL	Banco BPI SA
70	SLOVENIA	Nova Kreditna Banka Maribor d.d.
71	SLOVENIA	Abanka Vipa dd
72	SPAIN	Banco Bilbao Vizcaya Argentaria SA
73	SPAIN	Banco Espanol de Crédito SA, BANESTO
74	SPAIN	Banco Popular Espanol SA
75	SPAIN	Banco de Sabadell SA
76	SPAIN	Banco de Valencia SA
77	SPAIN	Banco Santander SA
78	SWEDEN	Svenska Handelsbanken
79	SWEDEN	Swedbank AB
80	SWEDEN	Skandinaviska Enskilda Banken AB
81	SWITZERLAND	EFG International

82	SWITZERLAND	Credit Suisse Group AG
83	SWITZERLAND	UBS AG
84	TURKEY	Turkiye is Bankasi A.S. - ISBANK
85	TURKEY	Turkiye Halk Bankasi A.S.
86	TURKEY	Akbank T.A.S.
87	TURKEY	Yapi Ve Kredi Bankasi A.S.
88	TURKEY	Turkiye Garanti Bankasi A.S.
89	TURKEY	Turk Ekonomi Bankasi A.S.
90	TURKEY	Finansbank A.S.
91	TURKEY	Denizbank A.S.
92	TURKEY	Turkiye Vakiflar Bankasi TAO
93	UNITED KINGDOM	Barclays Plc
94	UNITED KINGDOM	Royal Bank of Scotland Group Plc (The)
95	UNITED KINGDOM	HSBC Holdings Plc
96	UNITED KINGDOM	Lloyds Banking Group Plc

Endotes:

[i] Bagehot's dictum can be summarized as follows: "To avert panic, central banks should lend early and freely (without limit), to solvent firms, against good collateral, and at 'high rates."

[2] Regulatory arbitrage is where a regulated institution takes advantage of the difference between its real (or economic) risk and the regulatory position. For example, if a bank, operating under the Basel I accord, has to hold 8% capital against default risk, but the real risk of default is lower, it is profitable to securitize the loan, removing the low risk loan from its portfolio.

This process can increase the overall riskiness of institutions under a risk insensitive regulatory regime, as described by Alan Greenspan in his October 1998 speech on "The Role of Capital in Optimal Banking Supervision and Regulation". However, in the same speech, Greenspan adds that this phenomenon is not is not necessarily undesirable. In many cases, regulatory capital arbitrage acts as a safety valve for attenuating the adverse effects of those regulatory capital requirements that are well in excess of the levels warranted by a specific activity's underlying economic risk.

[3] It is worth mentioning there that when Peter Cooke was asked about the origin of 8% the answer was not that it resulted from a set of complicated formulas from negotiation among the members of the BIS. Some central banks wanted a larger figure while others thought that this level was already difficult to meet; a compromise was reached at 8%. J.Dermine: Bank Valuation and Value Based Management, McGraw Hill 2003.

[4] In its simplest form the inequality states that the convex transformation of a mean is less than or equal to the mean after convex transformation; it is a simple corollary that the opposite is true of concave transformations. Jensen's inequality generalizes the statement that the secant line of a convex function lies *above* the graph of the function, which is Jensen's inequality for two points: For $x_1 < x_2$, the secant line consists of weighted means of the convex function, $t * f(x_1) + (1-t) * f(x_2)$ while the graph of the function is the convex function of the weighted means, $f(t * x_1 + (1-t) * x_2)$. Or, in the context of probability theory, it is generally stated in the following form: if *X* is a random variable and φ is a convex function, then $\varphi(E[X]) \leq E[\varphi(X)]$.

[5] The three-risk-factor pricing model is well established in the finance literature, as it has been found to explain a large fraction of the systematic movement of the equity returns of individual firms. The model combines the Capital Asset Pricing Model (CAPM) with two additional pricing factors identified by Fama and French (1992) to explain the cross-sectional and time variation of equity returns in excess of the risk free rate. More concretely, the typical specification of the model is of the form:

$$R_t^i = a + b_M * R_{it}^m + b_{HML} * HML_{it} + b_{SMB} * SMB_{it} + u_{it}$$

The market factor (R_{it}^m) is the return on the broad market index corresponding to the individual asset. The value factor (HML) is the difference in the stock returns between a portfolio of firms with a high ratio of book-to-market valuation of their equity and one with a low valuation ratio. The size factor (SMB) is identified as the return differences between small and large capitalization stocks.

[6] Global Summary, database code 2025.

[7] Ratios, "Equity to Total assets", (database code 2055/database code 2060 * 100).

[8] Series code: NY.GDP.MKTP.KD.ZG.