An Empirical Analysis of Market Discipline Imposed by Stakeholders in the Indonesian Banking Sector

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Abstract

Financial sector authorities have incorporated market discipline as an integral part of their banking regulatory frameworks. Accordingly, in Indonesia, the Basel II Capital Accord has institutionalized the market discipline as Pillar 3 to complement requirements under Pillar 1 (risk-based calculation of capital) and Pillar 2 (supervisory review process). In addition, the provision of a financial safety net (FSN) has been a key element of the policy response to recent financial crises. This provision, however, might potentially lead to moral hazard outcomes that could impair the incentives for market players to monitor and discipline financial institutions. In turn, this could incite more risky bank activities and increase the likelihood of a financial crisis. Therefore, a further investigation of the presence of market discipline and the impact of a FSN is imperative to develop a more credible policy to safeguard financial system stability, especially in developing economies such as Indonesia.

This study investigates the presence of market discipline in the Indonesian banking sector as imposed by depositors, bond holders, and equity holders. The discipline by depositors is measured through the impact of bank fundamentals on the changes in the amount of deposits. Whereas, discipline by bond and equity holders is measured through the impact of bank fundamentals on bond yield spreads and equity returns, respectively. Bank fundamentals, in this study, are associated with the Capital Asset Management Earning and Liquidity (CAMEL) financial indicators that are commonly used by banking authorities to assess bank soundness. This study employs a dynamic panel data model using a sample of 95 banks, 70 bonds, and 11 equities.

Regardless of the lack of ideal conditions for an effective market discipline in a developing market, the present study has identified the presence of market discipline imposed by depositors and bond holders, but no significant evidence of discipline by equity holders. Moreover, this study identified moral hazard implications of the provision of a FSN. These include the lessening of discipline by large and institutional depositors and the existence of the “too big to fail” (TBTF) perception among stakeholders.

Student Declaration

I, Deni Ridwan, declare that the PhD thesis entitled 'An Empirical Analysis of Market Discipline Imposed by Stakeholders in the Indonesian Banking Sector' is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

Deni Ridwan **March, 2016**

List of Publications and Awards

Conference Paper

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Abbreviations

BAPEPAM-LK	Capital Market and Financial Institutions Supervisory Agency
BI	Central Bank of Indonesia
BIS	Bank for International Settlements
CAMEL	Capital Asset Management Earning and Liquidity
CAR	Capital Adequacy Ratio
FDIC	Federal Deposit Insurance Corporation
DER	Debt to Equity Ratio
ELA	Emergency Lending Assistance
EWS	Early Warning System
FEC	Foreign Exchange Commercial Bank
FKSSK	Coordinating Forum for Financial System Stability
FSB	Financial Stability Board
FSN	Financial Safety Net
FSSK	Financial System Stability Forum
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
IADI	International Association of Deposit Insurers
IBMD	Indonesian Bond Market Directory
IBPA	Indonesian Bond Pricing Agency
IBRA	Indonesian Bank Restructuring Agency
IDIC	Indonesian Deposit Insurance Corporation (Lembaga Penjamin Simpanan/LPS)
IDR	Indonesian Rupiah (local currency)
IDX	Indonesia Stock Exchange (Bursa Efek Indonesia/BEI)
IMF	International Monetary Fund
IPO	Initial Public Offering
JV	Joint Venture Bank
KPEI	Clearing and Settlement Corporation
KSEI	Central Securities Depository
LDR	Loan to Deposit Ratio
LoI	Letter of Intent

LoLR	Lender of Last Resort
MoF	Ministry of Finance
NFEC	Non-Foreign Exchange Commercial Bank
NIM	Net Interest Margin
NPL	Non-Performing Loans
OJK	Indonesian Financial Services Authority
OPEX	Operating Expense to Operating Revenue Ratio
OTC	Over-the-Counter Market
RD	Regional Development Bank
ROA	Return on Assets
TBTF	Too Big To Fail
USD	United States Dollar

Chapter 1
Introduction

1.1 Background

The use of market discipline for prudential purposes has gained greater importance as policymakers have increasingly recognized its role and have incorporated it into their regulatory frameworks (Kaufman, 2003; Stephanou, 2010). In the Indonesian context, one of the major goals of the development of its financial sector is to establish and to continuously enhance the integrity of the domestic financial system. This includes providing greater roles for private agents to monitor and discipline financial institutions, as recommended in Pillar 3 of the Basel II new capital framework[1] by the Basel Committee on Banking Supervision[2] (Bank Indonesia, 2006a).

The existing regulatory framework, however, has led to potentially confusing and inconsistent outcomes. These, in turn, have hindered the ability of the financial sector to attain its intended developmental goals and have created further uncertainty as to the regulatory environment. One of the potential outcomes is the moral hazard implications of the Financial Safety Net (FSN) on market discipline. The provision of a FSN is intended to safeguard financial system stability and has been a key element of the policy response to the 2008 global financial crisis (Schich, 2008). For example, Indonesia was among 48 countries that adopted some form of enhanced depositor protection as part of their FSN policies during the crisis (International Monetary Fund & International Association of Deposit Insurers, 2010). The provision of FSN contributes to overall short-term financial stability, but at the same time induces greater risk-taking by bank management and other stakeholders in the long-run (Greenspan, 2003). With respect to an effective market discipline, market players must not believe that they would be bailed out or guaranteed in the case of a bank default (Hamalainen et al., 2003). Therefore, the government provision of a FSN such as deposit guarantees or a failed bank resolution might reduce incentives for market players to monitor and discipline financial institutions (Lane, 1993).

[1] International Convergence of Capital Measurement and Capital Standards: A Revised Framework, published on June 2006 by the Basel Committee on Banking Supervision

[2] The Basel Committee on Banking Supervision is a committee of banking supervisory authorities that was established by the central bank governors of the Group of Ten countries in 1975. It consists of senior representatives of bank supervisory authorities and central banks from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

In order to develop a more credible regulation in promoting an effective market discipline environment, the related authorities should take a great deal of consideration regarding the moral hazard implication of the FSN on market discipline. In this context, this study contributes to the body of knowledge concerning market discipline in a developing country by investigating the influence of FSN on that discipline. In particular, the study explores the discipline that is imposed by depositors, debt holders, and equity holders in the Indonesian banking sector.

This first chapter introduces the research motivation and question in Sections 1.2 and 1.3 respectively. Section 1.4 briefly describes the research methodology. Section 1.5 presents the research contributions. Finally, this chapter concludes by presenting the organization of the thesis, in Section 1.6.

1.2 Motivation for the Research

Given the recent crises in financial sectors around the world, such as the Euro debt crisis, the Subprime mortgage crisis in the United States (US) in 2007-2008, and the Asian crisis of 1997, regulators around the world have added financial stability as a priority issue in their development agenda, not just for supervisory authorities, but also for public policymakers. As an emerging economy, the long term policy of the Indonesian government is to establish an efficient financial system that would facilitate a sustainable growth and development. To achieve this goal, Indonesia embarked upon a major financial sector reform agenda following the Asian financial crisis in 1997. This included the creation of Indonesia's FSN and the gradual implementation of the Basel II Capital Accord (Basel II) (Bank Indonesia, 2006a). Given this empirical scenario, this thesis revisits the response efforts of Indonesian authorities and the impact of these efforts a decade after the introduction of the new regulatory framework, to ascertain whether the policy initiatives have achieved the desired policy goals or not. The importance of this study relates to the continuing existence of contradictions within the current Indonesian regulatory framework, particularly between the FSN and Pillar 3 of the Basel II Market Discipline. This section briefly describes these two policy initiatives and outlines the conflicting outcomes.

In the Indonesian context, the creation of the FSN was an essential part of the development efforts adopted by the government and the Bank Indonesia (BI) to strengthen the financial sector following the 1997 Asian financial crisis. As stipulated in the Letter of Intent (LoI) to the

International Monetary Fund (IMF)[3], this development has focused on the stabilization of markets, the strengthening of financial institutions and prudential regulation, and the development of the FSN framework. The creation of the FSN was intended to provide a functional framework for a deposit insurance scheme; an emergency liquidity assistance facility under the central bank's lender of last resort (LoLR) function; and a mechanism to deal with failed banks as well as a crisis resolution policy (Batunanggar, 2002). The objective of the FSN was thus to create stability in the financial system in such a way that the financial sector could function effectively and efficiently, contributing to sustainable economic development (Crockett, 1997).

In June 2004, the Basel Committee issued Basel II as a standard to govern the capital adequacy of internationally active banks. The primary objective of Basel II is to strengthen the security and soundness of the financial system by reinforcing an emphasis on risk-based calculation of capital (Pillar 1); the supervisory review process (Pillar 2); and market discipline (Pillar 3). According to the Guiding Principles set by the Basel Committee (2006), the purpose of the third pillar is to improve financial transparency that, in turn, promotes greater market discipline to complement requirements under Pillar 1 (risk-based calculation of capital) and Pillar 2 (supervisory review process). The third pillar requires banks to disclose adequate information to enable market players to understand the risks involved in the banks. This enables market players to assess key information on the scope of risk, capital, risk exposures, risk measurement process and bank capital adequacy (Bank for International Settlements, 2006).

As a member of the Basel Committee on Banking Supervision since 2007, the Indonesian banking authority has gradually implemented the Basel II standard. In implementing the Basel standard, BI essentially sought to strengthen risk management so that banks would become more resistant to domestic, regional, and international financial shocks (Bank Indonesia, 2006a).

Regardless of its intended objectives to secure financial system stability, the provision of government safety nets has been widely criticized for creating moral hazards in cultivating a culture of indifference among financial institutions (Mishkin, 2000). This moral hazard implication can be identified in two forms: by encouraging the management of insured banks to take more risks (Garcia, 2000; Laeven, 2002); and by reducing incentives for market players to monitor their banks (Demirgüç-Kunt, Kane, & Laeven, 2008; Schich, 2008). In the first form,

[3] The first LoI of the Indonesian government was signed on October 31, 1997 by President Soeharto. This described the policies that Indonesia intends to implement in the context of its request for financial support from the IMF. The standby arrangement from the IMF is required to restore Indonesia's credibility and protect the currency from further decline during the financial crisis. http://www.imf.org/external/np/loi/103197.htm

the provision of a FSN may reduce the link between a default risk in a bank and its funding cost and thereby create an incentive for the bank to increase default risk at the expense of bank stakeholders or deposit insurance funds (Hoggarth et al. (2005). In the second form, the negative effects of a FSN on market players could occur when the provision of a FSN reduces incentive for market participants to monitor the bank since their funds are insured by the government. Moreover, the lack of incentives for market players to monitor banks would eventually impede market discipline and increase the likelihood of a financial crisis (Demirgüç-Kunt & Detragiache, 2002; Greenspan, 2003).

The moral hazard implication of a FSN on market discipline can also be found in bond markets. The literature with respect to market discipline has proposed debt holders, specifically subordinated debts, as one of the most favourable private agents to discipline the financial institutions (Flannery, 2001). However, the provision of a FSN might influence the behaviour of debt holders toward bank risk-taking activities. The availability of a FSN to support a troubled bank might distort the risk-pricing mechanism in the bond market. Therefore, the roles of debt holders to exert market discipline might not be effective if debt holders are not exposed to the default risks of the issuance banks (Flannery, 2001; Sironi, 2003). Empirical evidence in the US (Flannery & Sorescu, 1996) and European markets (Deyoung, Flannery, Lang, & Sorescu, 1998) indicate that discipline exercised by debt holders was weakened during a period of implicit government guarantees.

This issue of moral hazard implications of the FSN on market discipline should be addressed for at least two reasons. Firstly, the moral hazard effect could be expected to impede market discipline, to incite more risky bank activities, and thus possibly to increase the likelihood of a financial crisis (Greenspan, 2003; Hoggarth et al., 2005). Secondly, a distorted market price mechanism caused by the provision of a FSN would limit the accuracy of market indicators to represent the risk of a financial system (Stephanou, 2010). In the Indonesian context, the financial sector authorities have included market indicators in their Early Warning System (EWS) as part of the crisis management protocol (Departemen Keuangan, 2010). Consequently, if these market indicators do not adequately represent the risk of a bank and financial sector as a whole, Indonesia's EWS becomes unreliable in monitoring the stability of the Indonesian financial system and in preventing a potential financial crisis.

Based on these arguments, for Indonesia and other emerging economies in general, developing a FSN that does not hinder an effective market discipline mechanism is critical to avoid future crises (Demirgüç-Kunt et al., 2008). Hence, further investigation of the impact of the FSN on

market discipline is essential, while developing a more credible policy for safeguarding financial stability is imperative, especially in developing economies.

1.3 Empirical Research Objectives

In the presence of moral hazard implications of FSN, the effectiveness of Indonesia's current regulatory framework to improve the integrity of the financial system is questionable. To address this issue, first it is essential to verify the existence of market discipline initiatives in the Indonesian banking sector. This verification should focus on the liabilities side of a bank's balance sheet which is dominated by three main source of funds. These fund sources are depositors, bond holders, and equity holders who potentially have a disciplining power on the banks. Secondly, it also important to identify how market discipline is affected by the provision of FSN. Combining these two verfications, the primary objective of this thesis is to investigate the presence of market discipline, and to evaluate the influence of the FSN on market discipline in the Indonesian banking system. The specific objectives related to the overall research aim that can be empirically verified are:

a. to critically evaluate the discipline imposed by depositors by measuring the impact of bank fundamentals on deposits;
b. to critically evaluate the discipline imposed by bond holders by measuring the the impact of bank fundamentals on bond yields;
c. to critically evaluate the discipline imposed by equity holders by measuring the impact of bank fundamentals on equity returns; and
d. to determine the over all impact of FSN on the discipline of the financial sector stakeholders.

In addressing these research objectives, this study in particular examines the importance of bank financial performance on the investment decisions of the stakeholders. The following section provides a brief description of the proposed method. Further details of the method are discussed in Chapter 3.

1.4 Overview of Literature and Methodology

This section briefly reviews the existing literature relevant to the research topic and highlights the gap within the literature. It continues with a discussion of how this study and its methodology will attempt to fill the existing research gap and enrich the current literature.

The literature on market discipline in the Indonesian banking system is limited and shallow, and shows mixed results. Early research identifies that depositors in the Indonesian banking sector have exhibited a ‘‘flight to quality’’ behaviour during and shortly after the 1997-1998 financial crisis. This phenomenon is recorded by Yudistira (2003) as deposits were shifted from small banks to big banks. Such depositor behaviour implicitly assumes that the government will not allow the large banks to fail, implied by the “too big to fail” (TBTF) doctrine. Other studies indicate another type of flight to quality as deposits flow from private banks to state owned or foreign banks (Enoch, Baldwin, Frecaut, & Kovanen, 2001). This deposit flow indicates the depositor perception regarding an implicit government guarantee for state banks and a stronger capital adequacy and governance of the foreign banks. Hamada (2011) empirically investigated market discipline by depositors using panel data on Indonesian banks from 1998-2009. The results showed that depositors pay attention to bank soundness and riskiness and select banks based on the individual bank’s financial state particularly reflected by the equity ratio. Hadad et al. (2011) argue that market discipline began to deteriorate after the introduction of the deposit guarantee scheme. In addition, market discipline is more pronounced in listed banks than unlisted banks and in foreign banks than domestic banks. In contrast, Valensi (2005) found that market discipline hardly existed in Indonesian banking. His study examined market discipline imposed by depositors and peer banks using panel data from 1980–1999. This study also revealed that Indonesian banks failed to discipline their peers because the financial performance of the borrowing banks does not determine the call money exposures of the lending banks.

Previous studies, as described above, have typically focused only on market discipline from the depositor’s point of view. This approach possibly ignores the disciplining power of other important sources of funds such as bond holders and equity holders. Moreover, the studies, in general, have ignored the effect of market volatility because they employ annual banking data before and after the crisis. In order to gain a deeper insight into the market volatility during the observation period, it is important to employ data with shorter periodicity. The structure of the banking industry along with its regulatory environment has been dynamic and therefore comparing the banking data before and after the 1997 crisis may impair study conclusions. For instance, in terms of number of banks, there were 238 commercial banks operating in Indonesia

before the crisis in 1997 (Enoch et al., 2001). This declined to 150 banks in 2000 due to closures, mergers, and acquisitions following the banking sector restructuring program (Batunanggar, 2002). In terms of accounting data reliability, the empirical evidence shows that during Indonesia's stable economic periods, four of the five traditional CAMEL (Capital, Assets quality, Management, Earning, and Liquidity) components used by banking regulators to assess banks, provide significant insights into the financial soundness of the Indonesian banks.

Under stable economic conditions the relationship between financial soundness of a bank and its CAMEL rating is significant and reliable. However, the instability resulting from economic decline impairs this relationship and CAMEL ratings fail to accurately reflect bank soundness. (Gasbarro, Sadguna, & Zumwalt, 2002).

Having identified the limitations in previous studies, this proposed research aimed to investigate the existence of market discipline in Indonesia and the influence of FSN on market discipline, in particular discipline by depositors, equity holders, and bond holders in the banking sector. Discipline by depositors in this study is measured using deposit growth rate, whereas discipline by equity holder and bond holders are assessed through bond yields and equity returns respectively. This study uses the demand-supply model that is commonly used in studies of developing economies (Valensi, 2005). In this case, the model is a regression of deposit growth, bond yield spread, or equity return on bank financial performances. The equations can be illustrated as follows:

$$\textit{Bank Deposit Growth Rate} = f(\textit{bank fundamentals, macroeconomic variables}) \quad \text{(i)}$$

$$\textit{Bank Bond Yield Spread} = f(\textit{bank fundamentals, macroeconomic variables}) \quad \text{(ii)}$$

$$\textit{Bank Equity Return Rate} = f(\textit{bank fundamentals, macroeconomic variables}) \quad \text{(iii)}$$

The details of these equations are presented in Chapter 3 (Pages 96, 104, and 108).

In this study, the banks' fundamentals refer to bank financial performance, such as capital ratio, return on assets ratio, non-performing loans and loans to deposits ratio. These ratios vary from one study to another but most of them replicate CAMEL ratios. The CAMEL financial ratios are ratios commonly used by the financial authorities to assess bank soundness as promoted by the Basel Committee. Furthermore, macroeconomic variables are required to be included in the regression since the dependent variables are not explained completely by the bank individual

risks (Sironi, 2003). Common macroeconomic variables used in the study regarding market discipline in emerging countries are gross domestic product (GDP), inflation rate, exchange rate, and the central bank's interest rate.

The regression will be modeled using a dynamic panel data model, specifically the generalized method of moments (GMM) estimator as suggested by Arellano and Bover (1995). The dynamic panel data model is characterized by the presence of a lagged dependent variable among the regressors. This method is projected to produce more consistent results based on its ability to control for potential endogeneity, unobserved heterogeneity, and persistence in the dependent variable (Baltagi, 2008).

Data for the study was obtained from the public financial reports that are published by Indonesian banks and submitted to the Indonesian central bank (Bank Indonesia or BI) on a quarterly basis. In addition, data regarding the amount of insured and uninsured deposits in each bank was collected from the Indonesian Deposit Insurance Corporation (IDIC) (Lembaga Penjamin Simpanan or LPS). The data regarding the yields of the corporate bonds were collected from the Indonesian Bond Market Directory (IBMD) that are published by the Indonesian Stock Exchange (IDX) (Bursa Efek Indonesia or BEI). The yields of the government bonds are gathered from the Bloomberg database. Similarly, data regarding the Indonesian bank share prices were gathered from the IDX and Bloomberg.

The observation period of market discipline by depositors spans from the year 2001 to 2011. Following the restructuring and consolidation of the Indonesian banking industry post the 1997-1998 Asian financial crises, the year 2001 was chosen as a starting point to reflect a more current view of the Indonesian banking sector. However, due to the availability of data, the observation of market discipline by bond holders was taken over the period 2007-2011, whereas the analysis of market discipline by equity holders relates to data from 2002 to 2011.

1.5 Research Contribution

Arguably, a FSN in the banking industry is a two-edged sword. The FSN is intended to enhance the stability of a financial system and to prevent a full blown financial crisis. However, a lack of proper design in a FSN might increase bank fragility and increase the probability of a financial crisis (Hoggarth et al., 2005). Therefore, despite the IMF recommendation for its members to adopt a FSN, at least two-thirds of IMF member countries have experienced significant financial or banking sector problems over the time period of 1980–1996 (Lindgren, Garcia, & Saal, 1996).

Furthermore, crisis resolution is very complex and costly. The damage that these crises have caused on developing economies seems to be far greater than that on developed countries (Mishkin, 1996). On average, the net recapitalization cost to the government (after deducting recovery proceeds from the sale of assets) amounted to six percent of GDP across crisis countries, but in the case of Indonesia it reached as high as 37.3 percent of GDP (Laeven & Valencia, 2008). This observation further strengthens the case for implementing appropriate FSNs to mitigate the risk of shock to financial stability while minimizing any risk to public funds. This study is expected to contribute to strengthening government policy responses in handling financial crises and maintaining financial stability in Indonesia.

The methodology offers significant contributions to current knowledge in several ways. Firstly, it extends the previous studies by adding other major sources of funds such as bond holders and equity holders to the list of market players who in turn exert market discipline on banks. Secondly, this research is the first study that clearly differentiates between insured and uninsured depositors in analyzing depositor behaviour using data from the IDIC. Third, the research employs bank level quarterly data whereas other studies have generally used annual or industrial aggregate data. Finally, the observation period in this research focuses only on banking data after the 1997 crisis to capture the current Indonesian banking landscape and regulations that have changed significantly since the crisis.

1.6 Organization of the Thesis

The thesis is structured to provide a critical review of relevant information regarding banking regulatory frameworks, in particular the FSN and market discipline concept, and an overview of the Indonesian financial market structure. This is followed by a discussion on the proposed analytical framework and development of statistical hypotheses relevant to the study. Next, the data are analyzed to provide evidence for support of the hypotheses. Based on the research findings, the implications of the study are derived. This thesis consists of seven chapters, as follows.

Chapter 1 has provided a brief introduction to the motivation of the study along with the research problem. It has also outlined the research methodology and contributions made.

Chapter 2 presents a critical review of literature related to FSNs, market discipline, and the influence of FSN on market discipline. It is followed by a review of the literature on market discipline imposed by depositors, bond holders, and equity holders. In addition, this chapter

provides an overview of the Indonesian financial market structures and the Indonesian FSN framework.

Chapter 3 describes the research framework and empirical models of this study. This chapter consists of a conceptual framework and hypothesis development for evaluating the presence of market discipline in the Indonesian financial sector by depositors, debt holders, and equity holders. This chapter also presents the research design of this study, including regression models.

Chapter 4 presents an empirical analysis of market discipline imposed by depositors. This chapter consists of a description of data, an analysis of the empirical results, and a discussion of the results of the study on the discipline exerted by depositors.

Chapter 5 presents an empirical analysis of market discipline imposed by bond holders. It begins with a description of data used in this study, followed by an analysis and discussion of the results of the study pertaining to the bond holders.

Chapter 6 presents an empirical analysis of market discipline imposed by equity holders. This chapter presents a description of data used, an analysis of the empirical results, and a discussion of the results of the study regarding the discipline exercised by equity holders.

Chapter 7 presents a summary of the study and a synthesis of the results as presented in the previous chapters. This is followed by a discussion on the implications derived from the results, the limitations of the study and suggestions for future research.

Chapter 2
Review of Literature and Institutional Background

2.1 Introduction

As stated in Chapter 1, this thesis addresses research objectives related to market discipline in the Indonesian banking sector. In order to provide a theoretical background and the context of this study, this chapter is divided into two main sections: the first section provides a review of literature on market discipline and its relationship to the provision of FSNs; and the second part presents an overview of the Indonesian financial market and FSN framework.

In general, there are two schools of thought with respect to banking regulation; the private interest view and the public interest view of regulations (Anderson, 2006). The first approach suggests that the banking industry is similar to other industries; hence, banks are not subject to special regulations beyond those applicable to most enterprises. Any special regulations would create market distortions (moral hazard) and may not improve efficiency (Benston & Kaufman, 1996; Crockett, 1997). According to Adam Smith's *laissez-faire* invisible hand theory, the common interest is best served by allowing market participants to pursue their own self-interest with minimal (or no) state intervention. Without any government intervention at all, let alone regulation, markets in a free market economy are assumed to be able to attain equilibrium simply by the operation of the forces that act upon them and, in the process, market failures are corrected (Shleifer, 2005).

The private interest view also perceives regulations as a product with various stakeholders interacting to determine the shape and purpose it serves (Anderson, 2006). Given that firms in the financial sector are able to exert greater influence on legislators, the private interest school expects to see regulations that enhance the power or benefits of bankers and politically well-connected parties (Anderson, 2006; Hayek, 1976). This potential outcome of regulation has motivated Hayek (1976) to argue that the government is indeed the major source of instability. Even if markets cannot solve all problems perfectly, government regulators are incompetent, corrupt, and captured, so regulation would result in intensifying the existing inefficiencies resulting in unfavourable social outcomes (Shleifer, 2005). Based on these arguments, the private interest view supports greater reliance on market discipline, information disclosure, a light regulatory approach by banking authorities, and significant oversight of the regulatory process itself (Shleifer, 2005).

On the other side of the coin, the public interest view argues that where the market is imperfect, the invisible hands concept, as discussed above, will not be effective (Pigou, 1932). The public interest or helping hand theory of regulation assumes that markets often fail due to the problems of imperfect competition resulting in externalities (Shleifer, 2005). The self-correcting mechanism of the market is not entirely applicable to the financial market because the market is inherently unstable and risky (Gan & Li, 2000). Furthermore, it also presumes that governments are benign and capable of amending these market failures through regulations (Shleifer, 2005). Under the view that the financial system, in particular the banking industry, is inherently vulnerable to market failure, external regulation is essential to promote the development and growth of a robust banking system (Bhattacharya & Thakor, 1993). This view holds that governments regulate banks to facilitate the functioning of banks by correcting market failures. This is done for the benefit of broader civil society (Anderson, 2006; Crockett, 1997). An extensive amount of literature reveals key market failures that provide an economic rationale for government interventions in banking (Anderson, 2006), and one of the most discussed market failures in this area relates to imperfect information as described in asymmetric information theory (Akerlof, 1970), which is discussed in the next section. The public interest theory of regulation has become the foundation of modern public economics and it has been used to justify much of the growth of public ownership and regulation over the twentieth century (Shleifer, 2005).

Despite the fact that the public interest view has dominated the thinking on regulation, the latest financial crises have led to a renewed interest in discussing the roles of regulation as a source of bank stability and the growing importance of market discipline as a regulatory tool. This study is aims to enhance the body of knowledge regarding the subject by investigating the influence of FSN on market discipline in an emerging economy. For this purpose, the following section presents a discussion on financial system stability and the role of FSN to maintain the stability of a financial system. It is followed by a discussion about market discipline under the asymmetric information theory framework, and the influence of FSN on market discipline, in particular discipline imposed by depositors, debt holders, and equity holders.

2.2 Financial Safety Net

The main objective of a FSN is to safeguard the stability of the financial system (International Monetary Fund, 2009a). Sub-section 2.2.1 presents a discussion on the concept of financial

stability; and Sub-section 2.2.2 presents a discussion on the role of the FSN in maintaining the stability of financial systems.

2.2.1 Financial System Stability

Financial system stability is defined as a situation in which the financial system is capable of satisfactorily performing its three key functions simultaneously. First, the financial system is efficiently and smoothly facilitating the inter-temporal allocation of resources from savers (that is economic agents who lack productive investment opportunities) to investors (that is economic agents who have such opportunities) and the allocation of economic resources generally (Mishkin, 1996; Schinasi, 2006). Second, forward-looking financial risks are assessed and priced reasonably accurately and are relatively well managed (Crockett, 1997; Schinasi, 2006). Third, the financial system is in such a condition that it can comfortably, if not smoothly, absorb financial and real economic surprises and shocks (Schinasi, 2006). This definition clearly depicts the difference between monetary stability and financial stability. Monetary stability refers to the stability of the general price level whereas financial system stability refers to the stability or the smooth-functioning of the key institutions and markets that go to make up the financial system. Therefore, financial system stability requires (i) that the key institutions in the financial system are stable, in that there is a high degree of confidence that they can continue to meet their contractual obligations; and (ii) that the key markets are stable, in that participants can confidently transact in them at prices that reflect the fundamental forces (Crockett, 1997).

Historically, the role of governments to safeguard the stability of financial systems was fairly modest. Governments played the role indirectly through monetary, fiscal, and debt management policies. Government interventions to particular financial institutions such as subsidized lending, insurance of private institutions, or government recapitalization of particular institutions were relatively unusual (Calomiris, 1997). The trend for deeper government interventions has intensified in the US since the Great Depression of the 1930s. In 1933, the Federal Reserve (the Fed) was authorized by the President of the US to provide not only lending against high quality collateral assets, but also a permit to purchase the preferred stock of distressed banks and other firms (Mason & Calomiris, 2004). In addition, the Glass–Steagall Act of 1933 was passed to provide legislation for the establishment of the Federal Deposit Insurance Corporation (FDIC) in order to provide a certain level of protection for small depositors (Calomiris & White, 1994). The policies implemented by the US were adopted by most governments in developed

economies for the purpose of taking more significant roles in safeguarding the stability of financial systems (Benston & Kaufman, 1996). Hence, in most countries, the level of regulatory intervention in banking has increased dramatically since the Great Depression compared to the other sectors (Calomiris & Mason, 2003). For instance, during the global financial crisis of 2008, the provision of a FSN for banks and other financial institutions has been a key component of the policy response to the crisis (Schich, 2008).

There are two main reasons for making the health of the financial system a public policy concern: first, the financial system is prone to bouts of instability; and second, that instability can generate substantial negative spill-over effects or externalities (Crockett, 1997). There is persuasive evidence that financial stability provides a favourable environment for efficient resource allocation and more rapid economic growth (King & Levine, 1993), and instability has been associated with lower levels of saving and investment, fiscal costs, and setbacks to economic growth (King & Levine, 1993). Therefore, safeguarding the stability of the financial system is recognized as important to maintaining macroeconomic and monetary stability, and to achieving sustainable economic growth (Mishkin, 1996). Therefore, it is unavoidable that securing stability should be a concern of public policy authorities (Crockett, 1997). Moreover, implementing a safety net that does not hinder an effective market discipline mechanism is critical for avoiding future crises (Demirgüç-Kunt et al., 2008).

2.2.2 The Role of FSNs to Maintain Financial Stability

The FSN, in the present context, consists of four key elements: deposit insurance; an emergency liquidity support LoLR function); a prudential regulatory and supervisory framework; and a failure resolution mechanism for financial institutions (Financial Stability Board, 2012). A narrow definition is limited to deposit insurance and a LoLR function (Schich, 2008). These two features of FSN are commonly used containment measures in dealing with financial crisis, as shown in data from systemic banking crises over the period of 1970 to 2007 (Laeven & Valencia, 2008). The following sub-sections present a brief overview of these two most popular FSN features.

Deposit Insurance

The International Association of Deposit Insurers (IADI) states two main objectives for the provision of deposit insurance: (1) to provide protection to small depositors from loss in the case of a troubled or failing bank; and (2) to enhance public confidence in the financial system and to

maintain financial stability with other FSN participants (2011). A deposit insurance system in general refers to the set of specific functions (whether performed by a dedicated legal entity or not) inherent to provide protection to bank depositors, particularly to safeguard small savers from loss in the case of a troubled or failing bank (Financial Stability Board, 2012). In relation to this, Garcia (1996) advanced five arguments to implement deposit insurance: (i) providing consumer protection for small depositors; (ii) enhancing public confidence and systemic stability; (iii) increasing saving and encouraging economic growth; (iv) enabling small and new banks to compete with large and/or state banks; (v) limiting the cost to the government when a bank or group of banks fail; and (vi) requiring banks to contribute to the resolution of failed peers.

The importance of deposit insurance is acknowledged in the work of Diamond-Dybvig (1983), which argues that bank runs have a "self-fulfilling prophecy" feature, in which the erosion of deposits may trigger a banking crisis. This is due to two factors: (i) information asymmetry between depositors and bank management; and (ii) in general, depositors lack the capacity to assess financial soundness of a bank. Besides, banks are also vulnerable to liquidity risk since their liquid assets are far less than their liquid liabilities. According to this model, deposit insurance could enhance financial stability by removing the incentive for bank runs to develop (Garcia, 2000).

The recent role of this protection system in crisis containment has provided a greater prominence of deposit insurance to act as a pre-emptive instrument in the wider financial stability framework (Financial Stability Board, 2012; International Monetary Fund, 2009a). Data from the International Monetary Fund (2009b) shows that during the global financial crisis of 2008, approximately 48 countries adopted some form of enhanced depositor protection, including full depositor guarantees and a permanent or temporary increase of deposit insurance coverage. The enhancement of the deposit insurance system is necessary because a low level of coverage and/or partial insurance may not be effective in preventing bank runs, particularly during crises in which market confidence declines substantially (International Monetary Fund & International Association of Deposit Insurers, 2010). Furthermore, as asserted in a study of deposit insurance systems in Asian countries, establishing and maintaining an explicit and limited deposit insurance system is justified in order to prevent further possible financial crisis (Choi, 1999).

The provision of deposit insurance, however, would not address the root causes of the lack of confidence; this measure is nevertheless useful in escaping a deeper accelerated loss of confidence, thus buying valuable time (Mishkin, 1996). In many cases, safety nets are

established because of the perceived benefits that they confer in either preventing a weak banking system from spilling over into a full-blown crisis, or in enabling the government to handle a crisis more effectively (Hoggarth et al., 2005; Mishkin, 2000). Based on these reasons, the IMF has endorsed a limited form of deposit insurance in its code of best practices (Folkerts-Landau & Lindgren, 2008). In addition, the Financial Stability Board (FSB) recommends the adoption of an explicit deposit insurance system for its members in order to maintain financial stability by protecting depositors and preventing bank runs (Financial Stability Board, 2012).

Lender of Last Resort (LoLR)

The concept of LoLR can be defined as the discretionary provision of liquidity to a financial institution, or the market as a whole, by a central bank in reaction to adverse shock. This shock causes an abnormal increase in demand for liquidity which cannot be satisfied by alternative sources (Freixas, Giannini, Hoggarth, & Soussa, 1999). LoLR support to the market as a whole is used to deal with generalized liquidity shortages; whereas emergency liquidity support to individual illiquid but solvent institutions occurs when such institutions cannot borrow from other banks or from the central bank through normal facilities (Djiwandono, 2004; Freixas et al., 1999)

The provision of LoLR facilities by central banks is based on two main objectives: (i) to protect banks from the risk of informational asymmetry in times of crisis. This problem could make banks vulnerable to deposit withdrawals and/or the drying up of interbank lending; and (ii) to prevent widespread instability in the whole financial system following the failure of a solvent bank (Dong He, 2000). This potential systemic risk may be induced by the failure of a large financial institution, or a group of smaller ones, creating a domino effect on other financial institutions through direct credit, payment exposures or via contagion (Freixas et al., 1999).

According to the "classical" view of LoLR, as suggested by Bagehot (as cited in Freixas, Rochet, and Parigi (2004)), the liquidity support for a financial institution should satisfy at least three conditions: (i) the LoLR should be available only to solvent banks and against good collateral; (ii) the LoLR must be given at a penalty rate and considered the last alternative, so that banks do not use them to fund their current operations; and (iii) the central bank should demonstrate their readiness to provide the LoLR without limit, as long as the bank fulfils the conditions on solvency and collateral.

Despite the Bagehot concept being widely used in the current banking system, the pre-condition for LoLR has received some criticism. First, the distinction between a solvency problem and an illiquidity problem is difficult to define clearly (Freixas et al., 1999). Generally banks that require the assistance of the LoLR are already under suspicion of having a solvency problem (C. Goodhart & Illing, 2002). Second, the presence of a fully collateralized repo market, particularly in developed markets, allows central banks to provide the adequate aggregated amount of liquidity without a LoLR scheme (except in the case where money markets do not operate correctly during a crisis). This approach is expected to encourage banks to take responsibility for managing uncollateralized loans with other banks and to promote market discipline by peer banks (Goodfriend & King, 1988). Third, the presence of LoLR may generate moral hazard because, by insuring banks against the costs of liquidity or solvency problems, banks may become less concerned about avoiding such problems (Freixas et al., 1999). To minimize the moral hazard problem, it is essential that any LoLR support must be primarily for systemic purposes, which is to prevent a contagion effect caused by a failed financial institution (Dong He, 2000). Apart from these criticisms of the concept, the Bagehot view of the LoLR is still commonly used since there is no existent set of rules to replace it (Freixas et al., 2004).

2.3 Market Discipline

Market discipline can be defined as a mechanism through which the financial market provides signals that are utilized by market participants to monitor and discipline banks' excessive risk-taking behaviour in order to lead borrowers (i.e. banks) to behave in a way consistent with their solvency (Berger, 1991; Lane, 1993; Stephanou, 2010). This definition is in agreement with the purpose of promoting market discipline - as Pillar 3 of the Basel Capital Accord II framework to provide key essential information for market participants on the scope of application, capital, risk exposures, risk assessment processes, and the capital adequacy of the institution through a set of disclosure requirements.

From a historical perspective, the concept of market discipline can be traced back to the Scottish (from 1716 to 1845) and American (from 1836 to 1863) free banking eras. Compared to the current common practices, these periods are considered less regulated because neither the Scottish central bank nor the Scottish government supervised banking activities (England, 1988). Similarly, during the free banking era in the US, the federal government had no role in the banking industry. Few regulations regarding banking operations were issued at the state level

such as reserved requirements, branch licenses, and bank charters. A bank charter could be obtained as long as the minimum capital and collateral requirements were fulfilled in accordance with the regulations of each state. Once the bank charters were issued, the banks could issue their own bank notes (England, 1988). Therefore, the concerns for market participants (note holders and other banks) were whether the bank currency could be accepted by other parties or could be redeemed for specie (gold or silver coins). The market value of a note was generally determined by the available information regarding the financial conditions of the issuing bank, and also the distance between the location of the bank and the place where a transaction occurred (Walton & Rockoff, 2013). As a consequence, market participants could protect themselves by carefully selecting notes that had high market value, were acceptable and redeemable. However, the selection process was complicated because by 1860 more than 1,500 state banks in US had issued bank notes consisting, on average, of six different denominations. It is important to note that at that time there was no deposit insurance to guarantee depositor funds. In addition, there were serious issues with counterfeit notes and notes from liquidated banks that were still in circulation (Walton & Rockoff, 2013, p. 261). Because of these undesirable outcomes during the free banking experiments, government support for the pure market solution is limited and not popular (Crockett, 1997)[4]. Hence, as argued in Chapter 2, most countries in the modern era tend to follow the public interest approach to developing their regulation frameworks, in which government plays a significant role. (Shleifer, 2005)

The use of market discipline for prudential purposes has gained importance as policymakers in recent years have increasingly recognized its role and incorporated its concepts into their regulatory frameworks (Flannery, 2001; Stephanou, 2010). A key topic of financial system reform is whether and how the enhanced market discipline could complement regulatory discipline to resolve some of the moral hazard and efficiency problems in the banking industry (US Department of the Treasury, 1991). Correspondently, many analysts have suggested that supervisors should rely on market discipline to supplement the traditional procedures of banking regulators (Flannery, 2001). The main reason for this suggestion is due to the increasing size, cross-border activities, and complexity of large banking organizations making them more and more difficult to monitor and control using conventional supervisory tools (Flannery, 2001). Hence, rapid economic growth in a liberalized financial world without market discipline is arguably not sustainable (Gan & Li, 2000; Horne, 1998). Moreover, banking supervisors may

[4] Despite limited official support, the free banking school up to now still has a strong academic tradition, mainly from the Austrian School of Economics. For example, see Kevin Dowd (2013, 1988) and Hayek (1976) .

not adequately discipline banks as a result of potential moral hazards created by the FSN and unavoidable informational asymmetries between the bank and the supervisor (Hamalainen et al., 2003). Therefore, the existence of market participants with resources, expertise and incentives to monitor banks provides an additional means of discipline that complements official supervision and may also limit unnecessary regulatory forbearance by the supervisors. Under this viewpoint, market discipline and official supervisory action are seen as complementary and self-reinforcing (Flannery, 2001; Stephanou, 2010).

Market discipline can be manifested through the way in which holders of bank liabilities 'punish' banks that take higher risks. This may be through demanding higher yields or by withdrawing their funds altogether (Baumann & Nier, 2003). Hence, excessive risk-taking by deposit-taking institutions provides a classic example of the market disciplinary process. Bank liability holders such as depositors, debt holders, and equity holders have a potential role in influencing market discipline, but to differing degrees in different countries. This depends, for example, on the level of financial development and on the degree of international openness (Caprio & Honohan, 2004). While there is a considerable overlap between the mechanisms involved, each of these classes of stakeholders exercise discipline in different ways, mainly motivated by their interests. For example, faced with increasing costs and greater uncertainty, depositors can either demand a higher return (price effect) or withdraw their deposits (quantity effect) (Berger, 1991; Martinez-Peria & Schmukler, 2001). The threat of such actions, therefore, imposes discipline by signaling to deposit-taking institutions the riskiness of their activities. Similarly, debt holders can demand a higher yield on bank debt, thereby increasing the cost of funds for riskier institutions (Calomiris, 1999). Equity holders, even though they are sensitive to the potential for upside as well as downside, can still impose discipline by selling their shares if a bank falls into some sort of distress. This action puts downward pressure on share prices and places management under increased scrutiny (Berger, 1991).

To discuss the topic of market discipline in the current perspective, the following sub-section briefly introduces a theoretical framework of market discipline from the asymmetric information theory (Sub-section 2.3.1), benefits and requirements for effective market discipline (Sub-section 2.3.2), and the limitation of market discipline (Sub-section 2.3.3).

2.3.1 An Asymmetric Information Perspective on Market Discipline

The concept of asymmetric information was first introduced by George A. Akerlof in 1970 in a paper entitled *The Market for "Lemons": Quality Uncertainty and the Market Mechanism.* The concept was then further developed in 1973 by Michael Spence in the paper *Job Market Signalling,* and by Joseph Stiglitz in 1975 in the paper *The Theory of "Screening", Education, and the Distribution of Income.*

Many markets are characterized by asymmetric information, a condition in which actors on one side of the market have much better information than those on the other. Akerlof (1970) demonstrated how a market can contract into an adverse selection of low quality products due to significant disparity of information about product qualities between sellers and buyers. He examined the automobile market to illustrate a model where bad cars ("lemons") sell at the same price as good cars since it is impossible for a buyer to tell the difference between a good and a bad one. This situation occurs because the buyer sees the average of the whole product in the market while the seller has more intimate knowledge of a specific item. This information asymmetry gives the seller an incentive to sell goods of less value than the average market quality. However, in the long run, sellers with high quality goods would exit from the market because they could not sell their products above the average market price, leaving only an adverse selection of low quality goods for potential consumers. Hence, the average quality of goods in the market would reduce as would the market size. This process is called adverse selection (Akerlof, 1970).

Another fundamental insight is Akerlof's argument regarding the sellers' attempt to protect themselves from the adverse consequences of informational asymmetries. In a market where imperfect information and quality uncertainty exist, intermediary market institutions called *counteracting institutions* are required to reduce the asymmetric nature of information and to provide a precondition for trade and production. For example, a guarantee provided by professional dealers in the used-car market ensures that the buyer is able to get some expected standard quality. A guarantee allows the buyer sufficient time to reach the same level of information about the products as the seller before the buyer assumes full risk of the products being a "lemon". Brand-names, chains and franchising are other examples of such market mechanisms that guarantee the buyer at least some level of quality.

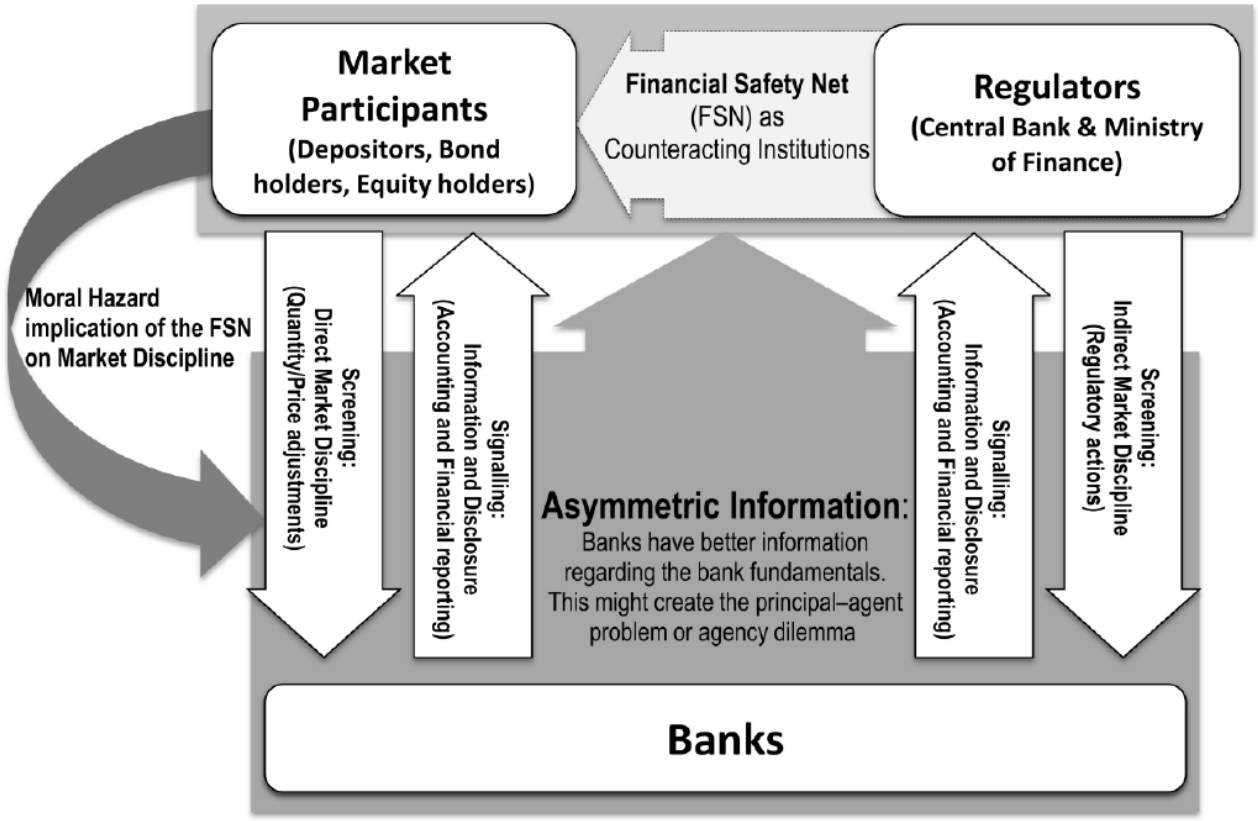
In contrast, Spence (1973) identified an essential form of adjustment by individual market participants, in which the better informed (e.g. sellers) may have incentives to take observable and costly action in an attempt to improve market outcomes by credibly transmitting information

to the poorly informed (e.g. buyers). Spence argued that such signaling actually worked in job markets by using education as a productivity signal.

An opposite type of market adjustment was introduced by Stiglitz (2010). While in the previous case the better informed entity actively transmitted information to the poorly informed agent, Stiglitz offers a case where the poorly informed agents actively extract information from the better informed. For example, the screening performed by insurance companies divides customers into risk classes by offering a menu of contracts in which higher deductibles can be exchanged for significantly lower premiums.

The conceptual framework of the asymmetry information theory has been applied in the context of the banking industry. Commonly, current literature discusses the application of the asymmetric information theory in the context of loan markets where banks are treated as economic entities that have less information than the lenders about the borrowers' credit worthiness (for example see Bebczuk, 2003; Dell'Ariccia, 2001; and Miskin, 1996). Conversely, in the context of market discipline, this thesis offers a view in which banks are treated as a well-informed economic agent, whereas stakeholders such as depositors, bond holders, shareholders, and even bank regulators are treated as having less information regarding the financial condition and performance of banks. The framework representing this view is presented in Figure 2.1.

Figure 2.1 Framework of Asymmetric Information Perspective on Market Discipline



Source: Developed by the author

A basic foundation of the banking business is the trust between the bank and its customers. In this respect, regulations regarding public information and disclosure by the banks such as the BASEL Capital Accord II are aimed to reduce information asymmetry and enhance public confidence in the banking sector (Bank Indonesia, 2012a). Information published by banks serves the function of the Spencer signaling, which provides indicators about bank financial performances and risk profiles. On the other hand, the ability of stakeholders to digest the information and to discipline banks through a volume or price adjustment to their investment portfolio is an example of the Stiglitz screening process.

The view of the asymmetric information theory is consistent with the definition of market discipline as a mechanism through which the financial market provides signals that are utilized by market participants to monitor and to discipline excessive risk-taking behaviour by banks in order to lead borrowers (i.e. banks) to behave in a way consistent with their solvency (Lane, 1993; Stephanou, 2010). This view also supports the purpose of the third pillar of the BASEL

Capital Accord II framework to allow market discipline to operate by requiring institutions to disclose details on the scope of application, capital, risk exposures, risk assessment processes, and the capital adequacy of the institution (Bank for International Settlements, 2006). The publication of bank financial information is expected to provide greater transparency to reduce asymmetric information (Bank Indonesia, 2012a).

The presence of asymmetric information is a root cause of adverse selection that could occur before a transaction and of moral hazard problems that could arise after the transaction (Mishkin, 1996). To illustrate, the provision of a FSN, particularly during economic turbulence which may potentially lead to a financial crisis, could be viewed as the response of governments as in the Akerlof perception of a counteracting institution. The main objective of this policy response is to prevent adverse selection by providing some sort of guarantee in order to restore public confidence. However, the creation of a FSN fosters moral hazard implications to both banks and their stakeholders. The FSN may incite banks to take additional risks, while also decreasing incentives for stakeholders to monitor banks (Garcia, 2000; Laeven, 2002). The impact of the provision of FSN on market discipline is discussed further in Section 2.4 .

2.3.2 Benefits of and Requirements for Effective Market Discipline

An increased awareness of the significance of market discipline has contributed to the identification of its perceived benefits. An analysis of current literature presents six potential benefits, as follows:

a. Improved institutional and market efficiencies: Market discipline may force banks to improve their efficiency or to exit the financial industry (Berger, 1991). To illustrate, an effective market discipline would not tolerate banks making loans with an expected return less than the cost of the funds, nor continue to provide access to deposits once they became insolvent. Hence, market discipline would lead the banks to pursue sustainable policies to avoid default (Gan & Li, 2000; Horne, 1998).

b. Reduced moral hazard problems: Market discipline may reduce the moral hazard incentives created by government safety nets if the market has the ability to punish inappropriate risk-taking activities by banks (Peria & Schmukler, 1999). Thus, if market discipline is effective, the market's risk preference would be accurately reflected by bank decisions regarding the pricing and the allocation of its asset portfolios (Flannery, 2001; Hamalainen et al., 2003).

c. Decreased cost in bank supervision: Adequate regulations can enhance the disciplining power of markets, while market signals can provide relevant information and incentives for bank and supervisory actions (Stephanou, 2010). Therefore, the cost of supervising banks may be reduced if regulators place greater emphasis on market forces that can tell "good" from "bad" banks. Since the market is a large, anonymous, multiple-entity group and a constant overseer of bank activity, the market is less susceptible to forbearance and may, therefore, react more quickly than regulators to decreased bank risk-taking and thereby reduce systemic risk (Peria & Schmukler, 1999).

d. Increased roles for market participants: Official banking supervisors generally rely on rules-based supervision which is to some extent insufficient and inflexible to cope with the increasing risk of bank activities and to impose penalties accordingly (Lang & Robertson, 2002). On the other hand, rational investors who face the risk of bank default will continuously price the risks of a bank on its financial securities more accurately. This market oversight may provide useful information to regulatory agencies to improve regulatory discipline and to prompt regulatory actions (Hamalainen et al., 2003).

e. Reduced regulatory burden for supervisors: Well-informed investors who continuously carry out disciplinary actions by pricing financial securities or withdrawing investments from banks have reduced the need for regulatory actions by banking authorities (Berger, 1991).

f. Increased responsibilities of bank management: An effective market discipline could shift the burden to show which bank is vulnerable from banking supervisors to bank managements. Bank management needs to demonstrate not only to supervisors, but also to investors that their bank is not taking risks excessively. Hence, it increases the incentives for bank management to respond to market signals by strengthening the bank's corporate governance arrangements (Stephanou, 2010).

The theory of efficient markets, as defined by Fama (1970), maintains that the price of a security (such as a share or debt) accurately reflects all available information. If the market processes new information efficiently, the reaction of market prices to new information will be instantaneous and unbiased. An instantaneous price reaction would, in practice, mean that after new information becomes available it should be responded to by market participants and be fully reflected in the next price established in the market. In relation to market discipline in the banking industry, the development of an efficient discipline mechanism requires four major conditions as identified in the existing literature, and as outlined below:

- Firstly, sufficient and reliable information (Caprio & Honohan, 2004; Crockett, 2002; Llewellyn, 2005) provided by an open capital market and public disclosure regulations of bank capital structure and risk exposure (Lane, 1993).
- Secondly, a sufficient number of stakeholders with the ability to process the information correctly (Crockett, 2002), as well as interest and adequate incentives to monitor a bank (Crockett, 2002; Llewellyn, 2005), including no bail-out policy anticipated by market participants (Lane, 1993).
- Thirdly, the existence of mechanisms to exercise discipline by adjusting risks to price and quantity of investment portfolios (Caprio & Honohan, 2004; Crockett, 2002; Llewellyn, 2005).
- Lastly, adequate responses from and appropriate incentives for bank management to adjust their behaviour in response to market signals (Lane, 1993; Llewellyn, 2005).

In summary, an effective market discipline requires reliable information, the capability of market participants to utilize the information, mechanisms to adjust the securities relative to its risk level, and bank responses to the market actions.

2.3.3 Limitations of Market Discipline

The limitations of market discipline mainly relate to the necessary requirements for an effective market discipline that in reality are difficult to fulfill, even for developed countries. The existing literature highlights several potential limitations and costs of market discipline, as follows:

a. Increased probability of banking crises and cost: Greater stress on market discipline may increase the likelihood of bank runs and the cost of rescuing the financial system (Diamond & Dybvig, 1983) mainly due to the existence of asymmetric information between lenders and borrowers in the banking industry and the under-developed secondary market for loans and securities (Goodhart et al., 1998). Moreover, with the aims to reduce moral hazard generated by a FSN, reducing the amount of deposit insurance coverage will undermine protections for small and unsophisticated investors (Berger, 1991).

b. Limited supply of bank credits: One of the objectives of banking authorities is maintaining an adequate supply of bank credits to support economic activities. This could be traded off with the objective of reducing the excessive risk-taking behaviour of banks that may limit their ability to supply credits (Calomiris, 1999).

c. Raised costs in the banking industry: An effective market discipline requires specific conditions that often involve high implementation costs. For example, to increase transparency and a discipline mechanism, the proposal for a mandatory issue of subordinate debt by banks may not be a problem for large banks but it could be too costly if imposed on smaller banks. Moreover, it would be more problematic for banks in a poorly developed debt market that may face difficulties in attracting buyers for its debts (Calomiris, 1999).

d. Reduced effectiveness of regulatory power: The information provided by the market may be unreliable and – in the context of developing economies - the capital markets are easier to manipulate by dominant investors (Ward, 2002). Therefore, a regulatory policy that is issued on the basis of false market signals may result in misguided regulatory actions (Davies, 2001).

As has been established, the ideal conditions for an effective market discipline are rare in economies with developing markets (Caprio & Honohan, 2004). These countries face many limitations, such as the high cost of generating financial information, or the ineffective and inefficient corporate governance. This results in a greater likelihood of banks ignoring market discipline (Ward, 2002). This environment is unlikely to result in market discipline because of the absence of relevant market and information infrastructures (Caprio & Honohan, 2004; Mishkin, 1996). The literature has raised concerns about whether unsophisticated markets are capable of providing adequate levels of market discipline.

2.4 The Influence of FSN on Market Discipline

As discussed in Section 2.2.2, the main objectives of the government provision of FSN are to reduce the probability of bank runs and preserve financial stability. However, as presented in Section 2.3.1, the implementation of a FSN could foster moral hazard problems to both banks and their stakeholders. Moral hazard problems for banks could occur since the provision of FSN might incite banks to take additional risks, which in the end could increase the risk of bank default (Demirgüç-Kunt et al., 2008; Garcia, 2000; Greenspan, 2003; Laeven, 2002). In the case of deposit insurance, for example, the link between a default risk and funding cost of a bank could be impaired, therefore a bank would be able to increase the default risk without addition cost at the expense of depositors or a deposit insurance operator (Hoggarth et al., 2005). For bank stakeholders, the design feature of a FNS could affect the effectiveness of market discipline because the provision of a FSN potentially reduces the incentive for bank stakeholders to

monitor banks since their funds are principally insured and their bank might be bailed out by governments (Demirgüç-Kunt & Huizinga, 2003; Garcia, 2000; Greenspan, 2003; Laeven, 2002; Schich, 2008). As a consequence of the moral hazard implication of a FSN, an increased risk of default and a weakened market discipline might increase the likelihood of a banking crisis (Demirgüç-Kunt & Detragiache, 2002).

The empirical literature on market discipline and its relation to a FSN has grown in recent years and has taken various approaches. The most common approach focuses on the sensitivity of bank stakeholder behaviour in relation to bank fundamentals. Bank fundamentals are intended to measure the capacity of a bank to repay its obligations. Hence, empirical models used in these studies typically include the degree of non-performing loans, the return on assets, the management efficiency, and the level of capitalization, among others (Levy-Yeyati et al., 2004b). Moreover, these studies focus on the extent to which market players or bank stakeholders are able to recognize and to monitor bank risk-taking activities (Bliss, 2001; Flannery, 2001; Hamalainen et al., 2003; Kwast et al., 1999). In this study, market discipline is signaled mainly by three classes of bank stakeholders: depositors, debt holders, and equity holders. Market discipline exerted by depositors is discussed in Sub-section 2.4.1; while market discipline imposed by bond holders and equity holders are discussed in Sub-section 2.4.2 and Sub-section 2.4.3 respectively.

2.4.1 Market Discipline Imposed by Depositors

As indicated above, the focus of existing depositor discipline studies is upon the sensitivity of the depositor behaviour on bank fundamentals. Deposit insurance, as the most common feature of a FSN, is considered to have a direct impact on how depositors would react to bank risk, generally by withdrawing their funds or demanding higher interest rates. Therefore, the focus of most literature on market discipline by depositors is on investigating the manner in which depositors exert market discipline and how deposit insurance lessens these disciplinary activities.

The characteristic of deposit as a potential source of market discipline is described in the following sub-section. This review of literature discusses the nature of market discipline by depositors in developed and developing economies, along with a discussion on the determinant of discipline by depositors.

2.4.1.1 Characteristics of Deposit as a Source of Market Discipline

The literature suggests that bank depositors appear particularly well-positioned to exert market discipline on bank management. Proponents of this view argue that the potential disciplining power of depositors is based on the five characteristics of deposit as described below:

a. Deposits are the main source of funds for banks. In contrast to industrial companies that infrequently raise money from the market to finance their operations, banks must seek new deposits as an ongoing source of funds (Garten, 1986). Hence, theoretically, market discipline can continuously be imposed by depositors (Hamalainen et al., 2003). The unique importance of deposit as a funding source makes other forms of public capital such as shares or debts relatively less significant, which may explain why bank securities holders in some cases do not exert sufficient discipline on bank risk-taking behaviour (Garten, 1986).
b. Retail deposits supply a relatively stable source of long-term funds for banks, although some accounts are formally demandable (Huang & Ratnovski, 2011). The stability of deposit funds is due to at least three factors: retail deposits are typically insured by government, therefore this limits reasons for depositors to transfer funds to other banks; second, retail depositor withdrawals are commonly caused by the liquidity needs of individual depositors and are thus predictable according to the law of large numbers (Feldman & Schmidt, 2001; Song & Thakor, 2007); and third, retail depositors have to deal with the high switching costs associated with transaction services from banks (Kim, Kliger, & Vale, 2003; Sharpe, 1997).
c. Wholesale deposits supply funds on a rollover basis and have to be refinanced before final returns are realized, or the bank is forced into liquidation. The fund owners are relatively sophisticated, since they have the capacity to acquire information on the quality of bank projects (Huang & Ratnovski, 2011).
d. Depositors are sensitive to the risk associated with banks as reflected by a statistically significant correlation between deposit rate with bank risks (Flannery, 2001). Moreover, regulators' concern about actual and possible bank runs demonstrates that depositors do react to perceived increases in bank risks (Garten, 1986). Both wholesale and retail depositors have reason to be sensitive to bank risks. Wholesale depositors have an incentive to monitor a bank's financial condition and impose additional funding cost upon risky banks because they are normally uninsured and would lose money when a bank is liquidated (Demirgüç-Kunt & Huizinga, 2003; Huang & Ratnovski, 2011). Whereas retail depositors, even with the provision of a deposit guarantee that makes it less sensitive to default risk, might avoid risky

banks because if the bank is liquidated they may only receive their money after a delay, which would affect their cash flow (Huang & Ratnovski, 2011).

e. Depositors react to an increase in bank risks either by withdrawing their funds from banks (quantity effect), or requiring higher interest rates (price effect) as a risk premium to compensate for additional risks associated with their deposits (Demirguc-Kunt & Kane, 2002; Flannery, 2001; Martinez-Peria & Schmukler, 2001). The depositors' action, therefore, imposes discipline by signaling to deposit-taking institutions the riskiness of their activities. Depositors may also signal to regulators who can then act accordingly by, for example, giving such banks more scrutiny (Flannery, 2001).

Many economists in the early literature challenged the ability of depositors to monitor and to discipline banks, in particular the depositors' ability to assess the strength of individual banks and initiate disciplinary actions (Dewatripont, Tirole, & Grimes, 1994; Miles, 1995). The depositor ability was in doubt for at least three reasons: from the bank perspective, deposits as a total represent the main source of funds, so the exposure of the individual depositor is limited; second, depositors have limited access to, and capacity to absorb, information (uninformed); and third, depositors are, in the main, reluctant to invest the time and money required to obtain information about the financial condition of their bank (free riding) (De Ceuster & Masschelein, 2003; Garten, 1986).

An extensive theoretical literature analyses the costs and benefits of deposit insurance and explores the challenge of balancing these benefits and costs to yield an ideal deposit-insurance scheme[5]. The following sections discuss current theoretical and empirical literature with regards to market discipline in developed and developing economies.

2.4.1.2 Market Discipline by Depositors in Developed Countries

In the high-transparency financial environments of developed countries, depositors can discipline banks that engage in excessive risk-taking by requesting higher deposit interest rates or by withdrawing their deposits (Demirguc-Kunt & Kane, 2002). Early literature on market discipline in developed countries mainly focused on the discipline that was enforced by uninsured depositors, such as the holders of large certificates of deposit (CD), large retail and institutional depositors (Hadad et al., 2011; Valensi, 2005). Uninsured depositors have an

[5] See Kane (2000, 1995) and Calomiris (1996) for summary of the literature in this subject.

incentive to monitor bank activities and to impose additional funding costs on risky banks since their deposits are not fully protected by the government. For example, the earliest studies found limited evidence for the existence of market discipline by evaluating the determinant of the spread of CD interest rate (price effect) in the US market. The statistical evidence shows that some coefficients of risk indicators used by the bank supervisors, such as profitability ratios, loss ratios and capital ratios, are not significant variables in explaining the spread of CD interest rates (Baer & Brewer, 1986; Crane, 1976; Herzig-Marx, Chayim, & Weaver, 1979). In contrast, other studies have found indications of market discipline showing significant results that are consistent with the effectiveness of market discipline theory. For instance, the CD spread variability can be explained significantly by profitability, asset quality, and capital ratios (Hannan & Hanweck, 1988), liquidity ratios (Herzig-Marx et al., 1979), variability of stock prices (Baer & Brewer, 1986; James, 1987), leverage ratios and loss provision ratios (James, 1987).

However, the use of CD as a source of market discipline has received some criticism. First, in terms of the amount, as the individual stakes of CD holders are relatively small compared to other sources of funds such as bonds and shares. Consequently, the power of CD holders as a source of market discipline is considerably weak (De Ceuster & Masschelein, 2003). Second, the disciplining power of CDs is limited because the short-term tenor of CDs and the availability of a liquid secondary market. This makes the CD holders able to sell certificates quickly before they mature, such as in the United Kingdom (UK) market (Hamalainen et al., 2003). Third, despite some statistical evidence regarding the strong correlation between bank risk and large deposit interest rates, the ability of a supervisor to extract information is limited because most CD interest rate data are not publicly available (Flannery, 2001). Furthermore, banks whose debts are downgraded by a rating agency quickly shift their funds by raising the use of insured deposits (Billett, Garfinkel, & O'Neal, 1998). This finding shows that the discipline exercised by CD holders, through an increase in the required return or withdrawal of uninsured deposits, may produce limited effects. This is because the proportion of CD is relatively small and banks are able to shift the uninsured CD funds to the insured deposits (Jordan, 2000).

To sum up, research concerning disciplinary actions by depositors in developed countries tends to employ uninsured large deposits, such as CD, as a proxy to measure market discipline. A large number of studies have found evidence that supports the hypothesis regarding sensitivity of the CD interest rates against bank fundamentals. However, the use of CD interest rates for a regulatory measure should not be overstated due to the limitations of CDs in disciplining banks.

2.4.1.3 Market Discipline by Depositors in Developing Economies

In developing economies, data on CD is limited because its use is not popular and its number is insignificant compared to the whole third party funds in the banking sector (Hadad et al., 2011). Therefore, unlike in developed countries, studies on discipline by depositors in emerging economies commonly use ordinary deposit such as saving, demand, and time deposits (Valensi, 2005).

As discussed earlier, financial markets in developing economies notably differ from their counterparts in developed economies. This is mainly due to the lack of ideal preconditions for an effective market mechanism, such as, for example, the absence of sufficient and relevant market information and infrastructures. The level of transparency plays an essential role since banks that disclose more information will be subject to more market discipline and have a greater incentive to limit their risk of default (Baumann & Nier, 2003; Calomiris, 1997; Levy-Yeyati et al., 2004a). In the context of developing economies, financial information generation is very costly, corporate governance is weak, and banks are more likely to ignore market discipline (Ward, 2002). Therefore, due to the lack of information and the low level of bank transparency, the presence and the effectiveness of market discipline in developing economies is in doubt (Calomiris, 1997; Caprio & Honohan, 2004; Mishkin, 1996; Ward, 2002).

Despite limited necessary conditions for an effective market discipline, a significant number of studies have found empirical evidence that confirmed the existence of market discipline imposed by depositors in developing economies. For instance, depositors discipline banks for taking riskier activities by withdrawing their funds, as found in Colombia (Barajas & Steiner, 2000), China (Wu & Bowe, 2012), and Russia (Karas, Pyle, & Schoors, 2010). Depositors punished risky banks by demanding higher interest rate in Poland (Mondschean & Opiela, 1999) and Indonesia (Hadad et al., 2011). Moreover, depositors punished banks for risky behaviour, both by withdrawing their deposits and by requiring higher interest rates as found in Argentina, Chile, and Mexico (Calomiris & Powell, 2001; Martinez-Peria & Schmukler, 2001), in India (Ghosh & Das, 2003), and Bolivia (Luzio-Antezana, 2001). In short, these empirical results support the hypothesis that maintains that market monitoring of banks can exist and complement public monitoring by bank regulators, even in less sophisticated financial markets (Hadad et al., 2011; Martinez-Peria & Schmukler, 2001; Mondschean & Opiela, 1999).

However, Levy-Yeyati et al. (2004b) could not find evidence that Argentinean and Uruguayan depositors disciplined their banks during the crisis period of 2000-2001. The weak evidence regarding the existence of market discipline in developing economies can be attributed to several

factors. These include the level of transparency, the extent of government deposit insurance, government ownership of banks, and macroeconomic variables (Levy-Yeyati et al., 2004b). The impact of market and macroeconomic variables on market discipline is discussed further in Section 2.4.1.4.

2.4.1.4 Determinant of Market Discipline Imposed by Depositors

The literature on the market discipline exerted by depositors in general maintains that this is influenced by both individual bank risk and market or systemic risk indicators.

The risk of individual banks is frequently measured by CAMEL indicators. For example, a study in Argentina indicates that interest rate spread is found to be associated with loans to assets ratios, capital ratios, and loan interest rates, whereas the deposit growth is only associated with capital ratios (Calomiris & Powell, 2001). In Colombia, deposit growth was found to be associated with capital ratios and loan loss provisions (Barajas & Steiner, 2000). In Bolivia, interest rate spread is related to capital ratios, liquid securities, loan interest rates, and return on asset ratios (Luzio-Antezana, 2001). In Poland, the spread of interest rate can be explained by the capital ratio, assets growth, and assets of Polish banks (Mondschean & Opiela, 1999). In India, interest rate spread is affected by capital ratios, non-performing loan ratios, earnings, and liquidity ratios; whereas deposit quantity is only affected by capital ratios (Ghosh & Das, 2003). These studies in general confirm the theory that, when market discipline exists, uninsured depositors punish riskier banks by withdrawing their money (the reduction in the rate of growth of uninsured deposits) or by demanding higher interest rates (the payment of an augmented risk premium) or both.

Besides bank fundamentals, non-fundamental variables such as the size of a bank and the composition of bank ownership might also affect both the rate of deposit growth and the level of deposit interest rates. In a relation to the TBTF doctrine, large banks have advantages over small deposit taking institutions, presumably because depositors perceive large banks as having a higher probability of government bailout in order to prevent a systemic banking crisis. Therefore, deposits held at large banks are considered safer (Enoch et al., 2001). Most literature, both in developed and developing countries, identifies the TBTF influence using a bank total asset as a proxy for bank size. Empirical evidence supports the TBTF argument if large banks appear able to attract more deposits (Calomiris & Powell, 2001) at lower interest rates (Barajas & Steiner, 2000; Hadad et al., 2011). From a supervisory point of view, the ability of large banks

to generate more funds at lower prices poses a potentially undesirable problem. These banks, are more likely to receive larger subsidies through an implicit TBTF policy thereby reinforcing managerial risk-taking incentives and increasing banking system fragility, particularly in a concentrated financial market (Mishkin, 2000).

The ownership structure of a bank, such as public ownership via capital markets and foreign ownership, is considered a non-fundamental variable that could play an important role in depositor behaviour. The empirical evidence suggests that from a depositor perspective, listed banks are generally more favourably viewed because of two main aspects: first, banks that disclose more information are subject to stronger market discipline that could limit their risk-taking behaviour (Hadad et al., 2011) and reduce the probability of default by choosing a higher capital buffer (Nier & Baumann, 2006); and second, depositors may be more confident in placing their deposits in listed banks due to the inherent diversity of their ownership structures. This means that control is not limited to one party but share across the ownership group (Wu & Bowe, 2012). These external pressures both from markets and equity holders are considered important in order to improve the corporate governance of banks (Nier & Baumann, 2006). For these reasons, listed banks are often able to attract more deposits than other banks.

In developing economies, foreign ownership in the form of bank subsidiaries or branches is perceived as having advantages over domestic counterparts. This advantage might be derived from the strong reputation of parent companies (Barajas & Steiner, 2000) and a more solid capital structure than the average domestic bank. This, in turn, would prevent the subsidiaries or branches of foreign banks from liquidation (Kameyama, Satiadhi, Alijoyo, & Bouma, 2006). As a result, these banks are expected to perform better than the average domestic bank if they wish to attract more deposits.

Moreover, as discussed in Section 2.4.1.3, the strength of market discipline is influenced not only by the idiosyncrasies of a bank, but also market environment conditions, particularly in developing economies where systemic risk exerts a significant impact on the behaviour of depositors. This impact would probably overshadow the role of bank fundamentals in driving market responses (Levy-Yeyati et al., 2004b). Therefore, a study of market discipline in developing economies needs to take into account systemic risks. This includes the provision of a deposit guarantee program, government ownership of banks (partly caused by government recapitalization and nationalization programs), and macroeconomic variables (Cubillas, Fonseca, & González, 2012; Levy-Yeyati et al., 2004a).

The strength of depositor discipline is potentially affected by moral hazard behaviour associated with a deposit insurance scheme. A government guarantee, both explicit and implicit, may limit the responsiveness of the yield or return on bank liabilities to changes in the bank risk of default and thus limit the incentive effects of market discipline (Baumann & Nier, 2003). In this case, depositors might not monitor bank financial performance indicators such as the published CAMEL ratios because there are no sufficient incentives for depositors (especially insured depositors) to monitor capital and loss exposures of banks. As a consequence, a deposit insurance system shifts responsibility for monitoring bank risk-taking from depositors to regulators (Demirguc-Kunt & Kane, 2002). Therefore, when market conditions are not well developed or in the presence of a deposit insurance, it is often argued that market discipline could not exist (Caprio & Honohan, 2004).

The literature comprises a considerable number of publications on the moral hazard implications of a deposit insurance program on market discipline. A study by Demirgüç-Kunt and Huizinga (2003) comprehensively examines the disciplinary role of interest rates and deposit growth in a bank-level dataset covering 43 countries over the period 1990-1997. The finding confirms that explicit deposit insurance lowers bank interest expenses and makes depositors less sensitive to bank risks. Cubillas et al. (2012), using a panel data set of banks from 66 countries that experienced a combined 79 banking crises over the period 1989-2007, conclude that on average market discipline weakens after a banking crisis. They also note that the weakening of market discipline is positively related to the accommodative policies applied to contain and resolve the crisis, such as the adoption of an explicit blanket guarantee, regulation forbearance, government recapitalization, and nationalization programs. A study in Turkey found that deposit guarantee schemes reduced market discipline during the period 1988-2000 (Onder & Ozyildirim, 2003). In Poland, after the new law concerning the deposit insurance program for private banks went into effect, the bank specific variables became less important in explaining differences in deposit interest rates (Mondschean & Opiela, 1999). In general, these studies present evidence that both explicit and implicit deposit guarantees might reduce incentives for depositors to exercise market discipline.

It is interesting to note that even though a deposit guarantee might lessen the disciplining power of the market, it would not eliminate it completely. Many studies suggest that market discipline will continue to be present to a certain extent under a deposit insurance program. In the US markets for example, the seminal study by Flannery (1998) supports the view that even in the presence of the federal guarantees, large CD rates sensibly react to the changes in bank risks.

Moreover, this study also found that retail depositors have been shown to behave rationally by withdrawing their money when some banks exhibit solvency problems. In the Japanese market, even after the reinstatement of deposit insurance, depositors were still able to discipline riskier banks by withdrawing their funds from troubled financial institutions (Fueda & Konishi, 2007). The presence of market discipline under a deposit guarantee program might be attributed to the notion of weaknesses in the credibility of the guarantees, gaps in coverage, delays and other costs entailed in recovering funds from the guarantor (Demirguc-Kunt & Kane, 2002).

Market discipline may survive under a deposit insurance program if depositors perceive that the deposit insurance scheme is not credible (Martinez-Peria & Schmukler, 2001). The lack of credibility of a deposit insurance program can be attributed to at least two main reasons: first, a government promise to secure public money in banks might not be credible since the governments had reneged on their policies to handle troubled banks and guarantee programs in the past (C. A. E. Goodhart, 2008; Martinez-Peria & Schmukler, 2001); second, the credibility of a deposit insurance system also depends on its funding structure (Martinez-Peria & Schmukler, 2001). An inadequate funding structure can lead to a loss of credibility in the deposit insurance system (Financial Stability Forum, 2001). Empirical evidence suggests that market discipline intensifies when the ability of deposit insurance to cover its guarantees is ineffective (Demirguc-Kunt & Kane, 2002; Martinez-Peria & Schmukler, 2001). The loss of credibility due to inadequate funding sources is particularly common in developing economies (C. A. E. Goodhart, 2008; Mishkin, 1996)[6].

As recommended by the Financial Stability Forum (2001), market discipline can be fostered under deposit insurance programs by implementing a co-insurance or a partial deposit insurance scheme. Partial deposit insurance could encourage market discipline imposed by sophisticated depositors, particularly uninsured depositors (Bhattacharya, Boot, & Thakor, 1998). Uninsured depositors, who potentially lose their assets if the bank is liquidated, are expected to monitor and discipline their banks by demanding a higher return or withdrawing their funds (Flannery, 2001). Empirical evidence in the US markets validate this correlation since interest rates paid on partially insured instruments increase significantly with bank riskiness (Baer & Brewer, 1986; Brewer & Mondschean, 1994; Demirguc-Kunt & Kane, 2002; Flannery, 1998; Hannan & Hanweck, 1988). Similar patterns were also found in Argentina, Chile and Mexico where

[6] The Financial Stability Forum (2001) recommends that a deposit insurance system should have adequate and accessible funding mechanisms to ensure the prompt reimbursement of depositor claims after a bank failure.

uninsured depositors acted as effective monitors of bank risk (Martinez-Peria & Schmukler, 2001).

2.4.2 Market Discipline imposed by Bond Holders

The literature with respect to market discipline has posited that debt holders, specifically subordinated debts (sub-debt)[7], are the most favourable private agents to discipline the financial institutions (Flannery, 2001). This view supports the proposal for a mandatory subordinated debt from the US (2000)[8], the European Shadow Financial Regulatory Committees (1999, 2000), and the Basel Committee (Bank for International Settlements, 2006) to embrace the market discipline as a suitable regulatory policy[9]. In emerging countries such as Indonesia, a mandatory subordinated debt might not be viable since the market is still relatively small and illiquid compared to developed countries (Calomiris, 1997; Mishkin, 1996). However, under international banking regulations, deposit taking institutions can already voluntarily issue subordinated debt and include it as part of their regulatory capital for solvency purposes.

Early literature in the US market was typically associated with the proposal by the FDIC to increase total bank capital requirements from six to nine percent of assets, with subordinated notes and debentures (SND) permitted to satisfy up to one-third of the new capital requirement (Avery, Belton, & Goldberg, 1988). The basic premise of this proposal is based on a view that holders of subordinated notes and debentures - rather than equity holders or uninsured depositors - are best able to impose market discipline to complement the existing supervisory framework (Flannery, 2001).

The following sub-section presents the features of bond or debt that make the subordinated debt a promising source of market discipline. This review of literature discusses the nature of market discipline in the primary and secondary bond markets, and the determinant of discipline by bond holders. Since the objective of this study is to examine market discipline in a developing economy, the last section focuses on a discussion of distinctive characteristics of market discipline in emerging markets.

[7] Also known as subordinated loan, subordinated bond, subordinated debenture or junior debt

[8] A joint report "The Feasibility and Desirability of Mandatory Subordinated Debt" by the Fed and US Treasury mandated by the Financial Services Modernization Act of 1999 (Gramm-Leach-Bliley) concluded that "*existing evidence supports efforts to use subordinate debt as a way to encourage market discipline*".

[9] A comprehensive summary of mandatory subordinate debt proposals can be found at Kwast et al. (1999) and Hamalainen et al. (2010).

2.4.2.1 Characteristics of Bond as a Source of Market Discipline

The literature on market discipline in the bond market has as its main objective the study of the perception or sensitivity of market players in pricing their assets with respect to the financial condition of financial institutions, in particular, the relationship between bank risks and bond interest rates (Mendonça & Villela Loures, 2009). In principle, the existence of market discipline is established from the relationship between the price of securities issued by banks and its respective risks (Flannery, 2001).

Advocates of the mandatory subordinated debt issuance propose the use of subordinated debts (sub-debt) as a source of market discipline because this type of fixed income financial instrument has several distinctive characteristics as outlined below:

a. Subordinated debt holders are subject to a larger risk of loss because the debt has no underlying assets (unsecured) that can be claimed by the holder in the event of bankruptcy (Caldwell, 2005), and generally the debt is not covered by government guarantees, explicit or implied (Bliss, 2001);
b. Subordinated debt holders are among the first to lose value in the event of bank failure. As a junior debt, the holders have a claim on the company's assets only after all the claims of senior creditors have been satisfied if the bank is liquidated, excepting only equity and preferred stock (Caldwell, 2005; Hamalainen, Howcroft, & Hall, 2010);
c. Subordinated debt provides the same cushioning effect to the deposit insurance scheme as equity but without the risk-taking incentive of equity holders (Flannery, 2001; Hamalainen et al., 2010);
d. Subordinated debt provides a relatively long maturity source of funds, compared to deposits, that limits the investor’s ability to avoid sharing in the cost of failure (Hamalainen et al., 2010); and
e. Unlike deposits owned by a large number of unsophisticated retail savers, subordinated debt holders commonly consist of large institutional investors that have adequate financial literacy to assess bank risks. Therefore they are expected to be able to impose market discipline adequately over time (Hamalainen et al., 2010).

The characteristics outlined above make subordinated debt an attractive source of market discipline. By considering these characteristics, it can be concluded that the aim of mandatory subordinated debt proposals is to create a significantly large class of financially sophisticated

and uninsured investors who will be subject to loss if a bank becomes insolvent (Hamalainen et al., 2010). These investors, therefore, would have a substantial financial incentive to monitor, accurately assess, and price bank risks (Flannery, 2001). As a result, the yield of subordinated debts could provide additional information regarding the condition and risks of the banks beyond that provided by share prices and senior debt yields (Seiler, 2003).

In addition, in evaluating the influence of market discipline of bond yields, Menz (2010) suggests taking other types of bonds, such as senior bonds, into consideration. The holders of senior bonds also face the risk of losing their asset value in the case of bankruptcy. Even though senior debt holders are the first in line to be repaid, they will not necessarily receive the full amount they are owed in a worst-case scenario. For example, usually, a senior debt is secured by collateral, and that collateral can be sold to repay senior debt holders. However, they might not receive full repayment if the proceeds from selling its collateral is lower than the book value of the bonds. Hence, the senior bond holders are expected to also have some sort of incentive to monitor the conduct and performance of the issuing banks**.**

2.4.2.2 Market Discipline by Bond Holders in Developed Countries

The literature on market discipline imposed by bond holders is largely focused on bond markets in developed countries, such as the US and in Europe. In general this literature identifies two potential forms of market discipline by bond holders: (i) market discipline in the primary market, and (ii) market discipline in the secondary market (Hamalainen et al., 2010).

In the primary market, a direct market discipline might be imposed by investors when a bank's cost of issuing a financial instrument increases or its ability to issue debt deteriorates with an increase in its risk profile (Covitz, Hancock, & Kwast, 2000; Evanoff & Wall, 2001; Imai, 2007). As a consequence, banks with higher risks are less likely to issue debts to avoid evaluation by the market. Using Canadian debt market data, Caldwell (2005) found evidence supporting the hypothesis that subordinated debt plays a role in market discipline that make it less favourable for risky banks to issue sub-debts. In the US market, Covitz, Hancock, and Kwast (2000) reported that larger banking organizations are more likely to issue sub-debts, whereas those banks with poor supervisory ratings are less likely to issue sub-debts. Further evidence was presented by Sironi (2003) who examined market discipline in sub-debt issuance spreads from 1991–2000 within the European banking industry. Similarly, Imai (2007) used the information about the issuance of 279 subordinated debts that offered a flexible rate in the

Japanese market from 1995 and 2004. He found a strong and robust relationship between interest rate spreads of subordinated debts and debt rating issued by Moody rating agency. The statistical relationship, however, was relatively weak between the spreads and the accounting measure of bank risks, particularly the capital adequacy ratio.

One of major drawbacks of this approach is the limited number of banks that issue securities in the bond market each year. Hence, the yields of issued bonds are not available on a timely basis to assist in the monitoring of risks of individual banks (Sironi, 2003). Moreover, Sironi recognized that banks are unlikely to make new debt issues when the market is not receptive. These phenomena could create a serious selection bias in the sample (Imai, 2007; Sironi, 2003). Finally, the timing of new sub-debts in Sironi's sample is unlikely to correspond precisely to the risks reflected in the accounting information.

In the secondary market, most studies observe market discipline by investigating the sensitivity of the yield spread of subordinated debts to bank-specific risks, such as accounting information, ratings from rating agencies and regulators (Avery et al., 1988). This approach may reduce potential selection bias in the sample and reflect more accurately the relevant information with respect to the bank risks over a certain period of time**.** However, early studies in the 1980s using bank subordinated note and debenture (SND) prices in the secondary market found little evidence of market discipline. For instance, the seminal study by Avery, Belton and Goldberg (1988) empirically analyzed the interest rate spread between SNDs and Treasury securities. This spread, or default-risk premium, was modeled as a function of various balance-sheet measures of risk, bond ratings issued by rating agencies, the index proposed by the FDIC for the pricing of risk-based deposit insurance, and accounting information of banks for the period 1983–1984. The results indicated no significant relationship between debenture spreads and credit risk with the obvious conclusion that either market discipline did not exist or it was not sufficiently strong to be measured from the available information.

Later, the methodology used by Avery et al. (1988) was refined by Gorton and Santomero (1990), arguing that the value of uninsured bank debt is not a linear, monotonic function of bank risk. Using the Black and Cox (1976) contingent claims valuation to derive an explicit pricing model, Gorton and Santomero confirmed the work of previous studies, arguing that there was little evidence of market discipline in US bank bond market.

Flannery and Sorescu (1996) combined the methodologies used by Avery et al. (1988) and Gorton and Santomero (1990). Using year-end debenture spreads and data from the Consolidated Financial Statements reports and Call Report for 83 different bank institutions over

the period 1983–1991 in the US, they found a strong correlation between debenture spreads and credit risk ratings. Therefore, contrary to previous studies, Flannery and Sorescu's argument rejects the hypothesis that investors cannot rationally differentiate between the risks undertaken by the major US banking firms. Furthermore, the evidence of market discipline is significant over the 1983-1991 period, but not in the specific 1983-1984 period as market discipline is stronger in periods when implicit government guarantees are weak, and when bank risk is high.

In summary, previous literature has provided indications of the presence of market discipline in both primary and secondary markets. However from the regulatory point of interest, examining the presence of market discipline in the secondary market is more appealing because it provides insightful information regarding the market reactions on the bank risks in a more reliable and timely manner over a certain period of time**.**

2.4.2.3 Market Discipline by Bond Holders in Developing Economies

In the context of emerging markets such as Indonesia, the discussion and analysis of market discipline should take into account both institutional and macroeconomics factors. These differ significantly from those of developed countries, but may have essential effects on market discipline. Some common features of institutional setting in developing economies include underdeveloped financial markets, inadequate disclosure and transparency, pervasive government ownership of banks, and greater guarantees (Levy-Yeyati et al., 2004a).

Financial sectors in emerging countries are typically underdeveloped and the banking sector is dominated by a large number of small banks. Due to illiquid and inefficient markets, transaction costs in developing markets are still relatively high and most of these small banks could not afford the cost of issuing securities. Hence, the issuance of debt and equity is relatively low compared to developed countries (Levy-Yeyati et al., 2004a). Moreover, the secondary markets tend to be very thin and there is a lack of publicly available secondary market bond pricing (Calomiris, 1997; Mishkin, 1996). Studies in Thailand, Malaysia, Indonesia and Taiwan show that limitations in market infrastructure have deterred bond issuance by companies and have hindered the development of the demand side of the market (Sharma, 2001; Wang, Chen, & Tung, 2010). Considering the limitation of the financial market in these countries, bank institutional risks might be neglected and thus further hinder the disciplining power of the market (Levy-Yeyati et al., 2004a). For example, Mendonca and Loures (2009) provided an empirical analysis of the relationship between debentures return and credit risk, particularly

bond ratings issued by rating agencies and accounting information issued by Brazilian banks. The results indicated a weak presence of market discipline in Brazil. Similarly, Wang et al. (2010) failed to find any significant results in their study of Taiwanese data as to whether commercial bank decisions to issue subordinated debts were related to the bank risk levels.

Moreover, the volatility in most small markets can be mainly explained by macroeconomic factors and systemic risks (Levy-Yeyati et al., 2004a) This includes the provision of government guarantee and ownership in financial institutions. Therefore, market risks may exert an overwhelming impact on market behaviour, overshadowing the link between the market responses and bank fundamentals. Using the Argentinean crisis as an illustration, Levy-Yeyati et al. (2004a) found that market discipline, while failing to produce evidence to support a link between bank fundamental and bank risks, is quite robust once systemic risks are factored in. Likewise, Wang et al. (2010) concluded that the banks' issuance decisions are strongly driven by business and bond market conditions in Taiwan. Moreover, subordinated debt does not play a significant role in market discipline in Taiwan due to the expectation of potential guarantees from the government in case of bank failure. In spite of encouraging discipline, the government encouraged all investors to invest in sub-debts without concern for the bank risk profiles.

2.4.2.4 Determinants of Market Discipline by Bond Holders

Evidence from the US market, as discussed in the previous section, highlights three main determinants of discipline by bond holders as indicated by the fluctuation of the bond yield spreads. These are: (i) bank risk indicators that derive from accounting information, such as the CAMEL rating system; (ii) rating or index issued by rating agencies and banking regulators; and (iii) macroeconomic conditions, such as GDP, exchange rates, and inflation rates (Avery et al., 1988; Flannery & Sorescu, 1996; Gorton & Santomero, 1990).

The correlation between yield spread and bank risk indicators have also been established outside the US market. Deyoung et al. (2001) conducted a cross-country comparison to study the correlation between the bond spreads and the bank risks that are derived from accounting information and the CAMEL rating. The investigation was based on data extracted from Call Reports between 1986 and 1995, from a sample of 1079 banks in different countries and 67 holding banks. The finding confirmed a positive correlation between the exposure to risk and debenture spreads.

As mentioned above, the bond rating issued by credit rating agencies or banking regulators is considered one of the major determinants of bond spreads. The correlation between subordinated bonds and credit rating in the US market was studied by Jagtiani et al. (2002). They analyzed the relationship between the subordinated debts spread and the ratings from Moody's, Standard and Poor's, FDIC, and the accounting information. The study sample comprised 39 holding banks and 19 banks and covered the period from 1992 to 1997. The results indicated the presence of a positive correlation between ratings and debenture spreads. A related study using Europe debt market data was conducted by Sironi (2003) investigated the risk sensitivity of European banks' subordinated notes and debenture spreads. The analysis was based on ratings from Moody's, Standard and Poor's, Fitch, and accounting information for the period of 1991-2000. The study included 290 debentures issued by European financial institutions from 14 countries. The empirical results support the hypothesis that subordinated bond investors are sensitive to bank risk, with the exception of subordinate bonds issued by public sector banks (i.e., government owned or guaranteed institutions).

Morgan and Stiroh (2001) offered a different perspective by presenting an ex-post analysis. They analyzed the relationship between data regarding asset portfolios of financial institutions and the spread of subordinated debts. The justification was that the ratings and indices used captured the past risk of the banks, which, in turn, permitted the evaluation of the monitoring capacity. The study investigated the relationships between the spread of subordinated debts issued by nearly 500 banks and the full portfolio of assets held by the issuing banks over the period of 1993 to 1998. The results suggest that bond spreads reflect the overall mix of banks' assets portfolios, thus banks are expected to pay higher spreads due to riskier investment.

According to Hamalainen (2010), market discipline recognizes two phases: the monitoring phase and the influencing phase. The studies discussed above were focused predominantly on the monitoring phase, that is, whether sub-debt interest rate spread reflected bank risk or not. Whereas the influencing phase concerning the issue of whether the spread premium influences the behaviour of the banks. There are few studies that use the later approach. One of the reasons for this is that modeling the influencing phase is not so easy because it requires modeling bank behaviour. One empirical work presented by Hwang and Min (2013) did study the influencing phase of market discipline. The writers examined subordinated debts issued by the Japanese commercial banks during the fiscal years of 2000 to 2004. The results showed that banks take less risk as the amount of sub-debts increases. Specifically, it is shown that the loan risk measure and the stock investment risk measure decreased with the increase of sub-debts amounts. This

provides n empirical evidence of market discipline which is consistent with both the monitoring theory and the moral hazard theory.

Despite the convincing evidence regarding the presence of market monitoring in the bank subordinated debt market, several studies have reached the same conclusion that, in some cases, market discipline was insignificant or did not exist at all. This could be related to the lack of well-functioning markets that are suitable for an effective regime of market discipline (Caprio & Honohan, 2004), or the influence of macroeconomic factors that overshadow individual risks (Levy-Yeyati et al., 2004a).

As outlined in Section 2.3.2, a well-functioning market requires several conditions, such as the availability of relevant information, sufficient number of capable market players, and the availability of tools to implement the optimal discipline. For instance, an effective market discipline firstly requires sufficient, reliable, and timely information (Caprio & Honohan, 2004; Crockett, 2002; Llewellyn, 2005). In their study, Avery et al. (1988) concluded that the weak findings probably corresponded with the lack of availability of sufficient information to build a strong model of market discipline. Furthermore, market discipline can be weakened not only by a lack of financial disclosure, but also by the increasing complexity of banks' risks, which makes it more difficult for private agents to digest (Sironi, 2003).

Secondly, an effective market discipline needs a sufficient number of stakeholders with the ability to effectively process the information (Crockett, 2002), and adequate incentives to monitor the banks (Crockett, 2002; Llewellyn, 2005). There is evidence that the holders of insured bonds do not monitor financial institutions because they believe that they are not exposed to the default risk (Sironi, 2003). For example, the provision of the government safety net might reduce the incentive to monitor banks. Flannery and Sorescu (1996) found evidence of market discipline in year-end market prices of the US bank subordinated debt market over the 1983–1991 period, but not during the 1983–1984 period when there were implicit government guarantees in place. Similarly, Deyoung et al. (1998) showed that the relationship between bond yield and risk measurement is statistically significant only under the assumption of no guarantees from the government. In the European banking industry, Sironi (2003) discovered that data in the 1991–1996 period shows little evidence of a relationship when the implicit guarantees such as TBTF policies were present. In contrast, when the guarantee was not in place during the 1997–2000 period, the results were consistent with the hypothesis that the sub-debt investors are sensitive to bank financial strength ratings. Moreover, Sironi argues that the testing for market discipline may also be complicated by government ownership of banks. In the

Japanese market, Imai (2007) found that the evidence of market monitoring was rather weak and virtually non-existent until late 1997 because the government did not allow large banks to be closed. The emergence of market monitoring occurred when the government allowed a large bank, namely Hokkaido Takushoku Bank, to fail for the first time since the Second World War II. After this event, the subordinated debt holders anticipated sufficient financial losses from bank failure and started punishing risky banks by requiring higher interest rates. In short, if the price of sub-debt does not reflect the risk level of the banks because investors lack the ability to observe the risk taken or expect government guarantees, then issuing sub-debts would not be good for supervision of the banking system (Bliss & Flannery, 2000; Evanoff & Wall, 2000).

In other words, the inability to find empirical evidence of market responses to bank fundamentals does not imply the absence of market discipline. In fact, it reflects the tendency that the informational content of observed fundamentals diminishes as market participants react to expected changes in future fundamentals driven by macroeconomic factors (Levy-Yeyati et al., 2004a). Therefore, the presence of the government guarantee, the TBTF policy, and the government ownership of banks, as described earlier, are some examples of macroeconomic factors that may affect market discipline both directly and indirectly. Under conditions where market participants are more sensitive to systemic risks, for any given level of bank risk, bank fundamentals are likely to become less informative (Levy-Yeyati et al., 2004a).

A different point of view with respect to the relationship between bond yield and bank risks was presented by Blum (2002). Using mathematical modeling, Blum demonstrated the ambiguous nature of the impact of subordinated debt on banks' risk-taking incentives. Blum argued that that a positive relationship between interest rates and risk is not a sufficient condition to assess the existence and effectiveness of direct market discipline. Instead, the positive relationship may actually exacerbate the excessive risk-taking incentives due to limited liabilities of the banks. Hence, the subordinated debt would reduce risk only if banks can convincingly commit to a given level of risk. Nevertheless, if banks are unable to commit, subordinated debt would lead to an increase in risk. Even so, the Blum hypothesis still needs empirical evidence to support this stance.

Furthermore, market discipline can be enhanced by the debt market in two ways. First, a direct market discipline can be enforced by debt holders by demanding higher prices for high risk alternatives making it more difficult for the institutions to raise funds (Fan, Haubrich, Ritchken, & Thomson, 2003; Flannery, 2001). Second, an indirect market discipline can be imposed by banking supervisors since the interest rate on debts will act as a proxy for high risk prompting

action by supervisors. This information would trigger mandatory supervisory action or at least provide supplementary information (Evanoff & Wall, 2001; Fan et al., 2003; Flannery, 2001; Krishnan, Ritchken, & Thomson, 2005).

Considering some possible deficiencies in the effectiveness of subordinated debt as the source of discipline, subordinated debt requirements should be mainly aimed at improving direct market discipline rather than indirect market discipline (Sironi, 2003). In other words, regardless of the valuable information for bank supervisors that can be gathered from the market price movement, the necessity to force banks to issue subordinated debts is questionable since this market price information may come at the cost of higher risks in banking operations (Blum, 2002). In addition, subordinated debt and equity provide complementary information about the riskiness of banks. Hence, the informational content of subordinated debt should not be overestimated since the same information about banks' underlying riskiness can also be obtained from equity prices (Levonian, 2001).

2.4.3 Market Discipline Imposed by Equity holders

The literature on the market discipline of banks emphasizes the significance of monitoring and controlling for bank risk by private agents such as equity holders or shareholders (Bliss & Flannery, 2002; Lane, 1993). Market participants constantly assess the risk of banks and their assessment is reflected in the market prices of tradable securities issued by banks (Hancock & Kwast, 2001; Morgan & Stiroh, 2001). Therefore, the market price of securities, such as debts and stocks issued by banks, are considered the two main indicators of market behaviour and are amenable to behaviour modification through policy making (Flannery & Sorescu, 1996). Empirical studies in the US market provide evidence that the share price of banks commonly behave in the same way as the equity prices of non-banks: they adjust promptly to new information, and make rational inferences about the implications of that information for related firms (Flannery, 1998). However, compared to debt holders and depositors, equity holders are frequently assessed as less effective in exercising market discipline on banks because their risk and returns function is almost equal to the risk and returns profile of banks (De Ceuster & Masschelein, 2003; Park & Peristiani, 2007). Therefore, the existing literature on market discipline focuses mostly on the effects of subordinated debt and the effectiveness of depositors in limiting risk-taking by bank management. As a result, the literature on the disciplining role of shareholders remains relatively sparse (Caner, Özyıldırım, & Ungan, 2012).

Following is a discussion on the main characteristics of equity as a source of market discipline. This is followed by a discussion relating to the determinants of market discipline for equity holders.

2.4.3.1 Characteristics of Equity as a Source of Market Discipline

The literature on market discipline identifies several characteristics of equity that make it a potential source of market discipline in banking. These are outlined below:

a. Equity is issued by all banks partly to satisfy capital adequacy regulations which are traded in secondary markets (Hamalainen et al., 2003). Therefore, markets for bank shares are fairly liquid and of greater depth compared to other types of bank-related claims, such as subordinated debts: this condition gives bank shares the ability to generate higher quality information, particularly those about stock prices that represent the market assessment of bank risk and condition (Caner et al., 2012; Hamalainen et al., 2003). Moreover, equity market signals are considered superior to debt market signals in terms of depth and informational efficiency (Flannery, Kwan, & Nimalendran, 2004; Kwan, 2004). Compared to subordinated debt, empirical evidence shows that banks exposed to higher levels of risk are generally more reluctant to issue new bonds and thus automatically escape from the disciplinary actions by investors. This problem creates selectivity bias when investigating market discipline by debt holders (Caner et al., 2012);
b. Equity provides a long-term source of funds for banks (Flannery, 2001). Unlike bonds and deposits, equity has no maturity date. Moreover, equity holders could not directly cause a run on a bank. The response of equity holders to bank risk-taking is to sell stocks in secondary markets. This action puts pressure on bank share prices in secondary markets, but does not impact the amount of funds that already have been collected from the issuance of bank shares (Horvitz, 1983);
c. Equities are typically the first to lose value in the event of bank failure. This makes equity-holders sensitive to bank risk and, therefore, potentially reliable monitors of bank conditions (Flannery, 2001; Hamalainen et al., 2003). Empirical data from US markets suggest that equity market variables provide relatively good predictions about the performance of banks' holding companies (Flannery, 1998); and
d. Equity holders have the potential to impose discipline since they have a stake in their banks and could initiate various governance mechanisms to influence bank management (De Ceuster & Masschelein, 2003). For example, equity holders can influence the behaviour of

managers through the introduction of performance-based compensation (Murphy, 1985) and the change of managerial board members (Cannella Jr, Fraser, & Lee, 1995). Moreover, large shareholders have the incentive to collect information and monitor management for the purposes of profit maximization (Shleifer & Vishny, 1997).

However, as mentioned earlier, many researchers argue that equity holders are less prone to impose market discipline (Cannella Jr et al., 1995; De Ceuster & Masschelein, 2003; Evanoff & Wall, 2001). There are two main arguments for this claim. First, the ability of equity to influence bank management may create a moral hazard in which shareholders, particularly majority shareholders, direct the management of bank to act in the interest of a particular shareholder at the expense of other bank stakeholders (Cannella Jr et al., 1995). Second, shareholder activities are influenced by a risk-return profile, in which shareholders might influence bank management to increase risk due to the option-like character of their stake[10] (De Ceuster & Masschelein, 2003; Park & Peristiani, 2007). Similar to an option, shareholder liabilities are limited to the extent of their investment, but they stand to share in all of the gains received from the bank's investments proportionally. Hence, shareholders are more concerned about the upside potential than the downside risks that affect a bank's performance (Caprio & Honohan, 2004; Furlong & Williams, 2006), particularly short-term institutional investors who seek immediate capital gain in the secondary market. In contrast, long-term investors may prefer a more sustainable profit from their investments, so they will be more concerned about the healthiness of bank fundamentals in the long run (Yan & Zhang, 2009). To sum up, equity holders are considered unsuitable as market discipliners due to the bipolar behaviour of bank shareholders: on the one hand, as allies of regulators, protecting their stake in a low-option value institution by penalizing risky strategies; and on the other hand, as enemies of regulators, condoning more risk-taking strategies for banks whose option value outweighs charter value[11] (Park & Peristiani, 2007).

2.4.3.2 Determinants of Market Discipline by Equity Holders

One of the main foundation theories that supports the potential power of equity holders as a source of market discipline is the efficient market hypothesis that was first proposed by Fama (1970). This theory suggests that if a capital market is efficient, then in equilibrium, at any time,

[10] Using the option-price theory developed by Black and Scholes (1972), Merton (1977) modeled equity as a call option on the assets of banks. This model highlighted the main characteristics of equity holders who have limited liabilities and who are the residual claim holders.

[11] The charter value of a bank is broadly defined as the value that would be foregone due to a closure; or the value of a bank being able to continue to do business in the future, reflected as part of its share price (Acharya, 1996).

any information published to the market will be reflected in stock prices. That is, the market will react to the information available on the market, such as the publication of financial reports. A survey of literature by Gilbert (1990) and Flannery (1998) concluded that most studies on the price of bank equities confirmed the hypothesis that the price of bank stocks have an inverse relationship to bank risk or a positive relationship to bank fundamentals, *ceteris paribus*. For example, data on large commercial banks in the US over the period of 1974 to 1983 indicated that the price of bank shares is a function of earnings and capital ratios (Shome, Smith, & Heggestad, 1986). Correspondingly, by using capital ratio, earning and growth of earning, asset size, and loss rates to estimate the share price of bank stocks, this study found that banks with higher capital ratios and lower loss rates tended to have higher share prices (Beighley, Boyd, & Jacobs, 1975). Further evidence on the negative association between loan-loss-reserve announcements and returns was found by Docking, Hirschey and Jones (1997) in their study of US bank shares. These studies in general confirm that return on equity is sensitive to financial indicators that are representative of increases in the bank's riskiness.

External information is also used by equity holders to assess the risk of a bank. For example, the announcement of Moody's debt-rating downgrades has caused a decline in equity prices since this downgrade represents discrete changes in bank risk. A debt-rating downgrade would increase future uninsured debt-financing costs of banks and, hence, have a negative effect on equity prices (Billett et al., 1998). Shareholders also respond negatively to the announcement of supervisory reviews for remedial actions taken to avoid failure. For instance, in the US market an average of 5% decline in stock prices of banks occurred after the release of this supervisory information (Jordan, Peek, & Rosengren, 2000).

In addition, similar to the previous literature on market discipline exerted by depositors and bond holders, the TBTF perception may also create risk indifference among shareholders of large banks since large banks are expected to have a higher probability of being rescued (Beighley et al., 1975). Interestingly, due to the TBTF perception, evidence from Europe suggests that bank equity prices respond much more reliably to rating agency downgrades than their bond prices (Gropp & Richards, 2001). This late response of bond holders is perhaps caused by a perception that the relevant banks, most of which are large, are TBTF and that bond holders are therefore unconcerned about risk.

Some studies have taken another approach by testing the accuracy of equity returns to assess the soundness of banks. For example, using commonly used equity-based indicators (equity prices, daily returns, volatility, and distance to default) on Italian banks listed on the Milan Stock

Exchange between 1995 and 2002, Cannata and Quagliariello (2005) found that equity-based variables reflect equivalent results with the supervisory ratings assigned by the Bank of Italy. in a broader study using the downgrade and upgrade events for 64 European banks for the period of 1995–2002, Distinguin et al. (2006) found that stock prices could be used to predict, with significant accuracy, financial distress for banks. Similarly, in the US market, using data from 11,450 inspections by supervisors from 1996 to 2000, Gunther et al. (2001) found that stock prices can predict the result of supervisory ratings even after taking account of past rating information. Therefore the equity returns provide useful predictive information about a bank's future performance. These findings in general suggest that the use of market signals for bank monitoring is appropriate and stock market prices might be effective in disciplining banks (Caner et al., 2012).

The potential signaling role of equity prices is important and undervalued, especially in relatively undeveloped markets. An extensive cross-countries analysis by Caprio and Honohan (2004) provided empirical evidence that the likelihood of stock market discipline increases as the assets of listed banks increases as a share of total banking assets in emerging markets. However, they found no significant evidence for the influencing ability of shareholders on bank management. A more specific study by Caner et al. (2012) on the Turkish financial market found indications of discipline by shareholders, as equity returns have a significant relationship with bank efficiency and liquidity. For shareholders who invest in small banks, the equity returns were also determined by other factors, including trading volume and franchise value; whereas in the case of shareholders of large banks, bank efficiency is not a key concern. The potential of equity prices to signal risk of failure was also found during the East Asian crisis. Bongini, Laeven and Majnoni (2002) highlighted the superior forecasting ability of default probability computed from an equity-price based option price model, not only relative to published ratings but also to a synthetic measure of risk of failure based on accounting data. A more specific study on equity market prices in Thai banks also predicted bank difficulties in the 1997 Asian financial crisis well before rating agencies downgraded their ratings. At that time, the debts of several Thai banks were at junk-bond levels while the rating agencies were still treating them as investment-grade (Saunders & Wilson, 2001).

2.4.4 Literature on Market Discipline in the Indonesian Banking Sector

Indonesia provides a unique institutional setting for studying the presence of market discipline in a developing economy and how market discipline is influenced by the provisions of FSN, in particular the deposit insurance program. Indonesia implemented a full deposit guarantee program (blanket guarantee scheme) to restore confidence in the national banking system following the Asian financial crisis in 1997-1998 (Enoch et al., 2001). In order to minimize moral hazard and enhance market discipline, in 2005 the blanket guarantee scheme was replaced by a limited deposit insurance program (Hadad et al., 2011).

The change from a full to a limited guarantee scheme could provide empirical data to evaluate the impact of this change on market discipline. However, literature with respect to market discipline in the Indonesian banking industry is relatively limited. Early studies showed some indication of discipline by the market, for example the "flight to quality" phenomena during the 1997-1998 financial crisis. This phenomenon was demonstrated in the massive withdrawals and re-channeling of deposits from small banks to large banks (Yudistira, 2003) and from domestic private banks to the state owned banks or foreign banks (Enoch et al., 2001; Kameyama et al., 2006). Large banks and state owned banks were considered TBTF as the government would not let the banks shut down for fear of further damaging the banking system (Enoch et al., 2001). Similarly, the subsidiaries or the branches of foreign banks were expected to be saved by their parent companies in the event of liquidity or solvency crises (Enoch et al., 2001; Kameyama et al., 2006). These depositor actions can be seen as an act of market discipline and, to some extent, the 1997 financial crisis has served as a wake-up call for depositors in relation to their banks (Kameyama et al., 2006).

One of earliest empirical studies that purposely evaluated the existence of discipline by Indonesian depositors was conducted by Valenci (2005). The study used the monthly call report files that were submitted by up to 241 banks to the central bank of Indonesia from January 1980 to December 1999. The study measured the correlation between both the implicit deposit interest rate and the deposit growth rate with the bank fundamentals. The study found no convincing evidence regarding the presence of discipline by the depositors. This finding raises doubts as to whether Indonesian depositors are able to exercise adequate discipline.

More recent empirical studies by Hamada (2011) and Hadad et al. (2011) found that despite the lack of ideal market conditions for an effective market discipline, Indonesian depositors were able to monitor the conduct and the performance of banks. By using panel data from the annual reports of Indonesian banks for the period of 1998 to 2009, Hamada (2011) measured the

depositor discipline by the changes in the amount of deposits and interest rates. The study concluded that Indonesian depositors monitor bank soundness and riskiness and select a bank based on the bank's condition as reflected by the equity ratio. This evidence is an indicator that under the blanket guarantee, depositors prefer to invest their money in well capitalized banks, or request a higher interest rate from risky banks. While under the limited deposit insurance, the depositors shifted their money from the banks that reported an increase in their non-performing ratio, regardless of the interest rate offered by the risky banks.

Using a balanced panel of 104 commercial banks from 1995 until 2009, Hadad et al. (2011) investigated the relationship between implicit deposit interest rates and bank risks. The study found an indication of market discipline as higher deposit rates were associated with higher default risk and with higher liquidity risk. This was particularly evident before the introduction of the deposit guarantee scheme. The results suggested that the regulations concerning the increase of minimum capital requirements and the introduction of a limited deposit insurance scheme provide a credible enhancement of the market monitoring functions. In addition, the evidence illustrates that the depositor discipline is statistically stronger in listed banks than in unlisted banks, and in foreign banks than in domestic banks.

The literature on depositor discipline in the Indonesian banking industry, however, contains four major limitations: the use of unpublished financial reports and unpublished financial ratios; the use of annual reports; and the use of unreliable data during the crisis. First of all, the studies often used the unpublished monthly call report submitted by banks to the regulators (e.g. Valensi, 2005 & Hadad et al., 2011)[12]. This method raised the question as to how depositors could respond to the relevant information contained in these financial reports when they were not publicly available.

The financial ratios that were published were those that were calculated by the authors and did not follow the standards followed by Indonesian banks. For example, the Z-score[13] was used as a proxy for insolvency risk, and the ratio of liquid assets to total assets was used as a proxy for liquidity risk in Hadad et al. (2011). The calculation and interpretation of those financial ratios would require a certain degree of financial sophistication on the part of recipients (Wu & Bowe, 2012). Therefore, by considering the characteristics of depositors as mostly unsophisticated

[12] Data for 1995– 2000 in Hadad et al. (2011) are based on the banks' condensed published financial statements; whereas the remaining financial data (2001–2009) are obtained from the banks' monthly reports to *Bank Indonesia*.

[13] The Z-score is defined as the number of standard deviations that a bank's return on assets has to fall for the bank to become insolvent (Köhler, 2012).

retail investors, it is unrealistic to expect them to spend time and have the capacity to calculate complex financial ratios by themselves and, more importantly, be able to accurately interpret these ratios within the context of their own institutions.

Further, Kameyama et al. (2006) and Hamada (2011) argue that annual reports may not contain sufficient information to adequately capture market dynamics. Empirical evidence indicates the tendency of banks to engage in "window-dressing" adjustment behaviour in bank assets, particularly in the end of financial year reports (Allen & Saunders, 1992). For this reason, in order to gain a deeper insight into the market volatility during the observation period, it is important to employ data with higher frequency.

The studies on market discipline in the Indonesian banking sector are commonly based upon data over the period of pre- and post- the 1997 financial crisis. The structure of the banking industry along with its regulatory environment has been dynamic and therefore comparing banking data before and after the 1997 crisis may impair the validity and reliability of these study results. For instance, in terms of the number of banks, there were 238 commercial banks operating in Indonesia before the crisis in 1997 (Enoch et al., 2001), this number declined to 150 banks in 2000 due to closures, mergers, and acquisitions following the banking sector restructuring program (Batunanggar, 2002). In terms of the reliability of published accounting data, the empirical evidence indicates that during Indonesia's stable economic periods, the regulators used four of the traditional CAMEL indicators, providing significant insights into their financial soundness. Nevertheless, the relationships between financial soundness and CAMEL ratings substantially deteriorated during the crisis period (Gasbarro et al., 2002).

It is important to note that the present study is unique in several ways. First, the study is based on publicly available financial reports published by banks on a quarterly basis. Use of published financial data is considered more appropriate to measure public responses or sensitivity to bank risk. Second, the sample used in this study covers the period after the 1997 financial crisis to represent a more current regulatory framework and banking structure, and to exclude the unreliable banking data that had been recorded during the crisis period. Third, while the existing market discipline literature commonly measures the behaviour of the Indonesian depositors as a group, this study will further investigate the extent of market discipline (if any) imposed by different types of depositors, in particular the disciplinary actions by retail and large (wholesale) depositors, as well as discipline by insured and uninsured depositors. The current study investigates the extent of discipline by uninsured depositors based on data gathered from the

IDIC and is the first to use this data to investigate market discipline in the Indonesian banking industry.

With respect to the proposal for a mandatory subordinated debt to enhance monitoring and disciplinary action by debt holders as mentioned in Section 2.4.2, in emerging countries such as Indonesia, this proposal might not be viable since the market is still relatively small and illiquid compared to the advance economies (Calomiris, 1997; Mishkin, 1996). However, under international banking regulations, deposit taking institutions can already voluntarily issue subordinated debt and include it as part of their regulatory capital for solvency purposes. In the Indonesian case for example, as stipulated in Article 14 of the BI Regulation Number 10/15/PBI/2008 regarding the capital adequacy ratio for Commercial Banks, Indonesian banks can issue subordinated loans or subordinated bonds and use these as the lower tier 2 capital to fulfill the capital adequacy requirement[14]. The sub-debt can only be calculated at most as 50% (fifty percent) of tier 1 (core) capital. Interestingly, despite the adoption of the Basel guidelines through the Indonesian banking regulator in utilizing the subordinated bond to enhance market discipline, there has been relatively little or no literature on the ability of debt holders to impose market discipline in the context of the Indonesian market. The results of the study would critically evaluate whether the decision by the Indonesian banking regulator to follow the Basel approach is supported by adequate empirical evidence or not. Secondly, the literature regarding market discipline by private agents in the bond markets for emerging economies is in the early stages of development (Mendonça & Villela Loures, 2009). The present study, therefore, will contribute to the body of knowledge regarding the existence and influence of market discipline in bond markets in developing economies.

2.5 Institutional Background – The Indonesian Financial Sector

Financial systems provide various means of channeling savings to investments. In Indonesia, like many other countries, this role is provided mainly by banks and capital markets. The purpose of a banking organization is mainly to collect short-term deposits and use them to make short-term loans for financing working capital requirements, whereas capital markets facilitate the provision of equity capital by investors to finance longer-term investments (Levine & Zervos, 1998). The main objective of this section is to provide an introduction to the Indonesian

[14] As amended in the BI Regulation Number 14/18/PBI/2012 concerning minimum capital adequacy requirement for commercial banks.

financial sector, in particular the banking and capital market industries, and an overview of the Indonesian FSN framework. This section is divided into three parts: Sub-section 2.5.1 presents an overview of the Indonesian banking sector; Sub-section 2.5.2 presents an overview of the Indonesian capital market; and Sub-section 2.5.3 presents an overview of the Indonesia FSN.

2.5.1 Overview of the Indonesian Banking Sector

The Law of the Republic of Indonesia Number 7 Year 1992 concerning Banking, as amended by the Law of Republic of Indonesia Number 10 Year 1998, defines the Indonesian banking system as an instrument of national development for the improvement of economic growth and stability as well as the equitable distribution of wealth. The Indonesian banking system has experienced two major structural developments in the last three decades. The first important development was the implementation of an extensive banking deregulation in 1988, which has resulted in a rapid growth of the banking industry in terms of the number of banks, as well as total assets. The second major development was the banking sector recapitalization and restructuring program following the collapse of the banking industry during the 1998 Asian financial crisis and its aftermath. The establishment of the Indonesian safety net was a key element in an effort to strengthen the stability and the resilience of the Indonesian banking sector. This section provides a brief description of the history of the Indonesian banking sector and presents an overview of the current state of this sector.

2.5.1.1 Development of the Indonesian Banking System before the 1997 Banking Crisis

Indonesia has undergone significant banking sector liberalization since the 1960s. The development in general has shifted the banking regulation approach from a "heavy" regulation and limitation approach, to a more "soft" regulation approach due to deregulatory measures adopted by the government (Abdullah & Santoso, 2001). In general, before the 1997 Asian financial crisis, the development of the banking industry can be divided into five periods, as follow:

a. The rehabilitation period (1967-1973) restored the economy from high inflation due to the impact of the continuing political and economic instability under the administration of the first President of Indonesia, Soekarno (Woo & Nasution, 1989). In this era the banking sector was dominated by five state owned banks which accounted for roughly 80% of total commercial bank assets (McLeod, 1999).

b. The ceiling period (1974–1983) saw interest rate ceilings applied. When President Soeharto took power, the government benefited from the oil boom during the 1970s as its budget relied heavily on revenues from oil and gas. In order to control inflation, the central bank applied credit ceilings, interest rate controls, and limits to pre-financing credit. Through the wind-fall profit from the oil boom, the government and the central bank were able to provide a liquidity support scheme. Under this scheme, banks obtained a certain margin of interest for credit extended to borrowers. This incentive was provided only to state owned banks and selected private banks that met the minimum criteria regarding bank soundness (Abdullah & Santoso, 2001);

c. The growth period (1983–1988) saw interest rate ceilings revoked. The government could no longer provide resources at subsidized interest rates due to the fall in oil prices in the early 1980s. Therefore, the government and the central bank introduced a number of reform packages, including one covering monetary and banking deregulations in June 1983. In this period, the government decided to reduce interest rate subsidies and pre-financing credit except for small and medium-sized enterprises. Discount window facilities, BI Certificates (SBI) and Money Market Commercial Paper (SBPU) were also introduced, as the central bank tools for monetary operations (Abdullah & Santoso, 2001). Since the removal of the loan subsidy program, private banks were able to swiftly reduce the market share of the inefficient state owned banks (McLeod, 1999). The share of private domestic banks in total bank assets increased from 12% in 1982 to 26% in 1988 (Pangestu & Manggi, 2002).

d. The acceleration period (1988–1991) saw the government and the central bank introduce a major banking reform and deregulation package "Paket 27 Oktober 1998" (known as PAKTO) that eliminated restriction to the opening of new banks, branches, and foreign joint-venture banks. Due to the impact of these reforms, the banking industry grew rapidly in terms of the number of banks as well as in total assets. Within two years, BI granted licenses for 73 new commercial banks and 301 commercial bank branches (Batunanggar, 2002).

e. The consolidation period (1991–1997) saw the government continue to roll out a series of reform packages in which prudential banking principles were introduced including capital adequacy and bank ratings (Batunanggar, 2002). These were aimed at improving the effectiveness of banks as financial intermediaries and the stability of the banking system (Abdullah & Santoso, 2001).

The relaxed policy on bank entry since PAKTO 1998 and the absence of a bank exit policy, combined with weak banking regulation and supervision, increased the fragility of the banking system (Batunanggar, 2002). For example, the rapid growth of banks and branches after the implementation of PAKTO 1998 had encouraged banks to be more aggressive in collecting funds from the public, without a proper plan about to whom they would lend the money. Private banks intentionally started to lend money extensively to related companies without sound credit analysis; whereas state banks struggled because of poor credit repayments, especially from credit given to the largest and most influential conglomerates and state owned enterprises (Enoch et al., 2001). These practices led to a high level of non-performing loans (NPL), considered the root of the worst banking crisis in Indonesian history (Abdullah & Santoso, 2001)[15].

The Indonesian banking crisis provides an example of how financial liberalization needs to be preceded or accompanied by a strengthening of financial institutions and prudential regulation (Pangestu & Manggi, 2002). Therefore, since the financial, economic and political crises that began to emerge in mid-1997, Indonesia has embarked on a major financial sector reform agenda. The reform has focused on the stabilization of markets, the strengthening of financial institutions and prudential regulation, and the development of the FSN framework. An overview of the Indonesian FSN framework is presented in Section 2.5.3.

2.5.1.2 Current Development of the Indonesian Banking System

Since the collapse of the banking sector in 1997, the banking system has improved its health and performance through restructuring and regulatory improvements. This is evidenced by its ability to withstand the 2008 global financial crisis (Bank Indonesia, 2009b). However, the domestic financial market still does not fully meet the needs of the corporate sector. Indonesia's financial sector is relatively small and dominated by banks, compared to other major economies in Asia (Organisation for Economic Co-operation and Development, 2010). As at the end of 2011, the banking sector in Indonesia represented approximately 78.07% of total financial sector assets and 50% of the Indonesian GDP. Other players in the financial industry, such as insurance companies, pension funds, finance companies, securities companies, and pawn shops, have small shares within the market. This is illustrated in Table 2.1 (Bank Indonesia, 2012c).

[15] Further discussion regarding the banking crisis of 1997 in Indonesia can be found in (Abdullah & Santoso, 2001; Batunanggar, 2002; Enoch et al., 2001; McLeod, 2004; Pangestu & Manggi, 2002).

Table 2.1 Assets Composition of Financial Institutions in December 2011

Financial Institutions	Number of Companies	Proportion (in percentage)
Commercial banks	120	76.9
Insurance	141	9.41
Finance companies	194	6.13
Pension funds	272	2.75
Mutual funds	647	3.43
Rural banks	1.669	1.17
Securities	147	0.65
Pawn Brokers	1	0.43
Capital venture firms	71	0.06
Credit Guarantee company	4	0.06
Total		**100.00**

Source: Financial Stability Review March 2012, Bank Indonesia

According to Indonesian banking law, banking institutions are classified into commercial and rural banks. A rural bank (Bank Perkreditan Rakyat or BPR) is a type of small bank which in the course of its business does not provide clearing payment services, foreign currency business activities, and has restricted operational area (Bank Indonesia, 2012d). By the end of 2011, there were 1,669 rural banks across Indonesia (Bank Indonesia, 2012b) with a market share of 1.17%.

In terms of an operational definition, banks in Indonesia are classified into conventional and sharia-based commercial banks. A conventional bank is a bank conducting conventional business, whereas a sharia bank is a bank conducting business based on sharia (Islamic) principles[16] which consists of Islamic commercial banks and Islamic rural banks (Bank Indonesia, 2012d). By the end of 2011, there were 11 Islamic commercial banks operating in Indonesia.

In terms of the ownership of banks, banking law classifies commercial banks on the basis of two types of ownership: domestically owned banks, which include state owned banks, private domestic banks, and regional development banks[17]; and foreign owned banks, which include joint venture banks and foreign banks. Private domestic banks are classified into two types:

[16]Sharia principles include contractual terms based on Islamic law, governing agreements between a bank and other parties for deposit of funds and/ or financing of business or other activities deemed compliant with sharia law.

[17]The Regional Development Banks were established with the primary objective of providing funds for development in their respective regions to support the national development plan as stipulated in the Republic Indonesia Law No. 13 year 1962.

foreign exchange commercial banks (bank devisa) and non-foreign exchange commercial banks (bank non-devisa).

In 1997, during the Asian financial crisis, there were 238 commercial banks operating in the country (Enoch et al., 2001), which then reduced drastically due to closures, mergers, and acquisitions following the banking sector restructuring program (Batunanggar, 2002). The recapitalization of the banking sector following the post-Asian crisis restructuring cost the Indonesian government more than USD 85 billion, or about 51% of the year 2000 GDP (Teo et al., 2000; World Bank, 2006). Table 2.2 shows how the consolidation of the Indonesian banking sector progressed after the crisis. The number of banks decreased from 150 in 2000 to 120 in 2011, mainly due to mergers and acquisitions. From a total of 120 banks operating in Indonesia, only 33 banks are listed in the Indonesian capital market. These are presented in Table 2.3.

Table 2.2 Indonesian Banks 2000-2011

Types of Banks	2000	2002	2004	2006	2008	2009	2010	2011
▪ State Owned Banks (SO Banks)	5	5	5	5	5	4	4	4
▪ Regional Development Banks (RD Banks)	26	26	26	26	26	26	26	26
▪ Foreign Exchange Commercial Banks (FEC Banks)	39	38	34	35	32	34	36	36
▪ Non-Foreign Exchange Commercial Banks (NFEC Banks)	42	40	38	36	35	31	31	30
▪ Joint Venture Banks (JV Banks)	28	24	19	17	16	16	15	14
▪ Foreign Owned Banks (FO Banks)	10	10	11	11	10	10	10	10
TOTAL	**150**	**143**	**133**	**130**	**124**	**121**	**122**	**120**

Source: Author calculation based on Bank Indonesia Annual Reports

Most banks operate almost exclusively in the domestic market, with some owning non-bank financial institutions, although their ownership is restricted by regulation. Despite the large number of banks operating in the Indonesian banking industry, assets and funding are concentrated in a few large commercial banks. For instance, according to data from BI, the top three state banks account for one-third of the banking sector assets and deposit base, and the top 15 banks account for approximately 70% of the banking sector total assets. This level of concentration, however, is not uncommon in financial sectors around the world. The state banks dominate the market of all government related transactional banking, micro and rural finance, and housing lending. Most of the smaller and mid-sized banks, in particular the non-foreign

exchange commercial banks and the regional development banks, do not have the ability to compete with the larger banks at the national level (World Bank, 2010).

As mentioned in Section 2.5.1.1, with the liberalization of the banking sector, the inclusion of a liberal foreign investment regime has opened an opportunity for overseas investors to fully or partially own local financial institutions. By the end of 2011, foreign banks as a group owned 24 institutions, which consisted of locally owned subsidiaries, joint venture banks and foreign bank branches. These accounted for around 29 percent of banking assets. Furthermore, the government launched a privatization program by selling its stake in state banks and many of the recapitalized private banks to strategic foreign investors or selling the banks through an Initial Public Offering (IPO) in the capital market. This move has not only reduced government control in the banking system, but has also significantly increased the role of the foreign investors and foreign owned banks in the Indonesian banking sector (World Bank, 2010). From the regulator's point of view, the participation of foreign investors has been beneficial due to their input in the introduction of managerial initiatives, especially new risk management techniques, the enhanced levels of competition in retail and SME banking and its associated contribution towards efficiency gains and the benefits to consumers, as well as the strengthening of the capital base. This has benefitted some of the weaker banks significantly (Bank Indonesia, 2012d). The Indonesian government initiative to sell its stake in the state owned and the recapitalized private banks in the capital market, in conjunction with the growing importance of capital markets as a source of long-term funds, has resulted in the growth of publicly-listed banks in the Indonesia stock exchange from 14 banks in 2000 to 31 banks in 2011. This can be seen in Table 2.3.

Table 2.3 Number of Listed Banks on the Indonesian Stock Exchange 2000-2011

Number of Banks	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Listed Banks	14	14	17	20	20	21	22	24	26	28	29	31
Total Banks	150	145	143	138	133	131	130	128	124	121	122	120

Source: Annual Reports of the Indonesian Stock Exchange Commission

Despite their size and recent improvements, like banks in many countries in the region, Indonesian banks obtain most of their funding from short-term deposits, and the maturity of more than 90% of bank deposits is less than one month (World Bank, 2006). Current and savings accounts (the so-called CASA deposits) represent over half of the total funding base and time

deposits the reminder of total deposits. The top 15 banks have access to a larger share of low-cost and stable CASA deposits, and this reflects their larger branch network and name recognition, while mid-sized and small banks rely more on time deposits for funding (World Bank, 2010). The distribution of deposits for each type of banks is discussed in Chapter 4.

2.5.2 Overview of the Indonesian Capital Market

Private sector–led economic growth requires well-functioning equity and corporate bond markets as a source of risk capital to encourage entrepreneurship and to provide the corporate sector with an alternative to bank finance. Sound capital markets also reduce the vulnerability of the economy to various shocks, and hence, the flow-on effects on the banking sector. However, the Indonesian capital market is not a major source of capital because of the domination of the banking sector in the Indonesian financial system (World Bank, 2006). The role of the capital market began to grow rapidly from the late 1980s when the government launched a process of deregulation and privatization of the capital market. As a result, by 2004 the value of all listed stocks had overtaken total bank loans; and by 2007 the size of the capital market was almost twice as large as total bank loans. This transformation of the financial sector can be attributed partly to government deregulation and privatization policies (Kung, Carverhill, & McLeod, 2010). This transformation is discussed in more detail in the following sub-sections.

2.5.2.1 History of the Indonesian Capital Market

The capital market in Indonesia existed long before the country's independence. The first stock exchange was established during the Dutch colonial era in 1912, but the beginning of the modern era of the Indonesian capital market started in 1977. In general, the development of the capital market in Indonesia can be divided into two periods, as follows:

a. Colonial and Post-Independence War Era

   The existence of a capital market in Indonesia dates back to the era of the Dutch East Indies, specifically to 14 December 1912. On that day, the Amsterdam capital market (Amsterdamse Effectenbeurs) established a branch stock exchange in Batavia[18] for the interest of the Dutch East Indies (VOC) (Ruru, 1995). The main activities of this exchange were to trade stocks and bonds belonging to Dutch plantation companies operating in Indonesia, as well as government bonds. The development of this exchange was negligible

[18] Batavia is the old name of Jakarta, the capital city of Indonesia during the Dutch colonial era.

and the operation was halted during World War I. The operations began again and two branches were opened in Surabaya and Semarang (1925-1942), before being halted once again during World War II.

After Indonesia gained its independence in 1945 and political power was transferred, the Government reformed Indonesia's capital market via Emergency Law No. 13 of 1951 and Law No. 15 of 1952. However, the decision of the government of Indonesia to nationalize Dutch companies hindered the development of the capital market and resulted in the stock exchange becoming increasingly inactive (Indonesia Stock Exchange, 2013).

b. Deregulation and Privatization of the Capital Market

The modern era of stock market operations in Indonesia was inaugurated by the establishment of the Capital Market Executive Agency, on 10 August 1977, by President Soeharto. This reactivation of the capital market was marked by the trading of shares in PT Semen Cibinong, the first publicly-listed company. Some analysts viewed it as premature to re-open the stock exchange at that time due two main factors: first, the absence of numerous large firms in need of funds for investment; and second, the lack of significant numbers of large funding institutions (such as life insurers and pension funds) that were able to mobilize funds from the general public (Kung et al., 2010). As argued by Cole and Slade (1999), at that time there were relatively few large firms in Indonesia, and many of them did not really need equity finance from the capital market because these companies were either government-owned or foreign owned companies. Moreover, mobilization of public funds by non-bank financial institutions such as life insurers and pension funds was limited due to low per capita income and savings in the Indonesian economy. Therefore, the re-activation of the Jakarta Stock Exchange (JSX) in 1977 was not a market-driven process. For example, the Investment Coordinating Board (BKPM) issued a government regulation requiring 24 foreign companies to divest up to 20 percent of their ownership stake to the public (Kung et al., 2010). These forced listings, however, were not sufficient to create an active market, as the shares soon became illiquid, and those companies subsequently chose to delist from the JSX (Indonesia Stock Exchange, 2013; World Bank, 2006).

The end of the oil boom in the mid-1980s had limited the ability of the government to finance the domestic economy through the state owned banks via the business community; hence the need for an active stock market was becoming more apparent. Therefore, the Government issued a series of reform and deregulation measures for the banking sector and

capital market to increase market activity. This was started in December 1987 by issuing the December Package I (PAKDES I) (Cole & Slade, 1999), which included a policy to allow the trading of foreign funds, and trading by foreign investors. This policy was issued due to the lack of domestic demand on the savings side of the stock market. The new policy allowed foreign ownership of up to 49% of the shares of companies other than banks. The 49% limit on foreign ownership of non-bank company shares was eventually lifted in 1997, and the prohibition on the foreign ownership of bank shares was lifted in 1998 (Kung et al., 2010).

Another important reform was the government decision to give the private sector and market mechanisms a much greater role relative to the public sector and bureaucratic control (Kung et al., 2010). The stock market entered a process of privatization and was officially established as the JSX on 13 July 1992. Ownership of the JSX was transferred to a large group of securities companies (clearly with a strong incentive to expand their activities), and the exchange's first boards of commissioners and directors were appointed in December 1991. In anticipation of rapid development in the capital market, the Surabaya Stock Exchange (SSX) began operating in 1989 as a private exchange corporation, located in the second largest city in Indonesia, after the capital city, Jakarta. Following this development, the government decided to reduce the role of the government agency from one of both operator and regulator of the capital market to one of regulator alone. As a result, the Capital Market Executive Agency was discharged from the responsibility for managing the exchange and changed its name to the Capital Market Supervisory Agency (Bapepam) (Indonesia Stock Exchange, 2013).

Furthermore, the Government issued Law No. 8 of 1995 concerning Capital Markets, which specified the roles of the JSX and SSX as part of a Self-Regulatory Organization (SRO) in Indonesia's capital market. This law stipulates that an exchange should provide the system and facilities for market participants as members to buy or sell their stocks. Moreover, the stock exchange was given authority to administer regulations to its members and enforce those regulations to maintain market integrity. Together with the stock exchange, the clearinghouse (KPEI)[19] and custodian agency (KSEI)[20] as an SRO were given special power to govern their members though their own rules and regulations.

[19]The Indonesian Clearing and Guarantee Corporation (KPEI) or Indonesia's central counterparty (CCP) was established in 1996 as a limited company to provide clearing and settlement, guarantee services for stock exchange transactions (equity, bonds and derivatives), and provide securities and borrowing.

In December 2007, the JSX and SSX were merged into one organization to become a Jakarta-based exchange named the Indonesian Stock Exchange (IDX). The capital market regulator (Bapepam) is now part of the integrated financial sector authority under the Financial Service Authority (OJK), commencing in 2013[21].

2.5.2.2 Current Development of the Indonesian Capital Market

The capital market, as stipulated in the capital market law, is defined as consisting of activities related to the trading and offering of securities, the activities of public companies in relation to the securities they have issued, and the activities of the securities-related institutions and professions. In terms of products, the capital market can be divided into two types: an equity market (also known as a stock or share market); and a bond market. The equity market in this study refers to a market in which company shares or stock are issued and traded; and the bond market is referred to as a market in which company bonds are issued and traded. Stocks and bonds can be traded either through the exchanges or over-the-counter (OTC) markets. In terms of trading activities, the trading of securities are conducted in two types of markets: the primary market in which new issues are first offered; and the secondary market in which any subsequent trading takes place (Indonesia Stock Exchange, 2011).

The series of capital market reforms and deregulations, from the 1990s onward is generally seen as heralding a boom period in the Indonesian equity market. During a period of 18 months, the number of companies listed on the JSX increased from 24 in December 1988 to 103 in July 1990. An estimated USD 3 billion in foreign institutional portfolio investments entered the Indonesian market during that period (Ruru, 1995). However, the growth of the equity market was halted due to the Asian financial crisis in 1997 during which the rupiah and the stock market plunged, thousands of companies declared bankruptcy, the banking sector waivered and the economy contracted (World Bank, 2006). But the equity market bounced back very quickly and has grown steadily The Indonesian stock market was one of the best performing ones in the region following the global finance crisis in 2009 (Indonesia Stock Exchange, 2011). In December 2011, total market capitalization of the IDX was about IDR 3.821 trillion (USD 421 million or equal to 48% of GDP) and about 440 companies were listed on the exchange. Out of

[20]The Kustodian Sentral Efek Indonesia (KSEI) was established in 1998 as a depository and settlement institution. KSEI's shareholders consist of the IDX, KPEI, custodian banks, securities companies, and registrars. Participants in the KSEI are custodian banks, securities companies and other parties approved by Bapepam.

[21]As stipulated in The Law of the Republic of Indonesia Number 21 of 2011 concerning Financial Services Authority (the OJK Law).

these, 30 stocks, mostly blue chip, actively traded on the exchange (Indonesia Stock Exchange, 2011). Moreover, the market was largely an institutional market with few individual investors participating. Foreign investors accounted for about two-thirds of market capitalization (International Monetary Fund, 2010).

Despite the stable growth during the past decade, the Indonesian stock market remains limited in both scope and depth and is not a major source of funding or a significant vehicle for long-term investment. This market is highly concentrated, with the top 50 listed companies accounting for 80% of turnover in 2011; limited liquidity hampers the use of the capital market as a source for long-term capital raising or investment (International Monetary Fund, 2010). This low liquidity can be seen by the low turnover velocity (computed as the ratio of a market's turnover value to its market capitalization) compared to other Asia-Pacific markets such as Australia, Japan and the Republic of Korea (World Bank, 2006). The illiquid market is partly caused by a high number of dormant stocks and the low number of free floats. The IDX data shows that among the top 20 companies by market capitalization, the free float (percentage of shares owned by the public) is approximately 39.4 percent. This relatively low free float occurred because many listed companies are family-owned business entities that trade only a small portion of their stock (World Bank, 2006). As an impact of the illiquid market and because of the reluctance of family-owned companies in Indonesia to go public, the Indonesian market remains small compared to most other emerging markets in the region. This is shown in Table 2.4.

While the Indonesian stock market plays limited roles in both scope and depth relative to its banking sector, in developed countries, such as the United States, stock market and other nonbank financial institutions account for more than 70% of the U.S. financial sector assets. This figure is a reflection of the increasing maturity and the associated liquidity transformation taking place via managed funds and the importance of stock market and other nonbank financial institutions as major sources of long term financing (IMF, 2015). Similarly, in the United Kingdom, stock market and other nonbank financial institutions represent key sources of long term market-based finance and account for almost 50% of the assets of UK financial system (Bank of England, 2015)".

Table 2.4 Ratio of Market Capitalization to GDP 2003-2011

Countries	2003	2004	2005	2006	2007	2008	2009	2010	2011
Indonesia	23.3	28.5	28.5	38.1	49.0	19.4	33.0	50.9	48.1
Malaysia	152.8	152.3	126.3	144.7	168.3	81.0	126.6	166.3	137.2
Singapore	245.6	253.4	256.4	198.6	209.9	107.9	176.6	173.6	128.6
Thailand	85.0	72.3	70.8	68.1	79.4	37.6	52.4	87.1	77.7
Philippines	28.1	31.7	39.0	56.0	69.1	30.0	47.6	78.8	73.6
Australia	125.5	127.0	116.1	147.1	152.7	64.2	136.5	127.7	86.9
China	41.5	33.1	34.6	89.4	178.2	61.8	100.3	80.3	46.3
Japan	70.7	79.0	103.6	108.5	102.2	66.4	67.1	74.7	60.3
Korea	51.2	59.4	85.0	87.8	107.1	53.1	100.3	107.3	89.1

Source: World Development Indicators of the World Bank

The Indonesian bond market comprises the OTC and exchange markets, where the government and corporate bonds are listed and traded. Corporate bonds can also be traded at the exchange using the Fixed Income Trading System (FITS). However, bond trading at the exchange is not popular, and almost all bonds—either government or corporate bonds—are traded in the OTC market (Asian Development Bank, 2012).

During the first 10 years since the reactivation of the Indonesian capital market in 1977, there were nine companies that implemented a public offering of bonds with a total value of IDR 936 billion. This value was far greater than the offering value of shares which was IDR 174 billion. Until 1996, 55 companies conducted public offering of bonds, with a value of IDR 11.54 trillion. During the period of 1999 to 2010, the average growth of the number of debt securities issuers in Indonesia was 6.39% annually, while the issue amount had grown on average 22.6% annually. Until the end of 2012, 189 companies had conducted public bond offerings with a total value of IDR 709.82 trillion (Asian Development Bank, 2012).

Commercial banks, foreigners and insurance companies together accounted for approximately 79.53% of total outstanding government bonds in 2012. The total outstanding bond value increased significantly from IDR 477 trillion in 2007 to IDR 820 trillion in 2012, as shown in Table 2.5.

Table 2.5 Government Bond Outstanding Value 2007-2012*

Government Bond Ownership	2007	2008	2009	2010	2011	2012	2012 (in %)
Commercial bank	268,650	258,750	254,360	217,270	265,030	297,980	37.66%
Foreign	78,160	87,610	108,000	195,760	222,860	224,420	28.36%
Insurance	43,470	55,830	72,580	79,300	93,090	106,860	13.51%
Mutual fund	26,330	33,110	45,220	51,160	47,220	48,600	6.14%
Pension fund	25,500	32,980	37,500	36,750	34,390	34,560	4.37%
Bank Indonesia	14,860	23,010	22,500	17,420	7,540	20,360	2.57%
Securities company	280	530	460	130	140	270	0.03%
Others	20,500	33,870	41,120	43,430	53,050	58,140	7.35%
Total	**477,750**	**525,690**	**581,740**	**641,220**	**723,320**	**791,190**	**100%**

*Value in IDR trillion

Source: Fiscal Management Office, Ministry of Finance (2013)

Moreover, the growth of the corporate bond value in the markets increased faster than the government bond. This increased from IDR 88 trillion to IDR 187 trillion, an increase of more than 100% in only three years. By the end of 2011, there were 347 bonds issued by 99 companies; the ownership of these corporate bonds was dominated by insurance companies (26.95%), mutual funds (20.58%), pension funds (20.09%), and financial institutions (18.31%), as presented in Table 2.6.

Table 2.6 Corporate Bond Outstanding Value 2009-2012*

Corporate Bond Ownership	2009	2010	2011	2012	2012 (in%)
Insurance	15,700	23,078	37,874	50,521	26.95%
Mutual fund	13,905	21,838	32,274	38,579	20.58%
Pension fund	18,531	22,940	31,084	37,661	20.09%
Financial institution	14,727	18,348	27,101	34,324	18.31%
Corporate	6,767	7,899	7,260	9,617	5.13%
Foreign	6,271	5,109	6,746	9,504	5.07%
Individual	10,305	13,812	2,425	3,599	1.92%
Foundation	1,574	1,274	1,646	2,549	1.36%
Securities company	637	356	367	919	0.49%
Others	44	57	206	206	0.11%
Total	**88,461**	**114,714**	**146,984**	**187,480**	**100%**

*Value in IDR trillion

Source: Kustodian Sentral Efek Indonesia (KSEI) (2013)

2.5.3 Overview of the Indonesia FSN

Following the Asian financial crisis in 1997, Indonesia has embarked upon a major financial sector reform agenda, with the main focus on stabilizing financial markets, the improvement of financial institutions and prudential regulation, and the development of the Indonesian FSN framework. As mentioned in Chapter 1, the Indonesian safety net in general consists of a prudential regulation and supervision framework, a deposit insurance scheme, a LoLR function, and a failed resolution mechanism (Batunanggar, 2002). Following is a brief overview of each element of the Indonesian FSN.

2.5.3.1 Prudential Regulation and Supervision

During the period of 2005 to 2012, there were three authorities responsible for the stability, regulation, and supervision of the financial sector: BI, the Ministry of Finance (MoF), and the Indonesian Deposit Insurance Corporation (IDIC or LPS). Responsibilities and objectives of each of the authorities are clearly defined in the relevant legislation as described below.

BI had two main roles; as a monetary and a banking authority. As the monetary authority, BI operates as a central bank with a main duty to achieve and maintain the stability of the value of

the Indonesian currency; whereas as the banking authority BI had responsibility to regulate and supervise the banking sector. These roles were stipulated in two major laws: (i) the Law of the Republic of Indonesia Number 7 of 1992 concerning Banking, as amended by the Law of the Republic of Indonesia Number 10 of 1998 (the Banking Law); and (ii) the Law of the Republic of Indonesia Number 23 of 1999 concerning *Bank Indonesia*, as amended by Law of the Republic of Indonesia Number 3 of 2004 (the BI Law).

The MoF, apart from its role as the government fiscal authority, was responsible for regulating and supervising the Indonesian capital market and non-bank financial institutions (NBFI). This function was conducted by one of its bodies, namely the Capital Market and Financial Institutions Supervisory Agency (Bapepam-LK)[22]. The mandate of Bapepam-LK to regulate and to supervise the capital market was stipulated in the Law of the Republic of Indonesia Number 8 of 1995 concerning capital market (the Capital Market Law), whereas the mandate for regulation and supervision of NBFI was stipulated in the Law of the Republic of Indonesia Number 2 of 1992 concerning Insurance (the Insurance Law), and the Law of the Republic of Indonesia Number 11 of 1992 concerning Pension Funds (the Pension Funds Law).

LPS was established in 2005 with a duty to provide a limited deposit insurance scheme, replacing the government blanket guarantee program. In addition, LPS also has a role to carry out the resolution of failed banks as specified in the Law of the Republic of Indonesia Number 24 of 2004 concerning Deposit Insurance Corporation (the LPS Law).

2.5.3.1 The Establishment of an Integrated Financial Sector Supervisor

A new regulatory structure was commenced in January 2013 in conjunction with the establishment of an integrated financial sector supervisor, namely the Financial Services Authority (Otoritas Jasa Keuangan or OJK)[23]. The establishment of OJK is based on the Law of the Republic of Indonesia Number 21 of 2011 concerning the Financial Services Authority (the OJK Law). The new supervisory board is a separate entity both from the central bank and the MoF, with a duty to regulate and supervise banks and other financial services companies, including insurance funds, pension funds, securities companies, venture capital firms, finance companies, and other financial institutions that collect and manage funds from the public (World Bank, 2010). In the transition period, the MoF relegated its power to the OJK to regulate and

[22] Badan Pengawas Pasar Modal dan Lembaga Keuangan (Bapepam-LK) in Bahasa Indonesia.
[23] The establishment of a new supervisory board was proposed in the amendment of the BI Law of 2004.

supervise the non-bank financial institutions and the capital market from 1 January 2013. The BI mandate to regulate and supervise the banking sector was transferred to the OJK from 1 January 2014.

Before the establishment of the OJK, the structure of regulatory agencies in the Indonesian financial sector reflected a sector-by-sector (institutional) supervision model, with bank supervision the responsibility of the central bank (World Bank, 2012). The OJK Law has shifted the organization of the financial sector supervision from a sector-by-sector supervision model into an integrated supervision model of the entire financial sector.

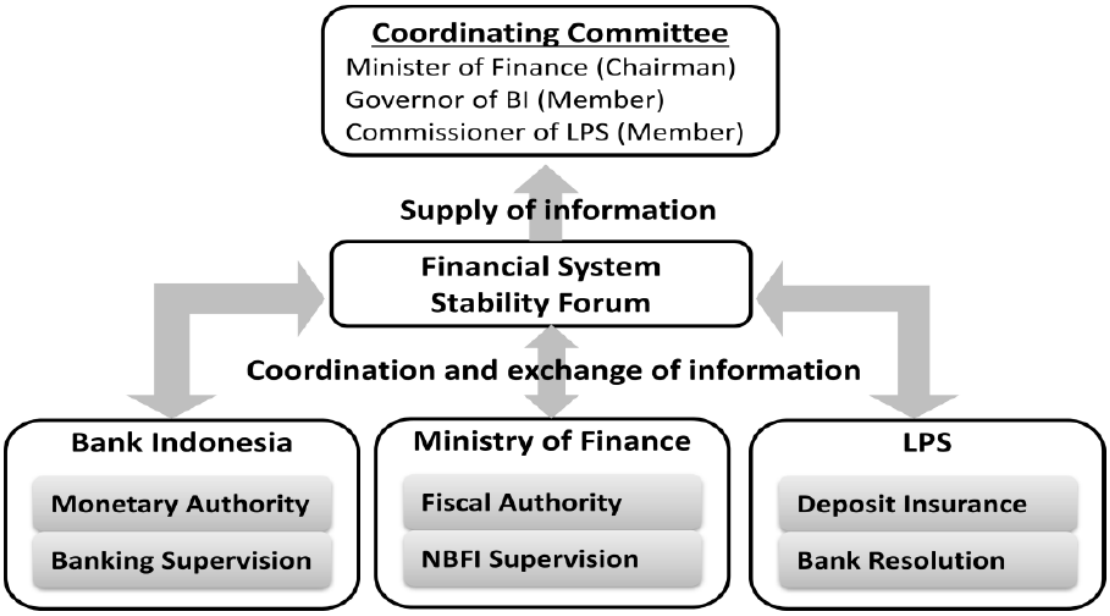
2.5.3.2 Coordination Framework between the Financial Sector Authorities

Learning from its past experience, Indonesia has been developing a crisis management protocol for dealing with a potential crisis in the financial sector. As part of this protocol, the Coordinating Committee was established which comprised of the MoF, the BI, and the LPS as constituted under the LPS Law of 2004. This committee serves as the mechanism for cooperation and coordination to determine the policy for the resolution and handling of a failing bank, particularly one that is predicted to have a systemic effect (Departemen Keuangan, 2010).

In order to support the work of the Coordinating Committee, a joint decree was issued by the MoF, the BI, and the LPS in June 2007 as a legal basis for the establishment of the Financial System Stability Forum (FSSK)[24]. The FSSK served as a means of cooperation, coordination, and exchange of information at a technical level among these three related agencies for promoting the stability in the Indonesian financial system. This forum was designed to enhance the ability of the MoF, the BI, and the LPS to supply inputs and any information required in a decision-making process by the Coordination Committee. The framework of coordination and sharing of information between these financial sector authorities was developed based on the LPS Law and the joint decree. This can be seen in Figure 2.2.

[24] Joint Decree of Finance Minister Number 299/KMK/010/2007, Governor of BI Number 9/27/KEP.GBI/2007, and Commissioner of LPS Number 015/DK-LPS/VI/2007 concerning the Establishment of the Financial System Stability Forum (FSSK).

Figure 2.2 Coordination Framework between the Financial Sector Authorities (2005-2012)

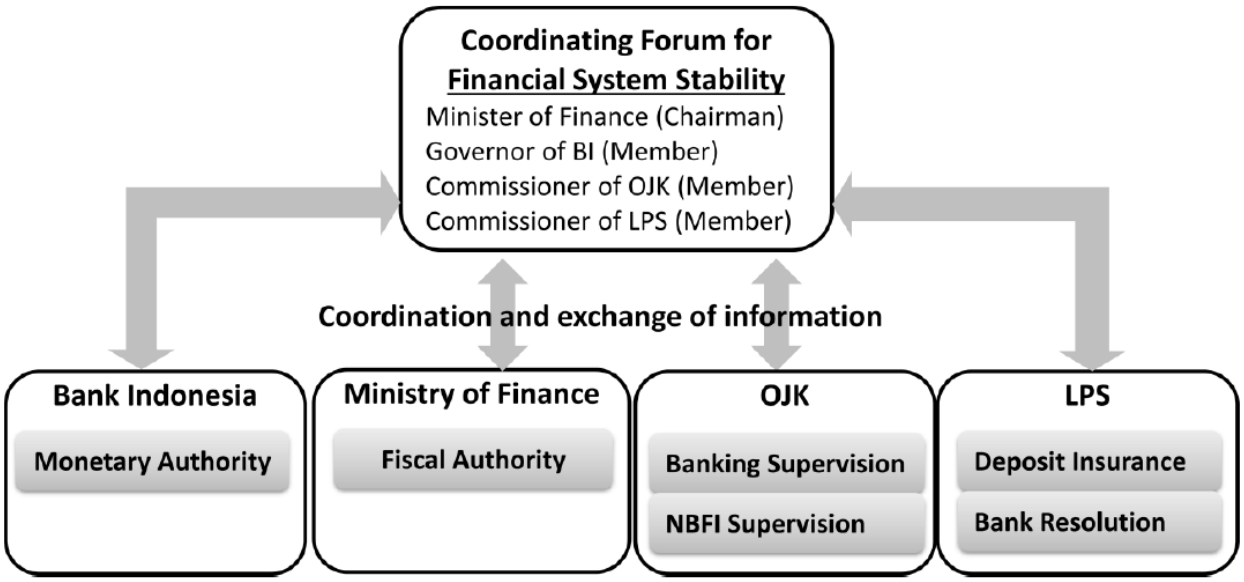


Adapted from the LPS Law of 2004 the Joint Decree of 2007

The FSSK had regular meetings to prepare policy recommendations in dealing with financial stability issues, in particular to prevent and to mitigate a potential systemic crisis (Departemen Keuangan, 2010). Crisis prevention measures could be undertaken by providing temporary liquidity assistance to a financial institution that has a liquidity problem; and by injecting temporary capital into a bank or non-bank financial institution that has a solvency problem. These two measures can only be provided for a financial institution that is considered as bearing a systemic risk to the whole financial sector (Batunanggar & Santoso, 2007). The temporary liquidity assistance and capital injection are part of the LoLR and bank resolution mechanisms in the FSN framework that will be discussed separately in this chapter.

In conjunction with the establishment of the OJK in 2012, the coordination and sharing of information among the financial sector authorities is conducted via the Coordinating Forum for Financial System Stability (FKSSK). This forum undertakes the monitoring of systemic risks, the design of crisis prevention policy, and the preparation of crisis management protocols on a market wide basis. The forum consists of the MoF as chairman, Governor of BI, Commissioner of OJK, and Commissioner of LPS as members. The structure of the FKSSK is illustrated in Figure 2.3 based on the provisions of OJK Law.

Figure 2.3 Coordination Framework between the Financial Sector Authorities (2013 – current)



Adapted from the OJK Law of 2011

Besides the proposal for the establishment of the OJK, the Amended BI Law of 2004 also proposed the drafting of the Financial System Safety Net Law (FSN Law). This new law specifically governs a crisis management protocol to prevent and to mitigate a potential systemic crisis in a more detailed fashion. This crisis management protocol is designed to provide better defined roles and responsibilities for the institutions that oversee the financial sector during a crisis, and provide a legal basis for the funding of state budgets, if required. The coordination mechanism by the FKSSK, as outlined in Figure 2.3, serves as a temporary medium for coordination and exchange of information until the government and parliament agree to pass the proposed FSN Law[25].

[25]In October 2008, the President promulgated an Ordinance in lieu of the law concerning FSN, establishing the Financial System Stability Committee comprising the MoF as the Chairperson and Member, and the Governor of Bank Indonesia, as Member. However in December 2008, the ordinance in lieu of the law failed to be approved as a law by the Parliament. In January 2009, the government submitted a draft of the FSSN Law, but it was rejected by the parliament. The revised draft of the law is being prepared to be re-submitted to the Parliament.

2.5.3.2 Lender of Last Resort

The BI Law has granted the BI the right to provide a LoLR facility both for normal conditions and for preventing a systemic crisis[26] (Batunanggar & Santoso, 2007). Under normal conditions, the BI may act as a LoLR to a bank in order to resolve a short-term liquidity problem[27]. This loan facility can be given in the form of conventional lending or Syariah principle based on financing for a maximum of 90 days. The loan must be guaranteed by high quality collaterals at least of similar value against the received facilities. The types of collateral accepted are government bonds, BI certificates, and loans classified as 'current' (where the bank does not possess eligible government bonds or BI certificates). This facility is in addition to the traditional central bank overnight and intraday facilities (International Monetary Fund, 2010).

With respect to the prevention of a systemic crisis, the LoLR facility may be given in the form of an Emergency Lending Assistance (ELA)[28]. As stipulated in the BI Law, in the event that a solvent bank confronting financial difficulties (liquidity problems) is deemed to be liable to trigger a crisis threatening the wider financial system, BI may provide emergency lending with a guarantee from the government. For systemically important solvent banks, the ELA facility allows for longer term extensions of credit (up to a maximum limit of 180 days). Since the ELA is guaranteed by the government, any losses that may be experienced by BI on such lending will be compensated by the government. However, as described in Section 2.5.3.2, more detailed procedures regarding the decision-making process to determine whether a troubled bank bears a systemic risk will be legalized in a separate law, namely the FSN Law.

Prior to the enactment of the FSN Law, the ELA provisions were applied in accordance with the Memorandum of Understanding (MoU) between the MoF and the Governor of BI, dated 17 March 2005. As stated in this MoU, BI is responsible for analyzing systemic risk that will threaten the stability of the financial system, whereas a decision to provide the ELA will be made by both the Governor of BI and the MoF.

[26]Law of the Republic of Indonesia Number 23 Year 1999 concerning Bank Indonesia, as amended by the Law of Republic of Indonesia Number 3 Year 2004.
[27]Short-term Funding Facility (Fasilitas Pinjaman Jangka Pendek or FPJP) as stipulated in article 11 verse 2 of the BI Law.
[28]Emergency Lending Assistance (Facilitas Pendanaan Darurat or FPD) as stipulated in article 11 verse 3 of the BI Law.

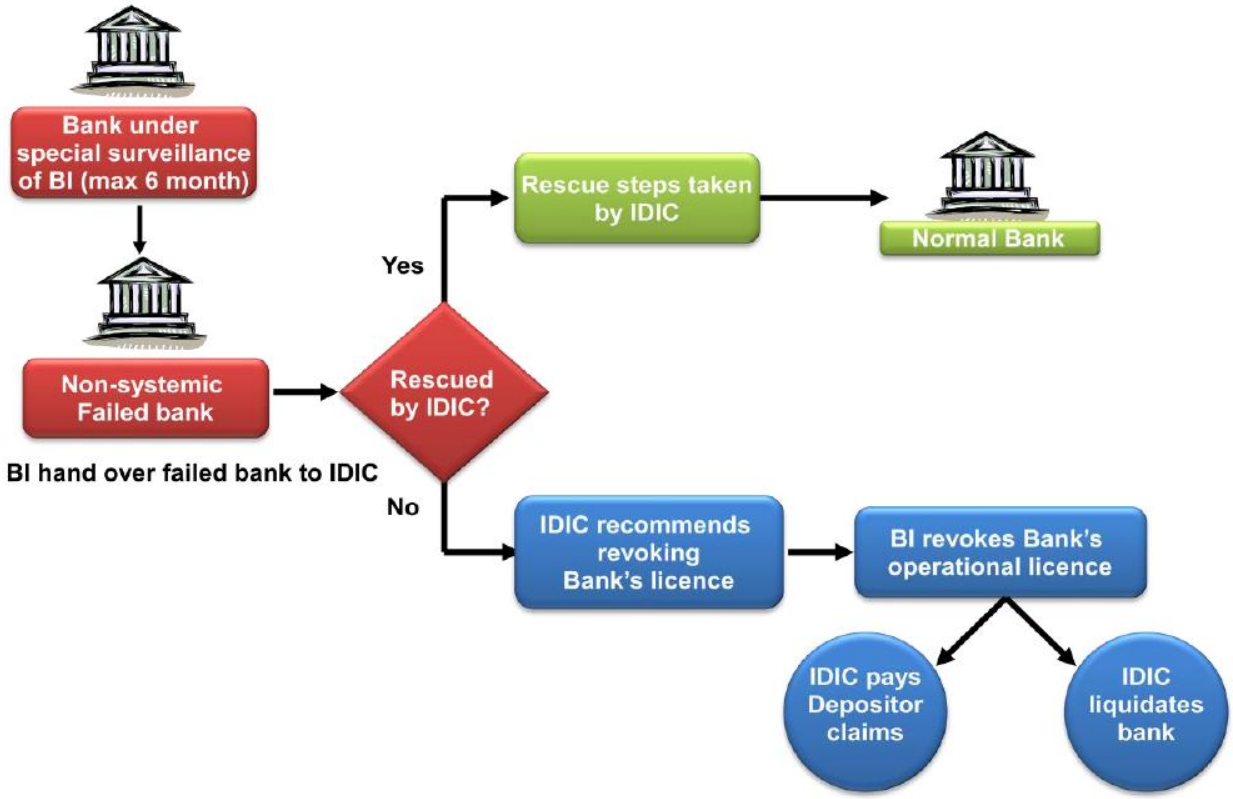
2.5.3.3 Bank Resolution

In the Indonesian banking sector, resolution of all failed banks is the responsibility of the LPS. According to the LPS Law, the settlement of a failed bank depends on whether the failed bank is exposed to systemic risk or not. If the banking supervisor decides that the failed bank is exposed to systemic risk, the LPS is entitled to decide whether to close or rescue the failed bank. If on the other hand the failed bank is deemed to be exposed to systemic risk that threatens the whole banking system, the LPS has no option but to rescue the failed bank.

If a failed bank is considered a non-systemic bank, the decision to rescue or not is determined by the LPS using the least cost approach. Under this approach, the LPS compares the estimated resolution cost and the estimated liquidation cost. This is illustrated in Figure 2.4. The LPS will rescue a failed bank only if the bank has good prospects for strong future performance and the rescuing cost is significantly lower than the liquidation cost. In this case, the existing shareholders have to surrender their rights to the LPS and the management of the entity is transferred to the LPS via a resolution of the general shareholder meeting (GSM). All costs incurred during the rescuing process of the failed bank are recorded in the bank balance sheet as a temporary capital placement from the LPS. Furthermore, the LPS is required to sell its share in the bank within two years, subject to two extensions, each lasting one year, giving a total of four years. Within this four-year period, the LPS law states that the sale price of the bank should at least be equal to the value of the LPS' temporary capital injection. If after this four-year period the selling price is still below the temporary capital placement, then the LPS must sell the entire shares at the best price offered by the market at the beginning of the fifth year.

If the LPS decides not to rescue a non-systemic failed bank, the banking supervisor subsequently revokes the bank's business license. The LPS will then begin the liquidation process of the failed bank, which includes a number of actions, such as: taking over and executing all rights and powers of the shareholders included in the GSM; providing funds for the payment of salaries and advances for employee severance; securing the bank's assets prior to liquidation; establishing a liquidation team; and declaring the bank's status as a bank in liquidation.

Figure 2.4 Procedure for Handling of a Non-Systemic Failed Bank by IDIC



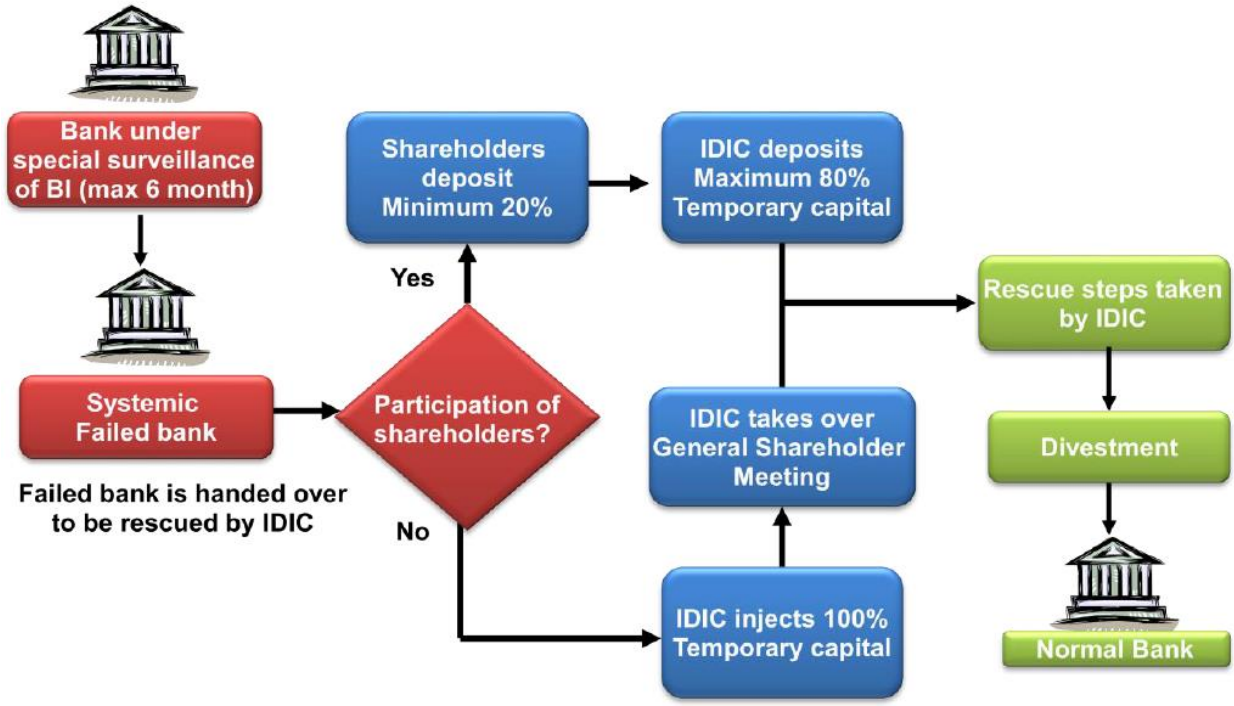
Source: The Indonesian Deposit Insurance Corporation (2011)

If the banking supervisor believes that the failing entity could have a systemic impact on the whole banking system, the resolution process for this bank requires approval from the MoF and the Governor of BI in the Coordinating Committee meeting as described in Section 2.5.3.2. The Coordinating Committee is called upon to decide whether this bank has a systemic risk or not. If the committee is convinced that there is no threat of systemic risk as a result of the entity in question failing, the failed bank would be handed over to the LPS to make a decision whether to liquidate or to rescue the failed bank. However, if the committee concludes that the failed bank does have a systemic risk, they instruct the LPS to rescue the bank by injecting a temporary capital placement in accordance with the LPS Law. This is illustrated in Figure 2.5.

The handling of systemic failed banks is conducted through a resolution process, which may or may not include previous shareholders (open bank assistance). Previous shareholders may participate in the resolution of the failed bank if they agree to inject a minimum amount of capital equivalent to 20% of the estimated resolution cost. In addition, the existing shareholders have to surrender the rights and authority of the GSM and the management of the bank to the LPS. The resolution of the failed bank will be carried out without the participation of shareholders if the above requirements are not fulfilled.

All costs incurred by the LPS to rescue the bank will be recorded as the LPS' temporary capital placement. The LPS is required to perform divestment within three years, which can be extended up to two times, with each extension lasting one year. The divestment of the bank is carried out in an open and transparent manner with due consideration for the optimal rate of return for the LPS. The optimal rate of return is equal at the very least to the value of the temporary capital invested in the bank. If by the time of the renewal period the LPS does not get back an optimal level of return, the LPS must sell the entire shares belonging to the bank for the best price the following year (the sixth year).

Figure 2.5 Procedure for Handling of a Systemic Failed Bank by IDIC (LPS)



Source: The Indonesian Deposit Insurance Corporation (2011)

2.5.3.4 Deposit Insurance

The deposit insurance scheme was introduced in Indonesia during the monetary and banking crisis that hit the country in 1998. Following the liquidation of 16 insolvent banks, public confidence in the banking sector was impaired resulting in runs on most banks (Batunanggar, 2002; Enoch et al., 2001; Pangestu & Manggi, 2002). In order to control the crisis and to restore public confidence in the national banking system, the government implemented a series of policies, one of which was to provide assurance to any bank's payment obligations, including public deposits (Enoch et al., 2001; Pangestu & Manggi, 2002). On 27 January 1998, the Indonesian government declared blanket guarantees for all bank liabilities in locally

incorporated banks. The implementation of the blanket guarantee represented a major change in banking regulation as, until this time, Indonesia had no explicit deposit insurance scheme (Batunanggar, 2002; Hadad et al., 2011).

The blanket guarantee scheme was endorsed by the Decree of the President of Republic of Indonesia Number 26 of 1998 concerning Guarantee in Commercial Bank Payment Responsibility and the Decree of the President of Republic of Indonesia Number 193 of 1998 concerning Guarantee on Rural Bank Payment Responsibility. The guarantee applied to all commercial banks in Indonesia, except for the branch offices of foreign banks. Under the blanket guarantee, the government guaranteed all bank liabilities, including off-balance sheet items. However, the guarantee was not applicable to loan capital, subordinated capital, unproved/illegal liabilities, liabilities to the bank's related parties, and derivative transactions (except for currency swaps). The blanket guarantee scheme membership cost a fixed-rate annual premium of 0.25% of deposits. The Indonesian Bank Restructuring Agency (IBRA) was responsible for administering the blanket guarantee (Lembaga Penjamin Simpanan, 2005).

In practice, the blanket guarantee succeeded in reviving banking accountability. However, the government recognized two major drawbacks of this scheme. Firstly, it could create a serious moral hazard problem in the banking sector and, secondly, it could create a burden for the state budget (McLeod, 2004). In order to handle these two risks, as well as develop customer confidence in the banking sector and to maintain the stability of the banking system, the government decided to gradually phase out this blanket guarantee scheme. The system was then replaced by a limited guarantee system, which is carried out by the IDIC (LPS) (Batunanggar & Santoso, 2007).

The establishment of LPS was based on the Law Number 24 of 2004 concerning Deposit Insurance Corporation, and came into effect on 22 September 2005. According to the Financial Sector Assessment Program (FSAP) Report on the Republic of Indonesia (2010) conducted by the IMF and the World Bank, the Indonesian deposit insurance regime is consistent with international practices. It can be evidenced by the LPS's mandates, powers, governance structure, membership and insurance coverage. The LPS Law states that this body is independent of the MoF. It has responsibility for lessening the financial burden on the state budget and to minimize the moral hazard of bank management and depositors, to protect small depositors by insuring their deposits up to a certain limit should a bank have its operating license revoked, and to preserve public confidence in the banking system.

LPS membership is mandatory to every bank operating in Indonesia, including foreign bank branches and subsidiaries. The current official annual premium is 0.20% of deposits per year. The coverage of the LPS insurance deposit scheme was decreased gradually from 2005, when all bank depositors were insured, until 2008 when the LPS only insured deposits up to IDR 100 million. However, in October 2008, in response to actions by other countries in the region and the financial crisis, deposit insurance coverage was raised from IDR 100 million (USD 10,000) to IDR 2 billion (USD 200,000). This policy amendment was necessitated by the desire to maintain public confidence in the domestic banking system and to prevent capital flight during any future global financial crisis (Hadad et al., 2011). The revised limit covers about 90% of depositors. The summary of the LPS deposit insurance coverage is shown in Table 2.7. In addition, to preventing weak banks from paying excessive deposit rates to attract insured deposits, the LPS limits the maximum rate on covered deposits both for commercial banks and rural banks. The limit is intended to make the market more cautious in their dealings with banks offering very high deposit rates, by making these deposits ineligible for deposit insurance (World Bank, 2010). The limit is reviewed periodically to adjust the current development in the financial sector (Lembaga Penjamin Simpanan, 2010).

Table 2.7 Brief History of Deposit Insurance in Indonesia

Time Period	Coverage
Jan 1998 – Sept 2005	The government issued a blanket guarantee. It covered all commercial bank liabilities, including both depositors and creditors.
Sept 2005 – March 2006	LPS officially operated from 22nd Sept 2005. For an effective implementation, a two year transition period was introduced prior to a full fledge deposit guarantee scheme, divided into 4 stages: Stage 1: All deposits were insured.
March 2006 – Sept 2006	Stage 2: Maximum amount of deposit insured was IDR5 billion for each depositor at one bank.
Sept 2006 – March 2007	Stage 3: Maximum amount of deposit insured was IDR1 billion for each depositor at one bank.
March 2007- Oct 2008	Stage 4: Limited guarantee for a maximum amount of deposit insurance at IDR 100 million for each depositor at one bank.
Oct 2008 – present	As a response to the global financial crisis, the maximum amount of deposits insured was increased to IDR2 billion for each depositor within a bank.

Source: The Indonesian Deposit Insurance Corporation (2009)

2.6 Chapter Summary

This chapter presented a critical review of prior literature related to FSN, market discipline, and the influence of FSNs on market discipline. The main objective of the establishment of a FSN is to maintain the stability of financial systems. Therefore, the provision of FSN has been a key policy response implemented by financial sector authorities in dealing with financial crises. The FSN commonly consists of four key elements: a deposit insurance scheme, a LoLR function, a prudential regulatory and supervisory framework, and a resolution mechanism for failed financial institutions.

Market discipline, as the third pillar of the Basel Capital Accord, is a mechanism through which the financial market provides signals that are utilized by market participants to monitor and discipline banks' excessive risk-taking behaviour. For this purpose, banks are supposed to increase the information available to the public by encouraging the release of timely information detailing their assets, liabilities and general financial information. This might enable market players to better evaluate bank conditions and diversify their portfolios accordingly. Market discipline can be manifested in the way in which holders of bank liabilities 'punish' banks that take higher risks. This is achieved through demanding higher yields or withdrawing their funds altogether. Holders of bank liabilities such as depositors, bond holders, and equity holders have a role to play in exercising market discipline. Depositors can exercise discipline by either demanding a higher return (price effect) or withdrawing deposits (volume effect). The threat of action, therefore, imposes discipline by signaling to deposit-taking institutions the riskiness of their activities. Similarly, bond holders can demand a higher yield on bank debt, thereby increasing the cost of funds for riskier institutions. Equity holders, even though they are sensitive to the potential for upside as well as downside movements, can still impose discipline by selling their shares if a bank becomes distressed. This action puts downward pressure on share prices and places management under increased scrutiny. These disciplinary actions are expected to lead banks to behave in a way consistent with their solvency.

In order to develop an effective market discipline mechanism as described above, the market requires the availability of reliable information, the capability of market participants to utilize the information, the mechanisms to adjust the securities relative to its risk level, and the ability of banks to respond to market signals. However, the necessary requirements for an effective market discipline in reality rarely exist in most developing economies. Furthermore, the implementation of FSN could foster moral hazard among banks as well as their stakeholders. Moral hazard problems for banks could occur because the provision of a FSN might incite banks

to take additional risks, which in the end could increase the risk of bank default. For bank stakeholders, the design features of a FSN could impact on the effectiveness of market discipline, potentially reducing the incentives for bank stakeholders to monitor banks since their funds are principally insured and their bank might be bailed out by government. In the case of developing economies, due to the lack of ideal conditions for effective market discipline and the provision of FSN that might potentially increase moral hazard, there is a significant concern in the existing literature on whether unsophisticated markets could foster market discipline. Interestingly, some literature on this topic indicates the possibility of the existence of market discipline in emerging economies, despite the poor market infrastructure and government guarantees.

Indonesian financial market provides a unique setting for studying the presence of market discipline and the influence of FSN on market discipline. Indonesia has implemented a series of financial sector restructure programs. This includes the provision of FSN comprising deposit insurance schemes, a LoLR facility, a prudential regulatory and supervisory framework, and a resolution mechanism for failed financial institutions. In 2005, Indonesia replaced the blanket guarantee program with a limited deposit insurance program. The main purpose of this replacement was to foster market discipline and to reduce direct exposure of government budgets. Hence, the study on the Indonesian financial sector during that period will provide empirical evidence on the influence of FSN on market discipline in an emerging economy.

The last section of this chapter provided an overview of the Indonesian financial market structure and the Indonesian FSN framework. The banking sector traditionally dominated the Indonesian financial system. At the end of 2011, the banking sector accounted for approximately 78.07% of total financial sector assets and 50% of the Indonesian GDP. Most of the funds were collected by Indonesian banks from short-term deposits, and more than 90% of bank deposits had maturity of less than one month. Indonesian banks generally use these funds to make short-term loans for financing working capital requirements. The longer-term investments are supposed to be financed through a public offering facilitated by capital markets. In the midst of banking domination, capital market activity grew markedly in importance relative to banking after the capital market reforms in the 1990s began to take effect. After the 2008 global financial crisis, the Indonesian stock market was one of the best performing ones in the region, with a total market capitalization of about IDR 3.821 trillion (48% of GDP) with a listing of about 440 companies. Foreign investors accounted for about two-thirds of market capitalization. However, the Indonesian capital market remains limited in both scope and depth compared to other Asian

countries. This is partly caused by the illiquid market and the reluctance of family-owned companies in Indonesia to go public.

In Chapter 3, the research objectives and conceptual framework are described. Then the hypotheses and the model specifications to test the hypotheses will be developed to investigate the market discipline imposed by depositors, bond holders, and equity holders.

Chapter 3
Research Framework and Empirical Models

3.1 Introduction

The literature relating to financial safety nets, market discipline, and the influence of a financial safety net on market discipline in developed and developing economies were reviewed in Chapter 2. This chapter outlines the research framework used to guide the present study as follows. Section 3.2 presents the research questions that have previously been outlined in Chapter 1 in more detail. Section 3.3 presents the conceptual framework that links the theoretical concepts of market discipline to an empirical data methodology. Section 3.4 presents hypotheses of market discipline in the Indonesian banking sector. Section 3.5 describes the research design to address the hypotheses based on the defined conceptual framework. The summary of the chapter is presented in Section 3.6.

3.2 Research Question

Demand for the enhancement of transparency relating to bank financial conditions and performance is rising. In line with the implementation of Basel II, particularly Pillar 3 (market discipline), banks are required to disclose the types of risk and risk exposures as well as risk management practices adopted. These disclosures are expected to provide more relevant and timely information to the public as well as market players to enable the review of bank risks and their efforts to mitigate them through risk management (Bank Indonesia, 2012d). However, the government provision of a FSN might potentially lead to moral hazard outcomes that could impair the incentives for market players to monitor and discipline financial institutions (Lane, 1993).

As already discussed, the possible presence of moral hazard implications following the implementation of FSN has the potential to weaken the integrity of the financial system. To address this issue, it is essential to first verify the existence of market discipline in the Indonesian banking sector. This verification should focus on the liabilities side of a bank's balance sheet. This is associated with three main stakeholder groups: depositors, debt holders, and equity holders, who potentially have a disciplining power over the banks. Secondly, it is also

important to identify how market discipline is affected by the provision of FSN. The primary objective of this thesis is to investigate the presence of market discipline, and to evaluate the influence of a FSN on market discipline in the Indonesian banking system. The specific objectives related to the above overall research aim that can be empirically verified are:

a. to critically evaluate the discipline imposed by depositors by measuring the impact of bank fundamentals on deposits;
b. to critically evaluate the discipline imposed by debt holders by measuring the the impact of bank fundamentals on bond yields;
c. to critically evaluate the discipline imposed by equity holders by measuring the impact of bank fundamentals on equity returns; and
d. to determine the over all impact of FSN on the discipline of the financial sector stakeholders.

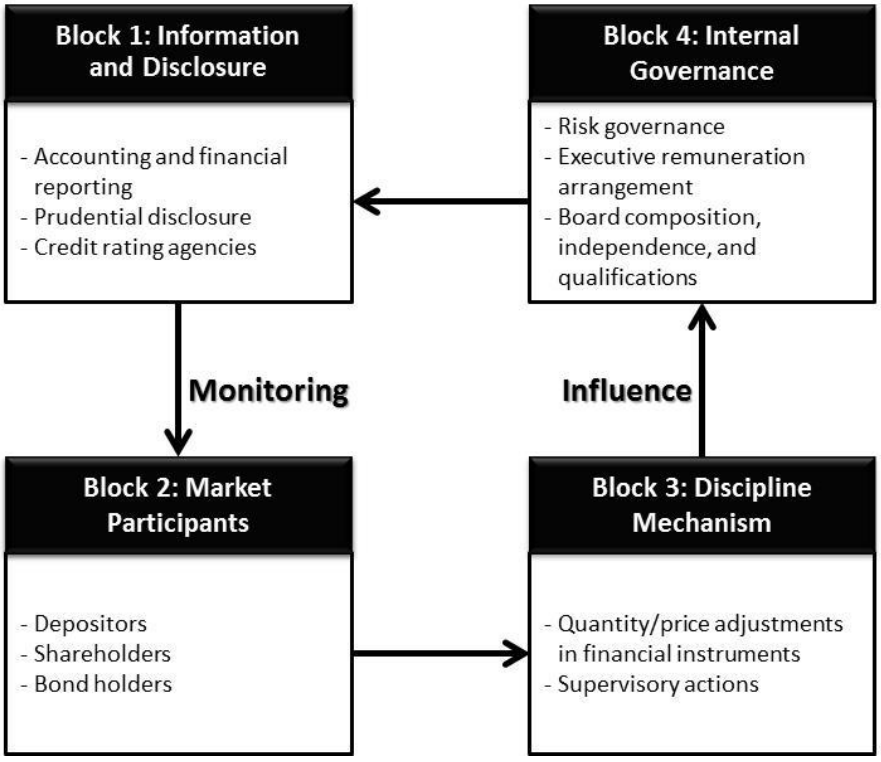
3.3 Conceptual Framework

The development of an effective market discipline mechanism, as discussed in Chapter 2, requires four main ingredients: available and reliable information, market participant capability to utilize information, mechanisms to adjust securities relative to bank risk level, and financial institution responses to market signals. These requirements are the four interrelated building blocks that form a market discipline framework (Stephanou, 2010), as shown in Figure 3.1.

Building block 1 represents the need for sufficient and reliable information (Caprio & Honohan, 2004; Crockett, 2002; Llewellyn, 2005) provided by an open capital market and public disclosure regulations of bank capital structure and risk exposure (Lane, 1993). The information and disclosure about the financial performance and risk exposures of a bank should be adequate, timely, consistent, reliable, and available to the general public (Hamalainen et al., 2003).

Building block 2 emphasizes the need for a sufficient number of independent market participants with the ability to accurately process the available information (Crockett, 2002), as well as the interest and adequate incentives to monitor a bank (Crockett, 2002; Llewellyn, 2005), including no bail out policy anticipated by market participants (Lane, 1993). Building block 3 illustrates the need for an effective mechanism and various instruments for market players to exercise discipline by adjusting risks to the price and quantity of investment portfolios (Caprio & Honohan, 2004; Crockett, 2002; Llewellyn, 2005)

Figure 3.1 Market Discipline Framework



Adapted from Stephanou (2010)

Building block 4 relates to the ability of the governance structure within the organization to adequately respond to market signals, to control bank risks, and to adjust management behaviour in response to market signals based on appropriate incentives for bank management (Lane, 1993; Llewellyn, 2005). Figure 3.1 indicates that, in general, market discipline consists of two distinct components: 'monitoring' (recognize) and 'influence' (control) phases (Bliss & Flannery, 2002). Therefore, Flannery and Sorescu (1996) suggest that an effective market discipline must satisfy a two-stage process, in which market players can 'recognize' and 'control' the risk of financial institutions. The mechanism for how this market discipline works is illustrated in Figure 3.2.

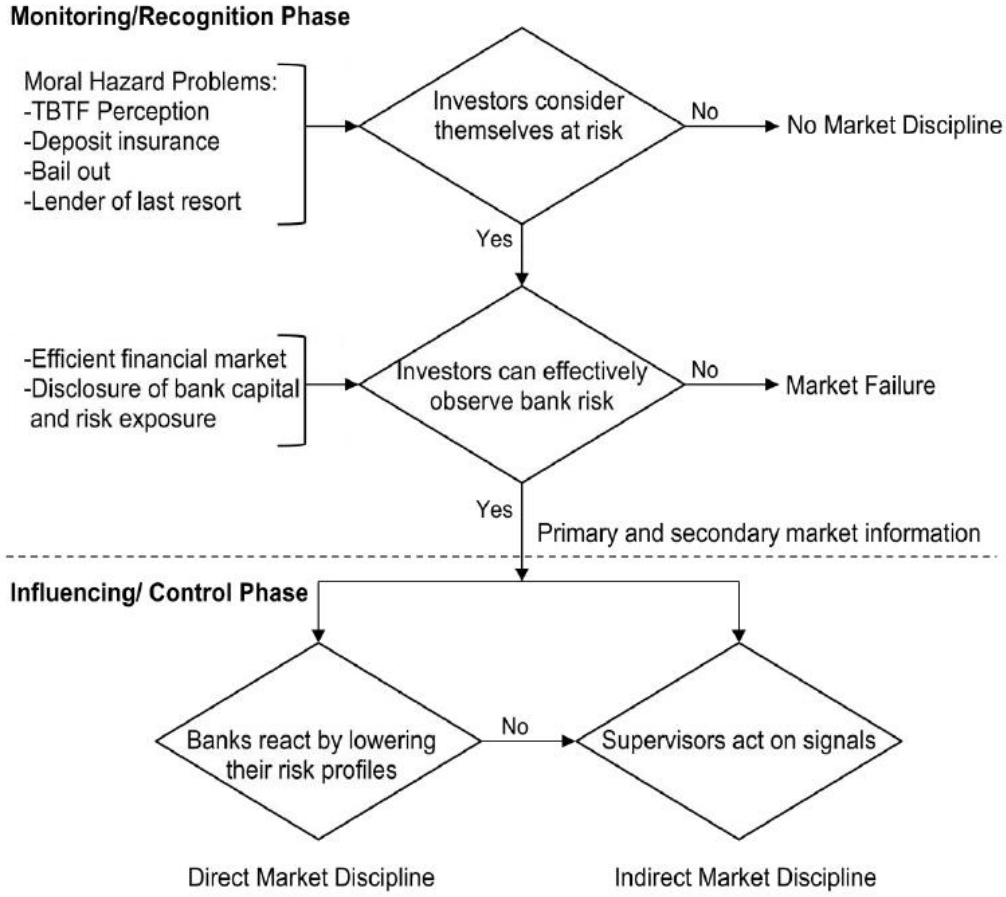
The monitoring (or recognition) phase in Figure 3.2 refers to the hypothesis that market players can adequately evaluate changes in a financial institution condition and incorporate those assessments promptly into their portfolios. Therefore, in this phase, market participants should be aware of risk and be able to effectively monitor bank risk (Bliss & Flannery, 2002). Market players need to be aware and consider themselves at risk of loss if the bank defaults, giving them an incentive to react to perceived changes in the likelihood of bank insolvency (Lane, 1993; Nier & Baumann, 2006; Van Hoose, 2010). Secondly, market discipline requires independent market players to effectively observe bank risk (Flannery, 2001). For an effective observation, market

players must have adequate information to measure the riskiness of the bank, and the financial market should be efficient for investors to exercise discipline in a manner that provides appropriate market signals (Caprio & Honohan, 2004; Crockett, 2002; Lane, 1993; Van Hoose, 2010). In addition, successful market discipline also requires investors to process information correctly (Crockett, 2002). An absence of correct information may result in inaccurate signals being transmitted to bank management and supervisors. Market monitoring mechanisms generate market signals, from primary or secondary markets, that may convey useful information to bank management and supervisors (Hamalainen et al., 2003).

However, the incentive for market participants to continuously monitor their banks might be impeded by the provision of a FSN, such as the provision of a deposit insurance scheme or financial rescue mechanisms (Crockett, 2002; Flannery, 2001). The provision of a FSN could reduce the default risk of a bank and hence may create moral hazard problems originating from bank management and from market players (Hamalainen et al., 2003).

The influence (or control) phase in Figure 3.2 refers to a process by which outside parties influence the action of a financial institution (Hamalainen et al., 2003). Market responses to changes in the bank's risk profile (from the monitoring phase) need to have cost implications for the bank and its managers (Nier & Baumann, 2006), so that bank management has an incentive to adjust their behaviour (Lane, 1993; Llewellyn, 2005). Bank management reacts to the information derived from market-monitoring activities (direct market discipline) generally by lowering their risk profile. In addition, the signals from the market can be utilized by supervisors to impose supervisory corrective actions on the part of banks (indirect market discipline) (Flannery, 2001; Hamalainen et al., 2003).

Figure 3.2 Market Discipline Mechanism



Source: Adapted from Hamalainen et al. (2005)

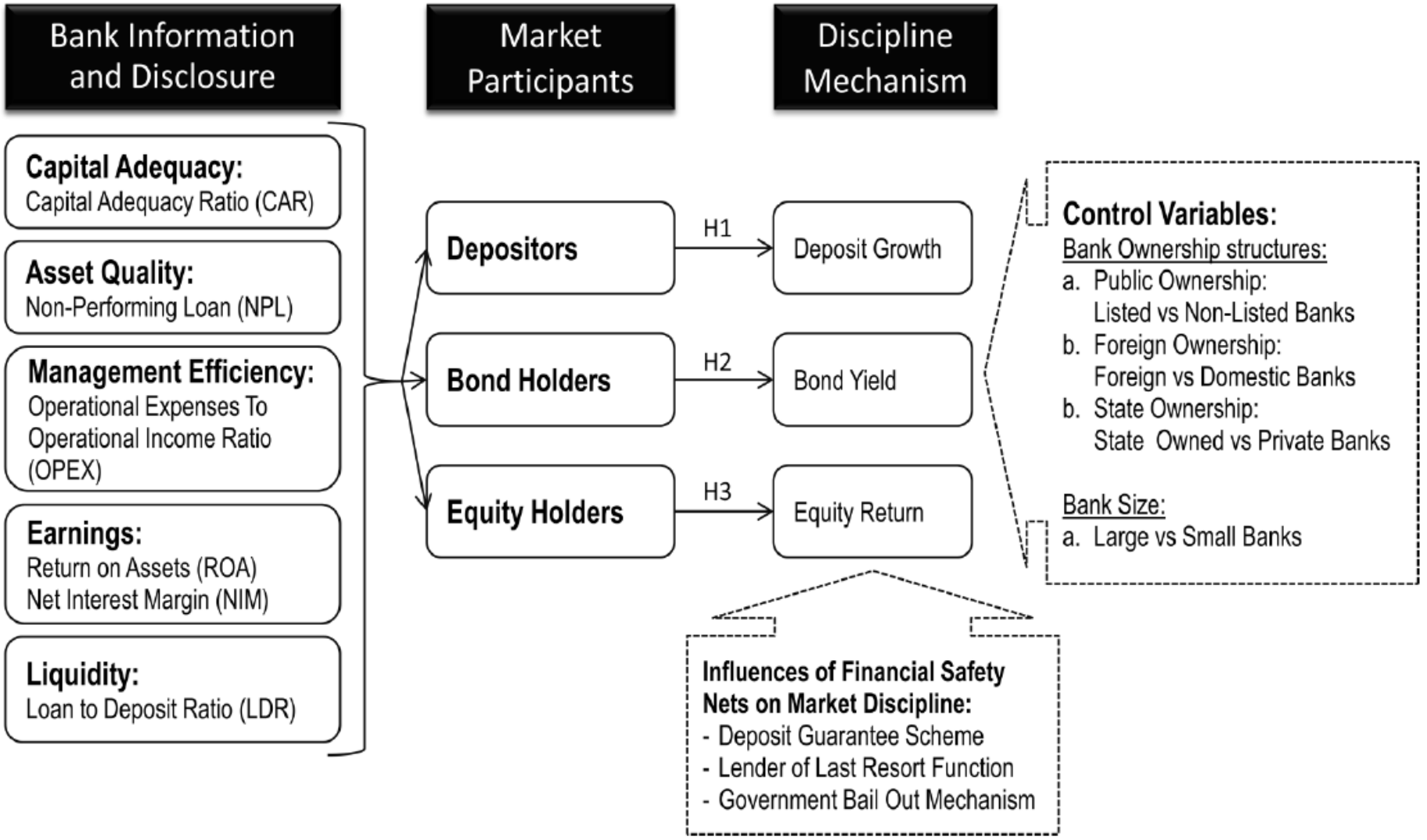
The present study is designed to evaluate the presence of market discipline, specifically in the monitoring phase as illustrated in Figure 3.2. In relation to Figure 3.1, the effectiveness of the monitoring phase depends on three elements (building blocks) in the market discipline framework. These are: the availability of information and disclosure (Block 1), the existence of an adequate number of market participants (Block 2), and the presence of various instruments to exercise discipline mechanisms (Block 3)[29]. Furthermore, the conceptual framework of this study is developed upon these three elements of the monitoring phase. The detail of the proposed conceptual framework is illustrated in Figure 3.3. The framework is divided into three main elements: bank information and disclosure; market participants; and discipline mechanisms. These three elements emphasize the presence of market discipline which is indicated by the

[29] The influencing phase and the last block (internal governance) are beyond the coverage of this study. However, the findings provide policy implications for management to improve their internal governance, as well as to banking sector authorities in order to enhance the overall market discipline.

capability of independent market participants to make reasonable assessments based on available information, particularly accounting information that represents bank fundamentals.

Bank fundamentals in this study refer to bank financial performance that is commonly used by financial authorities to assess bank soundness. These financial ratios can vary from one study to another but most of them replicate CAMEL ratios. In the Indonesian context, the qualitative rating of various aspects affecting the condition or performance of a bank is associated with the BI Regulation Number 6/10/PBI/2004 concerning Rating System for Commercial Banks. The quarterly financial report comprises not only a financial position report (balance sheets) and profit and loss report, but also bank financial ratios that represent CAMEL indicators. In this report, the capital indicator is represented by the Capital Adequacy Ratio (CAR); rating of the asset quality factor is measured by Non-Performing Loan (NPL); rating of the management factor is measured by an Operating Expenses to Operating Revenue ratio (OPEX); rating of the earnings indicator is measured by Return on Assets (ROA) and Net Interest Margin (NIM); and rating of the liquidity factor is represented by the condition of Loan to Deposit Ratio (LDR).

Figure 3.3 Conceptual Framework of Market Discipline Imposed by Depositor, Bond Holder, and Equity Holder



As argued in Chapter 2, the most appropriate approach to study the behaviour of market players is by using the information that is available to the public. Therefore, this study intentionally employs only financial information that is publicly available, such as published financial reports, securities rating from rating agencies, and trading data from capital markets. In the Indonesian case, according the BI regulation[30], banks are obliged to prepare and present to the BI periodic financial reports, such as annual reports, quarterly financial reports, monthly financial reports, and certain specific reports as required by BI. In addition, the BI regulations specifically state that a bank is required to periodically announce the quarterly published financial report in at least one Indonesian daily newspaper, which has wide circulation at the domicile of bank's head office or the domicile of the foreign bank branch office[31]. Based on this requirement, in order to measure market reaction towards the publication of financial reports, this study will use the quarterly published financial reports since they are widely available to the public, not only on bank websites, but also as distributed though national newspapers.

In accordance with prior studies and the literature reviewed in Chapters 2, three key market participants with an interest in enforcing market discipline have been identified and incorporated into the research framework. As illustrated in Figure 3.3, the presence of market discipline in this study is signaled by three classes of market participants: depositors, debt holders, and equity holders. The third building block is the disciplinary mechanism through which market players are able to adjust the price or volume of bank securities to reflect their risk preferences. In this study, discipline by depositors is measured using deposit growth rates, whereas discipline by shareholders and bond holders are assessed through equity returns and bond yields, respectively.

The study framework includes other control variables for systemic market risk and bank ownership and size factors that may influence the investment decision of market players. The systemic market risk, in particular, relates to the provision of government FSN. As argued in Chapter 2 and illustrated in Figure 3.3, the safety net might create moral hazard problems by encouraging risk-taking activities by bank management and stakeholders. Furthermore, the ownership structure of a bank, such as state ownership, foreign investor ownership, and public

[30]BI Regulation Number 14/14/PBI/2012 Concerning Bank Report Transparency and Publication and BI Regulation Number 13/19/PBI/2011 Concerning the Amendment to Bank Indonesia Regulation Number 8/12/PBI/2006 Concerning the Periodic Report of Commercial Bank.

[31]The announcement of the quarterly financial report should be made no later than the 15th of the second month after the end of the reporting month for report positions at the end of March, June, and September, and the 15th of April of the following year for report positions at the end of December.

ownership via capital market, might affect the behaviour of stakeholders toward bank risk. Lastly, the presence of the TBTF perception amongst market participants is investigated, particularly in relation to rescue mechanisms as part of the government FSN.

3.4 Hypotheses Development

In reference to prior studies and the literature as presented in Chapter 2, the standard market discipline hypothesis maintains that the behaviour of bank stakeholders is affected by volatilities in the earnings as a result of changes in bank fundamentals and in environmental factors. The basic argument underlying this hypothesis is that when banks are considered to be becoming riskier because of changes in their external operating environment, investors might start to withdraw their funds as a contingency against the possibility of failure, or demand a higher rate of return to compensate for increases in bank risk. Conversely, if banks are perceived to become healthier, investors might invest additional funds or accept a lower rate of return.

This section develops the study hypotheses in three sub-sections. Sub-section 3.4.1 presents hypotheses to evaluate market discipline imposed by depositors. Sub-sections 3.4.2 and 3.4.3 present hypotheses for bond holders and equity holders respectively.

3.4.1 Market Discipline Imposed by Depositors

In an attempt to measure discipline imposed by depositors, the present study commences by considering the standard depositor discipline hypothesis. This hypothesis posits that the behaviour of bank depositors is affected by changes in a bank risk profile resulting from the influence of bank fundamentals and market environment factors. The basic argument behind this hypothesis is that when banks are considered to be becoming riskier (healthier) as an outcome of changes in their external operating environment, risk-averse depositors will start to withdraw (invest) their funds as a contingency against the possibility of failure (success). This standard depositor discipline hypothesis has been widely used to test the impact of changes in bank risk on depositor behaviour (Demirgüç-Kunt & Huizinga, 2003; Hadad et al., 2011; Karas et al., 2010; Martinez-Peria & Schmukler, 2001; Wu & Bowe, 2012) and serves as a standard benchmark against which the subsequent results of this study will be compared.

Depositors can impose discipline generally by demanding a higher interest rate (price-based approach) or withdrawing their deposits (volume-based approach) (Flannery, 2001; Hamalainen et al., 2003; Valensi, 2005). Deposit interest rates have been used in previous studies to measure the degree of market discipline imposed on banks. Examples include Baer and Brewer (1986), Hannan and Hanweck (1988) Ellis and Flannery (1992), Mondschean and Opiela (1999), Martínez-Peria and Schmukler (2001), Calomiris and Powell (2001), Ghosh and Das (2003), Demirgüç-Kunt and Huizinga (2004), and Hadad et al. (2011). Limitations of this approach include the absence of real data on the actual interest rate paid to depositors, especially in studies of market discipline among developing economies. Therefore, an implicit interest rate in these studies is calculated by dividing the total interest expenses by total deposits. This method assumes that all types of deposits receive an equal interest rate payment. In practice, the interest paid to each type of saving product or depositor varies. Uninsured and wholesale deposits normally demand a higher risk premium than retail depositors.

Considering the limitation of the price-based approach, the present study develops a model using the quantity-based approach to investigate the sensitivity of deposits to bank fundamentals (as have been used in studies by Goldberg and Hudgins (1996), Calomiris and Powell (2001), Martinez-Peria and Schmukler (2001), Khorassani (2000), Jordan (2000), Fueda and Konishi (2007), Karas et al. (2010), Demirgüç-Kunt and Huizinga (2003), Hadad et al. (2011), and Wu and Bowe (2012)). Following the standard market discipline hypothesis, this study predicts that the inflow of deposits is negatively correlated with the level of risk and positively correlated with financial soundness and stability. The following hypothesis is relevant to this objective:

Hypothesis 1a: Ho : Total deposit has no relationship with bank fundamentals

H1a : Total deposit has a positive relationship with bank fundamentals

If the first hypothesis concerning the relations between total deposit and bank risk is statistically proven, the next question is which type of depositors are inclined to exert disciplining actions. The existing literature suggests that wholesale depositors have a greater capability to access and interpret information, hence they are in a better position to exercise discipline (Calomiris, 1999; Huang & Ratnovski, 2011). However, published financial statements in Indonesia do not provide information about the proportion of deposits collected

from retail or wholesale depositors. Following Mondschean and Opiela (1999) and Martinez-Peria and Schmukler (2001), time deposits and uninsured deposits are used as indicators to measure the sensitivity of wholesale depositors to bank risks. The justification for this choice is because time deposits in general are relatively large, mostly uninsured, and short-term in maturity (Huang & Ratnovski, 2011). This study predicts that time deposit holders would be more capable of disciplining the banks because they have sufficient competency to interpret financial information, and their ability to promptly transfer their funds from one bank to another, if necessary, and their capacity to negotiate deposit interest rates with bank management would significantly influence managerial decisions (Huang & Ratnovski, 2011; Martinez-Peria & Schmukler, 2001). The relevant hypothesis is as follows:

Hypothesis 1b: Ho : Time deposit has no relationship with bank fundamentals

H1b : Time deposit has a positive relationship with bank fundamentals

As discussed above, the behaviour of wholesale deposits could also be measured by the uninsured deposits in relation to the risk profile of banks. Unsecured depositors have been found to be more inclined to monitor banks and therefore market discipline imposed by these types of depositors would be stronger than that imposed by other types of bank depositors (Baer & Brewer, 1986; Goldberg & Hudgins, 1996; Nier & Baumann, 2006). Moreover, uninsured deposits are not only used to measure the responsiveness of wholesale deposits, but also to evaluate whether the presence of deposit insurance has a moderating effect on uninsured deposits (Baer & Brewer, 1986; Maechler & McDill, 2006). The present study, as is the case with several other studies, maintains that uninsured deposits have a positive relationship with bank fundamentals (Flannery & Sorescu, 1996; Hancock & Kwast, 2001). The formal hypothesis is as follows:

Hypothesis 1c: Ho : Uninsured deposits have no relationship with bank fundamentals

H1c : Uninsured deposits have a positive relationship with bank fundamentals

The second part of the current study is to investigate whether the degree of depositor discipline is influenced by the size or ownership structures of banks. The existing literature states that the presence of a TBTF perception might affect the risk sensitivity of depositors.

Depositor behaviour toward large banks is expected to be more risk indifferent since these banks are most likely to be rescued by government to prevent a full-blown systemic crisis. To measure this size effect, a hypothesis is formulated as follows:

Hypothesis 1d: Ho : The correlation between deposit and bank fundamentals for large banks is equal to that of small banks

H1d : The correlation between deposit and bank fundamentals for large banks is not equal to that of small banks

In terms of the ownership structure of banks, the literature suggests that discipline enforced by depositors might be affected by foreign ownership and public ownership via capital markets. The present study expects that market discipline will be more pronounced for listed banks than unlisted banks. Listed banks are generally more transparent than unlisted or private banks as they are under greater public scrutiny (Hadad et al., 2011), including professional appraisals such as rating agencies. Therefore, the prediction is that the greater transparency exhibited by listed banks will allow a greater disciplining influence by the market participants. The proposed hypothesis to evaluate the impact of public ownership on market discipline is as follows:

Hypothesis 1e: Ho : The correlation between deposit and bank fundamentals for listed banks is equal to the correlation for unlisted banks

H1e : The correlation between deposit and bank fundamentals for listed banks is not equal to that of unlisted banks

Similarly, market discipline is expected to be more prevalent among foreign banks than among domestic banks. Foreign banks are supervised by the home and host regulators, and hence, they are assumed to have better corporate governance than domestic banks. The subsidiaries or branch offices of a foreign bank are also considered to have a lower probability of default since their parent companies commonly have stronger funding structures. Hence, this study predicts that foreign banks would be more sensitive to disciplining conduct of stakeholders. The proposed hypothesis to measure the impact of foreign ownership on market discipline is as follows:

Hypothesis 1f: Ho : The correlation between deposit and bank fundamentals for foreign banks is equal to that of domestic banks

H1f : The correlation between deposit and bank fundamentals for foreign banks is not equal to that of domestic banks

3.4.2 Market Discipline Imposed by Bond Holders

The standard hypothesis of market discipline by bond holders suggests that the behaviour of bond holders in pricing their assets is influenced by changes in the bank risk profile (or bank fundamentals) that might be caused by both idiosyncratic and macroeconomic factors. Theoretical and empirical literature maintains that if the riskiness of a bank increases (or bank fundamentals change adversely) due to changes in its operating environment, then investors would probably demand a higher return to compensate for the higher risks of default. In other words, as identified by Flannery and Sorescu (1996), an increase in the risk level for institutions implies an increase in the return for bond holders. The following hypothesis is developed to address the research question whether the disciplinary action of bond holders depends on bank fundamentals:

Hypothesis 2a: Ho : Bond yield spread has no relationship with bank fundamentals

H2a : Bond yield spread has a negative relationship with bank fundamentals

Studies of market discipline by debt holders in developed markets commonly use yield spread of subordinated debt to measure the sensitivity of bond holders on bank risk. The reason for this choice is that subordinated debt holders are exposed to a larger risk of loss because the debt has no underlying assets (unsecured) (Caldwell, 2005), and is not guaranteed by governments (Bliss, 2001). In developing economies, the amount of subordinated debt issued is limited compared to advanced economies. Therefore, some studies in developing economies utilize not only subordinated bonds but also senior bonds. This approach is taken to increase the study sample size and to investigate the potential of senior bonds as a source of market discipline (Menz, 2010). Based on this approach, this study includes both senior bonds and subordinate bonds in the study sample. The following hypothesis has been constructed to

examine whether the degree of discipline (if any) of each type of bond is similar or significantly different.

Hypothesis 2b: Ho : The correlation between bond yield spread and bank fundamentals for subordinated bonds is equal to that of senior bonds

H2b : The correlation between bond yield spread and bank fundamentals for subordinated bonds is not equal to that of senior bonds

In order to investigate whether bond holder discipline depends on the size or ownership structures of a bank, the hypotheses test the correlation between bond yield and bank fundamentals for large banks and those of smaller banks. Likewise, the correlation between bond yield and bank fundamentals for state banks should be lower than that of the private banks (Levy-Yeyati et al., 2004a). The hypotheses developed to evaluate the influence of bank size or ownership structures on market discipline enforced by bond holders are presented as follows:

Hypothesis 2c: Ho : The correlation between bond yield spread and bank fundamentals for larger banks is equal to that of smaller banks

H2c : The correlation between bond yield spread and bank fundamentals for larger banks is not equal to that of smaller banks

Hypothesis 2d: Ho : The correlation between bond yield spread and bank fundamentals for state banks is equal to that of private banks

H2d : The correlation between bond yield spread and bank fundamentals for state banks is not equal to that of private banks

3.4.3 Market Discipline Imposed by Equity Holders

Equity holders have the potential to impose discipline on banks because they are naturally the first party to lose value in the event of a bank default (Hamalainen et al., 2003; Park & Peristiani, 2007). The general market discipline theory maintains that market discipline is

considered to exist if the price of bank shares increases parallel to the improvements in bank fundamentals. Empirical evidence supports the relationship in which bank equity returns adjust promptly to new information, and make rational inferences about the implications of that information for related banks (Flannery, 1998). Therefore, in order to measure the discipline imposed by shareholders, the proposed hypothesis predicts that equity returns have a positive relationship with bank fundamentals.

Hypothesis 3a: Ho : Equity returns have no relationship with bank fundamentals

H3a : Equity returns have a positive relationship with bank fundamentals

Similar to the hypothesis for discipline by bond holders, to investigate whether the size or ownership structures of a bank influences the behaviour of shareholders, the proposed hypotheses posit that the correlation between equity return and bank fundamentals for large banks is weaker than that for small banks due to the presence of the TBTF doctrine. Consistent with these hypotheses, the correlation between equity returns and bank fundamentals for state banks is lower than that for private banks. The hypotheses developed to evaluate the influence of bank size or ownership structures on market discipline enforced by equity holders are:

Hypothesis 3b: Ho : The correlation between equity returns and bank fundamentals for large banks is not different to that of small banks

H3b : The correlation between equity return growth and bank fundamentals for large bank is different to that of small banks

Hypothesis 3c: Ho : The correlation between equity returns and bank fundamentals for state banks is not different from that of private banks

H3c : The correlation between equity returns and bank fundamentals for state banks is different to that of private banks

Following the development of the research hypotheses, the next section provides a discussion on the research design and the estimation methods.

3.5 Research Design

In order to address the hypotheses outlined in Section 3.4, this section comprises two sub-sections describing the regression model and statistical method of this study. The key dependent and independent variables for the models are identified in Sub-section 3.5.1 along with the justification for the included variables. Sub-section 3.5.2 is a discussion on the estimated model and the estimations techniques.

3.5.1 Regression Model

This section presents a description of the regression model used in this study to analyze the discipline imposed by depositors, by bond holders, and by equity holders.

3.5.1.1 Models for Discipline Imposed by Depositors

The two common approaches to measuring the presence of depositor market discipline, as described in Chapter 2, are the quantity-based approach and the price-based approach. The quantity-based approach measures the relationship between the amount or growth of deposits and bank risks (Goldberg & Hudgins, 1996; Jordan, 2000; Khorassani, 2000; Martinez-Peria & Schmukler, 2001; Valensi, 2005, Fueda, 2007; Wu & Bowe, 2012). Whereas the price-based approach observes the relationship between the interest rate paid to depositors and bank risks (Demirgüç-Kunt & Huizinga, 2003; Ellis & Flannery, 1992; Fueda & Konishi, 2007; Hadad et al., 2011; Hamada, 2011; Martinez-Peria & Schmukler, 2001).

In measuring the price effect in developing economies, the common problem faced by researchers is the lack of specific data on the interest expense paid by banks on insured or uninsured deposits. To solve this problem, many studies use an implicit interest rate, which is calculated by dividing total interest expense by total deposits, as used by Martinez-Peria and Schmukler (2001), Demirgüç-Kunt and Huizinga (2003), Cubillas et al. (2012), and Hadad et al. (2011). This approach treats all types of deposits as a group and assumes all of them receive an equal rate of return. In practice, wholesale and uninsured depositors generally demand higher return than retail investors and insured depositors (Huang & Ratnovski, 2011). As a result, this approach can only measure the presence of disciplinary acts by depositors as a whole, without further identification of the possible differences between different types of depositors.

In order to investigate the presence of market discipline between different types of depositors, the present study uses the growth of deposits (quantity or volume-based approach). The

growth is calculated as a percentage change in the volume of deposits in each particular period as used by Calomiris and Powell (2001), Barajas and Steiner (2000), Wu and Bowe (2012), and Valensi (2005). Following Martinez-Peria and Schmukler (2001) and Mondschean and Opiela (1999), the present study uses time deposit as a proxy to measure the sensitivity of wholesale depositors to bank risks. The behaviour of wholesale depositors is also measured using uninsured deposit movement because retail deposits are generally covered by an insurance guarantee program.

The correlation between deposits and bank fundamentals is empirically investigated using models adopted from previous studies, such as those of Martinez Peria & Schmukler (2001), Fueda & Konishi (2007), Ghosh & Das (2004), Yilmaza & Muslumov (2008), Ng, Lin, & Tan (2010), and Hadad et al. (2011). The analysis employs the following specification to estimate the impact of the determinants of deposit growth rate:

$$\text{TOT\_DG}_{i,t} = \alpha_0 + \beta_1 \text{TOT\_DG}_{\text{I,T}-1} + \beta_2 (\text{BANK\_FUNDAMENTAL})_{\text{I,T}-1} + \beta_3 (\text{MACRO\_VARIABLE})_{\text{I,T}} + \beta_4 \text{DEP\_IR}_{\text{I,T}} + \beta_5 \text{BANK\_SIZE}_{\text{I,T}} + \beta_6 \text{FORG\_BANK}_{\text{I,T}} + \beta_7 \text{LIST\_BANK}_{\text{I,T}} + \beta_8 \text{BLA\_GR}_{\text{I,T}} + \text{E}_{\text{IT}} \quad (1)$$

$$\text{TIME\_DG}_{i,t} = \alpha_0 + \beta_1 \text{TIME\_DG}_{\text{I,T}-1} + \text{B}_2 (\text{BANK\_FUNDAMENTAL})_{\text{I,T}-1} + \text{B}_3 (\text{MACRO\_VARIABLE})_{\text{I,T}} + \beta_4 \text{DEP\_IR}_{\text{I,T}} + \beta_5 \text{BANK\_SIZE}_{\text{I,T}} + \beta_6 \text{FORG\_BANK}_{\text{I,T}} + \beta_7 \text{LIST\_BANK}_{\text{I,T}} + \beta_8 \text{BLA\_GR}_{\text{I,T}} + \text{E}_{\text{IT}} \quad (2)$$

$$\text{UIN\_DG}_{i,t} = \alpha_0 + \beta_1 \text{UIN\_DG}_{\text{I,T}-1} + \text{B}_2 (\text{BANK\_FUNDAMENTAL})_{\text{I,T}-1} + \text{B}_3 (\text{MACRO\_VARIABLE})_{\text{I,T}} + \beta_4 \text{DEP\_IR}_{\text{I,T}} + \beta_5 \text{BANK\_SIZE}_{\text{I,T}} + \beta_6 \text{FORG\_BANK}_{\text{I,T}} + \beta_7 \text{LIST\_BANK}_{\text{I,T}} + \text{E}_{\text{IT}} \quad (3)$$

Where:

$\text{TOT\_DG}_{i,t}$ = growth rate of total deposits

$\text{TIME\_DG}_{i,t}$ = growth rate of time deposits

$\text{UIN\_DG}_{i,t}$ = growth rate of uninsured deposits

$\text{BANK\_FUNDAMENTAL}_{i,t}$ = vectors of bank idiosyncratic risks that represent the CAMEL ratios which consists of CAR (capital adequacy ratio), NPL (non-performing loans), OPEX (operating expenses to operating income ratio), NIM (net interest margin), and LDR (loan to deposit ratio)

$MACRO\_VARIABLE_{,i,t}$ = vectors of macroeconomic variables which consists of GDP_RT (the growth of gross domestic products), EXC_RT (exchange rate), and INF_RT (inflation rate)

$DEP\_IR_{i,t}$ = deposit interest rate

$BANK\_SIZE_{i,t}$ = bank total assets

$FORG\_BANK_{i,t}$ = dummy variable of foreign ownership; 1 for foreign bank, and 0 otherwise

$LIST\_BANK_{i,t}$ = dummy variable of public ownership; 1 for listed bank and 0 otherwise

$BLA\_GR_{i,t}$ = dummy variable of deposit guarantee coverage; 1 for blanket guarantee period (Quarter I of 2001 to Quarter IV of 2004); and 0 otherwise

$\varepsilon_{i,t}$ = random error terms

These models include the first difference of deposits instead of the level of deposits. As argued by Martinez-Peria and Schmukler (2001), the use of deposit and total asset levels at part of the same equation could produce a simultaneity problem because at every point in time, assets must be equal to the sum of deposits plus bank capital. The use of the first difference of deposits avoids the simultaneity problem of the regression in levels, since the growth rate of deposits is not necessarily related to the asset size of banks.

As discussed in Section 3.3, the focus of this study is the impact of deposits on the published financial data. Therefore, the vector of bank fundamentals is included with a lag difference to account for the delay in the availability of financial statement information. The use of lagged variables is important as a means to capture, not only the monitoring power, but also the influence of market players on financial institutions (Bliss & Flannery, 2002).

The following sub-section describes in detail the justification for including bank fundamentals and macroeconomic variables followed by a discussion on how to measure these variables.

Bank Fundamental Variables

Bank fundamentals in this study refer to measures of bank financial performance, such as capital ratios, return on assets ratios, non-performing loans and loans to deposits ratios. These ratios can vary from one study to another but most of them replicate CAMEL rating system. The CAMEL financial ratios are those that are commonly used by financial authorities to assess bank soundness and the report of the CAMEL score from banks to regulator is typically confidential (Cargill, 1989). In general, this study expects deterioration in CAMEL indicators, which would signal an increase in the risk profile of banks, to cause a decrease in deposits held by a bank (Martinez-Peria & Schmukler, 2001).

The CAMEL ratios used in this study are financial ratios that are commonly employed in studies of market discipline in developing economies[32]. These studies use financial ratios as proxies for bank fundamentals that are mainly calculated by the authors. These financial ratios, therefore, are not publicly available unless depositors calculate the ratios by themselves. However, the calculation of these financial ratios requires a lot of time and a certain degree of financial literacy. The public in general is not expected to have the capability nor sufficient time to calculate complex financial ratios before making their investment decisions (Garten, 1986). Thus, they are most likely to be relying on the published financial ratios as required by the bank regulators. Based on this argument, in order to better reflect the depositor reaction to bank accounting information, this study uses financial ratios that are published by banks.

The Indonesian banks are required by the regulators to publish annual and quarterly financial reports[33]. These reports include financial ratios that represent the CAMEL rating system and are reported periodically to the central bank. The publication of these ratios is expected to improve transparency and provide more information making it easier for the general public to understand (Bank Indonesia, 2012d) and enable market players to assess the risk profile of their banks. Therefore, in order to measure depositor reaction over the publication of periodical accounting information, this study includes only the financial ratios that are computed and published by banks. By using only the publicly available financial information, the present study is expected to adequately demonstrate the "monitoring phase" of the market

[32] For example, Mondschean and Opiela (1999) for Poland, Barajas & Steiner (2000) for Colombia, Calomiris and Power (2001) for Colombia, Luzio-Antezana (2001) for Bolivia, Martinez-Peria and Schmukler (2001) for Argentina, Chile, and Mexico, Ghosh and Das (2003) for India, Martinez-Peria Schmukler (2004) for Argentina and Uruguaya, and Hadad et al. (2011) for Indonesia.

[33] BI Regulation Number 14/14/PBI/2012 Concerning Bank Report Transparency and Publication.

players as discussed in Section 3.3. The variables for signaling bank fundamentals used in this study are as follows:

1. CAR: The capital adequacy ratio is a measure of the amount of a bank's capital expressed as a percentage of its risk-weighted asset according to BI's regulations. Capital adequacy is expected to have a positive effect on the dependent variables (Barajas & Steiner, 2000; Kameyama et al., 2006; Martinez-Peria & Schmukler, 2001), because the ratio measures the bank's ability to absorb a reasonable level of losses before becoming insolvent, and before depositor's funds are lost (Bank for International Settlements, 2006)[34].

2. NPL: Non-performing loans are used to measure asset quality. This ratio is calculated by dividing NPL (consisting of credits that are rated substandard, doubtful and loss) by total credit. The NPL ratio measures the percentage of loans a bank might have to write-off as losses (Martinez-Peria & Schmukler, 2001). Following Wu and Bowe (2012), this study uses the lagged first difference of the NPL ratio in the regression. The coefficient on this variable reflects whether changes in the quality of bank assets have any impact on the independent variable. This study measures the impact of the periodic flow of non-performing loans, rather than the accumulated stock of non-performing loans, on deposit growth. The NPL variable is expected to have a negative effect on the dependent variables (Barajas & Steiner, 2000; Kameyama et al., 2006; Martinez-Peria & Schmukler, 2001)[35].

3. OPEX: Management efficiency is measured by the efficiency ratio calculated by dividing total operating expenses by total operating income. This ratio is not annualized and is calculated for each position or period, whichever is more relevant. The OPEX variable is expected to have a negative effect on the dependent variables, because less efficient banks in general are supposed to have higher expenditures (Martinez-Peria & Schmukler, 2001).

4. ROA: Earning is determined by the return on assets (ROA) ratio, which is an indicator of how profitable a bank is in relation to its total assets because it reflects the earnings per unit currency of assets for the bank (Saunders & Cornett, 2011). The coefficient is

[34] Instead of the CAR ratio, other studies use the Z-score as a proxy for insolvency risk, such as Laeven and Levine (2009), Hadad et al. (2011) and Cubillas et al. (2012). The Z-score is calculated as the return on assets plus the capital asset ratio divided by the standard deviation of asset returns (Boyd & De Nicolo, 2003; Köhler, 2012). This study does not use Z-score because this ratio is not provided and published by the Indonesian banks.

[35] In measuring credit risk, other studies use the ratio of loan loss provisions to total gross loans, as a proxy for credit risk, such as Cubillas et al. (2012), Hadad et al. (2011), Gropp, Vesala, and Vulpes (2004) and Nier and Baumann (2006). Whereas, Maechler and McDill (2006) use the percentage of loans that are non-current – 90 days or more past due – to capture the quality of banks' loan portfolios in the US market. These ratios are not used in this study because they are not part of the financial ratios that are published quarterly by the Indonesian banks.

calculated by dividing the annualized earnings before tax by average book value of total assets. A bank with a high efficiency in using its assets to generate earnings is considered more attractive and thus able to collect more deposits. This study predicts that the ROA coefficient will have a positive correlation with the dependent variables (Kameyama et al., 2006; Martinez-Peria & Schmukler, 2001).

5. NIM: An additional proxy to assess the bank ability to generate profit is the net interest margin (NIM). This ratio is a performance metric that measures how successful investment decisions of a bank are compared to its source of funds. NIM is calculated on an annualized basis as the difference between the interest income generated by banks and the amount of interest expense paid to its debtors, relative to the amount of their average interest-earning assets (Saunders & Cornett, 2011). A high margin denotes that the bank has made an optimal decision because interest expense is lower than the amount of return generated by its investments. Therefore, the NIM coefficient is expected to have a positive correlation with the deposit growth because a more profitable bank is considered to face lower probability of default.
6. LDR: Proxy for liquidity risk is assessed by the loan to deposit ratio (LDR), which is calculated as the average total credit divided by average deposits. Credit is total loans to third parties, while deposit in general can be divided into demand deposits, savings deposits and time deposits (excluding interbank loans). Generally, banks with a large volume of liquid assets are perceived to be safer, because a large amount of liquid assets should enhance a bank's ability to pay-off contingent deposit withdrawals (Martinez-Peria & Schmukler, 2001). Since loans normally have longer maturity than those of deposits, a higher LDR ratio would increase liquidity risk. A more prudent bank will issue fewer loans for a given amount of deposits, so a significant increase in the loan to deposit ratio indicates that a bank has become less risk averse or is less prudent when issuing loans, or both (Wu & Bowe, 2012). As a consequence, the liquidity coefficient is expected to have a negative correlation with the deposit variables (Demirgüç-Kunt & Huizinga, 2003; Martinez-Peria & Schmukler, 2001).
7. DEP_IR: Deposit interest rate is perceived as a means to attract deposits. Therefore, this variable in normal conditions is expected to have a positive relationship with the growth of deposits. However, specific data on the interest expenses paid by banks on deposits is unavailable. Hence, following Martínez-Peria and Schmukler (2001) and Demirgüç-Kunt

and Huizinga (2004), the present study uses an implicit interest rate that is calculated by dividing total interest expense by average total deposits.

The disciplinary action by depositors on banks is influenced by non-fundamental risk factors, for instance the size and the ownership structure of the bank (Barajas & Steiner, 2000), as discussed in Chapter 2. To measure this influence, the present study includes a variable for bank size and dummy variables for ownership, such as foreign ownership and public ownership via the stock market, as follows:

8. BANK_SIZE: This variable is a proxy for the bank total assets. Depositor sensitivity on bank risk might be influenced by the size of banks. Large banks are generally perceived as TBTF and seen as facing a lower probability of default by conservative investors (Martinez-Peria & Schmukler, 2001). Therefore, stakeholders tend to exhibit risk neutral behaviour towards large banks because of the almost certain rescue by government in the event of defaults. Therefore, a positive relationship is predicted between bank size and deposits (Barajas & Steiner, 2000).
9. LIST_BANK: Depositors may be more confident in investing their funds in listed banks for two reasons: firstly, the listed bank is exposed to more public scrutiny in terms of the requisite disclosure of information in the bank financial reports; and, secondly, the inherent diversity of the bank ownership structure makes it more difficult for a certain group of owners to control banks (Wu & Bowe, 2012). The LIST_BANK dummy variable is set to 1 if a bank has its shares listed on the IDX and 0 otherwise. This study expects market discipline to be more pronounced among listed banks compared to unlisted ones (Hadad et al., 2011).
10. FORG_BANK: A dummy variable for foreign ownership is inserted into the model to test whether these banks possess any advantages in terms of reputation over their domestic counterparts (Barajas & Steiner, 2000). It is set to 1 for foreign banks and 0 otherwise. This study expects market discipline to be more pronounced among foreign banks compared to domestic banks (Barajas & Steiner, 2000; Hadad et al., 2011).

Macroeconomic Variables

Macroeconomic factors which account for systemic risk have important effects on the way in which depositors behave and respond to bank fundamentals. Empirical evidence of market discipline in emerging economies shows that market sensitivity to risk is quite robust when

both idiosyncratic and systemic factors are taken into account (Levy-Yeyati et al., 2004b). Consequently, market discipline needs to account for systemic risk. Following the approach taken in previous studies (e.g. Demirgüç-Kunt and Detragiache, 2002), the present study includes three control variables for general macroeconomic conditions into the equation. These are: gross domestic product (GDP_RT), exchange rate (EXC_RT), and inflation rate (INF_RT). Previous studies, particularly in emerging markets, show mixed results regarding the relationship between these variables and yield spreads. Therefore, as Indonesia faced volatile economic conditions during the study period, the expected specific signs for these macroeconomic variables are ambiguous (Hadad et al., 2011). Consequently, the present study does not expect particular signs of correlation for the systemic risk factors.

Moreover, with regard to the Indonesian government deposit guarantee program, there have been significant changes in terms of the design of the guarantee program over the observation period of this study. The blanket (full) guarantee program was first introduced following the 1997-1998 financial crisis. Under this explicit guarantee, all deposits were covered by the government except those of foreign banks. This guarantee was fully funded by the state budget using tax payer money. In September 2005, the Indonesian government replaced the blanket guarantee with a limited deposit insurance scheme in order to reduce the burden on the state budget and to minimize moral hazard outcomes created by the previous blanket guarantee program. Under the limited guarantee scheme all bank deposits are insured up to a certain limit. This new scheme is funded mainly by premiums collected from participating banks and managed by the IDIC. In order to investigate whether the design of the deposit insurance scheme had a moderating effect on depositor responsiveness to bank fundamentals, a dummy variable $BLA\_GR_{i,t}$ is included in the model to account for the regulatory changes. The value of the variable is set to 1 for the years 2001 to 2005 inclusive, and to 0 otherwise. Assuming that the limited deposit insurance scheme is credible, the present study expects depositors to have greater incentives to monitor bank risk-taking when the blanket guarantee program was replaced (Demirgüç-Kunt & Detragiache, 2002; Martinez-Peria & Schmukler, 2001).

As described in Chapter 2, the transition from full deposit guarantee to a limited deposit insurance scheme took place in several stages, as shown in Table 3.1. In order to avoid the impact of the reduction of deposit coverage on the growth of uninsured deposits, the observation period would be divided on level of deposit coverage. In this case, there are 6 quarters under the maximum coverage of IDR 100 million and 13 quarters under the limited

coverage of maximum IDR 2 billion. However, the other two periods only have 2 quarters which is considered insufficient to get a reliable result. The current study, therefore, will not estimate a separate regression for these two observations.

Table 3.1 Deposit Coverage under the Limited Deposit Insurance Scheme

Time Period	Coverage	Number of Quarters
March 2006 – Sept 2006	Maximum IDR 5 billion	2 Quarters
Sept 2006 – March 2007	Maximum IDR 1 billion	2 Quarters
March 2007- Oct 2008	Maximum IDR 100 million	6 Quarters
Oct 2008 – Dec 2011	Maximum IDR 2 billion	13 Quarters

Source: LPS Annual Report 2009

3.5.1.2 Models for Discipline Imposed by Bond Holders

The literature provides two approaches to examining the market discipline in two types of markets: primary and secondary markets. In the primary market, the study of bank decision to issue subordinated bonds is commonly estimated using probit models (Caldwell, 2005; Covitz et al., 2000; Evanoff & Wall, 2001; Imai, 2007). Whereas, the study of the relationship between yield spread and bank fundamentals in the secondary market is frequently investigated using regression models, with the extensive use of fixed-effect or random-effect panel data models (e.g. Flannery and Sorescu, 1996; Deyoung et al., 2001; Hwang and Min, 2013; and Menz, 2010). As argued in Chapter 2, the latter approach has several advantages compared to the study of market discipline in the primary market. This approach is considered more suitable to address one of the main objectives of this study, which is designed to critically evaluate the discipline imposed by debt holders, specifically by measuring yield spread sensitivities to bank fundamentals in the secondary bond market in Indonesia.

Empirical studies of the disciplining influence of bond holders indicate that the confirmation of the relation between the bond yield spread and the risk of financial institutions is the key for identifying the existence of market discipline. The yield spread is calculated as the spread of each bond issued over a comparable maturity of government bonds (Avery et al., 1988; Evanoff & Wall, 2001). Furthermore, referring to the literature review in Chapter 2, the main determinants of bond yield spreads are bank individual risks that are estimated from accounting data, ratings or indices issued by rating agencies and banking regulators; and macroeconomic conditions as control variables. Therefore, by adopting the procedure outlined

in the study by Flannery and Sorescu (1996), the present analysis employs the following specifications to estimate the determinants of bond yield spread:

$$\begin{aligned} \text{YIELD\_SP}_{i,t} = \quad & \alpha_0 + \text{B}_1\text{YIELD\_SP}_{\text{I,T}-1} + \text{B}_2\,(\text{BANK\_FUNDAMENTAL})_{\text{I,T}-1} + \\ & \text{B}_3(\text{MACRO\_VARIABLE})_{\text{I,T}} + \text{B}_4\text{RATING}_{\text{I,T}} + \text{B}_5\text{BANK\_SIZE}_{\text{I,T}} + \\ & \text{B}_6(\text{BOND\_SIZE})_{\text{I,T}} + \text{B}_7\text{STA\_BANK}_{\text{I,T}} + \text{B}_8\text{SUBDEBT}_{\text{I,T}} + \text{E}_{\text{IT}} \end{aligned} \tag{4}$$

$\text{YIELD\_SP}_{i,t}$ = the difference between bank bond yield and government risk free bonds

$\text{BANK\_FUNDAMENTAL}_{i,t}$ = vectors of bank idiosyncratic risks that represent the CAMEL ratios which consists of CAR, NPL, OPEX, NIM, and DER

$\text{MACRO\_VARIABLE}_{,i,t}$ = vectors of macroeconomic variables which consists of GDP_RT, EXC_RT, and BI_RT

$\text{RATING}_{i,t}$ = credit rating score issued by rating agencies

$\text{BANK\_SIZE}_{i,t}$ = bank total assets

$\text{BOND\_SIZE}_{i,t}$ = principal amount of bond issued by a bank

$\text{STA\_BANK}_{i,t}$ = dummy variable of government ownership (set = 1 for state bank, and 0 otherwise)

$\text{SUBDEBT}_{i,t}$ = dummy variable of type of bond (set = 1 for sub-debt, and 0 otherwise)

$\varepsilon_{i,t}$ = random error terms

The dependent variable, $\text{YIELD\_SP}_{it,}$ is the difference between bank bond yield and government risk free bonds at time t (in logarithmic form). The vector of bank fundamentals is included with a lag difference to account for the delay in the availability of financial statement information. The use of lagged variables is important as a means to capture, not only the monitoring power, but also the influence of market players on financial institutions (Bliss & Flannery, 2002). The following sub-section explains in more detail the justification for, and measurement of, these variables.

Bank Fundamental Variables

Bank fundamentals, as independent variables, are bank characteristics related to the bank's financial condition, which are similar to those used in the CAMEL rating system of banks as mentioned in Section 3.4.1. In this study, the CAMEL financial ratio is utilized as an indicator of bank risk. This approach is widely used in previous studies, such as in Flannery and Sorescu (1996), Deyoung et al. (2001), and Evanoff and Wall (2001). The Indonesian banking regulator employs the CAMEL ratios to assess bank soundness, therefore these ratios convey relevant information for bond holders in relation to the financial health of banks (Bank Indonesia, 2012a). Independent variables used in the bond holder regression model are described below (the calculation methods of the variables are provided in page 98-101):

1. CAR: The capital adequacy variable is expected to have a negative effect on the yield spread (Evanoff & Wall, 2001) because this ratio measures the ability of banks to absorb a reasonable level of losses before becoming insolvent (Bank for International Settlements, 2006).

2. NPL: This study uses the lagged first difference of the non-performing loans ratio in the regression, as used in Wu and Bowe (2012). The coefficient of this variable measures the impact that changes in the quality of bank assets have on the dependent variable. The present analysis focuses on the impact of the periodic flow of non-performing loans, rather than on the accumulated stock of non-performing loans, as a determinant of the bond yield. The larger the non-performing loan ratio, the greater the likelihood of a loss, and the larger the required bond spread by investors. Hence, an increase in the NPL variable is expected to have a positive effect on the yield spread (Jagtiani et al., 2002; Wang et al., 2010).

3. OPEX: The management efficiency variable is expected to a have a positive effect on the yield spread because banks that are less efficient are expected to face higher levels of expenditure (Martinez-Peria & Schmukler, 2001).

4. ROA: The earning quality variable is expected to a have negative correlation with the yield spread because it measures the efficiency of a bank's use of its assets to generate net earnings (Avery et al., 1988). Therefore, an increase in bank profitability would reduce the probability of default, consequently lowering bond yield spreads (Jagtiani et al., 2002).

5. NIM: Similar to the ROA, the net interest margin coefficient is expected to have a negative correlation with the yield spread because an increase in the NIM ratio would increase bank profitability and, consequently, reduce the probability of default.

6. DER: This study uses a debt to equity ratio to represent liquidity risks[36] as well as a leverage indicator. This ratio represents the relative proportion of shareholder's equity and debt used to finance a company's assets. The higher ratio indicates higher risk since banks are more dependent on debt to finance its assets. Therefore, this leverage coefficient is expected to have a positive correlation on yield spread (Mendonça & Villela Loures, 2009).

7. BOND_SIZE: Other aspects of liquidity risk are related to the uncertainty with respect to the time and cost of transactions in selling bonds in a bond market at any given time. Therefore, investors normally demand an adequate yield spread as compensation for high transaction costs, especially on less liquid bonds (Crabbe & Turner, 1995). However, this liquidity risk of bonds is quite difficult to determine since this liquidity is not directly observable at the market. Adapting the model used by Menz (2010), Sironi (2003) and Avery et al. (1988), this study uses the amount or size of bond issuance as a proxy for liquidity risk. The existing literature suggests that bonds with greater par value or principal amount are normally more liquid than smaller bonds. The expectation is, therefore, a negative relationship between bond par value and yield spreads.

8. RATING: Previous studies have empirically confirmed the influence of credit rating issued by rating agencies on bond yield spreads (Avery et al., 1988; Flannery & Sorescu, 1996; Jagtiani et al., 2002; Mendonça & Villela Loures, 2009; Morgan & Stiroh, 2001; Sironi, 2003). This rating represents the probability of default in securities, thus the higher probability of default is expected to increase the yield of bonds required by investors. Following Sironi (2003), Jagtiani et al. (2002), and Avery et al. (1988) the ratings are transformed into cardinal numbers, with higher ratings being represented by smaller numbers. For example, the AAA rating as the highest quality of bonds has the scale of 1, whereas the BBB- rating as the lowest investment grade has the scale of 10. An increase in the rating scale (e.g. from BBB- (scale of 10) to BBB (scale of 9)) should then lead to a lower credit spread. Thus, a negative correlation between the yield spread and the bond rating is expected.

[36] The published quarterly financial statements of the Indonesian banks use LDR as a liquidity indicator. However, for assessing the bond yield, the literature commonly employs the DER rather than the LDR ratio.

9. BANK_SIZE: Bank total assets, as a proxy for bank size, may be indicative either of greater diversification benefits or of greater liquidity of the bank's bonds (Flannery & Sorescu, 1996). Moreover, a larger institution may be perceived as TBTF, and seen as having a lower probability of default by conservative investors (Jagtiani et al., 2002; Levy-Yeyati et al., 2004a; Wang et al., 2010). Therefore, the behaviour of bond holders toward large banks is expected to be more risk neutral since these banks are most likely to be rescued by a government in the event of defaults. Consequently, this study expects an inverse relationship between bank size and bond yield spread (Flannery & Sorescu, 1996; Jagtiani et al., 2002; Levy-Yeyati et al., 2004a; Wang et al., 2010).
10. STA_BANK: The previous empirical evidence suggests that the government ownership of banks might affect the extent of market discipline (Levy-Yeyati et al., 2004a; Sironi, 2003). Since these government banks are most likely to be bailed out, the behaviour of bond holders toward state banks is expected to be more risk neutral. A dummy variable, STA_BANK, is included in the model to test the hypothesis of bond holder sensitivity to the risk of default of state banks.

Macroeconomic Variables

Macroeconomic factors play a significant role in determining bond risk premium, as discussed in Chapter 2. The empirical evidence maintains that a bond's rate of return could not be completely explained by the risks of an individual institution, therefore the use of macroeconomic indicators as control variables becomes necessary (Sironi, 2003). Following Mendonça and Villela Loures (2009), for this purpose three control variables are considered: the growth of gross domestic products (GDP_RT), exchange rate (EXC_RT), and the central bank's interest rate (BI_RT)[37]. Previous studies, particularly in emerging markets, reveal mixed results about the relationship between these variables and the yield spreads. Therefore, as Indonesia faced volatile economic conditions during the study period, the present study did not predict a particular sign on the correlations between the systemic risk factors and the macroeconomic variables (Hadad et al., 2011).

[37] The central bank (BI) interest rate (BI Rate) is the policy rate reflecting the monetary policy stance adopted by BI and announced to the public. The rate is issued by the Board of Governors. It is implemented in the BI monetary operations conducted by means of liquidity management on the money market to achieve the monetary policy operational target.

3.5.1.3 Models for Discipline Imposed by Equity Holders

The form of market discipline in capital markets is demonstrated by the ability of equity holders to evaluate the financial condition of a bank (monitoring phase) and by the responsiveness of the bank management to investors' stock-return assessment (influencing phase) (Bliss & Flannery, 2002). Shareholder ability to assess the riskiness of publicly-traded banks is indicated by the fluctuation of the bank share prices as shareholders react to the announcements of bank financial indicators such as CAMEL ratios (Bliss & Flannery, 2002; Caner et al., 2012). Therefore, the bank risk monitoring behaviour of equity holders exists if there is a significant relationship between equity returns and risk measures obtained from the financial statements of banks (Bliss & Flannery, 2002).

The model to measure discipline by shareholders is constructed upon the growth of share price or equity return as a dependent variable. The equity returns are calculated by taking the difference between the stock return of a bank at the closing date and the return of a short-term investment alternative (Bliss & Flannery, 2002; Caner et al., 2012). In the present study, the yield of the BI certificate (SBI)[38] is used as an available investment alternative for investors in Indonesia. Bank stock prices and returns fluctuate according to the risks taken by banks as signaled by the CAMEL ratios after controlling for other bank specific variables and macroeconomic conditions, amongst other factors. With an intention to make a comparison of the empirical results for each discipline agent, the monitoring model of equity holders is designed to be similar to the models for evaluating market discipline by depositors and bond holders. The following is the model used:

$$\mathrm{EQT\_RT}_{\mathrm{I,T}} = \mathrm{A}_0 + \mathrm{B}_1\,(\mathrm{BANK\_FUNDAMENTAL})_{\mathrm{I,T-1}} + \mathrm{B}_2(\mathrm{MACRO\_VARIABLE})_{\mathrm{I,T}} + \mathrm{B}_3\mathrm{BANK\_SIZE}_{\mathrm{I,T}} + \mathrm{B}_4\mathrm{STA\_BANK}_{\mathrm{I,T}} + \mathrm{E}_{\mathrm{IT}} \quad (5)$$

$\mathrm{EQT\_RT}_{\mathrm{i,t}}$ = the bank equity return is represented as the growth of the bank share price

$\mathrm{BANK\_FUNDAMENTAL}_{\mathrm{i,t}}$ = vector of bank idiosyncratic risks that represent the CAMEL ratios which consists of CAR, NPL, OPEX, NIM, and LDR

[38] The BI certificate (SBI) is a Rupiah-denominated security issued by BI in recognition of short-term debt and comprises one of the instruments used in Open Market Operations. The term of SBIs is at least 1 month and no more than 12 months. SBI may be held by banks and other parties as stipulated by BI, and are negotiable. SBI may be purchased on the primary market and traded on the secondary market under repurchase agreements (repo) or in outright purchase/sale.

$MACRO\_VARIABLE_{,i,t}$ = vector of macroeconomic variables which consists of GDP_RT, EXC_RT, and BI_RT

$BANK\_SIZE_{i,t}$ = bank total assets

$STA\_BANK_{i,t}$ = dummy variable of government ownership; 1 for state bank, and 0 otherwise

$\varepsilon_{i,t}$ = random error terms

In line with the regression models for depositors and debt holders, the vector of bank fundamentals for this model is included with a lag difference to account for the fact that the financial statement information is available to the public only with delay. The following sub-section explains in more detail the justification for, and measurement of, these variables.

Bank Fundamental Variables

Bank fundamentals are represented by CAMEL financial ratios, similar to the approach used to investigate discipline by depositors and bond holders in Sections 3.5.1.1 and 3.5.1.2. The use of CAMEL ratios as indicators of bank risk have previously been used in, for example, Bliss and Flannery (2002) and Caner et al. (2012). Independent variables used in the shareholder regression model are described in detail as follows (the calculation methods of the variables are provided in page 98-101):

1. CAR: The capital adequacy variable represents the level of capital to absorb losses before becoming insolvent. Therefore, this variable is expected to have a positive effect on equity returns (Beighley et al., 1975; Berger, Davies, & Flannery, 2000; Caner et al., 2012; Shome et al., 1986).
2. NPL: The non-performing loans ratio is used as an indicator for asset quality. An increase in the NPL ratio indicates a low return for the bank. Therefore, this variable is expected to have a negative effect on equity returns (Berger et al., 2000; Caner et al., 2012).
3. OPEX: The management efficiency variable is measured using the OPEX ratio. This ratio is expected to a have a negative correlation with equity returns (Caner et al., 2012) because an increase in the OPEX ratio might reduce the wealth creation ability of a bank.

4. ROA: The earning quality variable is closely associated with the value maximization of shareholders and shares are priced on the basis of bank predicted future performance (Berger et al., 2000). Hence, this ratio is predicted to a have positive correlation with equity returns (Beighley et al., 1975; Berger et al., 2000).
5. NIM: The net interest margin coefficient is often employed to measure bank profitability, similar to the ROA ratio. NIM is expected to have a positive correlation with equity returns because an increase in the NIM ratio would decrease the ability of banks to generate wealth.
6. LDR: Similar to the regression model for depositors, proxy for liquidity risk is assessed by the loan to deposit ratio (LDR). Generally, banks with a large volume of liquid assets are perceived to be safer, therefore the liquidity coefficient is expected to have a positive correlation with equity returns.
7. BANK_SIZE: Bank total assets, used as a proxy for bank size, are included as a control variable to evaluate the influence of the TBTF doctrine on shareholder behaviour (Beighley et al., 1975; Berger et al., 2000).
8. STA_BANK: Previous studies of market discipline suggest that government ownership of banks might affect the extent of market discipline (Levy-Yeyati et al., 2004a; Sironi, 2003). Similar to other models, STA_BANK is included as a dummy variable in order to test the sensitivity of shareholders to the risk profile of state banks.

Macroeconomic Variables

Macroeconomics factors play significant roles in determining equity returns, as discussed in Chapter 2. The empirical evidence supports the view that equity returns could not be completely explained by the risks of an individual institution, which increases the importance of using macroeconomic indicators as control variables (Sironi, 2003). The present study incorporates three control variables: gross domestic products (GDP_RT), exchange rate (EXC_RT), and the central bank's interest rate (BI_RT). Previous studies, particularly among emerging markets, reveal mixed results on the relationship between these variables and the yield spreads. No particular *a priori* direction of relationship is postulated.

3.5.2 Statistical Methods

Prior studies on the empirical analysis of market discipline imposed by market participants have commonly employed static panel data, with an extensive use of fixed or random effect panel models. Martinez-Peria and Schmukler (2001), Ghosh and Das (2003), Nier and Baumann (2006), for example, used static panel data to investigate discipline by depositors while Flannery and Sorescu (1996), Mendonça and Villela Loures (2009), Deyoung et al. (2001), Menz (2010), and Hwang and Min (2013) used this procedure to measure the sensitivity of bond holders on bank fundamentals.

Recent studies, however, suggest the employment of the generalized method of moments (GMM) estimator developed for dynamic models of panel data by Arellano and Bover (1995). This approach has been adopted by studies, such as those of Cubillas et al. (2012), Wu and Bowe (2012), Hadad et al. (2011), and Karas et al. (2010). The dynamic relationships are characterized by the presence of a lagged dependent variable among the regressors (Baltagi, 2008). The GMM has several inherent advantages over panel models because this methodology is specifically designed to address three relevant econometric issues: (1) the first difference specification of the GMM models potentially reduces any inconsistency in the estimates arising from unobservable heterogeneity (or unobservable bank-specific effects) across banking institutions; (2) the autoregressive process in the data regarding the behaviour of the dependent variables (i.e. the growth rate of deposits is likely to exhibit some degree of persistency, resulting in autocorrelation. This can be accommodated through the inclusion of the lagged dependent variable on the right-hand side of the estimated equation); and (3) the likely endogeneity of the explanatory variables. The panel estimator controls for this potential endogeneity by using instruments based on lagged values of the explanatory variables (Martinez-Peria & Schmukler, 2001). Taken together, the GMM procedures are expected to yield more consistent estimators based on the ability to control for potential endogeneity, unobserved heterogeneity, and persistence in the dependent variable. Based on the arguments, to test the hypotheses, this study employs the GMM estimator.

3.6 Chapter Summary

The purpose of the present study is to investigate the existence of market discipline in the Indonesian banking sector and how the market discipline mechanism has been affected by the provision of the FSN. To achieve this objective, this chapter has outlined the main research

objectives developed to critically evaluate the presence of market discipline imposed by depositors, debt holders, and equity holders. Furthermore, the proposed conceptual framework is divided into three main parts: bank information and disclosure; market participants; and discipline mechanisms. The presence of market discipline is indicated by the capability of market participants to make reasonable assessments based on available information to exercise discipline on banks.

The discipline by despositors is measured by the relationship between deposit growth rate and bank fundamentals. The hypotheses developed to address the research objectives relating to the discipline imposed by depositors are summarized as follows:

H1a : Total deposit growth has a positive relationship with bank fundamentals

H1b : Time deposit has a positive relationship with bank fundamentals

H1c : Uninsured deposit has a positive relationship with bank fundamentals

H1d : The correlation between deposit and bank fundamentals for large banks is not equal to that of small banks

H1e : The correlation between deposit and bank fundamentals for listed banks is not equal to that of unlisted banks

H1f : The correlation between deposit and bank fundamentals for foreign banks is not equal to that of domestic banks

The disciplinary action by bond holders measured by the relationship between bond yield and bank fundamentals. The hypotheses developed to address the research objectives relating to the discipline imposed by bond holders are summarized as follows::

H2a : Bond yield spread has a negative relationship with bank fundamentals

H2b : The correlation between bond yield spread and bank fundamentals for subordinated bonds is not equal to that of senior bonds

H2c : The correlation between bond yield spread and bank fundamentals for larger banks is not equal to that of smaller banks

H2d : The correlation between bond yield spread and bank fundamentals for state banks is not equal to that of private banks

The discipline imposed by equity holders is measured by the relationship between equity return and bank fundamentals. The hypotheses developed to address the research objectives relating to the discipline imposed by equity holders are summarized as follows::

H3a : Equity returns have a positive relationship with bank fundamentals

H3b : The correlation between equity return growth and bank fundamentals for large banks is different to that of small banks

H3c : The correlation between equity returns and bank fundamentals for state banks is different to that of private banks

Regression models developed to evaluate the discipline imposed by depositors, bond holders, and equity holders consist of bank individual risk variables and market risk variables. Bank individual risks are measured through the CAMEL ratios derived from published quarterly financial reports. In addition, dummy variables are included in the models in order to identify the effect of bank size, ownership structures, and regulatory changes on market behaviour.

The GMM estimation procedure, which is a dynamic panel data model, is chosen to analyze empirically the sensitivity of market participants to bank risks. This procedure has several advantages compared to other methods and is suitable to test the hypotheses presented in this study.

The results of the estimation of the study models are presented in the following three chapters.

Chapter 4
Research Data and Results of the Depositor Model

4.1 Introduction

Chapter 4 comprises two main sections describing the data required based on the chosen methodology, followed by the analysis of regression results to test the hypotheses. Section 4.2 outlines the data sources, description analysis of the data, and their correlation matrix. Section 4.3 describes the regression results of the models and robustness tests, followed by a discussion of the results.

4.2 Data Description

This section consists of three parts: first, a description of the sources of financial data used in the regression models and sample selection; second a presentation of descriptive statistics of the collected sample data set; and, third a discussion of the correlation analysis. This information is presented to provide detailed understanding of the properties of the study data prior to discussing the results in relation to the study hypotheses.

4.2.1 Data Sources

The financial data were sourced from the banks' quarterly financial reports published in newspapers and submitted by Indonesian banks to the central bank.[39] Data on the levels of insured and uninsured deposits were sourced from the bank reports to the IDIC[40]. Macroeconomic data such as the inflation rate, the GDP growth, the exchange rate, inflation rate, and the central bank lending rate were obtained from BI publications.

BI as banking regulator, classifies banks operating in Indonesia into 6 categories: state owned banks (State banks), regional development (RD) banks, foreign exchange commercial (FEC)

[39] The quarterly financial reports are available via the BI website (http://www.bi.go.id/web/en/Publikasi/Laporan+Keuangan+Publikasi+Bank/Bank/Bank+Umum+Konvensional). However, some of the bank data for the year 2001 and 2002 is not available. The author collected additional data to complete the panel data from the InfoBank Magazine Research Division, which provides input into the periodical financial reports published in newspapers.

[40] These data are unpublished but the author was granted permission from the IDIC to use the data for this study.

banks, non-foreign exchange commercial (NFEC) banks, joint venture (JV) banks, and foreign banks[41]. In analyzing the effect of bank ownership on market discipline, this study compares discipline imposed by depositors on listed versus unlisted banks, and foreign versus domestic banks. In this study, domestic banks refers to RD, FEC, NFEC, and State banks, whereas foreign own banks refer to JV and the branch-offices of foreign banks. The JV banks are classified as foreign banks because their majority shareholders are generally foreigners. Furthermore, listed banks refer to banks that are listed on the IDX, mostly state owned and FEC banks.

This study employs a balanced panel to ensure that the results reflect the impact of regulatory changes and macroeconomic conditions[42]. Therefore, the sample was chosen among commercial banks that were operating in Indonesia from 2001 until 2011. Banks that experienced merger and acquisition during the period were excluded from the sample due to validity and reliability issues. Due to considerable differences in terms of business operation principles, the Islamic commercial banks were not included in this study[43]. After factoring for the above issues the final sample included 95 banks, consisting of 4 state banks, 26 RD banks, 24 FEC banks, 24 NFEC banks, 9 JV banks, and 8 foreign banks (the list of sample banks is presented in Appendix A.1). The sample distribution is provided in Table 4.1.

Table 4.1 Distribution of the Sample

Bank category	Number of banks*	Number of samples	Percentage observed
State Bank	4	4	100.00%
Regional Development Bank	26	26	100.00%
Foreign Exchange Commercial Bank	31	24	77.42%
Non-Foreign Exchange Commercial Bank	25	24	96.00%
Joint Venture Bank	13	9	69.23%
Foreign Banks	10	8	80.00%
Total	**109**	**95**	**87.16%**

* Number of commercial banks operating in Indonesia as at 31 December 2011

[41] Foreign banks in Indonesia may operate in the form of either a branch, a subsidiary (either through direct investment or capital market investment), or a representative office. While representative offices do not conduct business activities, branches and subsidiaries play an active role in the domestic banking industry (Goeltom, 2005).

[42] Hadad et al. (2011) use balance panel data for the similar reasons.

[43] By the end of 2011, there were 11 Islamic commercial banks operating in Indonesia.

The accounting information was collected from the quarterly financial statements of the Indonesian banks[44]. The banks are required by regulators to publish quarterly financial reports, including CAMEL ratios, in order to improve transparency and provide more meaningful financial information to the public. Therefore, CAR, NPL, OPEX, ROA, LDR and NIM ratios were directly taken from the banks' publications because the intention of the study was to examine the influence of CAMEL ratios that were calculated and published by the banks on the yield spread. The information regarding the types of banks was derived from the Indonesian Banking Directory published by the Indonesian central bank.

4.2.2 Descriptive Statistics

The following discussion on the descriptive statistics, which is based on the banks deposit and asset structures, provides a brief depiction of the characteristics of each type of bank.

The comparison of the deposit composition held by each type of bank in the study sample from Quarter 1 of 2001 until Quarter 4 of 2011 is presented in Table 4.2. In addition, Table 4.2 presents the mean, median, maximum, minimum, standard deviation, skewness, and number of observations with respect to total assets and deposits of the banks under observation. The data indicates that deposits had been the main source of funds for the Indonesian banks over the period of observation. On average, the total third party funds or deposits managed by the banks was around IDR 12,278 billion. This is approximately 76.96% of total assets as shown by the average total deposit to average total asset ratio in Table 4.2. Among the six bank categories, the RD banks had the highest ratio at 81.44%, whereas the JV banks were the lowest at 62.78%.

The bank with a high deposit to asset ratio would gain advantages if the deposit is collected from a wide range of retail deposits. Retail deposits are typically covered under the deposit insurance system. Although some accounts are formally demandable, retail deposits provide a relatively stable source of long-term funds for banks since they commonly consist of idle funds (Huang & Ratnovski, 2011). Moreover, retail deposits are classified as a source of low cost funds, as banks would normally pay less interest expenses to retail depositors such as those with saving and checking accounts (also known as demand deposits).

[44] As stipulated in the BI regulation, all banks are required to publish quarterly and annually financial statement on mass media with national circulation. The report can also be assessed from the website of each bank and from the BI's website (www.bi.go.id)

Conversely, banks with a high percentage of deposit to asset ratio can be viewed as having high dependency on its depositors if the deposits come from wholesale funds. This type of fund is categorized as high cost since banks need to provide higher interest rates to attract wholesale funds such as time deposits. Furthermore, wholesale deposits mostly belong to institutional customers. These types of customers are typically uninsured because the amount exceeds the deposit insurance coverage and deposits are of short-term maturity because the fund is rolled over frequently (Huang & Ratnovski, 2011). The evidence from the Indonesian banking industry affirmed that more than 65% of time or term deposits had a maturity of one month or less, and only 1% of them were longer than one year[45] (FSAP Report).

[45] Based on BI data until the end of 2009, as stated in the FSAP Report,

Table 4.2 Mean Comparison of All Banks' Total Assets and Deposit 2001- 2011

Bank Category	Deposits to Assets Ratio	Time to Total Deposits Ratio	Uninsured to Total Deposits Ratio	Uninsured to Insured Deposits Ratio
All Banks	**76.96%**	**45.63%**	**57.73%**	**125.63%**
State Banks	77.05%	45.19%	54.71%	129.89%
RD Banks	81.44%	30.78%	94.55%	53.91%
FEC Banks	80.28%	45.72%	44.05%	198.75%
NFEC Banks	79.84%	83.61%	52.66%	174.30%
JV Banks	62.78%	67.05%	98.78%	52.93%
Foreign Banks	63.88%	50.20%	75.83%	58.65%

Source: Author's calculation based on the IDIC and Indonesian banks quarterly reports March 2001-December 2011

The data collected from the published financial statements of the sample banks did not provide information about the proportion of deposits collected form retail or wholesale depositors. Considering the two characteristics of wholesale funds described above, this study used the levels of time deposits and uninsured deposits as an indication of funding from wholesale depositors.

As shown in Table 4.2, the time deposits were the main contributor to bank funding because on average they accounted for 45.63% of the total deposits. Moreover, the NFEC banks had the highest ratio of average time deposits to average total deposits at 83.61%, while the RD banks had the lowest ratio at 30.78%.

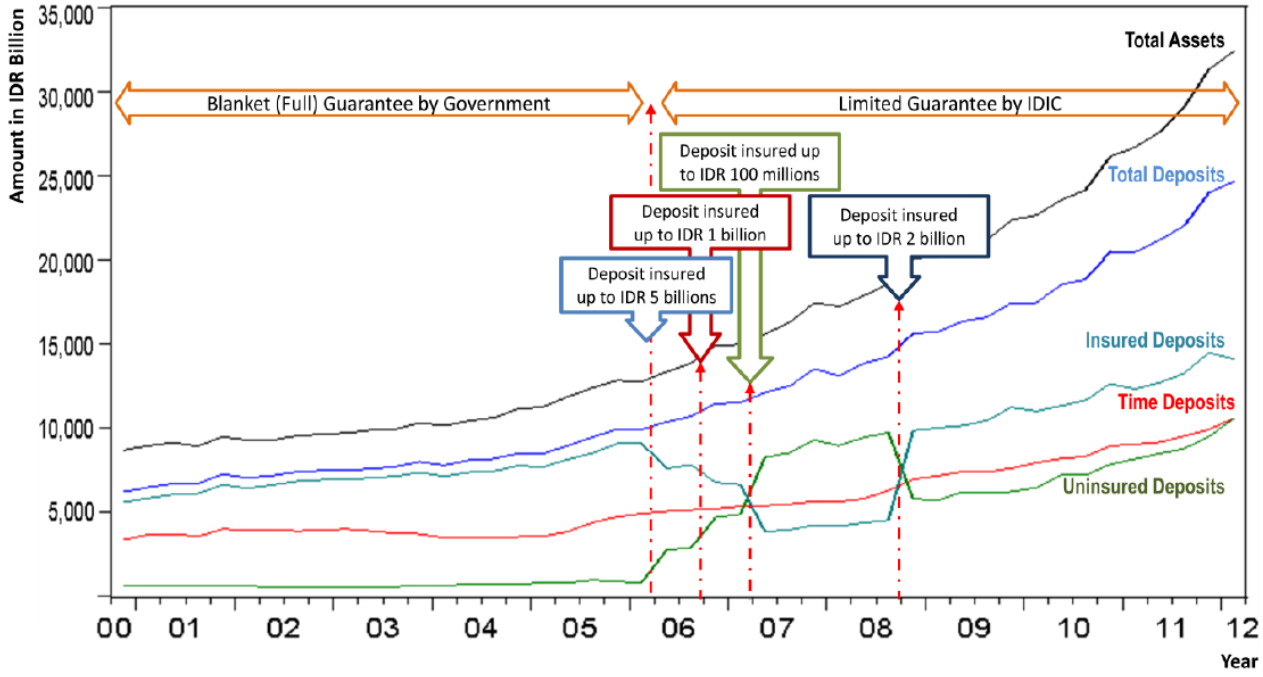
As discussed earlier, a bank with a high proportion of time deposits would normally pay more interest expenses in order to collect or retain time deposits. If market discipline exists, the bank's willingness to pay a higher interest rate is an indication that the bank is viewed as more risky than its peers. Furthermore, the nature of time deposits that can be transferred easily from one bank to another, makes a bank with a high proportion of time deposits exposed to more difficult situations in times of crisis or a run on banks. This scenario has been observed in recent bank failures in the US (e.g. the Continental Illinois, IndyMac, and Northern Rock) and the UK. Before the banks collapsed, short-term wholesale depositors were able to withdraw their funds ahead of retail depositors without incurring significant losses (Huang & Ratnovski, 2011). In the Indonesian case, during the global financial crisis of 2008, there was one bank, a NFEC bank called Century Bank, which collapsed and required bailout from the government. The collapse of Century Bank was initially caused by

a liquidity problem in association with the large scale withdrawal of funds by its major depositors (Departemen Keuangan, 2010). Based on this observation, NFEC banks are considered more risky than other categories of banks due to their high dependency on wholesale depositors.

The significance of wholesale funding as a source of market discipline in this study is also measured by the number of uninsured deposits. As explained in Chapter 2, a deposit insurance program is generally intended to protect small depositors. Therefore, it can be assumed that uninsured deposits are most likely to originate from large institutional customers or individuals who have a large amount of deposits. These types of savers in general, have a better capacity to assess accounting information published by the banks. Consequently, the uninsured depositors would be able to impose discipline, in particular to banks with a high proportion of uninsured deposits. As can be seen in Table 4.2, the JV banks had the highest percentage of average uninsured deposits to total deposits (98.78%), whereas the FEC banks had the smallest percentage (44.05%). Therefore, the JV banks are expected to face a stricter discipline than their peers from uninsured depositors.

Figure 4.1 shows that under the blanket guarantee scheme, all deposits were insured by the government except the deposits in foreign banks. During this period, the amount of deposits in domestic banks steadily increased as a result of the banking and economic recovery (Bank Indonesia, 2006b). Meanwhile, third party funds in foreign banks remained constant. This trend highlights the difficulties faced by foreign banks in competing with domestic banks when trying to attract deposit funds. There was an unequal playing field, largely because deposits in foreign banks were not insured by the government.

Figure 4.1 Total Assets and Deposits Structure of All Banks



Source: Author's calculation based on the IDIC and Indonesian banks' quarterly reports March 2001-December 2011

Since the establishment of the IDIC, the coverage of deposit insurance reduced gradually with the main objective being to minimize potential moral hazard problems created by the full guarantee scheme, as discussed in Chapter 2. In March 2006, the maximum amount of deposits that were insured was IDR 5 billion for each depositor. In September 2006, the IDIC further reduced the maximum amount of deposits insured to IDR 1 billion. The final reduction was implemented on March 2007 when the IDIC announced deposit guarantees up to IDR 100 million for each depositor. As can be seen in Figure 4.1, as a result of the insurance coverage reduction, the amount of uninsured deposits increased significantly, eventually exceeding the number of insured deposits. From the market discipline point of view, this shift is considered desirable since the uninsured depositors are directly exposed by the risk-taking activities of the banks. This calls for closer monitoring of the banks by depositors.

Subsequently during the global financial crisis of 2008, the government raised the level of insurance coverage to IDR 2 billion in order to enhance market confidence and to protect potential capital outflow. This decision was deemed necessary to maintain a competitive advantage, as the neighbouring countries such as Singapore, Thailand, and Australia had implemented full coverage for deposits (Departemen Keuangan, 2010).

As a consequence of this policy, until December 2011 the number of insured deposits was higher than uninsured deposits. Table 4.3 shows that under the IDIC limited guarantee scheme, the mean of insured deposits was IDR 8,903 billion, whereas the mean of uninsured deposits was IDR 7,086 billion, giving a ratio of insured deposits to uninsured deposits of 125.63%. From the financial system stability perspective, this deposit composition is more favourable because the risk of bank runs is lowered if more funds are under the coverage of a deposit guarantee program. On the other hand, from the market discipline point of view, the increased level of deposit coverage would reduce incentives for market participants to discipline their banks.

Table 4.3 Descriptive Statistics of Total Assets and Deposits
March 2001- December 2011

	Total Assets	Total Deposits	Time Deposits	Blanket Guarantee		Limited Guarantee	
				Insured Deposits	Uninsured Deposits	Insured Deposits	Uninsured Deposits
All Banks							
Mean*	15,949	12,274	5,601	7,237	675	8,903	7,087
Median*	2,068	1,497	688	716	0	1,008	1,211
Maximum*	489,107	380,236	144,710	199,037	25,978	264,906	168,955
Minimum*	5	0	0	0	0	2	0
Std. Dev.*	47,616	37,686	15,910	24,864	2,972	29,346	18,205
Skewness	530.4%	541.7%	513.5%	508.5%	502.6%	531.7%	489.4%
Observations	4,180	4,180	4,180	1,995	1,995	2,185	2,185
State Owned Banks							
Mean*	172,405	132,845	60,038	92,696	0	94,399	72,678
Median*	147,174	117,716	48,968	91,896	0	79,937	75,460
Maximum*	489,107	380,236	144,710	199,037	0	243,207	168,955
Minimum*	23,950	15,584	10,183	15,584	0	6,457	7,084
Std. Dev.*	115,789	91,794	40,165	58,902	0	64,463	41,894
Skewness	57.3%	59.7%	49.8%	28.0%		41.6%	15.3%
Observations	176	176	176	84	84	92	92
Regional Development Banks							
Mean*	5,457	4,445	1,368	2,088	0	2,265	4,203
Median*	3,075	2,433	456	1,178	0	1,491	2,634
Maximum*	61,503	49,413	32,351	13,470	0	16,154	26,562
Minimum*	5	62	5	97	0	70	0
Std. Dev.*	6,607	5,314	2,501	2,280	0	2,338	4,143
Skewness	290.5%	260.7%	503.5%	205.9%		229.1%	173.9%
Observations	1,144	1,144	1,144	546	546	598	598
Foreign Exchange Commercial Banks							
Mean*	19,849	15,935	7,286	9,976	0	13,953	7,020
Median*	2,359	1,980	1,259	1,297	0	1,634	1,050
Maximum*	395,310	335,253	77,704	131,638	0	264,906	107,845
Minimum*	97	71	38	71	0	45	0
Std. Dev.*	46,065	38,461	12,852	23,217	0	36,279	14,236
Skewness	427.0%	457.1%	248.2%	365.3%		450.6%	391.8%
Observations	1,056	1, 056	1, 056	504	504	552	552
Non-Foreign Exchange Commercial Banks							
Mean*	1,254	1,001	837	470	0	919	527
Median*	357	266	198	194	0	250	105
Maximum*	48,488	37,042	30,841	3,510	0	23,062	12,435
Minimum*	19	4	1	8	0	2	0
Std. Dev.*	3,814	2,968	2,573	644	0	2,504	1,406

Continued

Table 4.3 continued

Skewness	831.2%	790.4%	760.8%	217.6%		591.7%	502.3%
Observations	1, 056	1, 056	1, 056	504	504	552	552
Joint Venture Banks							
Mean*	5,157	3,237	2,171	1,305	0	1,693	3,198
Median*	3,128	1,374	860	899	0	636	1,436
Maximum*	35,954	23,953	19,358	6,806	0	11,278	18,573
Minimum*	13	0	0	0	0	14	6
Std. Dev.*	6,501	4,750	3,577	1,221	0	2,685	3,764
Skewness	238.9%	261.5%	285.7%	163.5%		223.6%	157.3%
Observations	396	396	396	189	189	207	207
Foreign Banks							
Mean*	16,339	10,437	5,239	0	8,014	4,642	7,915
Median*	12,722	9,099	4,575	0	8,585	1,420	6,868
Maximum*	64,502	43,332	17,118	0	25,978	19,626	31,621
Minimum*	278	162	14	0	162	13	0
Std. Dev.*	15,369	10,478	4,866	0	6,804	6,211	7,536
Skewness	110.5%	111.0%	62.7%		51.4%	128.3%	89.9%
Observations	352	352	352	168	168	184	184

* In IDR billion

Source: Author's calculation based on the IDIC and Indonesian banks' quarterly reports March 2001-December 2011

CAMEL RATIOS

Table 4.4 below presents the descriptive statistics for the variables included in the models employed in this study, covering the period of March 2001 to December 2011. This analysis included 4,180 observations from 95 banks that were operating in Indonesia continuously from Quarter I of 2001 until Quarter IV of 2011, without undergoing any structural changes such as mergers or acquisitions. In terms of size, the largest bank in the sample had total assets of IDR 489.1 trillion, whereas the smallest one had IDR 4.7 billion. Table 4.4 presents the comparison of all variables between the foreign and domestic banks, as well as between the listed and private banks. The total assets of the domestic banks generally were larger than the foreign banks; and the listed banks were larger than the private banks.

In terms of the CAMEL ratios, the domestic banks on average had lower CAR (27.53%) than the foreign banks (61.14%). This might be partly caused by the higher level of NPL in domestic banks (5.69%) compared to foreign banks (3.39%). This meant that domestic banks had to allocate an extra allowance for their non-performing assets. Interestingly, the CAR and NPL ratios of the listed banks (22.95% and 4.72% respectively) were both lower than the private banks (35.78% and 5.39%). These figures can be explained in part by the general

behaviour of the listed banks as public companies to act upon existing regulations, in particular the central bank regulation that limits the NPL ratio up to a maximum of 5%. Therefore, the listed banks most likely imposed a more rigorous approach in managing credits, including writing off their NPL, in order to comply with the maximum NPL limit.

The domestic banks on average showed a more efficient performance with an OPEX ratio of 77.22%; whereas the OPEX ratio of the foreign banks was 91.07%. This efficiency resulted in the higher return for domestic banks (ROA 3.01%) than foreign banks (ROA 1.69%). In addition, the listed banks generated a lesser return than the private banks, with ROA 2.09% and 2.91% respectively. These returns were affected by the lower OPEX and NIM ratios of the listed banks (83.31% and 5.76%) compared with the ratios of the private banks (78.96% and 7.08%). More detailed descriptive statistics of CAMEL ratios from each bank category can be found in Appendix A.2.

Three macroeconomic variables were included in the model as control variables, and the summary statistics are discussed below. The minimum year-on-year GDP grew by 1.56% in Quarter IV of 2001, when Indonesia was still struggling to recover from the Asian financial crisis. Whereas the highest economic growth recorded was 7.16% in Quarter IV of 2004 when the economy had nearly fully recovered and was starting to produce promising results. This economic recovery was also characterized by the strengthening of the domestic currency. The exchange rate (EXC_RT) of Indonesian domestic currency (Rupiah or IDR) to US was recorded at the highest level of IDR 8,285 in Quarter II of 2003. However, in the wake of the 2007-2008 global financial crises, the Indonesian domestic currency deeply depreciated to its lowest level of IDR 11,575. Additionally, the average and median rates were IDR 9,377 and IDR 9,194, respectively. The third economic indicator included in the analysis was inflation which had a mean of 8.32% and a median of 6.95%. The maximum inflation rate was 17.11%, which occurred in the Quarter IV of 2005; while the lowest inflation rate was 2.78%, in Quarter III of 2009 mainly as a result of the economy slowing down following the global financial crisis.

As can be seen in Table 4.4, the values of the dependent and independent variables indicate that, in general, the series are skewed. To approximate normality, all variables were transformed using the natural logarithmic transformation in order to satisfy the conditions of econometric modeling.

Table 4.4 Descriptive Statistics

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness
ALL Banks (N=4180)						
TOT_DG	0.0375	0.0351	1.8681	-1.8500	0.1751	0.65
TIME_DG	0.0389	0.0332	2.7629	-2.8422	0.2739	0.00
UIN_DG	0.0649	0.0448	4.6799	-4.9164	0.5796	0.55
DEP_IR	0.0678	0.0631	0.5560	0.0000	0.0386	3.82
BANK_SIZE*	20,959	4,002	489,100	20	55,671	4.74
CAR	0.3200	0.2111	17.9968	-0.1763	0.7404	18.38
NPL	0.0390	0.0228	0.8066	0.0000	0.0640	5.07
ROA	0.0275	0.0262	0.1812	-0.3993	0.0254	-1.89
OPEX	0.7848	0.7922	4.9182	0.0075	0.2049	4.09
NIM	0.0656	0.0591	0.5737	-0.1000	0.0341	2.44
LDR	0.7756	0.7423	5.5997	0.0063	0.3763	3.69
GDP_GR	0.0535	0.0569	0.0716	0.0156	0.0111	-0.91
EXC_RT**	9,377	9,194	11,575	8,285	722	1.31
INF_RT	0.0832	0.0695	0.1711	0.0278	0.0367	0.63
Foreign Banks (N=748)						
TOT_DG	0.0349	0.0311	1.7998	-1.0624	0.1768	1.54
TIME_DG	0.0456	0.0396	2.4689	-1.8475	0.2581	1.00
UIN_DG	0.1020	0.0683	4.4428	-4.1547	0.8802	0.22
DEP_IR	0.0964	0.0872	0.6469	0.0265	0.0464	5.77
BANK_SIZE*	1,201	323	46,651	19	4,123	7.63
CAR	0.6114	0.2298	25.2942	0.0633	2.1780	8.19
NPL	0.0339	0.0213	0.3185	0.0000	0.0437	3.28
ROA	0.0169	0.0146	0.1821	-0.3993	0.0325	-2.82
OPEX	0.9107	0.9034	4.9182	0.3755	0.2599	6.68
NIM	0.0655	0.0622	0.2638	-0.0625	0.0289	1.01
LDR	0.8090	0.8130	7.1650	0.0002	0.4680	7.60
Domestic Banks (N=3432)						
TOT_DG	0.0435	0.0380	1.8681	-1.9053	0.1698	-0.24
TIME_DG	0.0477	0.0361	3.0004	-3.2539	0.2973	-0.15
UIN_DG	0.0587	0.0409	4.6799	-4.9164	0.5123	0.68
DEP_IR	0.0721	0.0637	0.7998	0.0000	0.0429	4.08
BANK_SIZE*	18,982	3,025	489,100	5	51,133	4.73
CAR	0.2753	0.2011	5.5341	-0.6956	0.2587	5.76
NPL	0.0569	0.0283	2.0297	0.0000	0.1352	8.76
ROA	0.0301	0.0278	0.4999	-0.2234	0.0257	1.69
OPEX	0.7722	0.7803	2.8610	0.0070	0.1892	1.37
NIM	0.0692	0.0609	0.6099	-0.1000	0.0412	2.69
LDR	0.7371	0.6799	31.7700	0.0056	0.7337	25.60

Continued

Table 4.4 Continued

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness
Listed Banks (N=719)						
TOT_DG	0.0385	0.0367	0.7174	-0.6213	0.1039	-0.07
TIME_DG	0.0391	0.0325	1.7653	-0.7670	0.1518	2.31
UIN_DG	0.0803	0.0552	4.0334	-1.7180	0.4237	2.62
DEP_IR	0.0795	0.0712	0.3751	0.0051	0.0418	2.86
BANK_SIZE*	64,005	22,498	489,100	55	93,142	1.95
CAR	0.2295	0.1745	1.8443	-0.5809	0.1882	3.64
NPL	0.0472	0.0330	0.6219	0.0000	0.0610	4.94
ROA	0.0209	0.0203	0.1521	-0.0973	0.0162	0.92
OPEX	0.8331	0.8320	1.9198	0.0909	0.1359	0.18
NIM	0.0576	0.0540	0.1703	-0.0580	0.0241	0.25
LDR	0.7016	0.7165	1.4846	0.0478	0.2300	-0.06
Private Banks (N=3461)						
TOT_DG	0.0427	0.0367	1.8681	-1.9053	0.1820	0.11
TIME_DG	0.0490	0.0383	3.0004	-3.2539	0.3118	-0.07
UIN_DG	0.0608	0.0416	4.6799	-4.9164	0.6149	0.37
DEP_IR	0.0758	0.0679	0.7998	0.0000	0.0451	4.45
BANK_SIZE*	5,736	1,689	265,700	5	16,108	11.23
CAR	0.3578	0.2137	25.2942	-0.6956	1.0508	16.54
NPL	0.0539	0.0252	2.0297	0.0000	0.1336	8.99
ROA	0.0291	0.0271	0.4999	-0.3993	0.0291	0.05
OPEX	0.7896	0.7889	4.9182	0.0070	0.2222	3.45
NIM	0.0708	0.0647	0.6099	-0.1000	0.0414	2.61
LDR	0.7601	0.7021	31.7700	0.0002	0.7553	23.59

* In IDR billion
** Exchange Rate IDR/USD

Source: Author's calculation based on the Indonesian banks' quarterly reports March 2001-December 2011

4.2.3 Correlation Matrix

Table 4.5 shows the correlations among the variables included in the econometric analysis. The coefficient of correlation is a measure of linear dependence between two random variables that does not depend on units of measurement and is bounded between -1 and 1 (Wooldridge, 2009). The first column of the table shows the correlations between the dependent variables (TOT_DG, TIME_DG, and UIN_DG) and each independent variable excluding the dummy variables.

The pearson correlation matrix reveals that the dependent variables and the bank idiosyncratic variables are less than 11%. The highest figure is LDR with the value of -

0.1022, and the lowest one is NPL with the value of -0.01. Furthermore, this study utilizes three macro environment indicators as control variables. As can be seen in the table, correlation between deposit growth rate and GDP growth was maximum at -0.38, exchange rate (EXC_RT) was maximum at -0.14, and the inflation rate (INF_RT) was maximum at -0.20. These data indicate that all macroeconomic variables have higher coefficients of correlation to the explanatory variable than the individual bank variables. Following Levy-Yeyati et al. (2004a), these figures reflect a common situation in developing economies where market risk factors have a tendency to be more dominant than idiosyncratic factors in defining the risk of a financial institution.

The pair-wise correlations between the independent variables are shown in Table 4.6. Among the CAMEL indicator variables, the stronger correlations are observed between ROA and OPEX with the value of -0.78. Other variables have correlations below 0.40. The correlation matrix suggests that the pairwise correlation coefficients among the independent variables are less than .80. Therefore, these figures are acceptable for econometric estimation purposes since the data set has no problem with multi-collinearity (Kennedy, 2003).

Table 4.5 Correlation Matrix of Dependent and Independent Variables

VARIABLES	A	B	C	D	E	F	G	H	I	J	K	L	M	N
A. TOT_DG	1.0000													
B. TIME_DG	0.6545	1.0000												
C. UIN_DG	0.4910	0.3216	1.0000											
D. CAR	0.0064	0.0111	-0.0037	1.0000										
E. NPL	-0.0576	-0.0274	-0.0101	-0.0235	1.0000									
F. ROA	0.0087	0.0278	-0.0076	0.0139	-0.1172	1.0000								
G. OPEX	0.0067	-0.0153	0.0266	-0.0516	0.1077	-0.7773	1.0000							
H. NIM	-0.0282	0.0216	-0.0166	-0.0263	-0.1453	0.3342	-0.1866	1.0000						
I. LDR	-0.1022	-0.0727	-0.0737	-0.0314	0.0177	0.0403	-0.1050	0.0517	1.0000					
J. DEP_IR	0.0239	0.0032	0.0265	-0.0158	0.0878	-0.1938	0.2439	-0.1623	0.1332	1.0000				
K. BANK_SIZE	0.0069	-0.0087	-0.0071	-0.0683	0.0113	0.0482	-0.0700	-0.0068	-0.0697	-0.1263	1.0000			
L. GDP_DR	-0.0388	-0.0239	0.0180	-0.0009	0.4777	0.0304	0.0174	-0.1721	-0.1192	0.1321	0.0312	1.0000		
M. INF_RT	-0.0460	-0.0535	-0.1411	0.0421	0.1796	-0.0149	0.0102	-0.0588	-0.0287	0.1341	-0.0505	0.3975	1.0000	
N. EXC_RT	-0.0221	-0.0098	-0.2047	0.0035	0.0854	-0.0546	0.0649	-0.0144	0.0275	0.0913	-0.0170	0.2579	0.2123	1.0000

This table presents correlations between the variables included in this study. Quarterly observations over the period 2001–2011 are used. The dependent variables are TOT_DG (total deposit growth), TIME_DG (time deposit growth), and UIN_DG (uninsured deposit growth). The independent variables are: CAR (capital adequacy ratio), NPL (the changes in non-performing loan), ROA (return on assets), OPEX (ratio of operational expenses to operational revenue), NIM (net interest margin), LDR (loan to deposit ratio), BANK_SIZE (total asset of banks), DEP_IR (deposit interest rate), GDP_GR (the growth rate in GDP), INF_RT (inflation rate) and EXC_RT (the annual average of exchange rate IDR/USD).

4.3 Analysis and Discussions of the Estimation Result

The findings of this study with respect to the tested research hypotheses are presented in this section. The discussion starts with an analysis of the empirical results, as well as tests for robustness of the model. This is followed by an in-depth analysis and discussion of the regression results. The discussion in particular addresses the hypotheses as outlined in Chapter 3 in relation to the market discipline imposed by depositors in the Indonesian banking industry.

4.3.1 Empirical Result

The GMM was employed to empirically measure the sensitivity of Indonesian depositors to bank risk as discussed in Chapter 3. The regression results of this GMM estimator have been verified by post-estimation tests, including the Arellano–Bond and Sargan tests. The Arellano–Bond test is used for serial correlation among residuals. If the error term in the equation is independently and identically distributed, the first differenced error should be serially correlated and the second differenced error should not be correlated. The Arellano–Bond serial autocorrelation test of first order rejects the hypothesis of presence of serial autocorrelation in the model. Moreover, the test of second order serial correlation presents no significant evidence of serial correlation in the first-differenced errors of order 2. In addition, the Sargan tests of over-identifying restrictions present strong evidence against the null hypothesis that the over-identifying restrictions are valid (not correlated with the error terms). These overall post-estimation test results suggest that the regression results of this GMM estimation are statistically valid.

Table 4.6 presents the regression results of the correlation between the total deposit growth variable (TOT_DG) and bank fundamental. Column 1 presents regression results for the period from Quarter I of 2001 to Quarter IV of 2011. This period is divided into two sub-periods: the sub-period of the blanket (full) guarantee program from Quarter I of 2001 to Quarter IV of 2005, as presented in column 1a; and the sub-period of the limited guarantee program from Quarter I of 2006 to Quarter IV of 2011, as presented in column 1b. The creation of these sub-periods is aimed to examine the influence of a deposit coverage reduction from a full guarantee to a limited guarantee on market discipline. The regression results suggest that each of 6 CAMEL variables (CAR, NPL, ROA, OPEX, NIM, and LDR)

indicated significant correlations between the growth of total deposits as seen in column 1a and 1b.

In general, the inflow of total deposits has positive correlations with the CAR, ROA, and NIM variables. The CAR influences the growth of total deposit positively and is significant at the p = 0.01. The influences are consistent both during the blanket guarantee and limited guarantee program, as can be seen in columns 1a and 1b respectively. However, the coefficient of correlation decreases from 0.508 during the blanket guarantee to 0.110 under the limited guarantee period. Similarly, the NIM ratio is used to provide an additional proxy to measure the bank ability to generate profit. The relationship between deposit growth and the NIM ratio is significant at the p value of 0.01, during both the blanket and the limited guarantee periods. Moreover, the ROA ratio, as a proxy for earning quality, indicates that over the period of 2001-2011, this variable is insignificant to determine the growth of total deposits. Interestingly, when the observation period is divided into two sub-periods, the regression results indicate that these relationships are significant. During the sub-period of full guarantee the relationship is positive, whereas under the limited guarantee period the relationship is negative.

In contrast, the NPL, OPEX and LDR variables indicate negative correlations with the growth of total deposits. The correlation between total deposit growth and the indicator for credit risk (NPL), is negative and significant at the p = 0.01 level (see column 1), as predicted by the model. However, column 1b indicates that there is a shift in this relationship from a negative into a positive relationship. The efficiency ratio (OPEX) as expected, had a negative relationship with the growth of total deposits and is significant at the p value of 0.05, during both the blanket and the limited guarantee periods. This coefficient increased from -0.0787 to -0.148 during the limited deposit scheme, reflecting depositors increasing concerned about the bank efficiency measure. Furthermore, the LDR variable as a proxy for liquidity risk has a significant positive relationship with total deposit growth in all periods. However, contrary to expectations, the sign indicates a parallel relationship between the LDR and total deposit growth.

Table 4.6 Regression Results: Total Deposit Variable

			All Periods	Blanket Gr.	Limited Gr.
VARIABLES	**Lag**	**Expected Signs**	**TOT_DG (1)**	**TOT_DG (1a)**	**TOT_DG (1b)**
TOT_DG	L1		-0.165***	-0.193***	-0.216***
			(0.00482)	(0.00240)	(0.00408)
CAR	L1	(+)	0.159***	0.508***	0.110***
			(0.0141)	(0.0555)	(0.0161)
NPL	L1	(-)	-0.0926***	-0.0411***	0.547***
			(0.00712)	(0.00972)	(0.0430)
ROA	L1	(+)	-0.416	0.452**	-1.143***
			(0.309)	(0.226)	(0.249)
OPEX	L1	(-)	-0.105***	-0.0787***	-0.148***
			(0.0370)	(0.0304)	(0.0497)
LDR	L1	(-)	0.425***	0.276***	0.486***
			(0.0151)	(0.0281)	(0.0147)
NIM	L1	(+)	-0.0479	0.780***	0.300**
			(0.0757)	(0.103)	(0.137)
BANK_SIZE		(+)	0.0819***	0.113***	0.118***
			(0.00640)	(0.00508)	(0.00739)
DEP_IR		(+)	0.0982**	0.567***	0.184***
			(0.0460)	(0.104)	(0.0526)
GDP_GR			0.578***	-0.110	2.602***
			(0.0664)	(0.101)	(0.233)
INF_RT			0.661***	0.119**	0.215
			(0.0627)	(0.0572)	(0.132)
EXC_RT			-0.0616***	0.271***	-0.253***
			(0.0168)	(0.0327)	(0.0209)
BLA_GR			0.0789***		
			(0.00570)		
LIST_BANK			-0.214***	-0.0334**	-0.315***
			(0.0259)	(0.0154)	(0.0235)
FORG_BANK			-0.314***	-0.198***	-0.299***
			(0.0179)	(0.0204)	(0.0124)
Constant			-0.836***	-4.357***	0.320
			(0.196)	(0.284)	(0.206)
Observations			4,063	2,236	1,799
Number of banks			95	95	95
Wald Test	Chi2		24958	108804	57395
			0.000***	0.000***	0.000***
Sargan Test	Chi2		80.97	80.97	89.56
			1.000	1.000	1.000
Arellano–Bond test for AR(1)			-2.620	-3.458	-1.907
			0.0088	0.0005	0.0565
Arellano–Bond test for AR(2)			-1.703	-2.380	-2.072
			0.1886	0.1173	0.1382

Continued

Table 4.6 Continued

This table presents the results from the two-step GMM estimations. Coefficients and standard errors (in parentheses) are from the second step. The Sargan and Arellano–Bond tests are from the second. The estimation uses quarterly observations over the period 2001–2011. The dependent variable is TOT_DG (total deposit growth). The independent variables are: CAR, NPL, ROA, OPEX, NIM, LDR, BANK_SIZE (total asset of banks), and DEP_IR (deposit interest rate). Control variables for general macroeconomic conditions are: GDP_GR (the growth rate in GDP); INF_RT (inflation rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR 000). All variables are transformed using the natural logarithmic transformation. Three dummy variables are BLA_GR (1 = Quarter I of 2001 to Quarter of IV 2004 and 0 otherwise), LIST_BANK (1=listed bank and o otherwise and FORG_BANK (1 = foreign bank and 0 otherwise).
* Indicate statistical significance at the 10% level (2-tailed)
** Indicate statistical significance at the 5% level (2-tailed)
*** Indicate statistical significance at the 1% level (2-tailed)

Regression results for the model on time deposit growth and bank fundamentals are summarized in Table 4.7. Column 2 presents regression results over the period from Quarter I of 2001 to Quarter IV of 2011. Results for observation under the blanket guarantee over the period from Quarter I of 2001 to Quarter IV of 2005 are presented in column 2a, and the results for observation under the limited guarantee over the period from Quarter I of 2006 to Quarter IV of 2011, are presented in column 2b. In general, 5 out of the 6 CAMEL indicators (the CAR, NPL, OPEX, NIM, and LDR) used in this study suggest significant impact on the growth of time deposits. On the other hand, the ROA ratio has an insignificant impact on the inflow of time deposits.

Table 4.7 shows that the CAR and NIM ratios had positive impacts on the changes in the amount of time deposits at the 0.01 significance level. The sign of correlation for the CAR variable was consistent under both the blanket and the limited guarantee periods. However, the NIM variable indicates that during the blanket guarantee period, this variable impacted negatively on the changes in the amount of time deposits.

The NPL and OPEX indicators share a similar pattern on the regression results. During the full guarantee period, the relationship between these indicators and the growth of time deposit are negative and significant ($p = 0.01$), as shown in column 2a. In contrast, during the limited guarantee, time deposits have positive relationships with the NPL and OPEX indicators (see column 2b). Moreover, time deposit had a parallel correlation with the LDR ratio over the period of blanket and limited guarantee periods, as shown in columns 2a and 2b. This result is similar to the regression result on the growth of total deposits.

The ROA variable, however, is the only CAMEL indicator that presents insignificant regression results. These results suggest that under the period of blanket and limited guarantees, this earnings variable did not significantly influence the levels of time deposits.

Table 4.7 Regression Results: Time Deposit Variable

			All Period	Blanket Gr.	Limited Gr.
Expected Signs	**Lag**	**Expected Signs**	**TIME_DG (2)**	**TIME_DG (2a)**	**TIME_DG (2b)**
TIME_DG	L1		-0.159***	-0.137***	-0.150***
			(0.00251)	(0.00297)	(0.00237)
CAR	L1	(+)	0.260***	0.167***	0.202***
			(0.0310)	(0.0244)	(0.0158)
NPL	L1	(-)	-0.0107	-0.176***	0.757***
			(0.00883)	(0.0122)	(0.130)
ROA	L1	(+)	-0.530	0.145	-0.469
			(0.374)	(0.152)	(0.367)
OPEX	L1	(-)	0.0297	-0.147***	0.0820*
			(0.0468)	(0.0233)	(0.0480)
LDR	L1	(-)	0.445***	0.441***	0.520***
			(0.0231)	(0.0200)	(0.0209)
NIM	L1	(+)	0.978***	-0.206***	0.398**
			(0.107)	(0.0517)	(0.177)
BANK_SIZE		(+)	0.129***	0.0738***	0.191***
			(0.00553)	(0.00493)	(0.00867)
DEP_IR		(+)	0.132	0.363***	0.146
			(0.184)	(0.0276)	(0.220)
GDP_GR			0.693***	0.358***	7.272***
			(0.129)	(0.0398)	(0.274)
INF_RT			0.723***	-0.127**	-0.000552
			(0.183)	(0.0526)	(0.110)
EXC_RT			-0.117***	0.247***	-0.404***
			(0.0329)	(0.0119)	(0.0241)
BLA_GR			0.109***		
			(0.0146)		
LIST_BANK			-0.173***	-0.186***	-0.141***
			(0.0160)	(0.0138)	(0.0337)
FORG_BANK			-0.356***	-0.290***	-0.818***
			(0.0332)	(0.0166)	(0.0406)
Constant			-1.240***	-3.403***	0.224
			(0.267)	(0.129)	(0.223)
Observations			4,025	2,264	1,789
Number of bank			95	95	95
Wald Test			34119	6946	37395
	Chi2		0.000***	0.000***	0.000***
Sargan Test			86.98	84.25	90.00
	Chi2		1.000	1.000	1.000
Arellano–Bond test for AR(1)			-4.420	-3.968	-4.320
			0.0000	0.0001	0.0000
Arellano–Bond test for AR(2)			-2.707	0.166	-1.796
			0.1680	0.8683	0.725

Continued

Table 4.7 Continued

This table presents the results from the two-step GMM estimations. Coefficients and standard errors (in parentheses) are from the second step. The Sargan and Arellano–Bond tests are from the second. The estimation uses quarterly observations over the period 2001–2011. The dependent variable is TIME_DG (time deposit growth). The independent variables include: CAR, NPL, ROA, OPEX, NIM, LDR, BANK_SIZE (total asset of banks), and DEP_IR (deposit interest rate). Control variables for general macroeconomic conditions include: GDP_GR(the growth rate in GDP); INF_RT (inflation rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation. Three dummy variables are BLA_GR (1 = Quarter I of 2001 to Quarter IV of 2004 and 0 otherwise), LIST_BANK (1=listed bank and o otherwise and FORG_BANK (1 = foreign bank and 0 otherwise).
* Indicate statistical significance at the 10% level (2-tailed)
** Indicate statistical significance at the 5% level (2-tailed)
*** Indicate statistical significance at the 1% level (2-tailed)

Table 4.8 shows the regression results of the model on uninsured deposits and bank fundamentals. Uninsured deposits were only measured during the period of the limited insurance scheme, from Quarter I of 2001 to Quarter IV of 2011, as presented in column 3. As discussed in Chapter 3, within this period, the upper limit on deposit guarantee had changed twice. In order to minimize the impact of the changes in deposit insurance coverage on the growth of uninsured deposits, two sub-periods were included in the model, as shown in columns 3a and 3b. The regression results on uninsured deposits when the maximum guarantee was IDR 100 million for each depositor within a bank (over the period from Quarter II of 2007 to Quarter III of 2008) is presented in column 3a; and those for uninsured deposits when the maximum amount of deposit insured was IDR 2 billion (over the period from Quarter IV of 2008 to Quarter IV of 2011) is presented in column 3b.

In general, the regression results suggest that after the establishment of the Indonesian deposit insurance and the introduction of a limit on the deposit guarantee, the uninsured deposits were significantly influenced by the four CAMEL variables, CAR, ROA, LDR, and NIM ratios, as shown in column 3. The CAR ratios had a positive impact on uninsured deposits at the 0.01 significance level, whereas the NIM variable had a significantly negative impact. As shown in column 3b, whereas the government increased the deposit coverage to a maximum IDR 2 million in response to the evolving global finance crisis in 2008.

Similar to the results on time deposits, the relationship between uninsured deposits and the LDR variable is positive and significant at p value of 0.01. Furthermore, the relationship between uninsured deposit and the ROA is significant at p value of 0.01. However, the sign of relationships for these two variables is inconsistent with the expected direction.

Table 4.8 further indicates that, in general, the NPL and OPEX variables do not have a significant impact on uninsured deposits, except during the period of the maximum guarantee of IDR 100 million. As can be seen in column 3a, the NPL and OPEX indicators show a significant impact (at p-values of 0.10 and 0.05 respectively) only over the period from Quarter II of 2007 to Quarter III of 2008.

Table 4.8 Regression Results: Uninsured Deposit Variable

			Q2'06 - Q4'11	Q2'07 - Q3'08	Q4'08 - Q4'11
VARIABLES	**Lag**	**Expected Signs**	**UIN_DG (3)**	**UIN_DG (3a)**	**UIN_DG (3b)**
UIN_DG	L1		-0.243***	-0.327***	-0.266***
			(0.00534)	(0.0128)	(0.00551)
CAR	L1	(+)	0.626***	0.121	2.110***
			(0.0642)	(0.0843)	(0.133)
NPL	L1	(-)	-0.342	-0.531*	0.794
			(0.399)	(0.274)	(0.695)
ROA	L1	(+)	-2.492***	-1.955***	-0.698
			(0.708)	(0.710)	(0.627)
OPEX	L1	(-)	-0.0237	-0.362**	0.0629
			(0.0908)	(0.154)	(0.0762)
LDR	L1	(-)	0.758***	0.727***	0.642***
			(0.0498)	(0.0887)	(0.0506)
NIM	L1	(+)	-1.063**	-0.782	-2.460***
			(0.474)	(0.566)	(0.584)
BANK_SIZE		(+)	0.177***	0.457***	0.655***
			(0.0142)	(0.0489)	(0.0259)
DEP_IR		(+)	0.0824	0.482	0.936***
			(0.182)	(0.522)	(0.218)
GDP_GR			9.876***	14.94***	7.164***
			(0.423)	(1.215)	(0.444)
INF_RT			-5.356***	-4.141***	-3.495***
			(0.111)	(0.255)	(0.152)
EXC_RT			-2.436***	-5.159***	-1.736***
			(0.0546)	(0.360)	(0.0686)
LIST_BANK			0.212***	0.131	-0.151**
			(0.0378)	(0.115)	(0.0690)
FORG_BANK			-1.134***	-1.532***	-1.820***
			(0.0685)	(0.247)	(0.164)
Constant			19.18***	40.13***	5.178***
			(0.540)	(3.259)	(0.756)
Observations			1,815	561	1,081
Number of bank			95	95	95
Wald Test			20675	2590	38370
	Chi2		0.000***	0.000***	0.000***
Sargan Test			90.06	65.15	85.87
	Chi2		1.000	0.8502	1.000
Arellano–Bond test for AR(1)			-5.109	-2.703	-4.336
			0.0000	0.0069	0.0000
Arellano–Bond test for AR(2)			-2.878	-0.556	-3.160
			0.140	0.5782	0. 1600

Continued

Table 4.8 Continued

This table presents the results from the two-step Generalized Method of Moments System estimations. Coefficients and standard errors (in parentheses) are from the second step. The Sargan and Arellano–Bond tests are from the second. The estimation uses quarterly observations over the period 2006–2011. The dependent variable is UIN_DG (uninsured deposit growth). The independent variables include: CAR, NPL, ROA, OPEX, NIM, LDR, BANK_SIZE (total asset of banks), and DEP_IR (deposit interest rate). Control variables for general macroeconomic conditions include: GDP_GR (the growth rate in GDP); INF_RT (inflation rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation. Two dummy variables are LIST_BANK (1=listed bank and o otherwise and FORG_BANK (1 = foreign bank and 0 otherwise).
* Indicate statistical significance at the 10% level (2-tailed)
** Indicate statistical significance at the 5% level (2-tailed)
*** Indicate statistical significance at the 1% level (2-tailed)

As shown in Table 4.6, Table 4.7 and Table 4.8, the variable of bank size (BANK_SIZE), as hypothesized, has a positive sign at the .01 significance level for all observation periods. The variable of deposit interest rate (DEP_IR) has a significant positive impact on total deposits with a p-value of 0.01. These results were consistent for the blanket and the limited guarantee periods. However, the significant impact of deposit interest rates on the growth of time deposits was found only over the period of full guarantee (Table 4.7 column 2a); whereas the significant impact of deposit interest rates on the growth of uninsured deposits was found during the limited guarantee period, particularly between Quarter IV of 2008 to Quarter IV of 2011, as seen in Table 4.8 column 3b.

The macroeconomic indicators, in general, present consistent results. The indicator of economic growth (GDP_RT) had a significantly positive impact on total deposits, time deposits, and uninsured deposits. The empirical evidence for the inflation rate variable (INF_RT) indicates mixed results. Overall, inflation rate had a significantly positive impact on total and time deposits, particularly during the blanket guarantee period. However, this relationship was found to be insignificant during the limited guarantee period. Interestingly, during the limited guarantee period, the inflation rate had a significantly negative impact on uninsured deposits. With respect to the exchange rate (EXC_RT), the regression results suggest a negative impact of exchange rates on all types of deposits.

The regression results on dummy variable BLA_GR, as shown in Table 4.6 and Table 4.7, suggest a positive impact of the provision of blanket guarantees on deposits. This is an encouraging result for the regulators because of the positive sign on the influence of guarantees on bank viability. Moreover, the regression results for the dummy variables, LIST_BANK and FORG_BANK, indicate a negative significant impact on deposits. These results suggest that both listed banks and foreign banks experienced a lower deposit growth than private and domestic banks.

4.3.2 Robustness Test

As a robustness check for the regression results, the present study ran regressions excluding independent variables that are strongly correlated. As can be seen from Table 4.5 correlation matrix, only OPEX and ROA exhibited strong correlations (77.73%). This study used a combination of equations excluding these variables in the model. In general, the results were consistent with the above findings (see Appendix A.3 to A.8 for more detail). As an alternative regression model, the price-based approach was adopted, including implicit deposit interest rates (DEP_IR) as a dependent variable. This is presented in Table 4.9. According to Martinez-Peria and Schmukler (2001), the expected signs should be opposite to when deposit is used as a dependent variable. The present regression results indicate that for the full period of the study only NPL has an insignificant p value. Importantly, under the blanket guarantee, the results indicate that all CAMEL indicators have a significant influence on deposit interest rates, whereas for the limited guarantee period the results suggest that the impacts of CAR and OPEX were insignificant. From these results it can be concluded that ROA, LDR and NIM were the main drivers for deposit interest movements. The interest rate movements were also significantly influenced by macroeconomic variables, such as GDP, exchange rate, and inflation rate.

For comparative purposes, this study also analyzed the data employing the static panel data procedure, excluding lagged dependent variables as regressors in the model. The results in general are consistent with the dynamic panel data approach where most of the CAMEL variables have significant p-values. However, the R-squared values were relatively low, which might be because the nature of the data used in the dynamic panel data analysis was more appropriate.

Table 4.9 Regression Results Depositors Model – Price Effects

			All Periods	Blanket Gr.	Limited Gr.
VARIABLES	**Lag**	**Expected Signs**	**DEP_IR**	**DEP_IR**	**DEP_IR**
DEP_IR	L1		0.445***	0.420***	0.263***
			(0.00412)	(0.00250)	(0.00207)
CAR	L1	(-)	0.00472***	0.0329***	-6.46e-05
			(0.00157)	(0.00155)	(0.000791)
NPL	L1	(+)	0.00029	-0.00307***	0.0647***
			(0.00124)	(0.000903)	(0.00487)
ROA	L1	(-)	0.0859***	0.0442***	0.0734***
			(0.00698)	(0.00643)	(0.00523)
OPEX	L1	(+)	0.0151***	0.0190***	0.00190
			(0.00238)	(0.00117)	(0.00157)
LDR	L1	(+)	0.0203***	-0.0115***	0.0540***
			(0.00186)	(0.00108)	(0.000944)
NIM	L1	(-)	-0.0836***	-0.0829***	-0.0543***
			(0.00417)	(0.00734)	(0.00863)
BANK_SIZE			0.00497***	0.00251***	0.00353***
			(0.000367)	(0.000242)	(0.000363)
TOT_DG			0.00346***	0.00560***	0.00123***
			(0.000439)	(0.000658)	(0.000329)
GDP_GR			0.311***	0.281***	0.243***
			(0.00644)	(0.00448)	(0.00712)
INF_RT			0.170***	0.261***	0.0193***
			(0.00206)	(0.00347)	(0.00241)
EXC_RT			-0.0156***	-0.0324***	0.0140***
			(0.000883)	(0.00116)	(0.00124)
BLA_GR			0.00271***	0.00480***	
			(0.000301)	(0.000329)	
LIST_BANK			0.0123***	0.0186***	0.0155***
			(0.00139)	(0.00107)	(0.00141)
FORG_BANK			0.0127***	0.0259***	-0.0138***
			(0.00409)	(0.00111)	(0.00214)
Constant			0.0541***	0.241***	-0.177***
			(0.00968)	(0.00894)	(0.0102)
Observations			4,069	2,267	1,802
Number of bank			95	95	95
Wald Test	Chi2		236570	397748	43113
			0.000***	0.000***	0.000***
Sargan Test	Chi2		93.40	92.89	91.31
			1.000	1.000	1.000

continued

Table 4.9 continued

Arellano–Bond test for AR(1)	-3.403	-2.308	-2.584
	0.0007***	0.021***	0.0098***
Arellano–Bond test for AR(2)	1.921	1.304	1.243
	0.1548	0.1923	0.214

This table presents the results from the two-step Generalized Method of Moments System estimations. Coefficients and standard errors (in parentheses) are from the second step. The Sargan and Arellano–Bond tests are from the second. The estimation uses quarterly observations over the period 2001–2011. The dependent variable is DEP_IR (deposit interest rate). The independent variables include: CAR, NPL, ROA, OPEX, NIM, LDR, BANK_SIZE (total asset of banks), and TOT_DG (total deposit growth). Control variables for general macroeconomic conditions include: GDP_GR (the growth rate in GDP); INF_RT (inflation rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation. Three dummy variables are BLA_GR (1 = Quarter I of 2001 to Quarter IV of 2004 and 0 otherwise), LIST_BANK (1=listed bank and o otherwise and FORG_BANK (1 = foreign bank and 0 otherwise).

* Indicate statistical significance at the 10% level (2-tailed)
** Indicate statistical significance at the 5% level (2-tailed)
*** Indicate statistical significance at the 1% level (2-tailed)

4.3.3 Discussion

The main objectives of this chapter are to discuss the tests of the hypotheses, to determine the existence of market discipline, and to evaluate the impact of FSN on the market discipline imposed by depositors in the Indonesian banking industry. To achieve these objectives, a regression model was developed and the results related to this model were presented and discussed in Section 4.3.1. The following sections present an interpretation of the regression results, with particular reference to the hypotheses outlined in Chapter 3. This includes a discussion on the impact of bank fundamentals, the design of deposit guarantee schemes, the size of banks, the ownership structure, and macroeconomic indicators on the level of bank deposits.

4.3.3.1 The Association of Deposit Growth with Bank Fundamentals

The literature on market discipline provides strong support for the proposition that depositors have a potential role to discipline banks by moving their funds or demanding a higher risk premium in relation to the risk profile of banks. The present study measures the disciplinary actions of depositors by evaluating the impact of bank fundamentals on the changes in the amount of deposits over the period of 2001 to 2011. This observation period is divided into two sub-periods: a full (blanket) guarantee period and a limited guarantee period, in order to measure the impact of the design of the deposit insurance scheme on market discipline.

Regression results of the estimated relationship between deposit and CAMEL ratios are summarized in Table 4.10.

The changes in deposits were found to be strongly correlated with the movement of each of the six CAMEL ratios used in this study, as can be seen in the summary of regression results[46]. These results indicate that Indonesian depositors have the ability to deduce information from the published financial data and to exert market discipline accordingly. These results in general support the hypothesis that, to a certain extent, some unsophisticated markets in developing economies are still able to exert market discipline (Levy-Yeyati et al., 2004a).

Table 4.10 Summary of the Results for CAMEL Ratios

Variables	Sign	Blanket guarantee Period	Limited guarantee Period
TOTAL DEPOSIT GROWTH			
CAR	+	Significant	Significant
NPL	-	Significant	Significant*
ROA	+	Significant	Significant*
OPEX	-	Significant	Significant
NIM	+	Significant	Significant
LDR	-	Significant*	Significant*
BANK SIZE	+	Significant	Significant
DEP_IR	+	Significant	Significant
TIME DEPOSIT GROWTH			
CAR	+	Significant	Significant
NPL	-	Significant	Significant*
ROA	+	Not significant	Not significant
OPEX	-	Significant	Significant*
NIM	+	Significant*	Significant
LDR	-	Significant*	Significant*
BANK SIZE	+	Significant	Significant
UNINSURED DEPOSIT GROWTH			
CAR	+	N/A	Significant
NPL	-	N/A	Not significant
ROA	+	N/A	Significant*
OPEX	-	N/A	Not significant
NIM	+	N/A	Significant*
LDR	-	N/A	Significant*
BANK SIZE	+	N/A	Significant

* The sign is contrary to the expectation

[46] Regression results for ROA and NIM for all periods of observation were insignificant, but if the observation period is divided into the full guarantee and the limited guarantee, the results were significant.

In order to identify the differences in behaviour between retail and wholesale investors, this study used time deposits and uninsured deposits as signals to identify the sensitivity of wholesale depositors on bank risk. The growth of time deposits is correlated significantly with 5 out of the 6 CAMEL variables. For uninsured deposits[47], the deposit growth was only influenced significantly by four out of the six CAMEL variables. These results indicate a weaker market discipline by the holders of time deposits and uninsured deposits.

Under the assumption that a majority of time deposits and uninsured deposits are owned by large individuals and institutional depositors, these results contradict the premise that sophisticated wholesale investors have a much better capacity to impose discipline on financial institutions. Theoretically, wholesale depositors have a higher capacity to access and utilize information to make decisions (Garten, 1986), and they have significant incentives to monitor banks since their funds are not insured (Flannery, 2001). Therefore, the weaker discipline by wholesale depositors indicates the possibility of moral hazard implications due to a FSN, with wholesale depositors taking advantage of the government guarantee for their own benefit. This view concurs with that of Huang and Ratnovski (2011). As stated in the literature, a safety net has potentially lower risk of default, which enables wholesale depositors to invest money in a particular bank. This offers higher return regardless of its risk.

The exploitation of government guarantees by wholesale depositors could also possibly occur due to a condition in which small banks in Indonesia have a tendency to rely on wholesale funds[48]. This could provide opportunities for wholesale depositors to dictate to bank management for the provision of high interest rates to ensure depositors retain funds in their banks. This evidence, perhaps, could partially explain the phenomenon of the "deposit interest rate wars" that frequently occur in the Indonesian market, particularly in the midst of financial market turbulence (Bank Indonesia, 2009b).

The indicator of a bank capital adequacy (CAR) is one of the main factors that influences the growth of deposits in Indonesia. This concurs with the work of Kameyama et al. (2006). In the Indonesian market, uninsured deposits, time deposits, and total deposits grow faster in banks with a stronger capital base because these banks are considered less risky. The ability

[47]The growth of uninsured deposit is observed during the limited guarantee period from Quarter I of 2006 to Quarter IV of 2011.

[48]Table 4.2 shows that small banks in general have a higher proportion of time and uninsured deposit than large banks. Majority of the Indonesian small banks are categorized as regional development banks, non-foreign exchange commercial banks, and joint venture banks.

of banks with higher capital buffers to attract greater deposits is a signal of the presence of market discipline (Barajas & Steiner, 2000).

The results presented in Table 4.10 indicate the presence of mixed results on the correlation between NPL and deposits over the periods of blanket guarantee and limited guarantee. During the blanket guarantee period, the sign on the correlations is negative, which is consistent with existing literature that maintains that if market discipline exists, an increase in distressed assets would have a negative effect on deposit growth (Wu & Bowe, 2012). An increase in non-performing loans would be interpreted as an increase in bank credit risk and a reduction of profit because the bank has to set aside some provision to cover potential losses. In the Indonesian case, over the period of blanket guarantee, many banks recorded high NPL ratios that were above the central bank regulation of a maximum of 5% during the period immediately following the 1997 financial crisis. One of the main concerns of both bank management and regulators was how to write down these underperforming and nonperforming assets from bank balance sheets. The finding of the current study suggests that Indonesian depositors are also concerned about credit risk and, therefore, exercise market discipline by punishing banks that have a high NPL ratio (Kameyama et al., 2006).

In contrast, the sign on the relationship between NPL and deposit is positive during the limited guarantee period. One possible explanation relates to the condition of high NPL rates during the period of limited guarantee. In this period, the Indonesian banking sector had recovered from the financial crisis and the NPL ratio was not a major issue since most of the banks had complied with the central bank regulation to maintain their NPL under 5% (Bank Indonesia, 2009b). In this period, an increase in the provision of credits might not be viewed simply as a deterioration of bank credits, but could also be seen as the ability of bank management to obtain more deposits to finance new loans, which in turn would generate more income in the future. If this assumption is accurate, this could partially explain the tendency of higher deposit growth for banks with a higher NPL growth during the limited guarantee period.

Regression results of the relationship between the ROA variable and deposit growth suggests that the Indonesian depositors imposed discipline by investing their funds in more profitable banks, particularly during the full guarantee period. This finding is consistent with the hypothesis that a bank with a stronger earning quality indicator would likely be able to attract more deposits (Levy-Yeyati et al., 2004a). Nevertheless, over the period of limited guarantee, the relationship between ROA and deposit growth was negative, which indicates that the

improvement in bank profitability is followed by a decline in the rate of deposit growth[49]. This relationship, in a way, can be interpreted as an indication of a weaker market discipline. In this case, banks with low ROA indicators are more active in the market to gather deposits to finance their operations. Alternatively, the negative correlation can be seen as a signal of a different kind of market discipline action if depositors perceive that banks with a higher rate of ROA pose higher risks. If this is the case, market discipline during the limited guarantee period is demonstrated by the withdrawal of funds from banks that are perceived as having higher returns from risky investments - the additional risk does not justify the additional returns.

The empirical results of this study suggest that an increase in NIM would increase the volume of total deposits. NIM serves as an indicator of profitability which is calculated as the difference between interest earned and the interest paid by the banks. This could be increased by either reducing deposit interest rates (interest expense) or by increasing credit interest rates (interest revenue). If the increase in NIM was caused by lowering interest expenses, then it can be assumed that market discipline is effective. Generally, large banks are able to keep their deposit interest rates low because these banks have wider retail deposit bases that provide cheap funds. In contrast, if the improvement in a bank's NIM is the result of an increase in interest revenue from riskier investments that offer higher rates of returns, then depositors would probably react by decreasing their balances or, in extreme cases, withdraw their money completely. This might be the case for small banks that have limited access to low-cost retail deposits and therefore rely on expensive wholesale funding sources. To sum up, without any information on the actual reason for the increase in the NIM ratio, the impact of this variable on market discipline cannot be accurately determined.

The management efficiency variable as measured by the ratio of OPEX indicates a negative relationship implying that an increase in the value of the OPEX ratio results in a decline in the volume of deposits. This finding is consistent with the view that less efficient banks are expected to have higher expenditure; hence depositors would punish these inefficient banks by withdrawing their deposits. However, there is a possibility that the increases in expenditure are the result of greater investments in improving customer service. According to Martinez-Peria and Schmukler (2001), if the control variable for the quality of service cannot be measured, the effect of this efficiency variable cannot be determined. As this study does

[49] A similar situation was found in the Chinese market by Wu and Bowe (2012), who argue that this negative response of investors to an increase in reported bank earnings may represent the depositor perception that such earnings are potentially subject to manipulation by management.

not measure the quality of service variable, the impact of this variable on market discipline in the Indonesian market is undetermined.

The liquidity risk indicator, as measured by the LDR, indicates a positive relationship between the growth of deposit and LDR ratio, either during the blanket guarantee or the limited guarantee period. This sign on the relationship can be interpreted as the willingness of depositors to increase the size of their balances enabling the banks to increase their lending. These results are contrary to expectations as suggested by existing literature, which maintains a reverse correlation between a liquidity variable with the growth of deposits (Barajas & Steiner, 2000; Demirgüç-Kunt & Huizinga, 2003; Martinez-Peria & Schmukler, 2001). The previous findings suggest that at any given level of total deposits, a more prudent bank will issue fewer loans in order to maintain access to more liquid assets in the event of unexpected declines in the balances (Martinez-Peria & Schmukler, 2001; Wu & Bowe, 2012). However, in the Indonesian market, findings suggest that during the observation period of this study, an increase in LDR might not be seen as an increase in liquidity risk, but rather as an increase in bank capacity to generate revenue from new loans. Before the 1997 financial crisis, the average LDR of Indonesian banks was above 100% (Batunanggar, 2002), whereas the mean and median of LDR for sample banks in this study was 81.97% and 70.50% respectively, as shown in Table 4.4. Moreover, this ratio is comparatively small in comparison to other ASEAN member countries (Bank Indonesia, 2012b)[50]. If this assumption is valid, then it can be concluded that Indonesian depositors exercised discipline by rewarding banks that have the ability to generate higher levels of revenue through disbursing more loans at any given level of deposits.

Besides the CAMEL indicators, deposit interest rate is one of the main factors affecting the growth of deposits, as can be seen in Table 4.10. If market discipline exists, for a given increase in the interest rate, banks that are perceived as financially healthy may experience a growth in their deposits (Boyd & De Nicolo, 2003). Hadad et al. (2011) confirmed the existence of market discipline by depositors in Indonesia, which was imposed through a market price mechanism, where depositors demanded higher rates of return to compensate for additional risks. However, if market discipline is effective, banks cannot continuously adjust interest rates to attract new deposits, unless this is accompanied by an improvement in their risk profile (Boyd & De Nicolo, 2003). The provision of a FSN in the Indonesian banking

[50] To stimulate a higher level of LDR, the central bank issued a regulation on 1 March 2011 that linked the bank reserve requirement. The benchmark for a prudent LDR is 78% to 100%. A bank with a LDR lower or higher than the benchmark will be charged additional reserve requirements.

sector might distort the market price mechanism by enabling weak banks to compete for deposits. As documented in Enoch et al. (2001), the central bank introduced a cap in deposit rates in 1998. This was done in order to minimize the moral hazard implications arising from weaker banks attempting to increase their deposit balances through offering unsustainably high interest rates. Such actions could lead to solvency issues. This cap on the interest rate is no longer in place despite the potential of the moral hazard implications of the FSN. Therefore, the role of a banking supervisor is to ensure that only healthy banks have access to compete for deposits using the market price mechanism, such as competitive interest rates (Boyd & De Nicolo, 2003).

4.3.3.2 The Association of Deposit Growth with Bank Ownership Structure

The present study includes the variables of foreign ownerships (FORG_BANK) and public ownership via stock market (LIST_BANK) as dichotomous qualitative variables to represent non-fundamental risk factors. The regression results for the growth of total and time deposits indicate that both foreign and listed banks experienced lower deposit growth rates than domestic and non-listed banks. The flow of deposit can be influenced by two factors: the supply side (from depositors) and the demand side (from banks) (Wu & Bowe, 2012). From the supply side, it can be argued that depositors prefer to invest their money in domestic and non-listed banks. However, from the demand side, foreign and listed banks might not be as active as their counterparts in the market to compete for deposits to finance their business.

A previous study by Hadad et al. (2011), who used implicit deposit interest rates to measure market discipline (the price-based approach), found that listed and foreign banks, which are considered to have stronger capital and better governance, paid lower interest rates than their counterparts. Therefore, Hadad et al. argue that market discipline, when it exists, is more noticeable in listed and foreign banks compared to unlisted and domestic banks, respectively.

The present study, adopting a quantitative approach, found a significant negative impact of foreign banks and listed banks on the growth of deposits. However, to make a conclusion in relation to the research question about the influence of the ownership structure of a bank on depositor discipline, further investigation is required to determine which factor (the supply side or the demand side) is more dominant in defining the growth of deposits. Without any further information, the present study cannot arrive at a firm conclusion on the direction of the impact of this variable on market discipline.

4.3.3.3 The Association of Deposit Growth with Size of Bank

BANK_SIZE is used as a control variable to test depositor sensitivity on bank risk that might be influenced by the size of a bank. In all sub-models, the impact of bank size on deposits is positive. These results are consistent with the TBTF doctrine that suggests the advantages of large banks over smaller counterparts to attract greater inflow of deposits. Large banks are generally perceived as safer than small banks by conservative investors, mainly because these banks are expected to be bailed out by governments in the event of financial distress (Barajas & Steiner, 2000; Martinez-Peria & Schmukler, 2001). As discussed in Chapter 2, in the current Indonesian FSN framework, the policy option to bailout a failed bank only applies to the systemic component of bank risks. Hence, as large banks are perceived as bearing systemic risks with implications for the whole banking system, these banks are expected to be bailed out by the government in the event of financial distress (Hadad et al., 2011).

4.3.3.4 The Association of Deposit Growth with Macroeconomic Variables

The blanket guarantee period was included in the model to verify the impact of its phasing out and replacement by the limited deposit insurance scheme. The empirical evidence of the present study suggests that the growth of deposits was higher during the period of blanket guarantee than the limited guarantee periods. As stated in Chapter 2, the main objective of the blanket guarantee in the first place was to restore public confidence to the domestic financial market after the devastating losses of the 1997 financial crisis (Enoch et al., 2001). At this point, the provision of the blanket guarantee had achieved its intended objectives to stimulate the inflow of deposits to the Indonesian banking sector. Furthermore, the reduction of deposit guarantee coverage and the establishment of the Indonesian deposit insurance corporation were expected to minimize the moral hazard implications of the blanket guarantee and to limit the burden of the insurance program to the state budget (Batunanggar, 2002). If the lower growth of deposits over the period of the limited guarantee can be attributed to the increase of depositor awareness regarding bank risk, then the objective to enhance market discipline has been achieved to some extent (Barajas & Steiner, 2000; Demirgüç-Kunt & Detragiache, 2002). This assumption is consistent with the cross-country study by Demirgüç-Kunt and Detragiache (2002), which find that the less extensive the coverage of deposit insurance, the less moral hazard and the greater the market discipline.

Three macroeconomic indicators were included in the equation as control variables. As other studies in developing economies have shown, the present study does not expect a particular sign of the relationship between deposit growth and macroeconomic indicators. The regression results present a positive correlation between GDP, as an indicator for economic activity, and deposits. This relationship suggests more deposit inflows to the banking sector during a high economic growth than during recession. The second control variable is inflation, which also presents a positive correlation, similar to the GDP ratio. This similarity is possible because a high economic growth is commonly associated with inflation. The other variable is exchange rate (EXC_RT). The volatility of the domestic currency exchange rate against the US dollar demonstrates a negative relationship with the level of deposits. This result suggests that the appreciation of local currency would deter the inflow of deposits into the banking system, and vice versa.

4.4 Chapter Summary

This chapter presented the results of the empirical study on the factors affecting market discipline. The study model was formulated using a GMM approach and the data was acquired from a sample of 95 banks and covered the period of 2001 to 2011. This period represented an important episode in the evolution of the Indonesian banking sector, during which the initial impacts of some major financial reforms were observed. Of particular relevance was the introduction of a limited deposit guarantee scheme provided by the IDIC to replace a system of blanket guarantees. The findings of this chapter are summarized below in Table 4.11.

The results, in general, are consistent with the standard depositor discipline hypothesis as discussed widely in the literature. Under this hypothesis, the level of deposits is sensitive to changes in bank fundamentals after controlling for a variety of other external influences, namely the macroeconomic environment and ownership structure. The results support the proposition that an unsophisticated market is capable of instilling market discipline. Further, these results also support the view that improving information disclosure, such as the publication of certain key financial ratios, allows depositors to monitor bank risk behaviour more effectively. The ability of depositors to monitor banks is expected to encourage prudential risk management practices in the Indonesian banking sector. However, the provision of the Indonesian FSN, which reduces the risk of default, and the dependency of

some small banks on wholesale funds, have dampened the disciplinary influence, particularly those of sophisticated wholesale depositors.

Table 4.11 Summary of the Results

Hypotheses	Indicators	Results
Total deposit growth has a positive relationship with bank fundamentals	CAR	Significant
	NPL	Significant
	ROA	Significant
	OPEX	Significant
	NIM	Significant
	LDR	Significant
	BANK_SIZE	Significant
	DEP_IR	Significant
Time deposit growth has a positive relationship with bank fundamentals	CAR	Significant
	NPL	Significant
	ROA	Not significant
	OPEX	Significant
	NIM	Significant
	LDR	Significant
	BANK_SIZE	Significant
Uninsured deposit growth has a positive relationship with bank fundamentals	CAR	Significant
	NPL	Not significant
	ROA	Significant
	OPEX	Not significant
	NIM	Significant
	LDR	Significant
	BANK_SIZE	Significant
The correlation between deposit growth and bank fundamental for large banks is not equal to that of small banks	BANK_SIZE	Significant
The correlation between deposit growth and bank fundamental for listed banks is not equal to that of unlisted banks	LIST_BANK	Significant
The correlation between deposit growth and bank fundamental for foreign banks is not equal to that of domestic banks	FORG_BANK	Significant

This study also provides some preliminary evidence that the growth of total deposits, time deposits, and uninsured deposits at large banks were generally higher than those of the small banks. This result provides strength to the TBTF perception amongst depositors. The ownership structures of a bank, in this case listed and foreign banks, have significant correlations with the level of deposits. The flow of deposits can be influenced by two dimensions: the supply side (from depositors) and the demand side (from banks). In order to assess the impact of the ownership structures of banks on depositor behaviour, further investigation is required to evaluate which of these two dimensions is more dominant. For

that reason, the present study up to this point could not make any reliable conclusions on how the ownership structure of a bank might influence the Indonesian depositor behaviour toward listed and foreign banks.

The volume of deposits declined following the implementation of a cap on the deposit insurance cover. If the decline in the level of deposits is a reflection of the sensitivity of Indonesian depositors to bank fundamentals, the above observation is a strong indicator that participants in Indonesian financial markets have reached a level of sophistication that is sufficient to discipline the more powerful banks. This finding is consistent with those of previous studies that provided evidence of the impact of reduced deposit insurance coverage in creating greater market discipline and limiting moral hazards.

With respect to existing literature, the disciplinary action imposed by depositors by withdrawing their deposits is consistent with empirical evidence from other developing countries, for example Colombia (Barajas & Steiner, 2000), Argentina (Calomiris & Powell, 2001), India (Ghosh & Das, 2003), Russia (Karas, Pyle, & Schoors, 2010), and China (Wu & Bowe, 2012). In addition, the finding also provides evidence to support the argument that large banks are able to attract more deposits at lower interest rates due to TBTF perception, which is also the evidence from Argentina (Calomiris & Powell, 2001) and Colombia (Barajas & Steiner, 2000). However, in terms of discipline imposed by uninsured deposit holders, the finding is inconsistent with the empirical evidence found in Argentina, Chile, and Mexico (Martinez-Peria & Schmukler, 2001) where uninsured depositors were more effective in monitoring bank risks. The reason for this difference could be the lower reliability of the Indonesian deposit insurance program and the dependency of the banks on uninsured wholesale funds that make them willing to provide high interest as requested by wholesale depositors.

In summary, the empirical results of this study support hypothesis H1a, H1b, and H1c that the growth of total deposit, time deposit, and uninsured deposit have a positive relationship with bank fundamentals. The results also support the hypothesis H1d that the correlation between deposit and bank fundamentals for largeer banks is different from that of smaller banks. Similarly with hypothesis H1e and H1f, the findings is that the correlation between deposit and bank fundamentals for listed banks is different from that of unlisted banks, and the correlation between deposit and bank fundamentals for foreign banks is different to that of domestic banks. These results suggest that, regardless of the lack of ideal conditions for an effective market discipline, there are strong early signs of the presence of market discipline

imposed by depositors in the Indonesian banking sector. Findings from this study have important policy implications for developing an environment conducive to more effective market discipline. They also highlight that the moral hazard implications of the FSN are not very strong.

The general policy implications of the study findings are presented in Chapter 7.

Chapter 5
Research Data and Results of the Bond Holder Model

5.1 Introduction

This chapter presents the findings on the market discipline imposed by debt holders in the Indonesian banking Industry. As stated in Chapter 2, market discipline is measured by an analysis of the relationship between bank fundamentals and the return on bonds issued by banks. This chapter is organized as follows. Section 5.2 presents the data and methodology employed in this study. Section 5.3 provides evidence to determine whether debt holders are able to monitor the financial indicators of banks and impose discipline on them. Section 5.4 presents a summary of the findings to address the four research objectives of this study concerning the existence of market discipline as exercised by debt holders in the Indonesian banking sector.

5.2 Data Description

This section explores the sources and characteristics of the sample data, including all variable discussed in Chapter 3. It starts with an explanation of the method of data collection, followed by descriptive statistics of the collected sample data set and the coefficients of correlation. These steps represent the initial investigations of the data before applying the model to test the hypotheses and arriving at conclusions about the objectives of the study.

5.2.1 Data Source

The research to date on the influence of debt holders on bank risk-taking behaviour has tended to focus on market discipline based on the relationship between subordinated debt and bank risk. However, in an emerging bond market, the number of subordinated debts issued by banks is limited. The majority of bonds issued and traded in the market are senior bonds. Excluding senior bonds, as is the approach taken by some previous studies, therefore, would result in unreliable and invalid conclusions. In order to avoid this limitation, this study included both subordinated and senior debts in the model estimation, as suggested by Menz (2010). This approach to sample selection has a number of advantages. For instance, the use

of senior bonds in the sample enabled the measurement of the potential of senior bonds as a source of market discipline. In addition, the inclusion of both senior and subordinated bonds enabled the comparison of the degree of discipline (if any) that each type of bond may have on banks in the Indonesian bond market.

The yields of the Indonesian corporate bond data were collected from the IBMD, published by the IDX[51]. The yields of the government bonds were gathered from the Bloomberg database. The IBMD is issued annually, containing information on bond yields on a quarterly basis through OTC transactions in the Indonesian bond market. The first edition of the IBMD was issued in 2008, capturing quarterly bond yield data from 2007 until 2008. Therefore, the observation period of this study was started from Quarter I of 2007 until Quarter IV of 2011. The bonds that had less than four observation periods in every year (four quarters) were excluded from the observation. All the bonds in the sample were in domestic currency with quarterly fixed rate interest payments. As stated earlier, Islamic bonds or sukuk were also excluded from the observation. As a result, during the five-year period, the study observed 70 bonds as samples, consisting of 18 subordinated bonds and 52 senior bonds issued by 23 banks (4 state banks and 19 private domestic banks). The breakdown in the number of bonds traded in each year is provided in Table 5.1. As shown, the study covered more than 75% of total bonds in circulation.

[51] From 2011, the Indonesian Bond Pricing Agency (IBPA) has been involved in the production of the Bond Directory. The IBPA was established in 2009 as the first licensed independent securities pricing agency focused on performing valuations and pricing of Indonesian fixed income securities, sukuk, and other securities.

Table 5.1 Distribution of the Sample

Year	Total Outstanding			Total Observed		
	Senior Bonds	Subordinated Bonds	Total Bonds	Senior Bonds	Subordinated Bonds	Total Bonds
2007	30	11	41	24 (80%)	7 (64%)	31 (76%)
2008	33	13	46	25 (76%)	10 (77%)	35 (76%)
2009	29	11	40	23 (79%)	8 (73%)	31 (78%)
2010	29	11	40	27 (93%)	10 (91%)	37 (93%)
2011	47	17	64	37 (79%)	14 (82%)	51 (80%)

Sources: The Indonesian Bond Market Directories, 2008-2012

The yield spread was calculated as the spread of each government bond issued with comparable maturity, as adopted by Avery et al. (1988) and Evanoff and Wall (2001). For example, the yield spread of a bond that matured in five years was calculated by subtracting the yield of the bond from the yield of a five year government bond over a similar period.

The accounting information was collected from the quarterly financial statement of the Indonesian banks[52]. The banks are required by regulators to publish quarterly financial reports, including the CAMEL ratios, in order to improve transparency and provide more meaningful financial information to the public. Therefore, CAR, NPL, OPEX, ROA, and NIM ratios were taken directly from various publications of the banks because the objective was to examine the influence of CAMEL ratios that were calculated and published by the banks on yield spread. However, the DER was calculated using data from the financial statements because this ratio was not included in the mandatory publications. The information about the type of banks, for instance state bank or private bank, was derived from the Indonesian Banking Directory published by the Indonesian central bank.

Information about the rating of bonds was collected from the IBMD books and press releases of rating agencies operating in Indonesia. There are three main such rating agencies: (i) Pemeringkat Efek Indonesia (PEFINDO), whose rating process is supported through the Standard and Poor Rating Services (S&P) as its affiliate global partner; (ii) Indonesia Credit Rating Agency (ICRA), whose majority of shares is owned by the international Credit Rating Agency Moody's Investors Service; and (iii) Fitch Rating which is a majority-owned

[52] As stipulated in the *Bank Indonesia* regulation, all banks are required to publish quarterly and annually financial statement on mass media with national circulation. The report can also be assessed from the website of each bank and from the *Bank Indonesia*'s website (www.bi.go.id)

subsidiary of Fimalac SA. The analysis considers 10 levels of risk based on ratings disclosed by the rating agencies. This is illustrated in Table 5.2, which has been adapted from the procedure used by Sironi (2003).

Table 5.2 Rating Scale

Pefindo (S&P)	Fitch	ICRA (Moody's)	Scale	Rating Description
AAA	AAA	Aaa	1	Prime - Highest Quality
AA+	AA+	Aa1	2	High grade- High Quality
AA	AA	Aa2	3	
AA-	AA-	Aa3	4	
A+	A+	A1	5	Upper medium grade - Strong payment capacity
A	A	A2	6	
A-	A-	A3	7	
BBB+	BBB+	Baa1	8	Lower medium grade - Adequate Payment Capacity
BBB	BBB	Baa2	9	
BBB-	BBB-	Baa3	10	

Source: IBMD, Pefindo, Fitch, and ICRA

5.2.2 Descriptive Statistics

As discussed in Chapter 3, the presence of market discipline is principally analyzed by investigating the relationship between bank asset prices and their respective risks. This analysis tested the market discipline through both senior and subordinated debts holders. As displayed in Table 5.3, the analysis took into account 656 observation points from 70 bonds belonging to Indonesian banks that were traded in the Bond Market from Quarter I of 2007 until Quarter IV of 2011. In terms of size, the largest bank in the sample had a total asset of IDR 489.1 trillion, whereas the smallest had a total asset of IDR 1.8 trillion. The table presents the mean, median, maximum, minimum, standard deviation, and skewness of the individual bank and market risk variables. The minimum CAR was 9.34% showing that all banks under investigation were solvent and had met the central bank's and the Basel II's minimum CAR requirement of 8.00%. The maximum NPL was 9.5%, which is above the maximum of 5% as stated in the central bank regulation. Nevertheless, most of the banks had NPL ratios below 5% as reflected in the mean and median of the NPL, which were 2.95% and 3.02% respectively. Overall, the positive sign of ROA and NIM indicated that the banks in general were able to generate normal profits during the observation period. The values of the dependent and independent variables indicated that, in general, the distributions of the

data are skewed. To approximate normality, all variables were transformed using the natural logarithmic transformation before their inclusion in the analyses.

What is interesting in this data is that the bond yield spread had a minimum value of negative 7.37%. Under normal conditions, the spread would be positive since the corporate bonds yields are generally higher than risk-free government bonds. It is apparent from Table 5.3 that the spreads, in general, were consistent with the rule of thumb since the mean and median of the yield spread had positive values of 1.21% and 1.73% respectively. However, as depicted in Figure 5.1, the yield of government bonds from Quarter I of 2008 until Quarter II of 2009 had increased drastically and exceeded the average corporate bond yields. This phenomena was attributed to the global de-leveraging process in which capital flows to emerging markets were reversed as foreign investors pulled back their investment during the of global financial crisis. As reported in the Global Financial Stability Report released by the IMF (2009a), emerging markets, such as Indonesia, experienced large portfolio outflows in 2008 and 2009. Beside the de-leveraging process, investors were also concerned about the consequences for public finances of stimulus plans and bailout packages in the troubled developing economies. Therefore, global investors withdrew their investment portfolios from emerging markets for two main reasons: flight to liquidity and flight to quality (Bank Indonesia, 2009a). Consequently, the market premiums for sovereign risk and sovereign bond yields were rising rapidly. As a result, the government bonds, which comprised about 17% of the total owned by foreign institutional investors, were sold at deep discounts (fire sales). By contrast, the prices of corporate bonds remained stable since these were mainly held by local investors and were not actively traded in the market during the turbulent period. To prevent further deterioration, the government of Indonesia suspended the auction of new bonds and offered to buy-back government bonds (Departemen Keuangan, 2009).

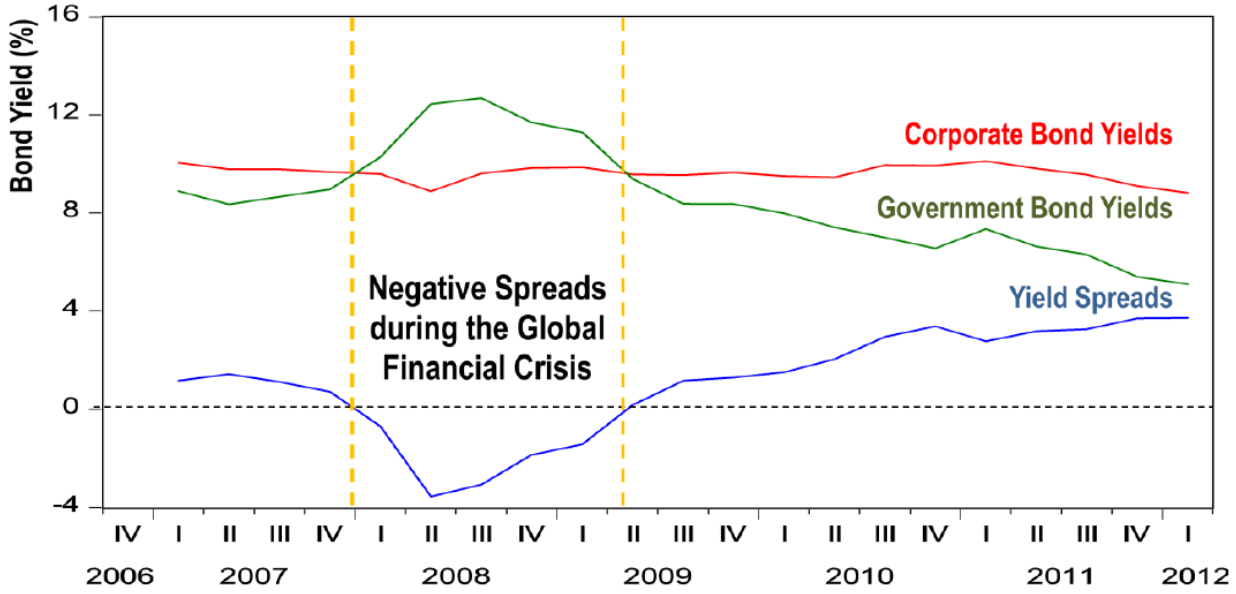
Table 5.3 Descriptive Statistics

	YIELD_SP	CAR	ROA	NPL	OPEX	NIM	DER	GDP_RT	EXC_RT	BI_RT	RATING	BOND_SIZE	BANK_SIZE
Mean	1.2075	0.1846	0.0258	0.0295	0.8087	0.0699	9.1777	0.0603	9,298	0.0732	5.33	621	55,937
Median	1.7252	0.1755	0.0230	0.0302	0.8134	0.0635	8.9867	0.0629	9,118	0.0675	5.00	400	36,693
Maximum	11.2375	0.4268	0.1034	0.0950	0.9512	0.1868	30.5759	0.0681	11,575	0.0925	9.00	3,500	489,106
Minimum	-7.3670	0.0934	0.0050	0.0040	0.1089	0.0135	1.8286	0.0414	8,597	0.0600	2.00	10	1,863
Std. Dev.	2.4420	0.0495	0.0118	0.0159	0.0750	0.0278	3.4944	0.0073	675	0.0100	1.93	596	72,895
Skewness	-0.52	1.14	1.39	0.47	-1.76	0.97	1.05	-1.42	2.05	0.63	0.00	2.11	3.01
Observations	656	656	656	656	656	656	656	656	656	656	656	656	656

Table 5.4 Correlation Matrix of Dependent and Independent Variables

Variables	A	B	C	D	E	F	G	H	I	J	K	L	M
A.YIELD_SP	1												
B. CAR	-0.2379	1											
C. ROA	0.1644	0.0241	1										
D. NPL	-0.0209	-0.1768	-0.3735	1									
E. OPEX	-0.1645	-0.0204	-0.7356	0.2723	1								
F. NIM	0.0213	0.0213	0.7078	-0.4690	-0.3720	1							
G. DER	-0.0219	-0.3274	-0.0595	0.0885	0.0609	-0.0902	1						
H. GDP_RT	0.3084	-0.0428	0.1800	-0.0855	-0.2270	0.1367	-0.0483	1					
I. EXC_RT	-0.4944	0.1107	-0.2037	0.0722	0.2568	-0.1179	0.0557	-0.7576	1				
J. BI_RT	-0.6636	0.2816	-0.1823	0.0961	0.1266	-0.0969	0.1553	-0.0195	0.3588	1			
K. RATING	-0.1208	0.1180	-0.0205	-0.1444	0.1576	-0.0622	0.2602	-0.0936	0.1578	0.3161	1		
L. BOND_SIZE	0.0720	-0.1717	-0.0203	0.1473	-0.1519	-0.1408	-0.0811	0.0704	-0.1030	-0.1810	-0.5471	1	
M. BANK_SIZE	0.0793	-0.2023	0.0693	0.2431	-0.2500	-0.0486	-0.1587	0.0553	-0.0828	-0.1865	-0.6410	0.7180	1

Figure 5.1 The Average Yields of Government Bonds and Corporate Bonds in the Indonesian Bond Market, 2007-2011



With regard to the BOND_SIZE, the smallest number of bonds issued by a bank was IDR 10 billion, whereas the biggest was IDR 35 trillion, with an average of IDR 400 billion. The correlation between the size of issue and the size of the bank was 71.80% as shown in Table 5.4, implying that the larger banks had the potential to sell more bonds than their smaller counterparts.

The distribution of the three macroeconomic variables (GDP_RT, EXC_RT and BI_RT) covered both the crisis and normal periods. In particular, their minimum and maximum values suggested the volatility of the country's economy during the study period. For example, during the crisis in 2008 to 2009 the exchange rate (EXC_RT) of Indonesian domestic currency deeply depreciated against the US dollar reaching its lowest level of IDR 11,575. During that period, the Indonesia's central bank interest rate (BI_RT) reached the highest level of 9.25%, while the year-on-year GDP growth dropped to 4.14%.

5.2.3 Correlation Matrix

Table 5.4 presents the correlations between the variables in the analysis. The first column of the table shows the correlations between the dependent variable (YIELD_SP) and each independent variable excluding the dummy variables. The Pearson correlation matrix revealed that the dependent variables and the bank idiosyncratic variables were less than 25%. The highest figure was CAR with the value of -0.24, and the lowest one was NPL with the value of -0.02. Furthermore, this study utilized three macroeconomic indicators as control variables. As can be seen in the table, correlation between YIELD_SP and GDP_RT growth was 0.31, exchange rate (EXC_RT) was -0.49, and the central bank's benchmark interest rate (BI_RT) was -0.66. These data indicate that all macroeconomic variables had higher coefficients of correlation with the explanatory variables compared to the individual bank variables. As verified by Levy-Yeyati et al. (2004a), these figures reflect a common situation in developing economies where market risk factors have a tendency to be more dominant than idiosyncratic factors in defining the risk of financial institutions.

The pairwise correlations between the independent variables are displayed in the Table 5.4 from columns 2-12. Among the CAMEL indicator variables, stronger correlations were observed between ROA and OPEX at -0.73; and ROA and NIM at 0.71. Moreover, strong correlations were found between BANK_SIZE with RATING and BOND_SIZE at -0.64 and -0.72 respectively. The correlation matrix suggests that the pairwise correlation coefficients among the independent variables were less than 0.80.

5.3 Analysis and Discussions of the Results

The findings of this study with respect to the tested research hypotheses are presented in this section. The discussion starts with an analysis of empirical results, as well as tests for the robustness of the model. This is followed by an in-depth analysis and discussion of the regression results. The discussion in particular addresses the hypotheses outlined in Chapter 3 in relation to market discipline imposed by bond holders in the Indonesian banking industry.

5.3.1 Empirical Results

The presence of market discipline in the Indonesian bond market was tested by employing the GMM estimator model as presented in Chapter 3. The models employed to test the hypotheses have satisfied the requirement of the GMM, including the Wald test, the Sargan test and the Arellano–Bond test for zero autocorrelation in first-differenced errors. This can be seen in Table 5.5.

The Arellano–Bond serial autocorrelation test of first order rejects the hypothesis on the presence of serial autocorrelation, and the test on second order serial correlation presents no significant evidence of serial correlation in the first-differenced errors at order 2. In addition, the Sargan test of over-identifying restrictions shows strong evidence against the null hypothesis that the over-identifying restrictions are valid.

The GMM model was chosen because suggestions in the recent literature indicate that it is more suitable for situations with dynamic relationships. The results obtained from the regression results as presented in Table 5.5 indicate that the lagged variable of YIELD_SP in the equation has a significant positive value with a $p = 0.01$ level. This result justifies the decision to employ a dynamic model of panel data since the bond spreads were significantly influenced by the spread of the previous periods.

Table 5.5 Regression Result

VARIABLES	Lag	Expected Signs	(1) YIELD_SP	(2) YIELD_SP	(3) YIELD_SP*	(4) YIELD_SP*
YIELD_SP	L1	(+)	0.871***	0.873***	0.536***	0.508***
			(0.0138)	(0.0327)	(0.0242)	(0.0296)
CAR	L1	(-)	-0.103***	-0.0974***	-2.233***	-2.229***
			(0.00786)	(0.0166)	(0.233)	(0.324)
ROA	L1	(-)	0.789***	0.832***	11.97***	11.51***
			(0.0247)	(0.0941)	(2.040)	(2.322)
NPL	L1	(+)	0.118***	0.0669**	0.810***	1.208
			(0.00583)	(0.0263)	(0.235)	(0.954)
OPEX	L1	(+)	0.0200***	0.0238**	0.556	0.456
			(0.00762)	(0.0114)	(0.361)	(0.423)
NIM	L1	(-)	-0.390***	-0.485***	-0.0242	-2.289***
			(0.0238)	(0.0682)	(0.858)	(0.543)
DER	L1	(+)	0.0101***	0.00868***	0.268***	0.185***
			(0.000533)	(0.00125)	(0.0268)	(0.0434)
RATING	L1	(-)	-0.00256***	-0.000924	-0.0338**	-0.0566***
			(0.000908)	(0.000970)	(0.0132)	(0.0118)
BANK_SIZE		(-)	-0.00579***	-0.00404	-0.115***	-0.137***
			(0.00151)	(0.00276)	(0.0218)	(0.0230)
BOND_SIZE		(-)	0.0127***	0.0125**	0.106***	0.155***
			(0.00167)	(0.00562)	(0.0290)	(0.0313)
GDP_GR			-0.167***	-0.206**	-5.950***	-3.663***
			(0.0299)	(0.0804)	(0.639)	(0.715)
EXC_RT			0.0283***	0.0265***	-0.0191	0.237
			(0.00333)	(0.00575)	(0.142)	(0.167)
BI_RT			-0.0237***	-0.0203***	-0.805***	-0.555***
			(0.00196)	(0.00505)	(0.0358)	(0.0742)
SUBDEBT		(+)	-0.00375	-0.0385	0.268***	
			(0.00497)	(0.0580)	(0.0522)	
STA_BANK		(-)	0.0114***	-0.0219		-0.215***
			(0.00165)	(0.0824)		(0.0489)
SUBDEBT*CAR		(-)		-0.0831		
				(0.0970)		
SUBDEBT*NPL		(+)		0.171		
				(0.108)		
SUBDEBT*ROA		(-)		0.185		
				(0.454)		
SUBDEBT*OPEX		(+)		0.0368		
				(0.0834)		
SUBDEBT*NIM		(-)		-0.0738		
				(0.0586)		

Continued

Table 5.5 continued

VARIABLES	Lag	Expected Signs	(1) YIELD_SP	(2) YIELD_SP	(3) YIELD_SP*	(4) YIELD_SP*
SUBDEBT*DER		(+)		0.00887***		
				(0.00279)		
STA_BANK*CAR		(-)		0.0416		
				(0.116)		
STA_BANK*NPL		(+)		-0.106		
				(0.102)		
STA_BANK*ROA		(-)		-0.788*		
				(0.474)		
STA_BANK*OPEX		(+)		-0.0780		
				(0.0790)		
STA_BANK*NIM		(-)		0.616		
				(0.456)		
STA_BANK*DER		(+)		0.0186		
				(0.0140)		
Constant			0.222***	0.216	0.0135	-4.075***
			(0.0713)	(0.171)	(1.337)	(1.530)
Observations			627	627	373	373
Number of bonds			70	70	66	66
Wald Test			705766	1.079e+06	5.198e+06	1.824e+06
			0.0000	0.0000	0.0000	0.0000
Sargan Test			61.34	53.77	55.40	53.01
			1.0000	1.0000	1.0000	1.0000
Arellano–Bond test for AR(1)			-4.657	-4.559	-3.257	-3.279
			0.0000***	0.0000***	0.0008***	0.0000***
Arellano–Bond test for AR(2)			-0.158	-1.252	-0.680	-0.741
			0.8747	0.2107	0.4963	0.4587

This table presents the results from the two-step Generalized Method of Moments System estimations. Coefficients and standard errors (in parentheses) are from the second step. The Sargan and Arellano–Bond tests are from the second. The estimation uses quarterly observations of bonds issued by the Indonesian commercial banks and traded in the Indonesian bond market over the period 2007–2011. The dependent variable is YIELD_SP (corporate bond yields minus government bond yields). The YIELD_SP* in model 3 and 4 exclude negative spreads. The independent variables include: CAR, NPL, ROA, OPEX, NIM, DER, BANK_SIZE (total asset of banks), and BOND_SIZE (book value if bond issued). Control variables for general macroeconomic conditions include: GDP_GR (the growth rate in GDP); BI_RT (the central bank interest rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation. Two dummy variables are SUBDEBT (1 = subordinated debt and 0 otherwise), and STA_BANK (1 = state own bank and 0 otherwise).

* Indicate statistical significance at the 10% level (2-tailed).

** Indicate statistical significance at the 5% level (2-tailed).

*** Indicate statistical significance at the 1% level (2-tailed).

The first column in Table 5.5 provides the regression results on the sample bonds issued by Indonesian banks that were traded over the period of 2007 to 2011. The results show that most of the variables of bank risks significantly influenced the yield spread. The CAR and NIM variables, as expected, had an inverse relationship with p = 0.01. Similarly, regression results for NPL, OPEX, and DER had positive associations, as expected, and were significant at p = 0.01. In contrast, the ROA variable resulted in a positive sign with yield spread. With respect to the bond rating, despite the coefficient being relatively small (-0.00256), it was significant at the .01 level. This result suggests that the bond rating, to some extent, influenced the yield spread.

The control variable on bank size (BANK_SIZE) had a negative impact at the .01 level, implying that the bond holders were willing to accept a lower return from larger banks, with the possible influence of TBTF. In contrast, the variable of BOND_SIZE had a significantly negative impact at the .01 level implying than the bond holders would demand a higher return if the amount of bonds issued by banks increased.

Two dummy variables were included in the models, one to measure the impact of ownership and the other to measure the impact of the type of bonds on risk premiums. Contrary to expectations, the results, as shown in column 1 of Table 5.5, were either insignificant (for SUBDEBT) or gave an unexpected sign (for STA_BANK). Column 2 presents the impact of SUBDEBT and STA_BANK variables on market discipline by interacting these variables with the CAMEL indicators. With regards to subordinated bonds, among the six CAMEL indicators, only the dummy interaction SUBDEBT*DER expressed the expected sign and was significant. The remaining CAMEL indicator interactions were insignificant (SUBDEBT*CAR, SUBDEBT*NPL, SUBDEBT*ROA, SUBDEBT*OPEX, and SUBDEBT*NIM). In addition, the dummy variable of government ownership unexpectedly displayed a positive sign, which was not in accordance with the theoretical view. Further, with respect to the relationship between the dummy variable of government banks with CAMEL indicators, most variables presented insignificant results (STA_BANK*CAR, STA_BANK*NPL, STA_BANK*DER, STA_BANK*OPEX, and STA_BANK*NIM). The only exception was the STA_BANK*ROA that suggests a negative sign at the .10 significance level.

Furthermore, the interaction between the dummy variables and the YIELD_SP might be affected by the negative spreads during the global financial crisis. Therefore, this study further investigated the interaction of these variables by creating another regression without the negative yield spreads (from Quarter I of 2008 to Quarter II of 2009). The results can be seen in column 3 of Table 5.5 for the SUBDEBT and column 4 for the STA_BANK. These further statistical tests

revealed that the sign of interaction between the SUBDEBT and the YIELD_SP was positive at the .01 level. This result indicates that the subordinated bonds provided higher interest rate margins than senior bonds. Column 4 shows the interaction of the STA_BANK dummy variable with the yield spread. The results indicated at the .01 significance level that the state banks paid lower risk premiums than the Indonesian private banks.

With respect to the macroeconomic variables, all three variables had significant impact at the p = 0.01 level. Economic activity, represented by GDP_GR, had the expected negative sign, implying that the market requires lower risk premiums when the economy is growing. Real exchange (EXC_RT) had a positive impact, consistent with expectations, while the central bank interest rate (BI_RT) had a negative sign. These results altogether imply that depreciation of the exchange rate and a lowering of the central bank prime lending rate have a widening impact on the spread between corporate and government bonds.

5.3.2 Robustness Check

In order to check the robustness of the estimated model, regressions were estimated excluding several independent variables that were correlated. As shown in Table 5.4, BOND_SIZE had strong correlations with BANK_SIZE (71.80%), whereas ROA has strong correlation with OPEX (73.56%) and NIM (70.78%). Appendix B.2 presents the estimation of the models that excluded BOND_SIZE (column 1), BANK_SIZE (column 2), ROA (column 3), OPEX and NIM (column 4). These estimations produced results that were consistent with the above findings.

5.3.3 Discussion

The following sections present an interpretation of the regression results, with particular reference to the hypotheses outlined in Chapter 3. Four hypotheses were presented in relation to the association of debt risk premiums with bank fundamentals, types of bond, ownership structure, and the size of bank.

5.3.3.1 The Association of Bond Yield with Bank Fundamentals

The objective of the first hypothesis was to estimate the existence of market discipline by measuring the impact of bank fundamentals on bond yield spreads. Theoretically, if the market price of uninsured bank liabilities, such as bonds, reflects the risk of default, then the market can

be seen as playing an effective role in disciplining the banks. As explained earlier, the usual approach taken to verify whether market prices of uninsured bonds contain individual bank risk premiums is to regress the yield spread against an accounting measurement of bank risk. Preliminary evidence gathered from the present study suggests the presence of market discipline as most of the individual bank risk variables had a statistically significant effect on yield spreads. To a large extent, these results validate the hypothesis that unsophisticated markets are still able to provide market disciplines (Calomiris & Powell, 2001; Levy-Yeyati et al., 2004a).

The main bank fundamental measures employed in this study were the CAMEL ratios, comprising capital adequacy, asset quality, management capability, earning, and liquidity that were published quarterly by the Indonesian banks. The first measure of risk preference used in the estimation was CAR. Consistent with previous studies, this indicator had a negative impact on debt spreads (Balasubramnian & Cyree, 2011; Levy-Yeyati et al., 2004a; Mendonça & Villela Loures, 2009; Menz, 2010). These results imply that in the Indonesian bond market, higher levels of solvency among banks will generally lower credit risk and, in turn, lowering the risk premium.

The asset quality in this model was measured by credit risk as represented by the changes in NPL. An increase in the impairment level of loan ratios would increase credit risk which, in turn, would increase the risk premium demanded by investors (Balasubramnian & Cyree, 2011; Menz, 2010). As mentioned earlier, banks with a higher degree of risk aversion prefer borrowers with a good credit record. Consequently, high risk borrowers, in general, are able to meet their fund requirements mostly from banks with aggressive approaches to lending and are willing to take higher levels of risk. Hence, a change in the level of impaired loans (NPL) is an indicator of the current preferences for risk-taking activities by banks. The evidence presented in Section 5.3.1 that Indonesian investors punished banks with an increase in the NPL ratio with higher bond yields is a clear indication of the presence of market discipline.

Management capability was measured by efficiency levels as indicated by the ratio of OPEX, through which banks that are unable to manage their costs effectively are considered to be risky (Martinez-Peria & Schmukler, 2001). The empirical evidence suggests that less efficient banks had a higher interest rate spread, which was an indication of the presence of market discipline. Consequently, if a less efficient bank issues new bonds in the Indonesian bond market, the bank would face comparatively higher interest expenses than its peers.

The earnings capability in this study was represent by the NIM and ROA. The NIM was the difference between interest earned and interest paid by the banks, which reflects the ability of the banks to generate operating income that can be utilized to repay its current and future obligations. This includes the payment of principal and the periodical interest payments on financial instruments. The regression results present evidence of a negative association between NIM and risk premium. This finding confirms the presence of market discipline because bond holders were capable of rewarding banks with a higher profitability ratio with lower required rate of return (Avery et al., 1988; Jagtiani et al., 2002).

The ROA ratio was employed to measure the efficiency of the banks in using resources to generate income. Previous studies have found an inverse relationship between ROA and the probability of bond defaults (Avery et al., 1988; Jagtiani et al., 2002). The present study found a statistically significant correlation between yield spread and ROA. However, contrary to the expectation, this study found a positive sign in the relationship between ROA and interest rate yields in the Indonesian bond market. A possible explanation for this result is related to the concern of the Indonesian bond holders about the risk-taking activities of banks. A high ROA ratio, especially over the crisis period, can be seen as an indication of aggressive attempts by banks to earn short-term profit at the expense of long-term commitment to bank sustainability. As argued by Flannery (2001) and Bliss (2001), debt holders do not benefit from the upside movement of returns that may be associated with increased risk-taking. Hence, if the market assesses that a higher ROA is possible only with higher risk-taking, the ROA coefficient should have a positive sign (Balasubramnian & Cyree, 2011). This means that the Indonesian bond holders are not in favour of the high risk activities of banks. However, to implicitly answer the question whether these results are influenced by the risk perception of investors or not is beyond the scope of this study.

The DER, which can be regarded as a proxy for liquidity risk, had a positive association with the risk premium in the study sample. This result confirms previous empirical evidence that a higher level of leverage implies a higher risk of default, and thus a higher interest rate yield (Mendonça & Villela Loures, 2009; Sironi, 2003).

The liquidity risk was measured by the size of bonds issued by banks, and as Menz (2010) argues, bonds with a sizeable par value are typically issued by large banks and are more liquid in the secondary market. Therefore, the risks of large bonds are lower compared to those associated with smaller ones. However, in contrast to Menz's findings, the results of this study suggest that in the Indonesian bond market, the relationship between the size of bond and the yield was

positive, which leads to the conclusion that bonds with higher face values seem to offer higher yields in order to attract buyers. One possible explanation for this relationship between bond size and yield spread was the illiquid market conditions that perhaps removed the different levels of liquidity risk between large and small bonds in the Indonesian market. This lack of noticeable difference in the liquidity levels induces the bond holders to pay greater attention to interest rates.

Consistent with the exiting literature (Avery et al., 1988; Balasubramnian & Cyree, 2011; Flannery & Sorescu, 1996; Jagtiani et al., 2002; Mendonça & Villela Loures, 2009; Morgan & Stiroh, 2001; 2003), the present study found an inverse relationship between bond rating and the required returns. The size of the coefficient, however, was quite small, implying a weak impact. This situation, according to Avery et al. (1988), might be caused by the deficiencies in the market infrastructure that can potentially limit the ability of market participants to exercise discipline. Another possible reason for this observation is the FSN itself which distorts the signals on financial viability of banks (Flannery and Sorescu, 1996; Imai, 2007).

5.3.3.2 The Association of Bond Yield with Type of Bond

The second hypothesis was to test whether the market discipline imposed depends on the type of bond - subordinated or senior. As argued by Menz (2010), due to the strong dependence of financial institutions on the bond market, as long as the risks are adequately priced, senior bonds have the potential to be used as a tool to exert market discipline. However, most literature supports the hypothesis that subordinated bonds have a greater risk of losing their value in the event of bank closures, making it necessary to offer relatively higher returns on subordinated bonds (Caldwell, 2005; Hamalainen et al., 2010). Therefore, it is of particular importance to understand the behaviour of debt holders with respect to the seniority of bonds.

The hypothesis was tested by including a dichotomous variable to represent subordinated debts. The results, however, failed to indicate any significant difference between these two types of bonds. Further, in terms of interaction between sub-debt and individual CAMEL variables, only the debt leverage ratio was found to have any significant correlation. As discussed in Section 5.3.1 , this particular observation could be due to the anomaly over the period of crisis when the yield spreads between the government and corporate bonds were negative. These abnormal spreads were observed mainly because the yields of government bonds were higher than corporate bonds. To obtain a more reliable result, a further investigation was undertaken by

excluding the negative yield spreads that occurred in the crisis period. This modified investigation produced evidence for significant differences in terms of the yield spreads between the subordinated bonds and the senior bonds, confirming the findings of Menz (2010). These results indicate that, with the exception of the period of global financial crisis, there is evidence to support the presence of market discipline exerted by debt holders through demanding higher returns on subordinated bonds.

5.3.3.3 The Association of Bond Yield with Ownership Structure

The current literature posits that government ownership of banks has the potential to limit the extent of market discipline, especially in emerging economies where state owned enterprises still play a dominant role. In order to examine this premise in the context of Indonesia, a dichotomous variable of STA_BANK was included in the equation. As described in Section 5.3.1 , the results of the full sample indicate a significant correlation but the sign is contrary to the expectation as suggested in the literature (Levy-Yeyati et al., 2004a). Considering the abnormal yield spreads during the 2008 global financial crisis, a further investigation concerning the relationship between yield spreads and government ownership was conducted by excluding the negative spreads in the regression (a similar procedure as was taken in Section 5.3.3.2). The results of this regression indicate that, in general, state banks paid lower risk premiums than Indonesian private banks. This result verifies the argument by Sironi (2003), who maintains that private agents do not impose market discipline on state owned banks on the understanding that the government would not let its banks fail. In terms of the interaction between the individual CAMEL indicators and the STA_BANK variable, only the ROA showed a significant correlation. To conclude, the regression results indicate that market discipline imposed on the basis of ownership structure is weak.

5.3.3.4 The Association of Bond Yield with Size of Bank

The last of the hypotheses tested was with respect to the doctrine of TBTF. The regression results indicate that bank total assets, as a proxy for bank size, had a statistically significant inverse relationship with bond yields. The results imply that the bond interest rates issued by large banks were considerably lower than that of small banks. According to Sironi (2003) and Deyoung et al. (1998), this result can be interpreted as an indication of the presence of market discipline by bond holders.

Bond holders are willing to accept a lower interest rate from the larger banks for a range of reasons. For instance, large banks are considered less risky because the major banks generally have better governance and higher levels of working capital compared to their smaller counterparts. In relation to the safety net, a lower interest rate was accepted because of the lower default risk under the doctrine of TBTF (Levy-Yeyati et al., 2004a). As described in Chapter 3, under the existing Indonesian FSN framework, a bank that poses a systemic risk to the industry would be rescued by the government in the event of bankruptcy.

5.3.3.5 The Association of Bond Yield with Macroeconomic Variables

Three macroeconomic indicators were included in the model as control variables, the most notable being GDP as an indicator of economic activity. As mentioned in Chapter 3, the present study did not expect a particular sign on the relationship between yield spread and macroeconomic indicators. The regression results show an inverse relationship between bond interest rates and GDP, which is an indication that during high economic growth, market participants were willing to lower their required rate of return. In contrast, as the risk of default increases during times of financial crises, the market would demand a higher yield to compensate for the increasing risks.

In line with the above finding, the movement of the Indonesian central bank's benchmark interest rates shows similar patterns. In the Indonesian market, the yield spread, in general, widens when the central bank reduces its benchmark rate, usually with the objective of improving economic growth, and the opposite policy is adopted to slowdown an overheating economy.

Lastly, the volatility of the domestic currency exchange rate against the US dollar demonstrates a positive relationship. This indicates that the spread between corporate and government bonds widens when the exchange rate depreciates substantially, usually as an impact of economic turbulence in the domestic market. On the other hand, when the economic conditions and the exchange rates return to normal, the risk premiums decline accordingly.

5.4 Chapter Summary

This study investigates the presence of market discipline by measuring the link between the yield spread of bonds issued by the Indonesian banks and various influencing factors over the period

of 2007-2011. The investigation was carried out via an econometric panel analysis, specifically using the GMM method. The regression model employed an unbalanced panel of 70 bonds, that consisted of 18 subordinated bonds and 52 senior bonds traded in the secondary market. The findings are summarized in Table 5.6.

Table 5.6 Summary of Findings: Discipline by Debt Holder

Hypotheses	Indicators	Sign	Result
Bond yield spread has a relationship with bank fundamental	CAR	-	Significant
	NPL	+	Significant
	ROA	+	Significant*
	OPEX	+	Significant
	NIM	-	Significant
	DER	+	Significant
	RATING	-	Significant
	BOND_SIZE	-	Significant*
The correlation between bond yield spread and bank fundamentals for subordinated bond is not equal to that of senior bond	SUBDEBT	+	Not significant
The correlation between bond yield spread and bank fundamentals for large bank is not equal to that of small bank	BANK_SIZE	-	Significant
The correlation between bond yield spread and bank fundamentals for state bank is not equal to that of private bank	STA_BANK	-	Significant

* The sign is contrary to the expectation

In general, the present study provides strong evidence of the presence of market discipline as a higher yield spread is associated with higher bank risks. The results suggest that bond holders in the Indonesian market are responsive to CAMEL indicators derived from the published financial reports. As expected, CAR and NIM have an inverse relationship with risk premium, whereas NPL, OPEX and DER show direct relationships with yield spreads. These results are consistent with those of a cross-country comparison study by Deyoung et al. (2001), the study by Sironi (2003) on the Europe debt market, and the work of Flannery and Sorescu (1996) in the US market confirming a positive correlation between bond spreads and bank risks that are derived from accounting information and the CAMEL rating. The finding of this study supports the argument that market discipline can also be imposed by participants in unsophisticated markets (Levy-Yeyati et al., 2004a). On the other hand, the present findings differ from the study by Mendonça and Villela Loures (2009), which found a weak market discipline exerted by bond

holders in the Brazilian banking industry, and from the work of Wang et al. (2010) in the Taiwanese market. The impact of return of assets and the size of bonds on the yield spreads was interesting because the results indicated that the bond holders demanded higher bond yields from the banks that generated higher profitability or issued a larger volume of bonds. These results are commonly found in emerging markets, such as Indonesia, where the bond market is still in its early stages of development and suffers from the lack of adequate liquidity (Sharma, 2001; Wang et al., 2010). Debt holders, therefore, seem to be more concerned about returns than the liquidity, and an increase in the banks' profitability ratios may be perceived as an increase in the risk-taking activities of banks.

One of the more significant findings to emerge from this study is the lack of difference in the debt holders' response between subordinated bonds and senior debts. This finding bears two interpretations: on the one hand, senior bonds are potential sources of market discipline similar to subordinated bonds, as suggested by Menz (2010); on the other hand, the results suggest that the risks associated with the loss in value of subordinated debts in the event of bank default are not credible. This concurs with findings in the Brazilian market (Mendonça & Villela Loures, 2009).

The credibility of default risk as an important source of information is also questioned when the risk sensitivity of debt holders against state banks is compared to that of the private banks. The findings of this study suggest that bond holders did not impose market discipline on state owned banks on the understanding that the government would not let its banks fail. This was indicated by the lower risk premiums paid by the state banks compared to the Indonesian private banks. This finding supported the TBTF perception, which still plays a significant role in defining bond interest rates required by investors in emerging markets, such as that of Indonesia (Levy-Yeyati et al., 2004a; Sironi, 2003).

In summary, the findings of this study support hypothesis H2a that bond yield spread has a negative relationship with bank fundamentals, but reject hypothesis H2b since the yield spread paid for the holders of subordinated bonds and senior bonds was indifferent. In addition, these findings support hypothesis H2c and H2d that the correlation between bond yield spread and bank fundamentals for larger banks is not equal to that of smaller banks, and the correlation between bond yield spread and bank fundamentals for state banks is not equal to that of private banks. The overall results suggest that despite the lack of ideal conditions for an effective market discipline, there are early signs of the presence of market discipline in the Indonesian bond market. However, the provision of FSNs, such as the LoLR facilities or the bailout mechanisms

for troubled banks, potentially undermine the presence and credibility of default risk in the Indonesian bond market. As frequently concluded in previous studies, a weaker market discipline could be attributed to the provision of a safety net that reduces the incentive to monitor banks (Deyoung et al., 1998; Flannery & Sorescu, 1996; Imai, 2007; Sironi, 2003). This finding has important implications for developing a more effective market discipline and minimizing the moral hazard implications of the FSN. The implication of this finding and policy recommendations are presented in Chapter 7.

Chapter 6
Research Data and Results of the Equity Holder Model

6.1 Introduction

The current chapter presents evidence on the existence of market discipline imposed by equity holders of listed banks in the Indonesian capital market. The indication of market discipline by equity holders is signaled by an analysis of the relationship between bank fundamentals and equity returns as discussed in Chapter 3. The presence of disciplining actions by equity holders is considered to exist if equity returns exhibit positive associations with bank fundamentals. This chapter is organized as follows: Section 6.2 presents the data and methodology which is applied in this study; Section 6.3 provides evidence to address the research question whether equity holders monitor the financial indicators of banks and discipline risky banks accordingly; and Section 6.4 presents a summary of the findings related to market discipline exercised by equity holders.

6.2 Data Description

This section explores the sources and characteristics of the sample data, including the relevant variables discussed in Chapter 3. It starts with an explanation of the method of data collection, followed by the descriptive statistics, including coefficients of correlation.

6.2.1 Data Source

As already outlined, this study used quarterly financial reports of Indonesian listed banks, both those published in newspapers and those submitted to BI, the banking regulator. Information on stock prices of the Indonesian listed banks was gathered from the IDX and the Bloomberg database. All stock price data were adjusted for rights offering, and stock split. Macroeconomic data such as the inflation rate, the GDP growth and the Rupiah/USD exchange rate, were collected from the BI published reports.

The number of listed banks in the IDX is subject to constant variation due to mergers, acquisitions, and delisting from the exchange. The annual distribution of listed banks is shown in Table 2.3 of Chapter 2. In 2000 there were only 14 listed banks in the equity market, which increased to 31 in 2011, whereas the number of banks operating in Indonesia decreased from a total of 150 to 120 during the same period. This increase in the proportion of listed banks is encouraging from the equity market point of view. The statistics presented in Table 2.3 also included five banks that launched IPO during 2009 to 2011. During this period, four listed banks merged with other banks and in 2008 two banks were delisted from the IDX and were restructured as private unlisted companies.

In order to ensure that the regression results reflect the impact of regulatory changes and macroeconomic conditions, this study employed a balanced panel data. For that reason, the observation period was selected to include a sample with the largest possible stable sample. Banks that merged or were involved in acquisitions (hosts and targets) during the period were excluded from the sample. Further, newly listed banks in the IDX from 2005 onward were also excluded from the sample and six banks were excluded because their shares were inactive because of low trading volume. As a result, a total of 11 listed banks were selected which operated in Indonesia over the period of Quarter I of 2003 to Quarter IV of 2011. The list of sample banks is presented in Table 6.2. This resulted in a total of 396 balanced panel observations. In terms of market capitalization, the banks included in the study sample represented approximately 85.96% of total the market capitalization of the banking sector at the end of 2011, as shown in Table 6.1. Therefore, the selected sample banks are considered sufficient to represent the population. This table also shows that the banking sector accounts for more than 90% of financial sector capitalization and more than 20% of the total capitalization of the Indonesian equity market.

Table 6.1 Ratio of Market Capitalization of Financial Sector, Banking Sector, and Sample Banks 2003-2011

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Ratio of Market Cap of Financial Sector to Capital Market	26.27	30.80	26.18	26.63	21.79	26.68	25.22	24.79	24.35
Ratio of Market Cap of Banking Sector to Capital Market	24.02	28.47	24.55	25.12	20.31	25.56	23.70	23.40	22.50
Ratio of Market Cap of Banking Sector to Financial Sector	91.44	92.43	93.78	94.31	93.21	95.80	93.97	94.38	92.39
Ratio of Market Cap of Sample bank to Banking Sector	87.59	89.40	86.55	87.02	88.27	86.43	87.62	82.68	85.96

Source: The Indonesian Stock Exchange Fact Books, 2003-2011

Table 6.2 List of Sample Banks

No.	Code	Listing Date	Total Assets*	Listed Shares**	Market Capitalization*
1	PNBN	29-Dec-1982	108,948	23,838	18,593
2	BNII	21-Nov-1989	90,740	55,719	23,401
3	BDMN	6-Dec-1989	127,183	9,489	38,904
4	BNLI	15-Jan-1990	101,534	8,943	12,162
5	BBNI	25-Nov-1996	288,511	18,462	70,155
6	BVIC	30-Jun-1999	11,302	6,482	836
7	BBCA	31-May-2000	377,250	24,408	195,264
8	BEKS	13-Jul-2001	5,993	9,166	1,063
9	BKSW	21-Nov-2002	3,593	3,526	2,503
10	BMRI	14-Jul-2003	489,106	23,100	155,925
11	BBRI	10-Nov-2003	456,531	24,422	164,848

* In IDR billions as of December 2011
** In million shares as of December 2011

Source: The Indonesian Stock Exchange Fact Books, 2003-2011

The accounting information for the analysis was collected from the quarterly financial statements published by the listed banks. As public companies, banks are required by the banking and capital market regulators to publish quarterly financial reports, including the CAMEL ratios. This publication is intended to improve transparency and to provide more meaningful financial information to the public. For this reason, this study employed CAR, NPL, OPEX, ROA, NIM and LDR ratios collected directly from the publications. As discussed in Chapter 3, use of financial ratios prepared and published by the banks facilitates accurate measurement of shareholder responses to changing conditions. The information on the type of banks, for instance state bank or private bank, was obtained from the Indonesian Banking Directory published by the Indonesian central bank.

6.2.2 Descriptive Analysis

The presence of market discipline exercised by shareholders was investigated by measuring the correlation between equity return and bank fundamentals represented by the CAMEL ratios. As displayed in Table 6.3, the analysis took into account 396 observations from 11 listed banks that traded in the IDX from Quarter I of 2003 to Quarter IV of 2011. The largest bank in the sample had total assets of IDR 489 trillion, whereas the smallest bank had total assets of IDR 845 billion.

In general, all banks under investigation were solvent and satisfied the minimum CAR of 8.00% as required by the central bank and Basel II. The maximum CAR was 61.00% and the mean was 18.84%. Similarly, with the NPL ratio most banks had kept their bad debts below the threshold of 5% as required by the central bank regulation, with the mean and median values of 6.16% and 4.45% respectively. Furthermore, the positive sign of ROA and NIM indicated that most banks in the sample were able to generate normal profits during the observation period, with means of 1.90% and 5.99% respectively. The mean value for OPEX was 83.62% which indicates a relatively low efficiency due to high operating costs; and the mean value for LDR was 65.63% which indicates that banks still hold a large volume of liquid assets. On the other hand, this represents a relatively low level of credit disbursements.

Table 6.3 Descriptive Statistics

	EQ_GR	CAR	NPL	ROA	NIM	OPEX	LDR	BANK_SIZE	GDP_RT	INF_RT	EXC_RT
Mean	0.0697	0.1884	0.0616	0.0190	0.0599	0.8362	0.6563	103,621,342	0.0563	0.0755	9,286
Median	0.0345	0.1676	0.0445	0.0216	0.0550	0.8322	0.6906	62,374,729	0.0585	0.0661	9,159
Maximum	1.5000	0.6100	0.5100	0.0620	0.1557	1.5800	1.0371	489,106,664	0.0716	0.1711	11,575
Minimum	-0.6047	-0.1763	0.0049	-0.1367	0.0072	0.1089	0.2147	845,563	0.0410	0.0278	8,285
Std. Dev.	0.2555	0.0824	0.0627	0.0233	0.0235	0.1623	0.1726	109,661,888	0.0085	0.0358	655
Skewness	1.33	1.24	3.67	-3.18	0.90	0.66	-0.33	1.16	-0.28	1.20	1.52
Observations	396	396	396	396	396	396	396	396	396	396	396

Table 6.4 Correlation Matrix of Dependent and Independent Variables

	Variables	A	B	C	D	E	F	G	H	I	J	K
A.	EQ_GR	1										
B.	CAR	0.0330	1									
C.	NPL	0.0416	0.0321	1								
D.	ROA	0.0471	0.2260	-0.6413	1							
E.	NIM	0.0097	-0.1214	-0.0648	0.2597	1						
F.	OPEX	-0.0534	-0.2565	0.5406	-0.8789	-0.2354	1					
G.	LDR	-0.0840	-0.2588	-0.0788	-0.0034	0.5144	0.0555	1				
H.	BANK_SIZE	0.0236	-0.0268	-0.1337	0.4009	0.1637	-0.4912	-0.0709	1			
I.	GDP_RT	-0.0590	-0.1067	-0.0454	-0.0254	-0.0082	-0.0693	0.2744	0.1344	1		
J.	INF_RT	-0.1661	0.0695	0.1077	-0.0096	-0.0106	0.0222	-0.0469	-0.1179	-0.0275	1	
K.	EXC_RT	-0.1227	-0.1295	-0.0206	-0.0884	0.0678	0.1018	0.1482	0.0099	-0.2030	0.2313	1

Only one bank, BEKS bank, reported a very weak financial performance. This bank had the lowest CAMEL ratios compared to the rest of the banks in the sample. For example, BEKS was the only bank which recorded negative CAR ratios (Quarter I and II of 2010), as well as the highest NPL ratio (51.00%) and OPEX (158%), and the lowest ROA (-13.67%). This bank was placed under special surveillance in 2010 by BI due to its solvability problem. To solve the problem, rights issue of shares was taken to meet the minimum capital requirement by the central bank, enabling new shareholders to take control of the bank by appointing a new management team of their choosing.

Three macroeconomic variables were included in the model as control variables. The lowest year-on-year GDP growth of 4.10% was incurred in 2009, mainly due to the impact of global financial crisis. The impact of this crisis episode can also be seen in the exchange rate (EXC_RT) movements, when the Indonesian domestic currency (Rupiah or IDR), against the USD dropped to the maximum IDR 11,575 and inflation rose to 12.14% per annum. In short, the three macroeconomic variables reflected both normal and crisis periods, particularly the impact of the global financial crisis in 2008-2009.

The values of the dependent and independent variables indicate that, in general, the data are skewed. To approximate normality, all variables were transformed using the natural logarithms before their use in the model estimation.

6.2.3 The Correlation Matrix

The results of the Pearson correlation matrix are presented in Table 6.4. The first column of the table shows the correlations between the dependent variable (EQ_RT) and each of the independent variables. The six CAMEL indicators have correlations that range from 0.03 for CAR to 0.08 for LDR and the three macroeconomic indicators included as control variables have correlation values less than 0.17. This correlation indicates that all macroeconomic variables had a stronger correlation with the explanatory variables compared to the individual bank variables. But these correlations are weak and are not expected to impair any of the estimates of the model.

The pairwise correlations between the independent variables are displayed in the table from columns 2-10. Most variables have correlation values less than 0.65. These figures are acceptable for econometric estimation purposes since the data set has no multi-collinearity issues (Kennedy, 2003). The only exception is the correlation between ROA and OPEX at -0.88. To

check the influence of this correlation in relation to the multi-collinearity issue, this study will compare the regression result with and without OPEX or ROA variable.

6.3 Analysis and Discussions of the Results

The findings of this study are presented in this section. As discussed in Chapter 3, this chapter examines whether equity holders exercise discipline in the Indonesian equity market. The discussion starts with an analysis of empirical results, as well as the tests for the robustness of the model. This is then followed by a deeper analysis and discussion of the regression results.

6.3.1 Empirical Results

The existence of monitoring by shareholders was tested by regressing bank-risk variables and indicators of general economic conditions on stock returns. Table 6.5 presents the results from the panel least square regression of the monitoring model, as described in Chapter 3. The same monitoring model was regressed for subsamples of private and state owned banks. The first column presents regression results for all samples during the period Quarter I of 2003 to Quarter IV of 2011. The second and third columns provide regression results for two sub-samples: private banks and state banks. The regression on private and state banks is aimed at examining the difference, if any, of shareholder sensitivity on these types of banks.

This study initially estimated a model of market discipline by equity holders employing a GMM estimation procedure, similar to the approach adopted to investigate market discipline by depositors (Chapter 4) and debt holders (Chapter 5). However, the regression results failed to meet the reliability and validity conditions and were deemed unsatisfactory. The results presented in the current chapter are that of a random walk mode, as introduced by Burton Malkiel in 1973. Random walk theory argues that changes in stock prices are independent of each other, therefore the movement or trend of a series of prices or markets in the past could not be used to forecast future stock price movements (Malkiel, 2007). Based on this theory, the lag of equity return might not be a relevant determinant of equity return since successive price changes are independent (Fama, 1970). Besides, initial data analysis could not find any trends.

Table 6.5 Regression Results: Equity Return Variable

			All Banks	Private Banks	State Banks
		Expected	(1)	(2)	(3)
VARIABLES	**Lag**	**Signs**	**EQ_RT**	**EQ_RT**	**EQ_RT**
CAR	L1	(+)	0.361902**	0.407999**	0.177284
			(0.180629)	0.189474	(0.827451)
NPL	L1	(-)	0.5083	0.512063	0.69699
			(0.407665)	0.445096	(1.084707)
ROA	L1	(+)	0.2083	0.962173	-2.180225
			(0.833335)	1.032343	(3.572922)
OPEX	L1	(-)	0.0265	0.374642	-0.271875
			(0.24083)	0.353739	(0.360709)
NIM	L1	(+)	0.9772	1.143825	2.142938
			(0.634494)	0.790827	(2.839165)
LDR	L1	(-)	-0.241045*	-0.301137**	-0.37267
			(0.134689)	0.14504	(0.721251)
BANK_SIZE			0.0030	0.007636	0.021281
			(0.007497)	0.009732	(0.085646)
GDP_RT			-1.0418	0.26885	-3.972123
			(1.506191)	1.762807	(3.159119)
INF_RT			-1.099258***	-0.799935**	-1.82333**
			(0.347016)	0.405623	0.774833
EXC_RT			-0.387578**	-0.359038*	-0.490702
			(0.178384)	0.207603	0.377876
Constant			3.64981**	3.004988	4.709858
			(1.653292)	1.93766	3.619173
R-squared			0.0862	0.0856	0.1267
Adj. R-squared			0.0617	0.0516	0.0338
Prob(F-statistic)			0.000	0.006	0.209
Number of Observations			385	280	105
Number of bank			11	8	3

This table presents the results from the panel least square regression. Standard errors are presented in parentheses. The estimation uses quarterly observations over the period 2003–2011. The dependent variable is EQ_RT (equity return). The independent variables include: CAR, NPL, ROA, OPEX, NIM, LDR, and BANK_SIZE (total asset of banks). Control variables for general macroeconomic conditions include: GDP_GR (the growth rate in GDP); INF_RT (inflation rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation.

* Indicates statistical significance at the 10% level (2-tailed)

** Indicates statistical significance at the 5% level (2-tailed)

*** Indicates statistical significance at the 1% level (2-tailed)

The present study, therefore, used the static panel data model to investigate the relationship between equity returns and bank fundamentals. Within the static panel analysis, the impacts of the determining factors have been simultaneously estimated under a pooled least squares-regression approach. The dependent variable of the model is equity returns calculated as the change in stock price over the previous period[53]. As can be seen in Table 6.5, the independent variables could jointly explain changes in the dependent variable with p-values less than 0.01 for the whole sample (column 1) and the private banks (column 2), whereas the estimates for state banks is not significant (column 3). However, the model could only explain approximately 8.6% of the total variation in entire equity returns, with figures for private and state banks at 8.6% and 12.7% respectively. These figures indicate that, apart from the six CAMEL ratios and the three macroeconomic variables that are used in these models, there are other variables that could exert a stronger influence on the movement of equity returns. These figures reflect a common state in developing economies where market risk factors have a tendency to be more dominant and overshadow the risk of individual firms (Levy-Yeyati et al., 2004a).

As shown in the table, of the six CAMEL indicators used in this study, only CAR and LDR had significant impacts on equity returns. The CAR, as expected, had a positive impact in the whole sample at p = 0.05, while LD, had a significant negative impact at p = 0.10. The regression results on the macroeconomic variables indicate that inflation rate has a negative impact at p = 0.01 and exchange rate a negative impact at p= 0.05.

The regression results for the private banks are presented in column 2 of Table 6.5. As shown, both the CAR and LDR variables of the private banks have significant impact at p = 0.05 and, similar to the whole sample, inflation and exchange rates have statistically significant impact on the equity returns of the private banks at p-values of 0.05 and 0.10 respectively. For state banks, as can be seen in column 3, none of the six CAMEL variables have a significant impact on equity returns, and inflation rate is the only macroeconomic variable that has a significant impact on equity returns, at p = 0.05.

[53] As alternative dependent variables, this study uses equity return minus the central bank benchmark rate and equity return minus the growth of market index. However, the regression results using these dependent variables were unsatisfactory.

6.3.2 Robustness Check

In order to check the robustness of the estimates, regressions were estimated excluding several independent variables that were strongly correlated. As stated in Section 6.2.3 , ROA and OPEX were strongly correlated. To test the possible impacts of multi-collinearity, the study compared the regression results with and without OPEX and ROA. The results of these reduced models were consistent with the regression results presented in Table 6.5, where amongst the CAMEL variables, only CAR and LDR had a statistically significant influence on equity returns and, among the macroeconomic variables, only inflation and exchange rate had a significant impact on equity returns (see Appendix C.1 and C.2 for more detail).

Tests were conducted to verify the presence of fixed effects and random effects in the panel data, as suggested by Baltagi (2008). Fixed effects are tested by an F-test, while random effects are tested by Breusch and Pagan's Lagrange Multiplier (LM) test. The former compares a fixed effect model and OLS (ordinary least squares) to see how much improvement could be achieved by the fixed effect model, while the latter contrasts a random effect model with OLS. Using a fixed effect method, the goodness-of-fit was increased from 8.62% to 12.01%. However, the null hypothesis of the cross-section F-test was rejected, implying that the fixed effect method does not add any significant improvement to the estimated model. Under this cross-section fixed effect model, the estimation results indicate that only CAR and inflation rate had a significant impact on equity returns. The results of the random effect model did not produce any significant changes to the original one.

6.3.3 Discussion

The main objective of this study is to empirically investigate the existence of market discipline in the Indonesian stock market. The following sections present a synthesis of the regression results in relation to the relevant study objectives and the research questions. Three hypotheses are presented in relation to the association of equity return with bank fundamentals, the size of bank, and the ownership structure. The last part of this section discusses the association of equity return with macroeconomic variables.

6.3.3.1 The Association of Equity Return with Bank Fundamentals

The first hypothesis in the equity holder modelwas developed to determine the existence of market discipline imposed by equity holders. As described in Chapter 2, in an efficient market investors react to available information about the market, such as the publication of financial reports. The impact of this information is reflected in market prices of stocks (Flannery & Sorescu, 1996; Hancock & Kwast, 2001; Morgan & Stiroh, 2001). The current study used six CAMEL indicators as proxies of bank fundamentals and three macroeconomic indicators as control variables. In general, the equity holder model could only explain a small percentage of the movement of the equity return during the observation period. This result suggested that the CAMEL indicators were not the main determinants of equity return, therefore the content of bank financial statements do not present a significant impact on the bank share prices.

From the market efficiency theory point of view, if a capital market is efficient, especially in a semi-strong form sense, stock prices would be expected to adjust instantaneously to new information, such as the announcements of quarterly financial reports, dividends, and stock splits (Fama, 1970). In the Indonesian case, as suggested by the results of the present study, its capital market could be categorized as an inefficient market. This condition is common in developing markets due to the lack of ideal conditions for effective market discipline (Caprio & Honohan, 2004). For instance, as outlined in Chapter 2, despite the tremendous increase in market activity after the Asian financial crisis in 1998, with notable trading volumes and upsurges in index value, the Indonesian capital market had the lowest ratio of market capitalization to GDP compared to neighbouring countries (World Bank, 2010). The limited number of new listings for both debt and equity instruments per year clearly represented a lack of strong market activity in terms of raising capital. Under such levels of market activity, a strong or semi-strong form of market discipline could not be expected. Moreover, in developing markets, the information available in the market may be unreliable, corporate governance is weak, and the capital markets are easier to manipulate (Ward, 2002). As described in Chapter 2, an efficient market discipline mechanism requires certain conditions, including the availability of sufficient and reliable information (Caprio & Honohan, 2004; Crockett, 2002; Llewellyn, 2005), as well as the presence of adequate mechanisms to price the risks of banks (Caprio & Honohan, 2004; Crockett, 2002; Llewellyn, 2005). The absence of these conditions, therefore, limits the impact of published financial information on changes in equity pricing.

The regression results of the equity holder model for the full sample of banks produced only two CAMEL indicators that are statistically significant: CAR and LDR. In addition, the regression

for the private banks showed similar results to the full sample; whereas the regression results for the state banks indicate that none of the six CAMEL variables could significantly influence the return of equity in the Indonesian capital market.

As stated above, the CAR variable as an indicator for capital adequacy has a positive impact on equity returns. This result is consistent with previous studies on the prices of bank equities that mostly confirmed a positive correlation between the price of bank stocks and bank fundamentals or an inverse correlation with bank risk (Flannery, 1998; Gilbert, 1990). Banks with a high level of solvency ratio are perceived to be less risky because their excess capital can be used as a cushion to absorb any potential loss in order to prevent bankruptcy (Beighley et al., 1975; Caner et al., 2012).

As expected, the correlation between the second indicator, the liquidity variable as measured by LDR, and equity returns was found to be negative. This is a reflection of risk premiums requested by shareholders to compensate for higher risk. Similar to the finding of Caner et al. (2012) for Turkish banks, the results of this study suggest that the reduction in the liquidity risk, or risk of not having sufficient cash or borrowing capacity to meet the banks obligations, significantly increases the returns on equity.

6.3.3.2 The Association of Equity Return with Size of Bank

As outlined in Chapter 3, the present study evaluates the hypothesis on the existence of the TBTF perception that might affect the risk-taking behaviour of Indonesian equity participants. The total assets of banks are used as a control variables to test the sensitivity of the shareholders to bank risks that might be influenced by size of banks (Beighley et al., 1975). The regression results do not find any significant impact of the size of bank on shareholder behaviour. This differs from the study by Caner et al. (2012) on Turkey, as an emerging market, where shareholders who invest in small banks as part of a portfolio are more sensitive to risk factors, such as bank efficiency and liquidity.

There are two possible explanations with respect to this result. First, the size of bank may not be a main determinant of the equity returns in the Indonesian stock market. Second, there is a possibility that all listed banks in Indonesia are perceived by shareholders as having systemic risks due to the possible spillover effect to the capital market. Therefore, regardless of the size of the assets, these banks are expected to be bailed out by the government in the event of financial distress (Barajas & Steiner, 2000; Martinez-Peria & Schmukler, 2001). This assumption about

shareholder behaviour is justified in the case of the Indonesian government decision to rescue a particular small listed bank named the Century Bank amid the global financial crisis in 2008. Despite the total assets of this failed bank accounting for less than 2% of total assets in the Indonesian banking sector, the MoF and the Governor of BI categorized the Century Bank as one that posed a systemic threat to the whole financial system. One of the main considerations behind this action was the prevention of potential negative sentiments arising in the capital market and to protect the interests of minority shareholders (Departemen Keuangan, 2010). This decision on the one hand was intended to prevent instability in the domestic financial sector, but on the other hand reduced the incentive for market participants to monitor bank fundamentals (Deyoung et al., 1998; Sironi, 2003).

6.3.3.3 The Association of Equity Return with Ownership Structure

The literature considers government ownership of banks as one of the ownership structures that might influence the sensitivity of stock holders to bank risks (Caner et al., 2008), in particular, in emerging economies where state owned enterprises still play dominant roles in the economy (Levy-Yeyati et al., 2004a). These banks are commonly perceived as less risky compared to their private sector counterparts since the government is less likely to allow their state banks to fail. To examine whether the government ownership of banks affects market discipline, this study estimated a regression using a sample that included only state banks. The results do not support any significant association between the returns on equity and bank risks (results are reported in column 3 of Table 6.5). This finding could be interpreted as an indication that government ownership, like bank size, is not a main determinant of equity return in the Indonesian banking industry. Alternatively, these results could be interpreted as an indication of the absence of market discipline because state owned banks are most likely to be rescued by the government. This would lead to a risk-neutral attitude among equity holders. In the Indonesian case, the government still holds majority stakes in the listed state owned banks, such as Bank Mandiri (BMRI), Bank Rakyat Indonesia (BBRI), Bank Negara Indonesia (BBNI), and Bank Tabungan Negara (BBTN)[54] (Bank Indonesia, 2012b).

[54] Bank Tabungan Negara (BBTN) is not included as a sample bank due to its limited observation periods - the bank went on public at the end of 2009.

6.3.3.4 The Association of Equity Return with Macroeconomic Variables

Three macroeconomic indicators were included in the model as control variables. The present study did not expect a particular direction of impact between deposit growth and macroeconomic indicators, as found by other studies in developing economies. The regression results indicate that exchange rates and inflation rates had statistically significant impacts on equity returns in the Indonesian stock market, whereas the impact of the GDP is insignificant. In terms of the exchange rate, this result is in line with the findings of Moore and Wang (2014), which found evidence of a negative relationship between stock prices and foreign exchange rates in the Indonesian and five other developing markets. In addition, the negative relationship between share price and inflation was found in a study of stock markets in the ASEAN countries (including Indonesia) by Wongbangpo and Sharma (2002)[55].

Exchange rates and inflation rates are considered more relevant to equity holders because stock trading takes place in an environment of higher liquidity compared to other types of securities. This is also affected by foreign investors holding majority shares in the Indonesian capital market. As discussed in Chapter 2, foreign investors account for about two-thirds of market capitalization (International Monetary Fund, 2010). For foreign investors, Indonesian exchange rates and inflation rates determine the real return of their investment when converted to their home currencies. Furthermore, the correlation between the exchange rate and the inflation rate are negative, reflecting a lower return for stakeholders when the exchange and inflation rates increase. Therefore, this relationship can be viewed as a mechanism adopted by foreign investors to discipline the local banks based not only on individual bank risk, but also on the systemic market risk. Indeed, in many developing economies, the market risk is much more important to assess the value of securities than the individual performance of financial firms (Levy-Yeyati et al., 2004a).

6.4 Chapter Summary

This study investigates the presence of market discipline by measuring the link between the equity return of Indonesian banks and various influencing factors over the period of 2003-2011. The investigation was examined via a static panel analysis. The regression model employed a balanced panel of 11 listed banks. The findings are summarized in Table 6.6.

[55] Studies by Moore and Wang (2014) and Wongbangpo and Sharma (2002) do not specifically investigate the stocks of the banking sector, but rather samples from other sectors in the equity markets.

Table 6.6 Summary of the Results

Hypotheses	Indicators	Sign	Result
Equity return has a relationship with bank fundamentals	CAR	+	Significant
	NPL	-	Not significant
	ROA	+	Not significant
	OPEX	-	Not significant
	NIM	+	Not significant
	LDR	-	Significant
The correlation between equity return and bank fundamentals for large bank is not equal to that of small bank	BANK_SIZE	+	Not significant
The correlation between equity return and bank fundamentals for state bank is not equal to that of private bank	STA_BANK	+	Not significant

The standard shareholder discipline hypothesis states that in an efficient market, the equity return is sensitive to changes in bank fundamentals after controlling for a variety of other external influences, such as the macroeconomic environment and ownership structure. The overall results of this study suggest that shareholders do not exert a high level of discipline on the publicly-listed banks in Indonesia. The model developed for this study included six CAMEL variables and three control variables. The estimated equations could only explain a small part of variation in equity returns. Further, only two out of the six CAMEL variables and two of the three macroeconomic variables could individually influence equity returns.

The size of banks is not a main determinant of equity return. This result can be interpreted as an absence of the TBTF perception amongst investors of Indonesian publicly-listed banks or that all publicly-listed banks are categorized as systemically important banks because of their strong connection to the capital market. Therefore, in the event of default, the Indonesian government is expected to rescue publicly-listed banks in order to maintain the stability of the Indonesian banking and capital market sector. This lack of shareholder monitoring is even worse in the case of state banks, where none of the six CAMEL variables is relevant to define the fluctuation of equity returns. Currently, there are four state banks and all of them are listed in the equity market, but the Indonesian government still maintains majority shareholder status in these banks. This dampens the incentives for market players to monitor state banks.

The findings presented in this chapter are consistent with many previous studies that produced evidence on the ineffectiveness of market discipline imposed by equity holders (Cannella Jr et al., 1995; De Ceuster & Masschelein, 2003; Evanoff & Wall, 2001), but if differs with the study by Caner et al. (2012) on the Turkish financial market which found that shareholders were able to discipline the entities, as equity returns have a significant relationship with bank efficiency and liquidity. The ineffectiveness of market discipline imposed by equity holders might be influenced by their risk- returns function that is almost equal to the risk- returns profile of banks, as found by De Ceuster & Masschelein (2003) and Park & Peristiani (2007). In the case of Indonesia, the weak market discipline imposed by equity holders could be due to the relatively small market capitalization of listed banks. As argued by Caprio and Honohan (2004), based on an extensive cross-country analysis, the likelihood of market discipline imposed by equity holders is mainly a function of the proportion of the assets of listed banks of the total banking assets in emerging markets.

To conclude, the findings of the study reject the three hypotheses tested. This implies that equity returns do not have a relationship with bank fundamentals; there is no difference between the equity returns of small versus the large banks; and equity returns and bank fundamentals for state banks is not different to those of private banks. In general, these findings support the argument that equity holders are less prone to imposing market discipline on banks, particularly in emerging countries, mainly due to lack of ideal conditions for an effective market discipline mechanism. Furthermore, the provision of the Indonesian FSN significantly diminishes the incentives for market participants to monitor their bank performance. The findings of the present study have important implications for developing a more effective market discipline and minimizing moral hazard implications of the FSN.

The practical implications of these findings and policy recommendations are presented in Chapter 7.

Chapter 7
Summary, Conclusions and Recommendations

7.1 Introduction

The primary objective of this thesis was to test the presence of market discipline in the Indonesian banking sector, focusing on market discipline imposed by depositors, bond holders and equity holders.

7.2 A Review of the Problem Statement and Methodology

A range of market disciplines has been incorporated by financial sector authorities in various jurisdictions as an integral part of banking regulatory frameworks. This was mainly in response to the positioning of market discipline as Pillar 3 of the Basel II Capital Accord by the Basel Committee on Banking Supervision. The purpose of the Pillar 3 is to improve financial transparency which in turn promotes greater market discipline to complement the requirements of Pillar 1 (risk-based calculation of capital) and Pillar 2 (supervisory review process). The third pillar requires banks to disclose sufficient relevant information for market players to estimate the risks involved in banks. This enables market players to assess key information on the scope of risk, capital, risk exposures, risk measurement processes and bank capital adequacy. Moreover, several regulatory frameworks to promote a greater role of market discipline, including one that suggests compulsory subordinated debt issuance, prompted corrective actions by regulators based on market indicators, and the risk-based premium of deposit guarantee schemes.

In the Indonesian banking sector, as part of an effort to enhance market discipline in line with the third pillar of Basel II, the banking authority has issued regulations for the enhancement of transparency in bank financial conditions and performance. For example, banks in Indonesia are required to disclose the types of risk and risk exposures as well as adopted risk management practices. This disclosure of information is expected to enhance the ability of market participants and the public in general, to assess the performance and risk profile of banks and the efforts of bank management to mitigate these risks. In addition, the banking authority issued regulations in which banks could voluntarily issue a certain amount of subordinated debts to improve their capital structures. With regards to the deposit protection program, the IDIC and related

government institutions are currently preparing a draft regulation on a risk-based premium to be applied to the banking sector. The main objectives of proposed regulations are to reduce financial risk, improve the soundness of banks, and to provide banks with incentives for better management.

On the other hand, as one of the main policy responses to the 1998 Asian financial crisis, the Indonesian financial sector authorities developed a FSN in order to improve and to preserve stability in the domestic financial system in such a way that the financial sector can function normally and contribute to sustainable economic development. The Indonesian FSN, in general, consists of prudential regulation and supervision, a deposit insurance scheme, a LoLR function, and the resolution mechanism for failed financial institutions.

The provision of a FSN, however, has the potential for unintended outcomes. As described in Chapter 2, a large number of theoretical and empirical studies have identified the moral hazard implications of FSN that could impede market discipline, induce banks to take higher levels of risk, and increase the likelihood of a financial crisis. These moral hazard implications exist because the FSN reduces incentives for market participants to monitor and discipline their banks since their funds are principally protected by the government. Given this environment, concerns have been raised about the ability of the current Indonesian regulatory framework to improve the integrity of the financial system and to improve the effectiveness of market discipline.

With respect to the possible contradiction between the market discipline and the FSN policies, the objective of this study was to develop a deeper understanding of the policy implications of the FSN by investigating the presence of market discipline in the Indonesian banking sector and how the market discipline mechanism has been affected by the provisions of FSN. To achieve this objective, this research focused on the behaviour of three bank stakeholders: depositors, bond holders and equity holders, who have potential power to monitor and influence banks. As the main sources of funds for banks, these stakeholders are expected to have adequate capability to exercise appropriate discipline upon those banks.

The literature suggests that the presence of market discipline can be verified if market participants are capable of imposing discipline by withdrawing their funds or demanding higher premium risk to compensate for an increase in the riskiness of banking institutions or a decrease in bank fundamentals. Bank fundamentals in this study refer to the CAMEL indicators as published in the bank quarterly reports. These indicators of bank soundness consist of capital adequacy ratio (CAR) as a proxy for capital requirement, non-performing loans (NPL) as a

proxy for asset quality, operating expenses to operating income ratio (OPEX) as a proxy for management efficiency, return on assets (ROA) and net interest margin (NIM) as proxies for earning quality, and loan to deposit ratio (LDR) as a proxy for liquidity. The presence of market discipline in this study is verified by measuring the impact of CAMEL ratios on risk assesment by depositors, bond holders, and equity holders.

This study used a sample of 95 banks, which included 4 state banks, 26 regional development banks, 24 foreign exchange commercial banks, 24 non-foreign exchange commercial banks, 9 joint venture banks, and 8 foreign banks. The data were obtained from quarterly reports of Quarter I of 2001 to Quarter IV of 2011. In order to investigate the impact of changes in deposit guarantee schemes on market discipline, this 11-year observation was divided into two sub-periods: the sub-period of the blanket (full) guarantee program from Quarter I of 2001 to Quarter IV of 2005, and the sub-period of the limited guarantee program from Quarter I of 2006 to Quarter IV of 2011. Data on the amount of insured and uninsured deposits were collected from the IDIC. Changes in the levels of time deposits and uninsured deposits were employed as proxies to represent the behaviour of large and institutional investors who were expected to be able to exert disciplinary actions on banks more effectively than retail depositors.

The market discipline imposed by bond holders was measured through the impact of bank fundamentals on bond yield spreads on a sample of 70 bonds, consisting of 18 subordinated bonds and 52 senior bonds issued by 23 banks (4 state banks and 19 private domestic banks), representing more than 75% of total bonds in circulation. The observation period of the study included Quarter I of 2007 until Quarter IV of 2011, providing 656 balanced panel observation points. The yields of the Indonesian corporate bond data were collected from the IBMD published by the IDX and the IBPA, and the yields of government bonds were gathered from the Bloomberg database. Information about the rating of bonds was collected from the IBMD books and press releases from rating agencies operating in Indonesia.

The discipline imposed by equity holders was measured through the impact of bank fundamentals on equity returns in a total of 11 listed banks over the period Quarter I of 2003 to Quarter IV of 2011. This selection produced a total of 396 balanced panel observations, representing approximately 85.96% of total market capitalization in the banking sector at the end of 2011. Information about stock prices of the Indonesian listed banks was gathered from the IDX and the Bloomberg database.

7.3 Summary of the Results

This section summarises the results of the study in relation to the objectives. Hypothesis statements, expected relationships as stated in the equations, and the results of testing the discipline exerted by depositors, bond holders, and equity holders are summarized and presented in Table 7.1.

7.3.1 Market discipline by depositors

The overall results were consistent with current hypotheses on depositor discipline. In general, these state that change in the amount of deposits is sensitive to the variations in fundamentals after controlling for a variety of other external influences, namely the macroeconomic environment and ownership structure. The results illustrate that changes in the amount of total deposits were significantly associated with all of the six indicators (hypothesis H1a). In the case of time deposits (hypothesis H1b), except for the ROA, the other CAMEL indicators presented significant impacts on changes in the level of deposits. During the period of the limited deposit insurance scheme, only four of the six CAMEL indicators had significant influence on the levels of uninsured deposits (hypothesis H1c). The influence of NPL and OPEX on the levels of uninsured deposits were not significant.

The CAMEL indicators had a stronger influence on the levels of total deposits compared to the influence on time deposits and the influence on uninsured deposits. This result suggests that large and institutional depositors exert weaker discipline on the banks. To conclude, this study found no strong evidence that the large and institutional depositors performed better disciplinary actions compared to retail depositors.

Table 7.1 Summary of Hypotheses, Expected Relationships, and Results

Hypotheses	Results
Market discipline imposed by depositors	
H1a Total deposit has a positive relationship with bank fundamentals	Supported for all CAMEL ratios for all models. However, contrary to expectations, LDR positively impacted the flow of total deposits. In addition, the implicit deposit interest rate had a significantly positive impact on the flow of total deposits.
H1b Time deposit has a positive relationship with bank fundamentals	Supported for all models except for ROA. However, contrary to expectations, the LDR positively impacted the flow of the time deposits over the blanket guarantee and the limited guarantee periods.
H1c Uninsured deposit has a positive relationship with bank fundamentals	Supported for all models except for the NPL and the OPEX. Moreover, from the other four camel ratios (CAR, ROA, NIM, and LDR), only the CAR indicator had the expected direction of relationship with the flow of uninsured deposits.
H1d The correlation between deposit and bank fundamentals for large banks is not equal to that of small banks	Supported for all models.
H1e The correlation between deposit and bank fundamentals for listed banks is not equal to that of unlisted banks	Supported for all models.
H1f The correlation between deposit and bank fundamentals for foreign banks is not equal to that of domestic banks	Supported for all models.

Continued

Table 7.1 continued

Hypotheses	Results
Market Discipline Imposed by Bond Holders	
H2a Bond yield spread has a negative relationship with bank fundamentals	Supported for all CAMEL ratios, except the sign on ROA was contrary to the expectation. In addition, the bond rating had a significantly negative impact on the spread of bond yields.
H2b The correlation between bond yield spread and bank fundamentals for subordinated bonds is not equal to that of senior bonds	Not supported. The risk premium paid for the holders of subordinated bonds and senior bonds was indifferent over the observation period. When the negative bond yield spreads during the global financial crisis (2008-2009) were excluded. The result supported the hypothesis.
H2c The correlation between bond yield spread and bank fundamentals for larger banks is not equal to that of smaller banks	Supported.
H2d The correlation between bond yield spread and bank fundamentals for state banks is not equal to that of private banks	Supported.
Market discipline imposed by equity holders	
H3a Equity returns have a positive relationship with bank fundamentals	Not supported. Only two out of the six CAMEL variables and two out of the three macroeconomic variables significantly impacted the returns of equity.
H3b The correlation between equity return and bank fundamentals for large banks is different to that of small banks	Not supported.
H3c The correlation between equity returns and bank fundamentals for state banks is different to that of private banks	Supported for the whole sample and the private banks; not supported for the state owned banks.

The liquidity risk indicator was represented by the LDR, which indicated a positive impact, contrary to expectations. A possible explanation on this positive impact could be the low level of credit disbursment in Indonesian banks. Over the observation period, the LDR was smaller than the loan ratio in Indonesia before the 1998 Asian financial crisis and smaller compared to the loan ratio of other emerging markets in the region. Therefore, an increase in the LDR might not be viewed as as increase in liquidity risk, but interpreted as an indication of the ability of banks to generate new loans and interest revenues at any given level of deposits[56].

The size of banks was found to be a determinant of deposit levels. The findings of this study sugget that changes in the levels of total deposits, time deposits, and uninsured deposits at large banks were generally higher than that of small banks. This finding provides strong support for the TBTF perception amongst depositors.

The ownership structure of banks, such as public ownership via an equity market (Hypothesis H1e) and the ownership of banks by foreign entities (Hypothesis H1f), had a strong correlation with the level of deposits. For all the models, the estimates indicate that the total deposits, the time deposits, and the uninsured deposits of listed banks were less than those of the unlisted banks and that those of foreign banks were significantly lower than those of domestic banks.

7.3.2 Market discipline by bond holders

The discipline imposed by debt holders was evaluated by measuring the impact of bank fundamentals on bond yield spreads. The findings indicate a significant positive correlation between yield spread and the level of risk, providing support for Hypothesis H2a. The six CAMEL ratios (CAR, NPL, ROA, OPEX, NIM, and DER) had significant correlation with bond yield spreads. However, contrary to expectations, the sign on the association between the bond yields spreads and the earning indicator (ROA) was positive. This indicates that bond holders perceive an increase in the profitability ratio as an increase in the risk-taking activities of banks. This behaviour is commonly found in emerging markets, such as Indonesia, where the bond market is in the early stages of development and is fairly illiquid. With respect to bonds with a

[56] To increase the banking intermediatory function, the central bank for the first time issued a regulation that linked the LDR target to the central bank statutory reserves. The LDR target is the estimated LDR with a lower limit (78%) and upper limit (100%) as determined by BI in order to calculate statutory reserve requirements. As a disincentive, a bank that fails to comply with the LDR target will have to provide a higher statutory reserve as stated in the BI regulation Number 12/19/PBI/2010 concerning Statutory Reserves in Rupiah and Foreign Currency for Commercial Banks.

lower credit rating, market discipline was exerted by market players by requiring higher returns to compensate for additional risks, which is consistent with the literature.

The existing literature suggests that subordinated bonds have a greater risk of losing their value in the event of bank closures, making it necessary to offer relatively higher returns on subordinated bonds compared to senior bonds. The regression results for the full period of observation indicated a rejection of this hypothesis since the difference of yield spreads between these two types of bonds was insignificant (Hypothesis H2b). A further investigation suggested that this result might have been affected by the yield spread anomaly over the period of the global financial crisis, during which the yield spreads between the government and corporate bonds were negative. If these negative spreads were excluded from the sample, the result supported the hypothesis that banks pay a higher risk premium for subordinated bonds compared to senior bonds. These results indicate that, with the exception of the period of global financial crisis, there was evidence to support the presence of market discipline exerted by debt holders through demanding higher returns on subordinated bonds.

The size of banks had a significant impact on risk perception of bond holders (Hypothesis H2c), indicated by bond interest rates issued by the large banks being significantly lower than those of small banks. In relation to the safety net, this result might be affected by the doctrine of TBTF in which systemically important banks are expected to be bailed out by the government to prevent a domino effect on the banking system as a whole.

The literature maintains that government ownership of banks has the potential to limit the extent of market discipline, especially in emerging economies where state owned enterprises continue to play a dominant role. The results of this regression, in general, support this hypothesis (Hypothesis H2d), with state banks paying significantly lower risk premiums compared to Indonesian private banks.

7.3.3 Market discipline by Equity holders

The third objective of this study was to evaluate the discipline imposed by equity holders. In an efficient market, investors will respond to information available on the market, such as financial reports, and the impact of this information would be reflected in the market prices of the stocks. The research hypothesis on this relationship (Hypothesis H3a) was not supported. Furthermore, of the six CAMEL indicators, only capital adequacy and the liquidity ratio had any noticeable

impact on equity returns. For the three macroeconomic indicators, only exchange and inflation rates had any significant influence on equity returns. This finding suggests that the information content of bank financial statements does not play an important role in decisions on the trading of bank equity.

The correlation between bank fundamentals and equity return for large banks was not found to be different to that of small banks (Hypothesis H3b), leading to the rejection of the hypothesis that the size of bank was not a main determinant of equity returns. This implies that the TBTF perception is not a strong driving force influencing investor behaviour. This behaviour might be triggerred by the Indonesian government decision to rescue the Century Bank (a small listed bank) in 2008, with one of the main considerations being the prevention of potential negative sentiments arising in the capital market and to protect the interest of minority shareholders.

With respect to the sensitivity of ownership on investor behaviour (Hypothesis H3c), findings indicate that shareholders did not actively monitor the performance of state banks, with none of the six CAMEL variables correlated with the fluctuation of equity returns. This is an indication that the CAMEL variables were not relevant for assessing the risk level of state banks.

To conclude, the findings of this study support the hypothesis that equity holders are less inclined to impose market discipline on banks, particularly in emerging economies, mainly due to lack of ideal conditions for market discipline mechanisms.

7.3.4 The Overall Impact of FSN on Market Discipline

Based on the findings, the general conclusion on the discipline imposed by depositors, bond holders, and equity holders is that the Indonesian banking sector is subject to disciplining by its stakeholders. This provides further evidence to support the view that there is a strong possibility of creating market discipline in unsophisticated emerging markets. Moreover, the improvements made to the information disclosure requirements have enabled market participants to monitor the performance of their investments closely and more effectively. The ability of market participants to monitor bank performance is expected to have an encouraging influence on prudential risk management practices in the Indonesian banking sector.

The effectiveness of market discipline, however, has been impaired by the government provision of a safety net in the Indonesian banking sector. The findings of this study indicate that the provision of a FSN resulted in moral hazard implications due to the lessening of incentives for

market participants to monitor their banks. The complacency among the market participants is evidenced by the behaviour of large and institutional depositors (the owners of wholesale funds) who imposed weaker discipline on banks than did retail depositors. The large and institutional depositors, as represented by holders of time deposits and uninsured deposits, are generally assumed to possess adequate capability to assess the risk of banks and accordingly are expected to impose stronger discipline than those imposed by small retail depositors. Contrary to expectations, however, this study found that the large and institutional depositors imposed weaker disciplinary actions compared to retail depositors. The provision of a FSN had enabled the large and institutional depositors to invest their funds in banks that offer higher returns, irrespective of the risk profile of the banks. Further, this study found no evidence that depositors exercised stronger discipline on banks following the implementation of the limited deposit guarantee program. This finding has raised questions on the credibility of the limited deposit guarantee program to achieve its objective of strengthening market discipline.

Indications of the moral hazard implications of the FSN in Indonesia are also evident in the presence of the TBTF perception in the market. The empirical evidence of this study consistently affirmed that the size of banks was a significant influence on the risk assessment of depositors, bond holders, and equity holders. The market participants assumed that large banks posed a lower risk of default due to the provision of FSN favouring large banks.

In conclusion, the results provide strong evidence on the presence of market discipline in the Indonesian banking industry. The strength of this influence, however, suffers from the dampening impact of the FSN. This is consistent with the current literature which provides evidence on the moral hazard implications of the provision of safety nets, particularly in reducing incentives for market participants to monitor the risk-taking behaviour of banks.

7.4 Significance of the Findings

This section presents a discussion on the significance of the findings and how these relate to previous studies. However, the discussion places greater emphasis on the implications of the asymmetric information theory, the credibility of a deposit insurance scheme to increase market discipline, the capacity of large and institutional depositors to impose discipline, and the effectiveness of bond holders and equity holders as sources of market discipline.

The findings provide evidence of market discipline, particularly on the discipline imposed by depositors and bond holders, which support the recommendations of BASEL II requiring financial institutions to provide key financial information to the public. The findings are also consistent with asymmetric information theory. The publication of bank financial information provided greater transparency thereby reducing the discrepancies in the levels of available information. They also functioned as Spencer signaling by providing information on indicators of bank financial performances and risk profiles. Furthermore, the mandatory disclosures strengthen the Stiglitz screening process by enhancing the ability of stakeholders to digest information and to discipline the banks through a volume or price adjustment to their investment portfolios.

The main objective of the phasing out of the blanket guarantee scheme, replaced by the limited deposit insurance scheme in 2005, was to enhance market discipline. However, the findings of this study indicate that the discipline exerted by depositors did not significantly improve following the implementation of the limited deposit insurance scheme. This result challenges the reliability of a deposit insurance scheme to increase market discipline. It is now clear that the Indonesian deposit insurance scheme in its current form is unable to achieve the intended objectives and needs amendments to enhance its capacity to achieve the initial goals.

In relation to the credibility of the existing deposit insurance scheme, another important finding is the weakening of the discipline imposed by high volume investors, including institutional investors. The premise is that these types of depositors have sophisticated financial literacy enabling them to assess bank risk and to price the risk optimally. Contrary to expectations, however, the larger depositors imposed weaker discipline. As argued earlier, the ability of large and institutional depositors to assess the risk of banks was not only used to adjust their investment portfolios, but also to gain advantages from the provision of the FSN.

The findings provide empirical evidence on market discipline imposed by the holders of both senior and subordinated bonds. These results provide justification for the decision taken by the Indonesian central bank to adopt the Basel Committee recommendation of using subordinated bonds to enhance the capital structure of banks and, at the same time, promote further monitoring functions to the market. Moreover, the results also endorse the potential of senior bonds as an alternative indicator to evaluate the disciplinary actions of bond holders.

Contrary to the evidence on discipline imposed by depositors and bond holders, this study did not find any significant evidence of market discipline exercised by equity holders. The absence

of evidence in this respect can be interpreted as an indication of an inefficient capital market, as commonly found in developing economies. This finding can also be seen as consistent with the view, as previously discussed, that opposed the suitability of equity holders as agents of market discipline.

In summary, the findings of this study make significant contributions to the debate on the application of the asymmetric information theory in the area of market discipline, the design and features of deposit insurance and the importance of depositors, bond holders, and equity holders as sources of market discipline. The following section presents some policy implications and recommendations as a result of this study.

7.5 Policy Implications and Recommendations

As discussed in Chapter 1, the provision of a FSN for banks has been a key element of the policy response to the financial crises of 1998 and 2008 implemented by the Indonesian authorities in order to preserve stability in the financial system. However, as discussed throughout this thesis, the FSN may create moral hazard implications that potentially impede the effectiveness of market discipline as the third pillar of the Basel Capital accord. The moral hazard problems might appear because the provision of FSN lessens incentive for market players to monitor banks and incite banks to take more risks.

The findings of this study, as presented in Section 7.3, while providing evidence of market discipline, also provide evidence of the unintended complacency among market players with regard to risk profiles. These moral hazard aspects of FSN should be adequately addressed by the Indonesian financial sector regulators. Therefore, this study not only contributes to the growing body of literature on market discipline in developing economies, but also has significant practical implications on the effectiveness of market discipline in the presence of a safety net. The policy implications and recommendations presented in this section mainly focus on how to mitigate the unintended outcomes of regulatory provisions, as well as on the use of market information to strengthen the supervision of banks. Moral hazard among market players can be avoided by monitoring the level of deposits and the interest rates paid to the large and uninsured depositors. Moral hazard for bank management can be avoided by implementing a risk-based deposit insurance premium and a mandatory subordinated debt issuance for large banks. The last part of this section discusses the use of market indicators for supervisory purposes.

a. Mitigating the Moral Hazard of Depositors

The main objective of the Indonesian government decision to phase out the blanket guarantee and to replace it with a limited deposit insurance scheme was to minimize the moral hazard of the deposit guarantee program. This limited deposit insurance scheme, while providing protection for small and unsophisticated savers, has the potential to provide an incentive for large and institutional depositors to monitor their banks. The findings, however, suggest that disciplinary actions of the large and institutional depositors were weaker than that of the small and retail depositors. Within the context of this study, there are two main implications of this finding related to the supply and demand side of funds. From the supply side, the current literature commonly highlights the "bright side" of wholesale funding in which sophisticated investors can monitor banks, discipline bad banks and refinance solvent banks. However, banking regulators should be aware of the "dark side" of wholesale funds, as argued by Huang and Ratnovski (2011), where wholesale investors who invest their funds in risky banks, fail to monitor banks adequately. These investors are capable of predicting and being sensitive to initial signs of failure and withdraw their funds ahead of small and retail depositors (Goldsmith-Pinkham & Yorulmazer, 2010; Marino & Bennett, 1999; Shin, 2009). Therefore, banking regulators should monitor the prices paid on large and uninsured deposits, as well as monitor and analyze the flow of these deposits to better understand how they relate to bank risk-taking behaviour (Feldman & Schmidt, 2001).

In order to minimize moral hazard, as stipulated in the IDIC Law, the deposit guarantee is only eligible for deposits below the maximum amount of deposit insurance coverage and the maximum level of deposit interest rates, both of which are reviewed periodically by the IDIC (Lembaga Penjamin Simpanan, 2010). To increase the incentive for large and institutional depositors to discipline their banks, this policy can be further strengthened by excluding them from the insurance scheme or by implementing a coinsurance system. Many deposit insurance schemes exclude deposits held by depositors who are deemed capable of assessing the financial condition of a bank and imposing market discipline, this includes deposits held by institutional and professional investors (Financial Stability Forum, 2001). In a coinsurance system, depositors bear a pre-specified share under the coverage limit in the event of a bank failure (International Association of Deposit Insurers, 2013). By implementing this scheme, depositors will be aware that they may suffer losses even if their deposits fall below the

coverage limit when banks fail. Under a coinsurance scheme, individuals or retail depositors who have small account balances may not exercise market discipline because of lack of financial incentives or sophistication. In this case, individuals bear a cost for bank failure without increasing market discipline (Financial Stability Forum, 2001). Therefore, a coinsurance scheme could be more effective if applied only for mitigating the moral hazard of large and institutional depositors.

b. Mitigating the Moral Hazard of Banks: Risk-based Deposit Insurance Premium

The "dark side" of wholesale funds can also be triggered from the demand side. Large and institutional depositors have significant power to negotiate the return on their investment, which is particularly evident in the case of small banks. In addition, the fact that the deposit insurance premium in Indonesia is flat may create an incentive for banks to take more risks, encourage poor decision-making, and transfer the risks to the deposit insurer (Demirguc-Kunt & Kane, 2002; Hadad et al., 2011). Empirical evidence indicates that Indonesian banks have shifted their risk to deposit insurers as a result of a low and fixed deposit insurance premium (Kariastanto, 2011). One approach to reduce the moral hazard implications on the management of banks is for the deposit insurance scheme to be based on risk-based premiums. Under this approach, the insurance premium levied should be based on a mutual rating, so that banks that have a higher risk exposure pay higher insurance premiums. This premium paid by the banks will provide an additional level of reliability to stakeholders on the level of bank exposure because it is estimated by an external agent. The IADI suggests that when the information required to implement a risk-based premium scheme is available, relating premiums to the risk a bank poses to the deposit insurer is preferable. In the context of the Indonesian banking industry, the existing CAMEL rating system can be utilized as a starting point. According to the Indonesian banking law of 1992, this rating system classifies banks into four categories: sound, fairly sound, poor, and unsound. The release of CAMEL ratings to the public would also be useful as a means to enhance discipline by market participants and to limit bank risk-taking behaviour.

The drawback of this policy, however, is the potential destabilizing effects of imposing high premiums on already troubled banks, as well as exposing already troubled banks to greater public scrutiny once their CAMEL scores are publicly available. Therefore, the Indonesian banking authorities need to find a balance between its two main objectives: providing stability

to the financial system and providing greater potential for stakeholder-enforced market discipline in the Indonesian banking supervisory framework.

c. Mitigating the Moral Hazard of Banks: Mandatory Subordinated Debt Issuance for Large Banks

The existing regulations have enabled Indonesian banks to voluntarily issue subordinated bonds to enhance their capital structures. As discussed in Chapter 2, one of the objectives of this policy was to enable the subordinated bond holders to monitor and, where necessary, to respond to risk-taking choices made by the issuing banks. Further initiatives have been proposed to increase the roles of subordinated debts to discipline banks' risk-taking behaviour, in particular the proposal of a mandatory subordinated debt issuance (Covitz et al., 2000; Evanoff, Jagtiani, & Nakata, 2011; Fan et al., 2003; Hamalainen et al., 2010).

However, without an adequate and effective market monitoring mechanism in place, the issuance of subordinated bonds, especially by vulnerable banks, would potentially increase the risk-taking activities of banks and destabilize the bond market in the long run. The provision of a safety net is one of the factors that could hamper the effectiveness of monitoring by debt holders. Furthermore, Levy-Yeyati et al. (2004a) argue that any regulation in developing economies that requires banks to issue subordinated debt as a vehicle for market discipline is likely to fail because of the high cost of issuance and the presence of illiquid markets.

In contrast, Evanoff et al. (2011) argue that previous studies that examined the potential usefulness of these proposals have done so in environments that are significantly different from those that are characterized by a fully implemented mandatory subordinated debt issuance program. In a fully implemented program, the market is expected to be deeper, issuance will be more frequent, debt will be viewed as a more viable means to raise capital, bond dealers will be less reluctant to publicly disclose more details on debt transactions, and generally, market participants will be more closely followed.

In the context of the Indonesian bond market, despite the limited liquidity and the number of bonds in the market, this study found indications of market discipline exercised by bond holders. This finding, in general, supports the use of subordinated bonds as a stimulus for market discipline. Nevertheless, more evidence is required for an accurate evaluation of the suitability of introducing a mandatory subordinated debt issuance into Indonesian banking

regulations. In the context of developing countries such as Indonesia, it has been recommended that the implementation of a mandatory subordinated debt issuance program should be restricted to large banks due to the higher levels of risk involved and the associated costs (Hamalainen et al., 2010). From a cost-benefit perspective, it might not be feasible for small banks to issue subordinated bonds because of cost considerations whilst from a systemic risk perspective, monitoring and a direct approach to market discipline is necessary for banks that pose systemic risk factors.

d. The use of Market Indicators for Supervisory Purposes

In the market discipline framework, as illustrated in Chapter 3, banking regulators collect signals from the market and utilize this information to impose indirect market discipline, such as supervisory corrective actions (Flannery, 2001; Hamalainen et al., 2003). In conjunction with the use of subordinated debt to enhance market discipline, as discussed in the previous section, recent proposals also recommend the use of subordinated debts, alongside with the CAR, as part of the criteria to trigger a supervisory action or to prompt corrective actions (PCA)[57]. The bond rates that investors require offer bank supervisors an indication of how the market views the risks the issuer is taking. This information, therefore, can be used by banking supervisors to promptly exert indirect market discipline on banks that are potentially in distress (Evanoff & Wall, 2002; Kwast et al., 1999).

The effectiveness of the PCA, however, would significantly depend on the ability of market indicators to reliably and accurately capture the risk exposure of banks. Without reliable and accurate market signals, the corrective actions taken by supervisors might be inappropriate and, therefore, ineffective (Evanoff & Wall, 2002). In an emerging market such as Indonesia, there are two factors that might distort market signals: the provision of a safety net and the under-developed bond market. As previously discussed, the moral hazard problem of a FSN might influence the behaviour of investors and hence distort market indicators. Secondly, the use of debt for PCA might be constrained by inadequate market infrastructure and the limited number of banks that issue bonds to finance their operations[58]. In emerging countries, partly

[57] See Evanoff et al. (2011), Evanoff, and Wall (2002), and Bliss and Flannery, 2002.

[58] In the US, as one of the most developed capital markets, only 15% of all banks issue equity, and a similar proportion of financial institutions have publicly-traded debt outstanding. In developing countries, these figures are much smaller (Flannery, 1998).

as a result of relatively higher transaction costs and partly due to the presence of a large number of small firms, the volume of the debt and equity issuance is relatively small (Calomiris, 1997; Levy-Yeyati et al., 2004; Mishkin, 1996). Further, secondary markets tend to be very thin and investors may lack the ability to observe the risk involved or expect protections in the form of government guarantees. Therefore, information on price and quantity movements may be distorted, undermining their potential as a market discipline tool. As a consequence, in the absence of accurate signals on the risk level, the pricing of subordinated debt may not be efficient, which would impair the use of subordinated debts as reliable signals for corrective action (Bliss & Flannery, 2002; Evanoff & Wall, 2001).

Nevertheless, even though yield spreads might not be suitable to trigger the PCA, this study suggests that bond market indicators still provide important information that could complement the existing supervisory assessments of bank conditions (Esho, Kofman, Kollo, & Sharpe, 2005; Flannery, 1998; Hamalainen et al., 2003). Furthermore, the signals from the bond market and the equity market can also be utilized as indicators in the financial sector's early warning system (EWS), as part of the Indonesian crisis management protocol (Departemen Keuangan, 2010).

7.6 Contribution of this Study

This study contributes to the literature on market discipline in two important ways: the source of market discipline and the source of data.

First, in terms of the source of market discipline, previous studies on emerging markets have typically focused only on depositors as potential participants in exerting market discipline. This approach has ignored the disciplining power of other important players with the potential for market discipline. In contrast, this study is the first to conduct a comprehensive evaluation and to compare the discipline imposed by three main market participants: depositors, equity holders, and bond holders. A concise comparison of market discipline imposed by depositors, equity and bond holders can be seen in Table 7.2. The present study, therefore, is expected to contribute to the body of knowledge by presenting a more comprehensive evaluation of the existence and influence of market discipline in developing economies.

Table 7.2 Comparison of Market Discipline by Depositors, Bond and Equity Holders

Features	Depositors	Bond holders	Equity holders
Investor characteristics	Unsophisticated retail depositors and sophisticated institutional depositors	Mainly sophisticated institutional investors	Mainly sophisticated institutional investors
Main objective	Saving or short term cash management to earn interest income	Investment to earn fixed interest income and typically long term horizon	Investment to earn dividend and capital gain, and typically shorter term horizon than bond holders
Incentive to exert discipline	Relatively weak incentive due to the provision of government deposit guARANTEE (UP TO CERTAIN AMOUNT)	Strong incentive since there is no guarantee in a case of default	As the first party to lose value in the event of bank failure, equity holders have incentive to penalize risk taking behaviour. But, at the same time they have risk-taking incentive to get profit from the upside potential
Discipline measurement	Sensitivity of deposit growth rate on bank fundamentals	Sensitivity of bond yields on bank fundamentals	Sensitivity of equity returns on bank fundamentals
Research finding	Disciplinary actions by depositors identified by significant correlations between deposit growth rates and bank fundamentals. However, THERE IS NO STRONG EVIDENCE THAT THE LARGE AND INSTITUTIONAL INVESTORS IMPOSED BETTER DISCIPLINE THAN RETAIL DEPOSITORS.	Disciplinary actions by bond holders identified by significant correlations between bond yields and bank fundamentals.	This study find no strong evidence of market discipline imposed by eqUITY HOLDERS SINCE THE RELATION THE CORRELATION BETWEEN EQUITY RETURNS AND BANK FUNDAMENTALS WAS INSIGNIFICANT.

Second, in terms of data, the present study employed data that has not been used in previous studies, in particular the use of deposit data from the IDIC and the use of bond data from the IDX and the IBPA. The existing market discipline literature commonly measured the behaviour of the Indonesian depositors as a group. By using data from the IDIC, this study further investigated the extent of market discipline imposed by different types of depositors, in particular the disciplinary actions of retail and large (wholesale) depositors, as well as discipline by insured and uninsured depositors. Additionally, in investigating discipline by bond holders, this study used data on the quarterly bond yield from the Indonesian bond directories that are published by IDX and IBPA.

7.7 Limitations of the study

The data set used in this study has both strength and weaknesses. The strength has been discussed in the previous section. Following is a discussion on the limitations of the study.

Firstly, the main challenge during the data collection process was the availability and validity of data in developing economies such as Indonesia. For example, some quarterly financial reports, particularly for the years of 2001 to 2003, were not available in the central bank database or in the websites of these banks. The Indonesian banking directory, which is published by the central bank, only contains annual reports. Similarly, bank websites commonly provide annual aggregates. To solve this problem, this study collated the data manually from alternative sources, such as magazines and newspapers[59]. This manual process was time consuming, but was worth the effort in the interest of improving the accuracy of the results. This study was also limited to using implicit deposit interest rates, as with previous studies of developing economies, because data on the real or explicit deposit interest rates are not available. Over the observation period, the central bank made some revisions to the chart of accounts in the financial reports. For example, a given account could have been split into two or more accounts in the following period, or conversely, two accounts could have been merged into one account in the subsequent reports.

Secondly, the observation period of this study, particularly relating to bond yield, was relatively short because of limited data availability. For example, in investigating the market discipline imposed by bond holders, data on quarterly bond yields is only available from 2007. The transaction data before 2007, when the bond market was managed by the Surabaya Stock Exchange[60], is not available.

Thirdly, some securities issued by the Indonesian banks were not liquid; hence the impact of the bank fundamentals on these dormant securities could not be estimated. This situation is common in developing economies where the equity and bond markets remain limited in both scope and depth. These illiquid or dormant securities were excluded from the samples in order to obtain a more accurate result.

[59] Copies of bank quarterly financial statement publications were collected from the Infobank magazine research division located in Jakarta, Indonesia.

[60] In December 2007, the JSX and SSX were merged into one organization, a Jakarta-based exchange named the Indonesian Stock Exchange (IDX)

Fourthly, according to efficient market theory, the price of a stock incorporates all relevant information, including accounting information. Therefore, to accurately evaluate the impact of the publication of the quarterly financial statements, the price of stocks should be collected on the day the financial information is published. However, information about this publication date is not available. Hence, this study used a two month lag in collecting the stock price, based on the argument that the announcement of the quarterly financial report should be made no later than the second month after the end of the reporting month.

Finally, the behaviour of market players such as depositors, bond holders, and equity holders in this study is measured mainly through financial or accounting information. This approach might provide some indications of stakeholder behaviour that needs further investigation. A study employing primary data from surveys, interviews, and focus groups would offer an further insight to complement the results of this study.

7.8 Suggestions for future research

Following are some suggestions that could improve the current knowledge in the area. One limitation of the study highlighted above relates to the data used in the study. One approach to improve the results is to employ a combination of qualitative and quantitative data in order to obtain a more comprehensive picture of the relationships. Therefore, future research should take necessary measures to improve the data set in terms of both quantity and quality in order to enhance the validity of the research. Furthermore, the present study can be extended along at least two paths: the research methodology and the measurement techniques.

As described in Chapter 3, market discipline consists of two distinct components: the 'monitoring' (recognize) and the 'influence' (control) phases (Bliss & Flannery, 2002). Most studies in this field, includidng the current one, have focused on the monitoring phase of market disipline framework. Only a handful of studies discuss how market participants influence the management of banks (Caner et al., 2012; Valensi, 2005). Therefore, the study of market discipline in the Indonesian banking sector could be broadened in order to analyse how market participants influence the management of banks, forcing them to adjust their policies after being punished by depositors (Calomiris & Powell, 2001), bond holders (Bliss & Flannery, 2002; Hwang & Min, 2013), and sharehoders (Caner et al., 2012).

An alternative measurement technique to study the behaviour of bank stakeholders, besides a quantitative research approach with the extensive use of accounting data, is a qualitative research approach such as using information collected from questionnaires, indirect observations, interviews, or focus groups. Qualitative analysis deals with the aspects of a research that cannot be measured by numbers but have a distinct impact on research objects. The strength of qualitative research is its ability to provide complex textual descriptions of how people experience and behave in a given research issue. This is a particularly important aspect of the nature of business in the banking industry where public trust and confidence are key ingredients of survival. A combination of both qualitative and quantitative analysis could generate a synergy providing a unique perspective on important issues.

In terms of the research aim, this study observed depositors, bond holders and equity holders as independent market participants with incentives to monitor banks. As identified by Stephanou (2010) and Hamalainen et al. (2003) there are other market participants who hold potential power to impose direct market discipline, such as counterparty banks and clearinghouses, or banking supervisors. To conclude, the findings of this study on market discipline suggest the need for even more research on market discipline in developing economies.

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Appendix A: Discipline by Depositors

A.1 List of Sample Banks & Balance Sheet Summary per 31 Dec 2011

(in million IDR)

NO	BANK NAME	CASH	SECURITIES	LOANS	TOTAL ASSETS	DEPOSITS	TOTAL LIABILITIES	TOTAL EQUITY
	STATE BANK							
1	Bank Mandiri (Persero)	10,259	86,348	273,962	489,107	380,236	429,928	59,179
2	Bank Negara Indonesia (Persero)	6,126	43,873	158,165	288,512	224,755	251,122	37,390
3	Bank Rakyat Indonesia (Persero)	10,429	46,760	283,586	456,531	372,148	406,757	49,775
4	Bank Tabungan Negara (Persero)	512	2,679	59,338	89,121	58,650	81,800	7,322
	SUB TOTAL	**27,326**	**179,661**	**775,051**	**1,323,271**	**1,035,789**	**1,169,606**	**153,665**
	REGIONAL DEVELOPMENT BANK							
1	BPD - Bali	339	109	7,274	10,587	8,787	9,482	1,105
2	BPD - Bengkulu	165	55	1,320	2,169	1,757	1,945	224
3	BPD - DI. Aceh	366	475	8,228	13,055	9,144	11,524	1,531
4	BPD - DI. Yogyakarta	208	223	2,704	4,808	3,579	4,304	503
5	BPD - DKI Jakarta	420	610	9,851	19,505	14,863	18,267	1,239
6	BPD - Jambi	264	39	1,616	3,093	2,428	2,669	420
7	BPD - Jawa Barat	1,712	3,977	26,998	52,103	37,008	46,748	5,355
8	BPD - Jawa Tengah	1,156	1,282	13,483	22,982	19,312	20,953	2,029
9	BPD - Jawa Timur	1,903	749	15,921	24,847	19,935	21,586	3,260
10	BPD - Kalimantan Barat	247	225	4,580	7,126	6,189	6,427	699
11	BPD - Kalimantan Selatan	345	273	3,290	6,447	5,381	5,768	679
12	BPD - Kalimantan Tengah	173	-	1,991	3,439	2,897	3,020	418
13	BPD - Kalimantan Timur	606	328	11,180	23,046	18,664	20,079	2,967
14	BPD – Lampung	176	114	1,957	4,189	2,439	3,811	378

Continued

Appendix A.1 continued

NO	BANK NAME	CASH	SECURITIES	LOANS	TOTAL ASSETS	DEPOSITS	TOTAL LIABILITIES	TOTAL EQUITY
15	BPD - Maluku	177	79	1,997	3,565	2,422	3,245	320
16	BPD - Nusa Tenggara Barat	155	169	2,620	3,469	2,626	2,991	478
17	BPD - Nusa Tenggara Timur	190	152	3,808	5,622	4,097	4,846	776
18	BPD - Papua (Irian Jaya)	735	1,736	5,220	13,673	10,872	12,167	1,506
19	BPD - Riau Kepri	378	1,268	8,318	16,984	12,850	15,376	1,607
20	BPD - Sulawesi Selatan	297	164	5,133	6,941	5,153	5,974	966
21	BPD - Sulawesi Tengah	79	35	566	1,147	732	950	197
22	BPD - Sulawesi Tenggara	50	64	1,237	2,348	1,478	1,990	358
23	BPD - Sulawesi Utara	162	198	3,686	5,298	3,694	4,868	430
24	BPD - Sumatera Barat/Nagari	435	212	8,580	12,895	9,813	11,781	1,114
25	BPD - Sumatera Selatan BaBel	416	776	8,259	13,193	10,911	12,040	1,153
26	BPD - Sumatera Utara	889	791	11,001	18,951	15,130	17,470	1,481
	SUB TOTAL	**12,040**	**14,101**	**170,817**	**301,481**	**232,161**	**270,284**	**31,193**
	FOREIGN EXCHANGE COMMERCIAL BANK							
1	Bank Agro	21	238	1,823	3,481	2,766	3,134	348
2	Bank Antar Daerah	32	70	829	1,347	1,170	1,227	119
3	Bank Bukopin	728	2,918	38,796	54,942	45,638	50,589	4,353
4	Bank Bumi Arta	37	148	1,634	2,963	2,420	2,487	476
5	Bank Central Asia (BCA)	10,344	55,585	202,269	377,251	323,457	336,759	40,492
6	Bank Danamon Indonesia	1,777	6,995	86,700	127,183	87,994	105,371	21,812
7	Bank Ekonomi Rahardja	353	3,021	14,003	24,098	20,072	21,556	2,543
8	Bank Ganesha	28	150	1,070	1,840	1,605	1,656	184
9	Bank Hana	30	82	2,355	3,682	2,295	2,633	1,049
10	Bank ICB Bumi Putera	65	580	5,105	7,300	6,011	6,677	623
11	Bank ICBC Indonesia	25	1,845	10,481	17,678	12,735	16,032	1,646
12	Bank Internasional Indonesia (BII)	1,686	7,862	62,574	90,741	70,075	82,985	7,756

Continued

Appendix A.1 continued

NO	BANK NAME	CASH	SECURITIES	LOANS	TOTAL ASSETS	DEPOSITS	TOTAL LIABILITIES	TOTAL EQUITY
13	Bank Maspion Indonesia	55	166	1,918	2,798	2,400	2,429	369
14	Bank Mayapada	83	713	8,758	12,951	10,667	11,288	1,664
15	Bank Mega	1,160	11,172	31,798	62,287	49,589	57,410	4,876
16	Bank Mestika	155	1,508	4,240	6,729	5,116	5,204	1,525
17	Bank Metro Express	21	86	336	652	424	440	211
18	Bank Nusantara Parahyangan	70	265	4,810	6,573	5,660	5,990	583
19	Bank Of India Indonesia	20	104	1,436	2,080	1,676	1,734	346
20	Bank Panin	1,386	13,843	70,794	118,262	85,537	100,824	17,438
21	Bank QNB Kesawan	37	205	1,991	3,594	2,637	2,701	893
22	Bank Saudara	85	424	3,342	5,086	4,088	4,613	473
23	Bank SBI Indonesia	11	324	1,192	2,112	1,468	1,915	197
24	Bank Sinar Mas	467	1,910	9,598	16,659	14,060	15,364	1,295
	SUB TOTAL	**18,675**	**110,212**	**567,852**	**952,286**	**759,560**	**841,018**	**111,270**
	NON-FOREIGN EXCHANGE COMMERCIAL BANK							
1	Bank Andara	2	6	480	730	77	553	177
2	Bank Anglomas International	2	25	60	166	61	62	104
3	Bank Artos Indonesia	8	20	254	456	265	351	105
4	Bank Bisnis	3	19	222	339	201	204	135
5	Bank BTPN	821	2,117	30,199	46,651	35,497	41,034	5,617
6	Bank Centratama Nasional	14	25	671	1,010	822	882	128
7	Bank Fama International	4	30	417	596	455	460	136
8	Bank Harda Internasional	9	254	1,043	1,578	1,331	1,424	155
9	Bank Ina Perdana	11	89	1,127	1,445	1,282	1,324	121
10	Bank Jasa Jakarta	27	600	2,831	4,148	3,394	3,458	690
11	Bank Kesejahteraan Ekonomi	5	331	1,919	2,546	2,155	2,312	234
12	Bank Liman International	4	15	121	251	117	121	130

Continued

Appendix A.1 continued

NO	BANK NAME	CASH	SECURITIES	LOANS	TOTAL ASSETS	DEPOSITS	TOTAL LIABILITIES	TOTAL EQUITY
13	Bank Mayora	27	211	827	1,509	1,277	1,321	187
14	Bank Mitraniaga	10	107	298	738	615	622	116
15	Bank Multi Arta Sentosa	2	37	502	813	618	630	183
16	Bank Nationalnobu	2	40	163	334	200	204	130
17	Bank Prima Master	23	-	886	1,238	986	1,084	154
18	Bank Pundi Indonesia	86	499	3,554	5,993	5,323	5,400	593
19	Bank Royal Indonesia	8	117	162	431	305	309	122
20	Bank Sahabat Purba Danarta	1	3	222	420	250	257	163
21	Bank Sahabat Sampoerna	8	46	643	1,079	811	820	259
22	Bank Sinar Harapan Bali	34	29	623	1,018	816	866	152
23	Bank Victoria International	32	3,126	5,588	11,303	8,784	10,091	1,212
24	Bank Yudha Bhakti	14	184	1,510	2,303	1,896	2,084	219
	SUB TOTAL	**1,154**	**7,929**	**54,322**	**87,096**	**67,539**	**75,873**	**11,222**
	JOIN VENTURE BANK							
1	Agris Bank	8	29	422	1,028	545	774	254
2	Bank ANZ Indonesia	137	2,267	18,316	27,323	22,252	24,026	3,297
3	BNP Paribas Indonesia Bank	0	696	983	3,341	774	2,158	1,183
4	China Trust Indonesia Bank	32	466	4,120	5,987	3,250	4,223	1,764
5	Capital Indonesia	15	1,002	1,759	4,695	3,976	4,086	609
6	DBS Indonesia Bank	257	3,344	22,063	32,482	21,827	28,705	3,777
7	Korea Exchange Bank Danamon	15	455	1,985	3,873	1,446	2,569	1,304
8	Resona Perdania Bank	23	120	7,112	10,132	4,934	8,470	1,661
9	Sumitomo Mitsui Indonesia Bank	9	1,095	15,975	21,147	8,431	16,327	4,820
	SUB TOTAL	**496**	**9,475**	**72,734**	**110,008**	**67,433**	**91,339**	**18,669**
	FOREIGN BANK							
1	Bangkok Bank	5	41	4,235	5,084	758	3,763	1,321

Continued

Appendix A.1 continued

NO	BANK NAME	CASH	SECURITIES	LOANS	TOTAL ASSETS	DEPOSITS	TOTAL LIABILITIES	TOTAL EQUITY
2	Bank of America (BOA)	4	20	503	1,651	1,182	1,662	(11)
3	Citibank	447	21,142	26,329	58,849	38,278	51,630	7,219
4	Deutsche Bank	29	5,408	4,543	22,226	9,830	20,058	2,168
5	Hongkong Shanghai Bank Corps	249	7,679	30,750	55,052	39,090	53,508	1,544
6	JP Morgan Chase Bank	3	3,277	1,785	8,234	3,053	8,208	26
7	Standard Chartered Bank	130	9,787	25,679	47,605	24,750	46,802	803
8	The Royal Bank Of Scotland	29	1,907	824	3,835	1,479	2,672	1,162
SUB TOTAL		**895**	**49,260**	**94,649**	**202,537**	**118,421**	**188,304**	**14,233**
GENERAL TOTAL		**60,586**	**370,639**	**1,735,424**	**2,976,679**	**2,280,903**	**2,636,425**	**340,253**

A.2 Descriptive Statistics of CAMEL Ratios, March 2001- December 2011

	CAR	NPL	OPEX	ROA	LDR	NIM
All Banks						
Mean	0.3792	0.0545	0.8033	0.0277	0.8197	0.0685
Median	0.2070	0.0269	0.8001	0.0255	0.7050	0.0612
Maximum	50.4971	2.0297	4.9182	0.5180	96.1600	0.6099
Minimum	-0.6956	0.0000	0.0070	-0.3993	0.0000	-0.1000
Std. Dev.	1.5940	0.1306	0.2453	0.0312	2.3728	0.0393
Skewness	2158%	872%	518%	125%	3049%	263%
Observations	4180	4180	4180	4180	4180	4180
State Owned Banks						
Mean	0.1806	0.0714	0.8071	0.0249	0.6534	0.0597
Median	0.1704	0.0498	0.8280	0.0230	0.6198	0.0541
Maximum	0.3073	0.2766	1.5382	0.0608	1.1629	0.1229
Minimum	0.1035	0.0218	0.1089	0.0037	0.2435	0.0053
Std. Dev.	0.0454	0.0565	0.1278	0.0128	0.2044	0.0270
Skewness	90%	220%	-87%	68%	40%	76%
Observations	176	176	176	176	176	176
Regional Development Banks						
Mean	0.2124	0.0304	0.7042	0.0411	0.5838	0.0984
Median	0.1975	0.0201	0.7104	0.0391	0.5771	0.0940
Maximum	0.7134	0.3036	1.3383	0.2086	1.2959	0.6099
Minimum	0.0011	0.0000	0.3081	0.0002	0.1106	0.0085
Std. Dev.	0.0813	0.0363	0.1037	0.0178	0.2257	0.0422
Skewness	172%	380%	-5%	136%	20%	362%
Observations	1144	1144	1144	1144	1144	1144
Foreign Exchange Commercial Banks						
Mean	0.2466	0.0371	0.8560	0.0190	0.6885	0.0554
Median	0.1762	0.0263	0.8693	0.0163	0.7156	0.0529
Maximum	1.4463	0.6219	1.9198	0.1500	2.3640	0.1600
Minimum	-0.5809	0.0000	0.0909	-0.0973	0.0056	-0.0580
Std. Dev.	0.1798	0.0507	0.1277	0.0177	0.2265	0.0227
Skewness	174%	623%	-20%	172%	-3%	32%
Observations	1056	1056	1056	1056	1056	1056
Non-Foreign Exchange Commercial Banks						
Mean	0.5646	0.0667	0.9003	0.0162	0.7709	0.0655
Median	0.2193	0.0252	0.8900	0.0147	0.7877	0.0609
Maximum	25.2942	2.0297	4.9182	0.1821	7.1650	0.3564
Minimum	-0.1763	0.0000	0.3445	-0.3993	0.0002	-0.0625
Std. Dev.	1.8639	0.2103	0.2364	0.0308	0.4421	0.0335
Skewness	936%	687%	645%	-268%	658%	140%
Observations	1056	1056	1056	1056	1056	1056

Continued

Appendix A.2 continued

	CAR	NPL	OPEX	ROA	LDR	NIM
Joint Venture Banks						
Mean	0.8223	0.0974	0.7763	0.0351	2.0985	0.0541
Median	0.2972	0.0418	0.7572	0.0318	1.1601	0.0451
Maximum	50.4971	1.0000	4.6401	0.5180	96.1600	0.5737
Minimum	-0.6956	0.0000	0.0070	-0.3597	0.0000	0.0009
Std. Dev.	4.1226	0.1737	0.5243	0.0630	7.5134	0.0418
Skewness	1051%	356%	384%	201%	965%	629%
Observations	396	396	396	396	396	396
Foreign Banks						
Mean	0.3641	0.0910	0.7045	0.0375	0.7716	0.0402
Median	0.2553	0.0477	0.6847	0.0359	0.6400	0.0400
Maximum	1.9700	0.8066	2.3700	0.1812	5.5997	0.2222
Minimum	0.0081	0.0000	0.0870	-0.0458	0.0064	-0.1000
Std. Dev.	0.2765	0.1254	0.2600	0.0293	0.6901	0.0286
Skewness	175%	228%	192%	102%	311%	14%
Observations	352	352	352	352	352	352

Source: Author's calculation based on the Indonesian banks quarterly reports
March 2001-December 2011

A.3 Regression Results: Total Deposit Variable (without the OPEX variable)

			All Periods	Blanket Gr.	Limited Gr.
VARIABLES	**Lag**	**Expected Signs**	**(1) TOT_DG**	**(2) TOT_DG**	**(3) TOT_DG**
TOT_DG	L1		-0.168***	-0.138***	-0.218***
			(0.00344)	(0.00488)	(0.00370)
CAR	L1	(+)	0.142***	0.133***	0.121***
			(0.0158)	(0.0166)	(0.0146)
NPL	L1	(-)	-0.0822***	-0.138***	0.591***
			(0.00796)	(0.00901)	(0.0436)
ROA	L1	(+)	-0.267*	0.272**	-0.667***
			(0.160)	(0.128)	(0.138)
LDR	L1	(-)	0.429***	0.377***	0.474***
			(0.0175)	(0.0138)	(0.0115)
NIM	L1	(+)	0.0232	-0.178***	0.149
			(0.0504)	(0.0522)	(0.123)
BANK_SIZE		(+)	0.0780***	0.0729***	0.121***
			(0.00633)	(0.00424)	(0.00470)
DEP_IR		(+)	0.161***	0.353***	0.194**
			(0.0464)	(0.0412)	(0.0855)
GDP_GR			0.652***	0.319***	2.752***
			(0.0506)	(0.0667)	(0.240)
INF_RT			0.576***	-0.166***	0.175**
			(0.0742)	(0.0501)	(0.0772)
EXC_RT			-0.0476**	0.235***	-0.242***
			(0.0201)	(0.0260)	(0.0184)
BLA_GR			0.0746***		
			(0.00741)		
LIST_BANK			-0.249***	-0.156***	-0.331***
			(0.0189)	(0.0145)	(0.0277)
FORG_BANK			-0.303***	-0.247***	-0.299***
			(0.0131)	(0.0157)	(0.0134)
Constant			-0.971***	-3.347***	0.0802
			(0.208)	(0.232)	(0.182)
Observations			4,063	2,264	1,799
Number of bank			95	95	95
Wald Test	Chi2		14394	13956	39356
			0.000***	0.000***	0.000***
Sargan Test	Chi2		82.99	75.95	87.84
			1.000	1.000	1.000

Continued

Appendix A.3 continued

			All Periods	Blanket Gr.	Limited Gr.
VARIABLES	**Lag**	**Expected Signs**	**(1) TOT_DG**	**(2) TOT_DG**	**(3) TOT_DG**
Arellano–Bond test for AR(1)			-2.616	-4.012	-1.908
			0.0089	0.0001	0.0564
Arellano–Bond test for AR(2)			-1.750	0.171	-2.043
			0.1801	0.8645	0.141

This table presents the results from the two-step Generalized Method of Moments System estimations. Coefficients and standard errors (in parentheses) are from the second step. The Sargan and Arellano–Bond tests are from the second. The estimation uses quarterly observations over the period 2001–2011. The dependent variable is TOT_DG (total deposit growth). The independent variables include: CAR, NPL, ROA, NIM, LDR, BANK_SIZE (total asset of banks), and DEP_IR (deposit interest rate). Control variables for general macroeconomic conditions include: GDP_GR (the growth rate in GDP); INF_RT (inflation rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation. Three dummy variables are BLA_GR (1 = Quarter I of 2001 to Quarter IV of 2004 and 0 otherwise), LIST_BANK (1=listed bank and o otherwise and FORG_BANK (1 = foreign bank and 0 otherwise).

* Indicate statistical significance at the 10% level (2-tailed)

** Indicate statistical significance at the 5% level (2-tailed)

*** Indicate statistical significance at the 1% level (2-tailed)

A.4 Regression Results: Time Deposit Variable (without the OPEX variable)

			ALL Periods	Blanket Gr.	Limited Gr.
VARIABLES	**Lag**	**Expected Signs**	**(4) TIME_DG**	**(5) TIME_DG**	**(6) TIME_DG**
TIME_DG	L1		-0.164***	-0.190***	-0.149***
			(0.00295)	(0.00207)	(0.00264)
CAR	L1	(+)	0.225***	0.404***	0.220***
			(0.0195)	(0.0400)	(0.0139)
NPL	L1	(-)	-0.0114	-0.0452***	0.753***
			(0.00725)	(0.00876)	(0.150)
ROA	L1	(+)	-0.0188	0.339*	-0.726**
			(0.237)	(0.177)	(0.306)
LDR	L1	(-)	0.421***	0.204***	0.542***
			(0.0184)	(0.0276)	(0.0178)
NIM	L1	(+)	0.751***	0.894***	0.507**
			(0.0935)	(0.0962)	(0.204)
BANK_SIZE		(+)	0.120***	0.109***	0.193***
			(0.00695)	(0.00422)	(0.00848)
DEP_IR		(+)	0.296*	0.374***	-0.134
			(0.154)	(0.135)	(0.162)
GDP_GR			0.350**	-0.194*	7.018***
			(0.170)	(0.115)	(0.326)
INF_RT			0.833***	0.205**	0.110
			(0.157)	(0.0805)	(0.173)
EXC_RT			-0.0563	0.287***	-0.398***
			(0.0364)	(0.0369)	(0.0297)
BLA_GR			0.114***		
			(0.0118)		
LIST_BANK			-0.167***	-0.0412***	-0.129***
			(0.0232)	(0.0148)	(0.0263)
FORG_BANK			-0.383***	-0.135***	-0.809***
			(0.0231)	(0.0175)	(0.0322)
Constant			-1.627***	-4.441***	0.175
			(0.290)	(0.309)	(0.304)
Observations			4,025	2,236	1,789
Number of bank			95	95	95
Wald Test			19486	23991	37774
	Chi2		0.000***	0.000***	0.000***
Sargan Test			86.50	85.92	88.79
	Chi2			1.000	1.000

Continued

Appendix A.4 continued

			ALL Periods	Blanket Gr.	Limited Gr.
VARIABLES	**Lag**	**Expected Signs**	**(4) TIME_DG**	**(5) TIME_DG**	**(6) TIME_DG**
Arellano–Bond test for AR(1)			-4.370	-3.484	-4.318
			0.0001	0.0005	0.0001
Arellano–Bond test for AR(2)			-2.786	-2.353	-1.764
			0.153	0.1186	0.1778

This table presents the results from the two-step Generalized Method of Moments System estimations. Coefficients and standard errors (in parentheses) are from the second step. The Sargan and Arellano–Bond tests are from the second. The estimation uses quarterly observations over the period 2001–2011. The dependent variable is TIME_DG (time deposit growth). The independent variables include: CAR, NPL, ROA, NIM, LDR, BANK_SIZE (total asset of banks), and DEP_IR (deposit interest rate). Control variables for general macroeconomic conditions include: GDP_GR (the growth rate in GDP); INF_RT (inflation rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation. Three dummy variables are BLA_GR (1 = Quarter I of 2001 to Quarter IV of 2004 and 0 otherwise), LIST_BANK (1=listed bank and o otherwise and FORG_BANK (1 = foreign bank and 0 otherwise).

* Indicate statistical significance at the 10% level (2-tailed)

** Indicate statistical significance at the 5% level (2-tailed)

*** Indicate statistical significance at the 1% level (2-tailed)

A.5 Regression Results: Uninsured Deposit Variable (without the OPEX variable)

Volume Effect: Limited Guarantee			**Un-Insured Deposit**
VARIABLES	**Lag**	**Expected Signs**	**(7) UINS_DG**
UINS_DG	L1		-0.253***
			(0.00464)
CAR	L1	(+)	0.711***
			(0.0727)
NPL	L1	(-)	-0.468
			(0.386)
ROA	L1	(+)	-1.254***
			(0.478)
LDR	L1	(-)	0.695***
			(0.0344)
NIM	L1	(+)	-1.141***
			(0.353)
BANK_SIZE		(+)	0.162***
			(0.0128)
DEP_IR		(+)	0.269
			(0.212)
GDP_GR			11.73***
			(0.322)
INF_RT			-4.509***
			(0.156)
EXC_RT			-2.553***
			(0.0673)
LIST_BANK			0.282***
			(0.0348)
FORG_BANK			-1.314***
			(0.0788)
Constant			20.27***
			(0.621)
Observations			1,642
Number of bank			95
Wald Test			28221
	Chi2		0.000***
Sargan Test			90.91
	Chi2		1.000

Continued

Appendix A.5 continued

Volume Effect: Limited Guarantee			Un-Insured Deposit
VARIABLES	**Lag**	**Expected Signs**	**(7) UINS_DG**
Arellano–Bond test for AR(1)			-4.843
			0.0000
Arellano–Bond test for AR(2)			-3.263
			0.0011

This table presents the results from the two-step Generalized Method of Moments System estimations. Coefficients and standard errors (in parentheses) are from the second step. The Sargan and Arellano–Bond tests are from the second. The estimation uses quarterly observations over the period 2006–2011. The dependent variable is UIN_DG (uninsured deposit growth). The independent variables include: CAR, NPL, ROA, NIM, LDR, BANK_SIZE (total asset of banks), and DEP_IR (deposit interest rate). Control variables for general macroeconomic conditions include: GDP_GR (the growth rate in GDP); INF_RT (inflation rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation. Two dummy variables are LIST_BANK (1=listed bank and o otherwise and FORG_BANK (1 = foreign bank and 0 otherwise).

* Indicate statistical significance at the 10% level (2-tailed)

** Indicate statistical significance at the 5% level (2-tailed)

*** Indicate statistical significance at the 1% level (2-tailed)

A.6 Regression Results: Total Deposit Variable (without the ROA variable)

			All Periods	Blanket Gr.	Limited Gr.
VARIABLES	**Lag**	**Expected Signs**	**(1) TOT_DG**	**(2) TOT_DG**	**(3) TOT_DG**
TOT_DG	L1		-0.170***	-0.130***	-0.222***
			(0.00284)	(0.00443)	(0.00380)
CAR	L1	(+)	0.149***	0.129***	0.115***
			(0.0145)	(0.0292)	(0.00879)
NPL	L1	(-)	-0.0888***	-0.168***	0.623***
			(0.00419)	(0.00858)	(0.0392)
OPEX	L1	(-)	-0.0441**	-0.158***	0.0279*
			(0.0208)	(0.0193)	(0.0158)
LDR	L1	(-)	0.433***	0.393***	0.462***
			(0.0142)	(0.0211)	(0.0100)
NIM	L1	(+)	-0.0965**	-0.206***	0.114
			(0.0448)	(0.0500)	(0.0845)
BANK_SIZE		(+)	0.0727***	0.0606***	0.117***
			(0.00589)	(0.00632)	(0.00554)
DEP_IR		(+)	0.105**	0.358***	0.179***
			(0.0418)	(0.0417)	(0.0564)
GDP_GR			0.582***	0.453***	2.750***
			(0.0575)	(0.0722)	(0.200)
INF_RT			0.648***	-0.163***	0.228***
			(0.0643)	(0.0472)	(0.0684)
EXC_RT			-0.0423**	0.226***	-0.252***
			(0.0178)	(0.0237)	(0.0133)
BLA_GR			0.0765***		
			(0.00557)		
LIST_BANK			-0.206***	-0.162***	-0.300***
			(0.0213)	(0.0181)	(0.0299)
FORG_BANK			-0.308***	-0.243***	-0.304***
			(0.0145)	(0.0255)	(0.0126)
Constant			-0.918***	-2.999***	0.203
			(0.180)	(0.238)	(0.135)
Observations			4,063	2,264	1,799
Number of bank			95	95	95
Wald Test	Chi2		14087	4664	23205
			0.000***	0.000***	0.000***

Continued

Appendix A.6 continued

			All Periods	Blanket Gr.	Limited Gr.
VARIABLES	**Lag**	**Expected Signs**	**(1) TOT_DG**	**(2) TOT_DG**	**(3) TOT_DG**
Sargan Test	Chi2		76.98	83.89	89.05
			1.000	1.000	1.000
Arellano–Bond test for AR(1)			-2.601	-4.019	-1.912
			0.0093***	0.0001***	0.0559*
Arellano–Bond test for AR(2)			-1.746	0.213	-2.014
			0.1809	0.831	0.144

This table presents the results from the two-step Generalized Method of Moments System estimations. Coefficients and standard errors (in parentheses) are from the second step. The Sargan and Arellano–Bond tests are from the second. The estimation uses quarterly observations over the period 2001–2011. The dependent variable is TOT_DG (total deposit growth). The independent variables include: CAR, NPL, OPEX, NIM, LDR, BANK_SIZE (total asset of banks), and DEP_IR (deposit interest rate). Control variables for general macroeconomic conditions include: GDP_GR (the growth rate in GDP); INF_RT (inflation rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation. Three dummy variables are BLA_GR (1 = Quarter I of 2001 to Quarter IV of 2004 and 0 otherwise), LIST_BANK (1=listed bank and o otherwise and FORG_BANK (1 = foreign bank and 0 otherwise).

* Indicate statistical significance at the 10% level (2-tailed)

** Indicate statistical significance at the 5% level (2-tailed)

*** Indicate statistical significance at the 1% level (2-tailed)

A.7 Regression Results: Time Deposit Variable (without the ROA variable)

			ALL Periods	Blanket Gr.	Limited Gr.
VARIABLES	**Lag**	**Expected Signs**	**(4) TIME_DG**	**(5) TIME_DG**	**(6) TIME_DG**
TIME_DG	L1		-0.164***	-0.189***	-0.153***
			(0.00218)	(0.00145)	(0.00171)
CAR	L1	(+)	0.214***	0.444***	0.205***
			(0.0244)	(0.0404)	(0.0133)
NPL	L1	(-)	-0.00283	-0.0682***	0.786***
			(0.00696)	(0.00789)	(0.164)
OPEX	L1	(-)	0.0885***	-0.156***	0.190***
			(0.0239)	(0.0273)	(0.0227)
LDR	L1	(-)	0.412***	0.241***	0.507***
			(0.0233)	(0.0239)	(0.0191)
NIM	L1	(+)	0.830***	0.858***	0.399**
			(0.0908)	(0.0939)	(0.170)
BANK_SIZE		(+)	0.121***	0.114***	0.184***
			(0.00580)	(0.00491)	(0.00726)
DEP_IR		(+)	0.274	0.326	0.192
			(0.191)	(0.211)	(0.189)
GDP_GR			0.484***	-0.0827	7.076***
			(0.132)	(0.110)	(0.216)
INF_RT			0.851***	0.172*	0.0286
			(0.179)	(0.0968)	(0.120)
EXC_RT			-0.0814***	0.239***	-0.347***
			(0.0270)	(0.0326)	(0.0321)
BLA_GR			0.115***		
			(0.0130)		
LIST_BANK			-0.172***	-0.0412	-0.125***
			(0.0225)	(0.0335)	(0.0270)
FORG_BANK			-0.380***	-0.169***	-0.836***
			(0.0258)	(0.0202)	(0.0269)
Constant			-1.473***	-3.985***	-0.252
			(0.229)	(0.274)	(0.299)
Observations			4,025	2,236	1,789
Number of bank			95	95	95
Wald Test			23232	79558	70286
	Chi2		0.000***	0.000***	0.000***

Continued

Appendix A.7 continued

VARIABLES	Lag	Expected Signs	ALL Periods (4) TIME_DG	Blanket Gr. (5) TIME_DG	Limited Gr. (6) TIME_DG
Sargan Test			85.21	83.38	88.29
	Chi2		1.000	1.000	1.000
Arellano–Bond test for AR(1)			-4.377	-3.499	-4.312
			0.0001***	0.0005***	0.0001***
Arellano–Bond test for AR(2)			-2.807	-2.321	-1.817
			0.105	0.1203	0.1693

This table presents the results from the two-step Generalized Method of Moments System estimations. Coefficients and standard errors (in parentheses) are from the second step. The Sargan and Arellano–Bond tests are from the second. The estimation uses quarterly observations over the period 2001–2011. The dependent variable is TIME_DG (time deposit growth). The independent variables include: CAR, NPL, OPEX, NIM, LDR, BANK_SIZE (total asset of banks), and DEP_IR (deposit interest rate). Control variables for general macroeconomic conditions include: GDP_GR (the growth rate in GDP); INF_RT (inflation rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation. Three dummy variables are BLA_GR (1 = Quarter I of 2001 to Quarter IV of 2004 and 0 otherwise), LIST_BANK (1=listed bank and o otherwise and FORG_BANK (1 = foreign bank and 0 otherwise).
* Indicate statistical significance at the 10% level (2-tailed)
** Indicate statistical significance at the 5% level (2-tailed)
*** Indicate statistical significance at the 1% level (2-tailed)

A.8 Regression Results: Uninsured Deposit Variable (without the ROA variable)

Volume Effect: Limited Guarantee			**Uninsured Deposit**
VARIABLES	**Lag**	**Expected Signs**	**(7) UINS_DG**
UINS_DG	L1		-0.252***
			(0.00434)
CAR	L1	(+)	0.640***
			(0.0734)
NPL	L1	(-)	0.0321
			(0.326)
OPEX	L1	(-)	0.101**
			(0.0478)
LDR	L1	(-)	0.682***
			(0.0412)
NIM	L1	(+)	-1.942***
			(0.476)
BANK_SIZE		(+)	0.155***
			(0.0139)
DEP_IR		(+)	0.126
			(0.207)
GDP_GR			11.68***
			(0.348)
INF_RT			-4.425***
			(0.166)
EXC_RT			-2.453***
			(0.0790)
LIST_BANK			0.239***
			(0.0450)
FORG_BANK			-1.351***
			(0.0807)
Constant			19.47***
			(0.687)
Observations			1,642
Number of bank			95
Wald			34023
	Chi2		0.000***
Sargan			88.91
	Chi2		1.000

Continued

Appendix A.8 continued

Volume Effect: Limited Guarantee			Uninsured Deposit
VARIABLES	**Lag**	**Expected Signs**	**(7) UINS_DG**
Arellano–Bond test for AR1			-4.898
			0.0001***
Arellano–Bond test for AR2			-3.158
			0.116

This table presents the results from the two-step Generalized Method of Moments System estimations. Coefficients and standard errors (in parentheses) are from the second step. The Sargan and Arellano–Bond tests are from the second. The estimation uses quarterly observations over the period 2006–2011. The dependent variable is UIN_DG (uninsured deposit growth). The independent variables include: CAR, NPL, ROA, OPEX, NIM, LDR, BANK_SIZE (total asset of banks), and DEP_IR (deposit interest rate). Control variables for general macroeconomic conditions include: GDP_GR (the growth rate in GDP); INF_RT (inflation rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation. Two dummy variables are LIST_BANK (1=listed bank and o otherwise and FORG_BANK (1 = foreign bank and 0 otherwise).

* Indicate statistical significance at the 10% level (2-tailed)

** Indicate statistical significance at the 5% level (2-tailed)

*** Indicate statistical significance at the 1% level (2-tailed)

Appendix B: Discipline by Bond Holders

B.1 List of Sample Bonds

Bank Name	Bond Code	Series Name	Outstanding *	Listing Date	Maturity Date	Rating
Bank Rakyat Indonesia (Persero) Tbk.	BBRI01XXBFSB	Subordinasi I Tahun 2004	500,000	12-Jan-04	9-Jan-14	AA+
	BBRI02	Subordinasi II Tahun 2009	2,000,000	23-Dec-09	22-Dec-14	AA+
Bank Mandiri (Persero) Tbk.	BMRI01	Subordinasi Rupiah I Tahun 2009	3,500,000	14-Dec-09	11-Dec-12	AA+
Bank Negara Indonesia (Persero) Tbk.	BBNI01XXBFTW	I Tahun 2003	1000000	14-Jul-03	10-Jul-11	AA
Bank Tabungan Negara (Persero) Tbk.	BBTN09XXBFTW	IX Tahun 2003	750,000	3-Oct-03	2-Oct-08	A+
	BBTN10A	X Tahun 2004	750,000	25-May-04	25-May-09	A+
	BBTN10B	Subordinasi I Tahun 2004	250,000	25-May-04	25-May-14	A
	BBTN11	XI Tahun 2005	750,000	7-Jul-05	6-Jul-10	A+
	BBTN12	XII Tahun 2006	1,000,000	20-Sep-06	19-Sep-16	A+
	BBTN13A	XIII Tahun 2009 Seri A	300,000	1-Jun-09	29-May-12	AA-
	BBTN13B	XIII Tahun 2009 Seri B	300,000	1-Jun-09	29-May-13	AA-
	BBTN13C	XIII Tahun 2009 Seri C	900,000	1-Jun-09	29-May-14	AA-
	BBTN14	XIV Tahun 2010	1,650,000	14-Jun-10	11-Jun-20	AA
Bank DKI (BPD DKI)	BDKI04	IV Tahun 2004	700,000	18-Jun-04	17-Jun-09	A-
	BDKI05A	V Tahun 2008	425,000	5-Mar-08	4-Mar-13	A-
	BDKI05B	Subordinasi I Tahun 2008	325,000	5-Mar-08	4-Mar-18	A-
	BDKI06A	Obligasi VI Tahun 2011 Seri A	125,000	20-Jun-11	17-Jun-14	A+
	BDKI06B	Obligasi VI Tahun 2011 Seri B	325,000	20-Jun-11	17-Jun-16	A+
	BDKI02SB	Obligasi Subordinasi II Tahun 2011	300,000	20-Jun-11	17-Jun-18	A

Continued

Appendix B.1 continued

Bank Name	Bond Code	Series Name	Outstanding *	Listing Date	Maturity Date	Rating
Bank Jabar Banten Tbk.	BJBR04B	IV Tahun 2004 Seri B	690,000	6-Oct-04	5-Oct-09	A
	BJBR05	V Tahun 2006	1,000,000	11-Dec-06	8-Dec-11	AA-
	BJBR06A	VI Tahun 2009 Seri A	350,000	13-Jul-09	10-Jul-12	AA-
	BJBR06B	VI Tahun 2009 Seri B	400,000	13-Jul-09	10-Jul-14	AA-
	BJBR07A	Obligasi VII Tahun 2011 Seri A	276,000	10-Feb-11	9-Feb-14	AA-
	BJBR07B	Obligasi VII Tahun 2011 Seri B	601,000	10-Feb-11	9-Feb-16	AA-
	BJBR07C	Obligasi VII Tahun 2011 Seri C	1,123,000	10-Feb-11	9-Feb-18	AA-
Bank Lampung (BPD Lampung)	BLAM01A	I Tahun 2005 Seri A	45,000	14-Jul-05	13-Jul-08	BBB
	BLAM01B	I Tahun 2005 Seri B	59,000	14-Jul-05	13-Jul-10	BBB
	BLAM02	II Tahun 2007	300,000	12-Nov-07	9-Nov-12	BBB
Bank NTB (BPD NTB)	BNTB01B	I Tahun 2005 Seri B	140,000	11-Apr-05	8-Apr-10	BBB+
Bank SULUT (BPD Sulawesi Utara)	BSLT03	III Tahun 2005	200,000	13-May-05	12-May-10	A-
	BSLT04	IV Tahun 2010	390,000	12-Apr-10	9-Apr-15	A-
	BSLT01SB	Subordinasi I Tahun 2010	10,000	12-Apr-10	9-Apr-15	BBB+
Bank Nagari (BPD Sumatera Barat)	BSBR01SB	Obligasi Subordinasi I Tahun 2010	81,000	14-Jan-11	13-Jan-18	A
	BSBR06	Obligasi VI Tahun 2010	500,000	14-Jan-11	13-Jan-16	A
Bank SULSELBAR (BPD SULSELBAR)	BSSB01A	Obligasi I Tahun 2011 Seri A	50,000	13-May-11	12-May-14	A
	BSSB01B	Obligasi I Tahun 2011 Seri B	350,000	13-May-11	12-May-16	A
Bank SUMSEL (BPD Sumatera Selatan)	BDSS01XXBFTW	I Tahun 2003	97,500	16-Jul-03	11-Jul-08	A-
Bank JATIM (BPD Jawa Timur)	BJTM03XXBFTW	III Tahun 2003	280,000	14-Jul-03	11-Jul-08	A-

Continued

Appendix B.1 continued

Bank Name	Bond Code	Series Name	Outstanding *	Listing Date	Maturity Date	Rating
Bank Danamon Indonesia TBK	BDMN01A	I Tahun 2007 Seri A	250,000	20-Apr-07	19-Apr-10	AA+
	BDMN01B	I Tahun 2007 Seri B	1,250,000	20-Apr-07	19-Apr-12	AA+
	BDMN02A	Obligasi II Tahun 2010 Seri A	1,879,000	10-Dec-10	9-Dec-13	AA+
	BDMN02B	Obligasi II Tahun 2010 Seri B	921,000	10-Dec-10	9-Dec-15	AA+
Bank Permata Tbk.	BNLI01	Subordinasi I Tahun 2006	500,000	15-Dec-06	14-Dec-16	AA-
	BNLI02SB	Obligasi Subordinasi II Tahun 2011	1,750,000	30-Jun-11	28-Jun-18	AA-
Bank Victoria International Tbk.	BVIC02A	II Tahun 2007	200,000	22-Mar-07	21-Mar-12	BBB+
	BVIC02B	Subordinasi I Tahun 2007	200,000	22-Mar-07	21-Mar-17	BBB+
Bank Mayapada Internasional Tbk.	MAYA01B	Subordinasi I Tahun 2005	45,500	28-Feb-05	25-Feb-15	Baa1
	MAYA02A	II Tahun 2007 Seri A	50,000	30-May-07	29-May-10	A2
	MAYA02B	II Tahun 2007 Seri B	300,000	30-May-07	29-May-12	A2
	MAYA02C	Subordinasi II Tahun 2007	150,000	30-May-07	29-May-17	BBB+
Bank MEGA Tbk.	MEGA01	subordinasi Tahun 2007	1,000,000	16-Jan-08	15-Jan-18	A
Bank PAN Indonesia Tbk.	PNBN02A	II Tahun 2007 Seri A	50,000	20-Jun-07	19-Jun-10	AA
	PNBN02B	II Tahun 2007 Seri B	1,400,000	20-Jun-07	19-Jun-12	AA
	PNBN02C	II Tahun 2007 Seri C	200,000	20-Jun-07	19-Jun-14	AA
	PNBN03	Subordinasi II Tahun 2008	1,500,000	10-Apr-08	9-Apr-18	AA
	PNBN04	III Tahun 2009	800,000	7-Oct-09	6-Oct-14	AA
	PNBN04SB	Obligasi Subordinasi III Tahun 2010	2,460,000	10-Nov-10	9-Nov-17	AA
	PNBN05	Obligasi IV Tahun 2010	540,000	10-Nov-10	9-Nov-15	AA

Continued

Appendix B.1 continued

Bank Name	Bond Code	Series Name	Outstanding *	Listing Date	Maturity Date	Rating
Bank Tabungan Pensiunan Nasional Tbk.	BTPN01A	I Tahun 2009 Seri A	350,000	8-Oct-09	7-Oct-12	AA-
	BTPN01B	I Tahun 2009 Seri B	400,000	8-Oct-09	7-Oct-14	AA-
	BTPN02A	II Tahun 2010 Seri A	715,000	19-May-10	18-May-13	AA-
	BTPN02B	II Tahun 2010 Seri B	585,000	19-May-10	18-May-15	AA-
	BTPN03A	Obligasi III Tahun 2010 Seri A	400,000	23-Dec-10	22-Dec-13	AA-
	BTPN03B	Obligasi III Tahun 2010 Seri B	700,000	23-Dec-10	22-Dec-15	AA-
	BTPN01ACN1	Obligasi Berkelanjutan I Tahun 2011 Seri A	165,000	30-Jun-11	28-Jun-14	AA-
	BTPN01BCN1	Obligasi Berkelanjutan I Tahun 2011 Seri B	335,000	30-Jun-11	3 Years	AA-
Bank Internasional Indonesia Tbk.	BNII01SB	Obligasi Subordinasi I Tahun 2011	1,500,000	20-May-11	20-May-18	AA
Bank BUKOPIN TBK	BBKP01AXBFTW	Seri A II Tahun 2003	319,000	15-Jul-03	10-Jul-08	A-
	BBKP01BXBVSB	Subordinasi Seri B Tahun 2003	236,000	15-Jul-03	10-Jul-13	BBB+

***) in Million IDR**

B.2 Regression Result Yield_SP

VARIABLES	Lag	Expected Signs	Without BOND_SIZE (1) YIELD_SP	Without BANK_SIZE (2) YIELD_SP	Without ROA (3) YIELD_SP	Without NIM & OPEX (4) YIELD_SP
YIELD_SP	L1	(+)	0.880***	0.866***	0.841***	0.901***
			(0.0136)	(0.0166)	(0.00952)	(0.00961)
CAR	L1	(-)	-0.0918***	-0.0965***	-0.0977***	-0.103***
			(0.00511)	(0.00664)	(0.00540)	(0.00469)
ROA	L1	(-)	0.744***	0.770***		0.446***
			(0.0308)	(0.0337)		(0.0230)
NPL	L1	(+)	0.135***	0.118***	0.106***	0.120***
			(0.00614)	(0.00637)	(0.00660)	(0.00576)
OPEX	L1	(+)	0.0170***	0.0222***	-0.0493***	
			(0.00394)	(0.00548)	(0.00395)	
NIM	L1	(-)	-0.302***	-0.346***	-0.0830***	
			(0.0132)	(0.0293)	(0.0223)	
DER	L1	(+)	0.0110***	0.0103***	0.00900***	0.00947***
			(0.000602)	(0.000755)	(0.00101)	(0.000636)
RATING	L1	(-)	-0.00243***	-0.000213	-0.000672*	-0.00126*
			(0.000545)	(0.000481)	(0.000360)	(0.000760)
BANK_SIZE		(-)	0.000729		-0.00103	-0.00309***
			(0.00114)		(0.00124)	(0.00116)
BOND_SIZE		(+)		0.00967***	0.00674***	0.00831***
				(0.00171)	(0.00173)	(0.000927)
GDP_GR			-0.280***	-0.235***	-0.145***	-0.329***
			(0.0154)	(0.0192)	(0.0305)	(0.0246)
EXC_RT			0.0157***	0.0201***	0.0165***	0.0144***
			(0.00110)	(0.00345)	(0.00245)	(0.00265)
BI_RT			-0.0201***	-0.0223***	-0.0325***	-0.0232***
			(0.00217)	(0.00148)	(0.00218)	(0.00210)
SUBDEBT		(+)	0.00312	-0.00637	-0.00920***	-0.00234
			(0.00339)	(0.00441)	(0.00334)	(0.00229)
STATE_BANK		(-)	0.00962***	0.00771**	0.00728***	0.0118***
			(0.00309)	(0.00316)	(0.00119)	(0.00175)
Constant			0.356***	0.250***	0.473***	0.220***
			(0.0523)	(0.0810)	(0.0503)	(0.0496)
Observations			627	627	627	627
Number of bond			70	70	70	70

Continued

Appendix B.2 continued

VARIABLES	Lag	Expected Signs	Without BOND_SIZE (1) YIELD_SP	Without BANK_SIZE (2) YIELD_SP	Without ROA (3) YIELD_SP	Without NIM & OPEX (4) YIELD_SP
Wald Test			3.200e+07	1.260e+09	2.940e+07	2.200e+08
			0.0000	0.0000	0.0000	0.0000
Sargan Test			63.83	63.68	63.19	63.72
			1.0000	1.0000	1.0000	1.0000
Arellano–Bond test for AR(1)			-4.640	-4.598	-4.537	-4.660
			0.0000	0.0000	0.0000	0.0000
Arellano–Bond test for AR(2)			0.155	0.0175	-0.985	-0.0721
			0.8764	0.986	0.3245	0.9425

This table presents the results from the two-step Generalized Method of Moments System estimations. Coefficients and standard errors (in parentheses) are from the second step. The Sargan and Arellano–Bond tests are from the second. The estimation uses quarterly observations of bonds issued by the Indonesian commercial banks and traded in the Indonesian bond market over the period 2007–2011. The dependent variable is YIELD_SP (corporate bond yields minus government bond yields). The YIELD_SP* in model 3 and 4 exclude negative spreads. The independent variables include: CAR, NPL, ROA, OPEX, NIM, DER, BANK_SIZE (total asset of banks), and BOND_SIZE (book value if bond issued). Control variables for general macroeconomic conditions include: GDP_GR (the growth rate in GDP); BI_RT (the central bank interest rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation. Two dummy variables are SUBDEBT (1 = subordinated debt and 0 otherwise), and STA_BANK (1 = state own bank and 0 otherwise).

* Indicate statistical significance at the 10% level (2-tailed).

** Indicate statistical significance at the 5% level (2-tailed).

*** Indicate statistical significance at the 1% level (2-tailed).

Appendix C: Discipline by Equity Holders

C.1 Regression Results: Equity Return Variable (without the OPEX variable)

			All Banks	Private Banks	State Banks
VARIABLES	**Lag**	**Expected Signs**	**EQ_RT**	**EQ_RT**	**EQ_RT**
CAR	L1	(+)	0.35953**	0.407811*	0.1067
			(0.1791)	(-0.189428)	(0.816606)
NPL	L1	(-)	0.5059	0.4503	0.6876
			(0.40656)	(0.440021)	(1.081009)
ROA	L1	(+)	-0.1428	0.1096	-0.1852
			(0.581525)	(0.210286)	(0.330478)
NIM	L1	(+)	0.9648	1.0483	0.9819
			(0.623541)	(0.78397)	(2.100289)
LDR	L1	(-)	-0.238518*	-0.275855*	-0.2681
			(0.132539)	(0.142446)	(0.698292)
BANK_SIZE			0.0028	0.0067	0.0050
			(0.007119)	(0.00968)	(0.081091)
GDP_RT			-1.0722	-0.0166	-3.8858
			(1.48823)	(1.735578)	(3.145507)
INF_RT			1.478739***	-0.797185*	-1.713749**
			(0.346389)	(0.405514)	(0.751242)
EXC_RT			-0.388514**	-0.368271*	-0.4514
			(0.177946)	(0.207316)	(0.371123)
Constant			3.681462**	3.2909	4.5773
			(1.625897)	(1.912752)	(3.600694)
R-squared			0.086195	0.085657	0.1233
Adj. R-squared			0.064264	0.051667	0.040201
Prob(F-statistic)			0.000085	0.006507	0.164978
Number of Observations			385	280	105
Number of bank			11	8	3

This table presents the results from the panel least square regression. Standard errors are presented in parentheses. The estimation uses quarterly observations over the period 2003–2011. The dependent variable is EQ_RT (equity return). The independent variables include: CAR (capital adequacy ratio), NPL (non-performing loan), ROA (return on assets), OPEX (ratio of operational expenses to operational revenue), NIM (net interest margin), LDR (loan to deposit ratio), and BANK_SIZE (total asset of banks). Control variables for general macroeconomic conditions include: GDP_GR (the growth rate in GDP); INF_RT (inflation rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation.

* Indicate statistical significance at the 10% level (2-tailed)

** Indicate statistical significance at the 5% level (2-tailed)

*** Indicate statistical significance at the 1% level (2-tailed)

C.2 Regression Results: Equity Return Variable (without the ROA variable)

			All Banks	Private Banks	State Banks
VARIABLES	**Lag**	**Expected Signs**	**EQ_RT**	**EQ_RT**	**EQ_RT**
CAR	L1	(+)	0.364634**	0.40781**	0.10666***
			(0.18942)	(-0.180073)	(0.816606)
NPL	L1	(-)	0.4946	0.4503	0.68763
			(0.403504)	(-0.44002)	(1.081009)
OPEX	L1	(-)	-0.0166	-0.1096	-0.18522
			(0.168069)	(-0.168069)	(0.330478)
NIM	L1	(+)	0.9819	1.0483	0.98189
			(0.633414)	(-0.210286)	(2.100288)
LDR	L1	(-)	-0.23827*	-0.27585*	-0.26813
			(0.134064)	(-0.142446)	(0.698292)
BANK_SIZE			0.0032	0.0067	0.00496
			(0.007454)	(-0.00967986)	(0.08109)
GDP_RT			-1.0967	-0.01658574	-3.88578
			(1.48823)	(-1.7355784)	(3.1455)
INF_RT			-1.095268***	-0.7971847*	-1.7137489**
			(0.346215)	(-0.4055137)	(0.751241)
EXC_RT			-0.390154**	-0.3682711*	-0.451429**
			(0.177863)	(-0.177863)	(0.37112)
Constant			3.700669**	3.29093*	4.57730
			(1.638674)	(-0.2073)	(3.60069)
R-squared			0.086072	0.0827046	0.12326
Adj. R-squared			0.064138	0.0521279	0.04020
Prob(F-statistic)			0.000087	0.004968	0.16498
Number of Observations			385	280	105
Number of bank			11	8	3

This table presents the results from the panel least square regression. Standard errors are presented in parentheses. The estimation uses quarterly observations over the period 2003–2011. The dependent variable is EQ_RT (equity return). The independent variables include: CAR, NPL, ROA, OPEX, NIM, LDR, and BANK_SIZE (total asset of banks). Control variables for general macroeconomic conditions include: GDP_GR (the growth rate in GDP); INF_RT (inflation rate); and EXC_RT (the annual average of exchange rate IDR/USD scaled in IDR000). All variables are transformed using the natural logarithmic transformation.

* Indicate statistical significance at the 10% level (2-tailed)

** Indicate statistical significance at the 5% level (2-tailed)

*** Indicate statistical significance at the 1% level (2-tailed)