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The Determinants of Financial Distress: Empirical Evidence from Banks in Ethiopia

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A thesis submitted to the department of Accounting and Finance of Addis Ababa University for the partial fulfillment of the requirements for the Degree of Master of Science in Accounting and Finance

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COLLEGE OF BUSINESS AND ECONOMICS
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ADDIS ABABA, ETHIOPIA
JANUARY, 2017**

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DECLARATION

I, Tadesse Yirgu, declare that this thesis entitled: The determinants of financial distress: Empirical evidence from banks in Ethiopia and submitted in partial fulfillment of the requirements for the Degree of Master of Science in Accounting and Finance, is outcome of my own effort and study and that all sources of materials used for the study have been duly acknowledged. I have produced it independently with only guidance and suggestion of the thesis Advisor. The study complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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CERTIFICATION

This is to certify that the thesis prepared by Tadesse Yirgu, entitled: The determinants of financial distress: Empirical evidence from banks in Ethiopia and submitted in partial fulfillment of the requirements for the degree of Master of Science in Accounting and Finance, complies with the regulations of the University and complies the accepted standards with respect to originality and quality.

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ACKNOWLEDGEMENTS

The researcher extend special acknowledgement to the following individuals for their unreserved support without which this research would not become reality. My first sincere and deepest gratitude goes to my advisor Ato Gebremedhin Gebrehiwot for his unreserved assistance in giving me relevant comments and guidance throughout the study.

Many other people who have been a part of this journey with me and each have carried me along my path in some way. I would like to thank: my parents, for their unconditional support; my dearest friends, for always believing in me; and Ato Sewagegn, Ato H/lioul, Ato Kahisay, for their support and effort while I search for data.

Tadesse Yirgu

December 2016

ABSTRACT

This research is aimed to test the level of financial distress of commercial banks in Ethiopia and identify its determinant. In order to achieve these objectives secondary data was collected for eight banks for sample period covering from 2006 to 2015 and analyzed using descriptive statistics and fixed effect (FE) regression model. Based on the descriptive statistics the study concludes that sampled banks were under distress. The FE regression model identified capital adequacy, management efficiency, earning ability and bank size as having negative effect on banking financial distress and except size all of them appeared significant; whereas asset quality and liquidity appeared as having positive effect, but liquidity was only significant. Regarding the macroeconomic factors, economic growth and saving interest rate have significantly negative and positive effect on banking financial distress respectively; whereas inflation was not significant. In general, the research concludes that both bank specific and macroeconomic factors determine the level of financial distress of Ethiopian commercial banks.

Key words: Altman Z-score, CAMEL, Financial Distress, Ethiopian Commercial Banks

ACRONYMS AND ABBREVIATIONS

- AIB: Awash International Bank
- BCBS: Basel Committee on Banking Supervisions
- BHC: Bank Holding Companies
- BIS: Bank for International Settlement
- BOA: Bank of Abyssinia
- CAMEL: Capital, Asset, Management, Earning, Liquidity
- CAR: Capital Adequacy Ratio
- CBB: Construction and Business Bank
- CBO: Cooperative Bank of Oromiya
- CBR: Case Based Reasoning
- CEO: Chief executive Officer
- CLRM: Classical Linear Regression Model
- CPI: Consumer Price Index
- DB: Dashen Bank
- DD: Distance-to-Default
- DW: Durbin-Watson
- EBIT: Earnings Before Interest and Tax
- EU: European Union
- FD: Financial Distress
- FE: Fixed Effect
- GA: Genetic Algorithm
- GDP: Gross Domestic Product
- JB: Jarque-Bera
- LPM: Linear Probability Model
- MDA: Multiple Discriminant Analysis
- MENA: Middle East and North Africa
- NAFTA: North America Free Trade Area
- NBE: National Bank of Ethiopia

- NIB: Nib International Bank
- NIC: Newly Industrialized Countries
- NN: Neural Network
- NPL: Non-Performing Loans
- OECD: Organization for Economic Cooperation and Development
- OLS: Ordinary Least Square
- ROE: Return on Equity
- UA: Univariate Analysis
- UB: United Bank
- UK: United Kingdom
- US: United States
- WB: Wogagen Bank

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CHAPTER ONE: INTRODUCTION

1.1. BACKGROUND OF THE STUDY

The financial sector of the economy, by facilitating the flow of funds from surplus units/investors to deficit unit/borrowers, is an important contributor to long term economic growth and development (Carlson, et al., 2008). Hence, financial development is a prerequisite and good predictor of future rates of economic growth, capital accumulation, and technological change (Levine, 1996). However, disruptions like financial distress impede the ability of the financial sector to intermediate financial flows and might also be restrain economic activity (Betz, et al., 2013; Zamorski and Lee, 2015).

According to Elebute (1999) financial distress is observed in a country when a fairly reasonable proportion of banks are unable to meet their obligations to customers, owners and economy because of weakness in financial, operational or managerial capabilities & leads them to illiquid or insolvent. In this regard the banking crisis observed in sub-Saharan Africa region in the year 1980s and 1990s; the financial crisis in Asia in the year 1997 to 1998; and, the recent financial crisis in US and Europe in the year 2007/08 were an example of this kind of financial distress and failure (Daumont, et al., 2004; Zamorski and Lee, 2015; Betz, et al., 2013) respectively. On the other hand, countries may face a micro level banking distress or failure when a bank liquidated, merged with a healthier bank under government pressure or rescued with state financial support (Heffernan, 2005). Despite its form, micro or macro, financial distress imposes significant costs to the economy (Gros and Alcidi, 2010).

Loss of output and fiscal costs are costs associated with financial system or banking failure. According to Leaven and Valencia (2012), the 2007/8 financial crisis, which was start with the collapse of subprime residential mortgage market in US, brought significant costs (median fiscal cost of 5.9% of GDP and median output loss of 24.8% of GDP) on the advanced economies. In addition to these costs, due to contagion effect, a number of financial institutions ranging from Lehman Brothers, Wachovia and city group in US and Bankia and Dexia in Europe were distressed and failed, even if, they were rated as well capitalized on the day they failed, got bailed out, or were acquired (Bulow and klemper, 2013).

In similar way, in the year 1980s and 1990s, the sub-Saharan Africa region had also experienced banking crisis that imposes large costs. According to Daumont et al. (2004), for example, in the year 1988 to 1991 Benin and Nigeria was incurred financial distress that costs 17% of their GDP as a result of 50% to 78 % of their banking nonperforming loans. In the year 1987 to 1990, Tanzania was also experienced bank distress that costs 10% of its GDP as a result of 60% to 80% nonperforming loan at end of 1994. The cause of banking distress in this region is unique; meaning primarily emanates from pervasive government intervention and lack of a strong legal and institutional environment; besides to macroeconomic shocks, contagion effect, insufficient capital & decline loan quality that are common to elsewhere in the world (Daumont, et al., 2004).

Thus, in order to minimize these costs and to manage its effect on economy, international organizations like Bank for International Settlement (BIS) advice regulators: to increase the resilience of the financial sector and forestall distress. Following the 2007 financial crisis, for example, Basel committee for banking supervision (BCBS) introduced Basel III accord which advice banks to increase their regulatory capital; assuming that the disruptions stem from an interplay of insufficient capitalization; excessive maturity mismatch driven by banking funding structures; and insufficient holdings of high quality liquid assets that would allow banks to independently cope with short term funding squeeze capital (Buchholst and Rangvid, 2013).

On the other hand, complementary to the regulatory measures, researchers have been empirically investigating the causes of financial distress that would increase bank failure; so that regulators, supervisors and managers could be able to take corrective action ahead of time. For example, according to Poghosyan and Cihak (2009), inadequate capitalization, lack of asset quality and insufficient earning are significant factor of probability of financial distress of EU banks but liquidity and management are not. In similar effort, Bou-Said and Saucier (2003) have identified under capitalization and deterioration in asset quality as a main cause for the 1990s Japanese banking distress and failure; but their finding regarding earning ability was insignificant. More interestingly, they have associated quality management with higher probability of bank distress, which is not consistent with the findings of Sahut and Mili (2011) for banks in MENA countries.

Thus, this research seeks to identify the determinants of distress of Ethiopian commercial banks; to do so, the research measure their level of financial distress, using Altman et al. (1993) Z-score.

1.2. STATEMENT OF THE PROBLEM

As we observed from various episodes of financial crises, the 1980s and 1990s sub-Saharan Africa banking crisis, the 1997 and 1998 Asian financial crisis and the 2007/08 financial crisis in US, banks play an important role in the economy. When banks are healthy they efficiently allocate funds and when banks are unhealthy, whether distressed or insolvent, this role is compromised. This is why governments engaged in costly bailouts with tax payers' money in an effort to resume the health of financial institutions and reduce the adverse effect of distress and failure on economy (Daumont, et al., 2004; Zamorski and Lee, 2015; Betz, et al., 2013).

As discussed earlier, banking distress and failure, on one hand, uncover the shortcomings of existing monitoring system of the financial sector. Following the 2007/08 financial crisis, for example, bank for international settlement (BIS) advice regulators to strengthen financial sector regulation by increasing quality of regulatory capital (8%) and setting limit on leverage (i.e., 3% Tier I to on-and-off balance sheet items). According to Schutz (2014) and Kinyariro (2016), these measures reduced financial distress and failure of EU and Kenyan banks respectively. Buchholst and Rangvid (2013) were also reported that increasing capital contribution promotes bank resilience to disruptions and distress. But the question here is that: do regulators really know how much capital the banking system needs? The current capital requirement (i.e., 8% Tier I plus Tier II capital relative to risk-weighted assets) established by Basel 25 years back and does not provides empirically justified answer that the 8% capital sufficient to protect individual banks or the system as a whole (Carapeto, et al., 2010). Hence, it is of significance to test the level of distress and identify its determinants to take timely remedial actions.

In this regard, internationally, a considerable empirical investigation made (e.g., Bou-Said and Saucier, 2003; Konstandina, 2006; Sahut and Mili, 2011; Zhang, et al., 2014); however, their findings lacks consistency across countries and regions. One contradiction is observed among the findings of cross country studies: for instance, Poghosyan and Cihak (2009), using multiple logistic regression, identified under capitalization, deterioration in asset/loan quality and poor earning ability, as having significant effect on financial distress of European commercial banks but management efficiency and liquidity were not appeared significant. However, using same method, Sahut and Mili (2011) reported that management inefficiency have significant effect on

financial distress of MENA banking sector. As also supported by Konstandina (2006), Sahut and Mili (2011) disqualified the effect of asset quality, which was appeared as significant factor of bank distress and failure of EU commercial banking sector.

Another contradiction is observed among the findings of countries' studies: to mention some, Bou-Said and Saucier (2003) identified under capitalization and deterioration in asset quality as a main cause for the 1990s Japanese banking distress but their finding regarding earning ability was not significant. However, earning ability appeared to be significant determinants of financial distress of Russian banking sector (Konstandina, 2006). There is still another contradiction with regard to the macro economic factors. According to Goldstein et al. (2010) and Zhang et al. (2014) macroeconomic variables, such as GDP, inflation, interest rate, have significant effect on financial distress although Konstandina (2006) and Sahut and Mili (2011) disregard this effect.

Despite their inconsistency, considerable empirical investigations had conducted in the area of banking financial distress; however, there are no sufficient studies concerning the banking sector of Ethiopia. The sector has been characterized by a rapid growth and attractive accounting profit (Mullu, 2011); but this couldn't guarantee their going on concern since accounting profit doesn't equivalent with cash (Pranowo, et al., 2010). Thus, an investigation is needed to assure their soundness. In this regard recently a lot of researches have done. To mention some: Girma (2011), Atakilt and Veni (2015), Tsegaye and Nigatu (2016) investigate the banking sector from credit risk; while Nigist (2015), Fentaw (2016) approaches the sector from liquidity risk. However, since these are not the only problems that the banking sector prone to, further researches should be made to address other problem areas. So, this research approached the banking sector of Ethiopia from a broader perspective; i.e., financial distress.

So far, there is only one attempt by Ephrem (2015) that aimed to identify the factors of financial distress by taking six private banks. But this research may not even worth mentioning since the model used to measure distress deviates from what it has to be, Altman et al. (1993). Therefore, this research is needed to fill the literature gap regarding the Ethiopian banking sector and contribute to the body of knowledge by: incorporating more bank-specific factors; including macroeconomic factors, which was not addressed by Ephrem; increasing the sample size, to minimize limitation of the previous study; and using the appropriate model developed by Altman et al. (1993) that have been used for predicting banking financial distress.

1.3. RESEARCH QUESTIONS

Following the above problem statement the study formulate the following research questions:

- I. What is the level of financial distress of commercial banks in Ethiopia?
- II. What are the bank specific determinants of financial distress of banks in Ethiopia?
- III. What are the macroeconomic determinants of financial distress of banks in Ethiopia?

1.4. OBJECTIVE OF THE STUDY

General objective

The principal objective of this research was to identify the determinants of financial distress in the case of commercial banks in Ethiopia.

Specific objectives

The research was guided by the following three specific objectives to be deal with.

- To describe the level of financial distress of Ethiopian commercial banks;
- To identify the bank specific determinants (capital, asset quality, management quality, earning ability, liquidity and Size) of financial distress of the banking sector; and
- To identify the effect of macroeconomic variables (GDP, inflation and saving rate) on banking distress.

1.5. SIGNIFICANCE OF THE STUDY

The global financial crisis has highlighted the importance of early identification of weak banks: when problems are identified late, solutions are much more costly. Therefore, this study will have immense benefits to various stakeholders of the banking sector.

First, the findings and recommendations will enable bank regulators, supervisors, and managers know about the causes of financial distress so that they can manage or consider those factors while playing their role in the banking industry.

Two, since corporate bankruptcy is indeed not desirable an early detection of financial distress provides the chance to take timely corrective measures, before banks become failed. Hence, the measurement made in this research describes the level of financial distress of the banking sector, so that supervisors and managers can take step to avoid costly failures.

Third, the research contributes to existing literature, the determinants of financial distress in the banking sector, as far as the Ethiopian commercial banking sector is concerned. Besides, it can serve as a basis for future researches that primarily aimed to investigate the Ethiopian banking sector.

1.6. SCOPE AND LIMITATION OF THE STUDY

1.6.1. Scope of the Study

The research covers a period of ten years (2006-2015). Since the research used panel data, it is required to have large number of observation as much as possible. Consequently, the research is limited to those banks that are stayed more than ten years in the industry, during sampling period. Thus, there are only nine banks that are fulfilled these criteria: namely, DBE, CBE, CBB, DB, AIB, BOA, WGB, UB, NIB, and CBO. However, the research excluded two state owned banks— the Development bank of Ethiopia (DBE) due to its unique nature and commercial bank of Ethiopia (CBE) for its incomparable large size with the remaining banks; and Lion International Bank for its incomparable small size.

1.6.2. Limitation of the Study

It must be noted that this research is conducted in a country where there is no official declaration of banking financial distress; hence, the study used Altman's Z-score to measure the level of financial distress of sampled commercial banks.

The research used ordinary least square (OLS) method of linear relationship estimation, which does not entertain outlier data; hence, the study excluded two state owned banks that have big size compared with the remaining sampled banks.

Besides, the data quality heavily relay on the quality of data compiled at the National Bank of Ethiopia (NBE).

1.7. ORGANIZATION OF THE PAPER

The remaining part of the research outlined as follow:

Chapter two thoroughly discussed both theoretical and empirical literatures that are available and necessary for this research. The theoretical part discussed both the theories and the theoretical determinants of financial distress while the empirical part present the findings of countries, cross-countries, and Ethiopian research; and, at the end, the knowledge gap of previous empirical investigations and the conceptual framework of the research presented.

Chapter three briefly discussed the methodology that the research has employed. It begins with; first, discussing the research design, and then presents the target population and sample; second, present the method used for data collection and analysis; and, third, the chapter present model specification and end up with presenting hypotheses to be tested.

Chapter four begins with presenting the descriptive statistics and correlation analysis, which shows the nature and trend of data used for regression analysis. And then tests of classical linear regression model assumptions are discussed. Then the chapter concludes after discussing the bank specific and macroeconomic factors of banking financial distress, based on the output of FE regression output, and providing summary of research findings.

Finally, the fifth chapter provides research conclusion, and provides recommendations to various stakeholders of the banking sector (Regulators, supervisors and managers). The chapter then winds up providing comments for further research.

CHAPTER TWO: LITERATURE

Since the very objective of the research is to identify the effect of both bank specific and macroeconomic factors on banking distress, this section present theories and findings of empirical researches that have focus in the subject area; And then, develop the conceptual framework that the research follows.

2.1. INTRODUCTION

2.1.1. Terms Misrepresented with Financial Distress

The term bank distress has been swapped with failure, insolvency, default and bankruptcy. But they are distinctly different in their formal usage (Altman, 2006). Failure, by economic criteria, means continues decline in return from invested capital as compared to similar investment and risk level. According to Altman (2006) business failure includes businesses that cease operation following the assignment or bankruptcy; those that cease with loss to creditors after such actions or execution, foreclosure, or attachment; those that voluntarily withdraw, leaving unpaid obligations, or those that have been involved in court actions such as receivership, bankruptcy reorganization, or arrangement; and those that voluntarily compromise with creditors.

Altman (2006) identified insolvency as another term that has been used interchangeably with distress, but in its formal use insolvency is an inability of total asset to cover total liability; meaning that negative net worth. Another word that inescapably associated with distress is default. Technical default happens when debtor violates a condition of an agreement with a creditor. On the other hand, when a firm fails to meet interest and principal payment legal default is more likely.

The last word that has been swapped with distress is bankruptcy. This is true when either a firm becomes insolvent (negative net worth) or when a formal bankruptcy declaration is made by the court (Altman, 2006). Therefore, financial distress can be considered as inability of a bank to meet up with its financial obligation to its customers and then leads to failure, if not well and timely managed.

2.1.2. Definition of Financial Distress

Various scholars have defined financial distress in different ways. According to Altman (2006) failure, insolvency, default and bankruptcy are four different terms and they all mean that a firm is in distress.

According to Balcaen and Ooghe (2006) corporate failure is not a well defined dichotomy. It appears from most research that the criterion for failure is chosen arbitrarily and could either mean judicial bankruptcy or financial distress. Foster (1986) indicates that filing for bankruptcy is a legal event which is heavily influenced by the actions of bankers and or other creditors. He further defines financial distress to mean that the firms face serious liquidity problems that cannot be resolved without a rescaling of the entity's operations or restructuring. Muler et al. (2009) defined financial distress as the situation when a company cannot continue to exist in its current form. Whitaker (1999) defined financial distress as either insufficient net operating cash flow to repay maturing debts and loss of corporate market value, or the occurrence of negative retained earnings or net loss in the last three years.

According to Arena (2008), a bank or financial institution will be considered failed when the following situation occurs; either the central bank or government agency recapitalized the financial institution or when the financial institution required a liquidity injection from the monetary authority; when the operation of the financial institution is temporarily suspended; or when the government closed the financial institution. In his analysis, a bank is considered failed when it fits into any of the above criteria during the crisis period.

According to Sahut and Mili (2011), financial distress is generally the result of bank insolvency and undercapitalization. Many empirical studies that have used multiple logistic regression analysis identified banks as being distress when one of the following criteria is meeting:

- (1) Declaration of bankruptcy,
- (2) Forced merger with another bank,
- (3) Being in the fourth quartile of loan loss provision, state intervention
- (4) Received governmental support (greater than 30% of Tier 1 capital) (Schutz, 2014).

2.2. THEORETICAL LITERATURES

Although quite few attempts have been made, Aziz and Dar (2006) have identified the following theories that have been used to substantiate bankruptcy predictive models.

Trade-off theory: The trade-off theory underlines that although the tax benefit of debt will cause the value of a firm to increase as leverage is increased, this will only be true to a point since leverage increases, so too does the likelihood of default. The cost of financial distress eventually becomes so great that it erodes the benefits of the tax shield, and firm value begins to decline. The implication is that there is an optimal debt level. Beyond this level, firm value declines because of the increased probability of default. Although the Modigliani and Miller (1950) theory was revised to incorporate the tax benefit of debt, it still failed to incorporate the effect of financial distress. Hence, the trade-off theory addressed the impact of financial distress on the capital structure decision. The underline premise of this theory is that a firm will identify an optimal target capital structure that they believe balances the benefits of the tax shield against the cost of distress.

Entropy theory: The Entropy theory or the Balance Sheet Decomposition Measure theory dictates that it is possible to identify the potential risk of financial distress by carefully looking at changes in their balance sheet (Aziz and Dar, 2006). According to this theory, if a firm is not capable of maintaining equilibrium state in their balance-sheet component (Asset and liability) and is not able to control in near future, it is more likely to foresee distress (Aziz and Dar, 2006).

Entropy theory employs the Univariate Analysis (UA) and Multiple Discriminate Analysis (MDA) in examining changes in the structure of balance sheets. Univariate Analysis is the use of single accounting based ratios indicators for the distress risk assessment (Natalia, 2007). The financial ratios of each company, therefore, are compared once at a time and the distinction of those companies through a single ratio with a cut – off value is used to classify a company as either distressed or non-distressed (Monti and Moriano, 2010). MDA, which has developed to overcome the shortcomings of univariate analysis, is a statistical analysis whereby more than one variable is analyzed at the same time (Slotemaker, 2008). So far, Aziz and Dar (2004) and Sayari (2013) and Sun and Li (2008, as sighted in Kinyariro, 2016), have used entropy theory as the theoretical foundation for investing studies on financial distress.

Cash management theory: The proponent of cash management theory dictates that firm has to manage the cash inflows and outflows to avoid fund imbalance. According to Aziz & Dar (2006) persistent fund imbalance between cash inflow and cash outflows, which emanate from failure of cash management function of the firm, will result in financial distress and, then, may lead to business failure. Hence, short-term management of corporate cash balances is a major concern of every firm. This is so because it is difficult to predict cash flows accurately, particularly the inflows, and there is no perfect coincidence between cash outflows and inflows (Aziz & Dar, 2006). Due to these facts, management have to pay much attention to cash management function of the firm, to immune from the effect of financial distress.

Gambler's Ruin theory: Gambler Ruin theory, which was developed by Feller in 1968, is based on the probability of a gambler wins/loses of money by chance. The gambler starts out with a positive, arbitrary, amount of money where the gambler wins a dollar with probability p and loses a dollar with a probability $(1-p)$ in each period. The game continues until the gambler runs out of money (Espen, 1999).

The firm can be considered as a gambler playing repeatedly with some probability of loss, continuing to operate until its net worth/capital goes to zero. With an assumed initial amount of cash, in any given period, there is a net positive that a firm's cash flows will be consistently negative over a run of periods, ultimately leading to bankruptcy (Aziz and Dar, 2006). The major weakness of this theory is that it assumes that a company starts with a certain amount of cash; that means, the company has no access to securities markets and the cash flows are results of independent trials. (Espen, 1999).

Credit risk theory: This theory is closely related to financial institutions. According to this theory the firm will face credit risk, which emanates from failure of debt holders to pay the amount owed when it comes due, that would prone the firm to financial distress and then business failure (Nyunja, 2011). Aziz and Dar (2006) have also mentioned that the theory is in line with Basel I and Basel II accords. Particularly, Basel II has three pillars, namely the minimum capital requirement, supervisory review of institutional assessment process and capital adequacy and effective use of disclosure to strengthen market discipline. Although banks face many kinds of risks, such as credit risk, market risk, operational risk, market risk and so on, the

accord clearly recognize that credit risk matter the most. Therefore, following Basel II accord, a number of attempt have been made to develop internal assessment models, such as JP Morgan's credit metrics and Moody's KMV model, to measure credit risk. In general, although there are many available theories as discussed above, this research follow the entropy or balance sheet decomposition measure and the credit risk theory.

2.3. DETERMINANTS OF FINANCIAL DISTRESS

This study aimed to investigate the impact of financial and macroeconomic indicators on the financial distress or the probability of banking failure. Hence in line with this objective the following determinants of financial distress have identified from literatures.

2.3.1. Bank Specific Factors

Capital Ratio and Financial Distress

Capital adequacy ratio is the capital expected to maintain balance with the risks exposure of the financial institution such as credit risk, market risk and operational risk, and so on; in order to absorb the potential losses and protect the financial institution's debt holder. Capital adequacy can be defined in term of capital to deposit ratio because the primary risk is depository risk derived from the sudden and considerably large scale of deposit withdrawals. Another measure of capital is capital to total asset ratio. This is because the default on loans came to expose the greatest risk instead of deposit withdrawals. This ratio is simple to calculate and transparent. In general, having sufficient capital allows a bank to absorb losses and still keeps running its daily business operations, even under higher financial distress condition.

Asset Quality and Financial Distress

A most important asset category is the loan portfolio; the greatest risk facing the bank is the risk of loan losses derived from the delinquent loans. The credit analyst should carry out the asset quality assessment by performing the credit risk management and evaluating the quality of loan portfolio using trend analysis and peer comparison. Measuring the asset quality is difficult because it is mostly derived from the analyst's subjectivity.

According to Grier (2007) “poor asset quality is the major cause of most bank failures”. The deterioration in loan, as measured by non performing loan, was also the main cause for the 1980s and 1990s banking crisis in Africa (Daumont, et al., 2004). For most financial institutions, loans are the most risky assets in their balance sheets and loan quality variables have been statistically significant in previous empirical research. During the global financial crisis write downs on real estate loans were also responsible for getting banks into trouble. Thus high loan loss leads banks to financial distress and failure (Bou-Said and Saucier, 2003).

Management Efficiency and Financial Distress

Management efficiency is the most important ingredient that ensures the sound functioning of commercial banks. In competitive financial sector, efficiency and effectiveness have become the rule as banks constantly strive to improve their productivity. Presently it is common to see branches of banks both public and private maintaining extended working hours, flexible time schedules, outsourcing marketing etc. to attract customers. Another development over the year has been the deployment of technology. Thus, managerial competence of a bank is an important determinant of profitability, while contributing to the long term survival of the bank, even under distress (Sahut and Mili, 2011).

Earning Ability and Financial Distress

To survive in a competitive business environment generating low volatile and diversified income is a must to attain. In accordance with Grier (2007) opinion, a consistent profit not only builds the public confidence in the bank but absorbs loan losses and provides sufficient provisions. It is also necessary for a balanced financial structure and helps provide shareholder reward. Thus consistently healthy earnings are essential to the sustainability of banking institutions. The proxy for the earnings ratio is the return on average equity or average assets. A higher return gives a bank more buffers to deal with unexpected losses and stayed under distress Konstandina (2006).

Liquidity and Financial Distress

There should be adequate liquidity, compared to present and future needs, and availability of assets readily convertible to cash without undue loss. The fund management practices should ensure that a bank is able to maintain a level of liquidity sufficient to meet its financial

obligations in a timely manner; and capable of quickly liquidating assets with minimal loss. The liquidity ratio expresses the degree to which a bank is capable of fulfilling its respective obligations. Banks make money by mobilizing short-term deposits at lower interest rate, and lending or investing these funds in long-term at higher rates, so it is hazardous for banks mismatching their lending interest rate. Poor management of short term liquidity thus leads initially solvent financial institutions to financial distress and failure (Sahut and Mili, 2011).

Bank Size and Financial Distress

Regarding bank size literature provides a contradicting view. On one hand, Bongini et al. (2001) argue that in terms of probability of financial distress, a large financial institution might have lower chance of becoming distressed if it is more diversified and less exposed to liquidity shocks. On the other hand, according to the “too-big-to-fail” hypothesis the likelihood of distress increases for big banks due to a guarantee provided from government at a time of insolvency. This support exposed large banks to take excessive risks, which is more than they can afford to lose, in an effort to maximize earnings (Iannotta, et al., 2007).

2.3.2. Macroeconomic Factors

Economic Growth and Financial Distress

The economic growth is measured as percentage change in Gross Domestic Product (GDP) or Gross National Product (GNP). The GNP is broader than GDP, although both proxies are used to measure economic growth. Economic growth usually signals a healthy economy and reduced the probability of financial distress in the banking industry. This happens because negative shocks affect the solvency of bank borrowers, a major recession or crises in business operations reduces borrowers’ capability to service obligations; as a result increases banks’ NPLs and eventually banks insolvency.

Inflation and Financial Distress

It is shown that low and stable inflation is important for the financial activity viability. By offering a relative monetary certainty, it reduces financial distress or the exposure to bank failure. Several empirical studies such as those of Boyd, Levine and Smith (2001) have shown

that monetary stability and financial development are generally negatively correlated. Thus, higher inflation contributes to financial stability.

Saving Interest Rate and Financial Distress

Hellman et al. (2000) provide a theoretical argument to show that, in an environment with only capital adequacy regulation and no regulation of interest rates, banks may have an incentive to bid up deposit interest rates so as to gain the funding to “gamble”. Since the National bank set only the floor to saving rate this theory might also work for Ethiopian commercial banking sector. Only a combination of capital adequacy regulation and deposit interest rate limitations can implement the Pareto-optimal allocation under all circumstances (Evan Kraft and Tomislav Galac, 2005). Therefore, high deposit interest rates were a source of funding for risky banks, and that high deposit interest rates are correlated with eventual failure.

2.4. EMPIRICAL LITERATURE ON DETERMINANTS OF FINANCIAL DISTRESS

There are two different purposes and consequently two broad approaches in financial distress studies; one line is the attempt to simply find a set of early warning indicators by observing leading indicators which could reliably signal of threats ahead. Another line is the attempt to find an explanation to the events of distress and failure by theoretical reasoning and econometric testing. Therefore, in this section the findings of both approaches are discussed.

2.4.1. Determinants of Financial Distress— Countries Study

In identifying the real cause of the 1990s Japanese banking distress, Bou-Said and saucier (2003) examined the sector based on a sample of 160 banks for the period 1993 to 1999. There were two arguments in explaining the cause. The first group claims that accumulation of risky asset in the second half of the 1980’s as the main cause for the 1990’s distress; while the second group count managerial inefficiency as the main challenge for banks to resume with sound operation.

Therefore, based on mean score analysis, they identified that capital adequacy, loan loss provision and earning as significant predictor of banking distress. The findings of probit analysis were also in line with this. That means, high capital adequacy ratio and high asset quality reduces the probability of banking distress. Both the mean test and probit analysis identified a

paradoxical result that Quality management is also associated with a higher probability of distress. This might be due to that endangered banks were pushed to increase productivity in an effort to survive. The wrong sign of liquidity ratio might also account to either a steady fled of deposit to bigger and safer banks before they were capitalized or inappropriateness of the proxy. In general, the results were supported the view of the first group, which advocate that the major problem of failed banks as capital inadequacy and considerable problems in their assets quality than management inefficiency.

In contrast, using a multivariate logit regression and macroeconomic and micro data of Russian banks, Konstandina (2006) reported that management inefficiency increase the probability of failure. The study was also used proportional hazard model to identify factors that determine survival times; and identified holding high government securities adversely affect bank survival, which is inconsistent with Molina (2002) that had reported significantly contribute to Venezuelan banking soundness. In general, the research reported that bank specific factors, such as equity to total assets, nonperforming loans, management efficiency, interbank loans, loans to residents and non residents, public deposit, other bank deposit, liquid assets, profit margin and size of bank, to be essential in explaining failures and survival times. On the other hand, the macroeconomic variables, such as GDP, inflation and exchange rate, were identified as insignificant to both, failure and survival of financial institutions.

With the aim of developing the most accurate model for financial distress Al-Saleh and Al-Kandari (2012) investigates the Kuwait commercial banks. Based on multiple logistic regression analysis, using a sample of six commercial banks for the period 2001 to 2009, they were identify three ratios, namely investment in securities to total assets, loan to total assets and loan to deposit, as significant determinants of banking financial distress, although the data suffered from multicollinearity. Whereas, net profit to total assets, banking income to assets, liquid asset to assets, equity to asset and deposit to asset were reported as insignificant to financial distress.

Following distress of small and medium banks during the global financial crisis, Buchhols and Rangvid (2013) investigated Danish banks for the period 2008 to 2012 using multiple logistic regressions. Based on their analysis a bank's excess capital in per cent of risk weighted assets,

the three year average lending growth lagged two years, property exposure, and a funding-ratio were collectively predict the probability of a bank becoming distressed.

Recently Zhang et al. (2014) identified the determinants of financial distress for US large bank holding companies (LBHC); based on 354 US LBHC and using distance-to-default (DD) as a measure of the probability of distress. Based on their analysis that involve housing price index, to capture the effect of pro-cyclical macroeconomic factors; NPL, net charge off ratio and short term whole sale funding, as a measure of risk characteristics; activity diversity and measures of regulatory capital requirement; they were come up with the following findings:

Zhang et al. (2014) identified housing price index is consistently significant and is positively associated with the DD measure. Non-performing loans, short-term wholesale funding, and the credit risk indicators were also negatively associated with the DD measure. Non-interest income is positively related with the BHCs' DD, which was on the contrary to their expectation. The positive relationship exhibits the complexity of the examined BHCs. However, they had reported a negative effect of off-balance-sheet activity on the DD. Finally, they have concluded that capital requirements, as measured by Tier 1 risk-based capital ratio, total risk-based capital ratio and Tier 1 leverage ratio, were significantly determined default risk of US BHC.

According to Yauri et al. (2012), who investigated the effect of recapitalization on Nigerian banking distress, concluded that increasing minimum capital requirement had only account for a short-term improvement in the liquidity position of banks and improvement in their asset quality but were not have long-term effect on forestalling distress. Therefore, they had recommended improving bank corporate governance to forestall future occurrence of the threat of distress in the banking sector, which is also consistent with the findings of Baklouti et al. (2016). However, most recently, Kinyariro et al. (2016) investigated the contribution of Basel III accord in forestalling distress of Kenyan commercial banks. They used Altman's Z-score as a measure of bank distress for 43 banks for the period 2013-2014 and identified, liquidity requirement of the accord, as having significantly positive effect on distress; however, leverage and capital requirements were appeared insignificant.

2.4.2. Determinants of Financial Distress— Cross Country Study

Since banking distress is a very rare event in a single country (Poghosyan and Cihak, 2009), Pesola (2005), used the ratio of banks' loan losses to lending as a measure of financial distress and fragility when investigated the Nordic countries macroeconomic determinants of banking fragility and distress. It is assumed that a significant increase in banks' loan losses does not emerge out of the blue. Loan losses have a rather long gestation period when the borrowers' vulnerability to negative shocks like change in interest rate gradually increases. Therefore, it was concluded that high customer indebtedness combined with adverse macroeconomic surprise shocks, such as change in income as measures by GDP and change in real interest rate, contributed to the financial distress in banking sector. Loan losses were also display strong autoregressive behavior which might indicate a feedback effect from loan losses back to macroeconomic level in deep recessions.

Another IMF study conducted by Poghosyan and Cihak (2009) was also investigating distress in European banks. Based on a unique database of individual bank distress across the European Union from mid-1990s to 2008 and using logistic regression model, banks with better capitalization and earnings have less PD, as supported by the economic theory. And poor asset quality as measured by loan loss provision and as an indication of deterioration in loan portfolio was also associated with high degree of experiencing financial distress in the upcoming year. Interestingly, Poghosyan and Cihak (2009) have also come up with another two important findings: one, banks that had “bargain for resurrection” in difficult times by using increasing deposit rate were more likely to experience financial distress in the next year; two, financially distressed banks were not merely influence itself rather it also significantly increase PD of other participant in the market, through contagion effect.

Similar to Bou-Said and saucier (2003), Poghosyan and Cihak (2009) had also reported that some of distressed banks had had good cost to income ratios; however, management efficiency was not appeared significant. In contrast with Konstandina N.V. (2006), Poghosyan and Cihak (2009) were identified liquidity as insignificant in affecting EU banking distress.

Sahut and Mili (2011) examined the “Determinants of banking distress and merger as strategic policy to resolve distress” in Middle East and Northern Africa (MENA) countries by applying

long list of bank specific and macroeconomic variables using two logit econometric models. The study was involved 275 non-distressed and 55 distressed banks in the first model for identifying the determinants of distress. In the second model only 55 distressed banks (of which 37 were involved in merger) were involved since the focus is to estimate the probability of merger with respect to distress. The first model was 75% accurate in classifying distressed banks. The result confirmed that bank level factors not only significantly affect the likelihood of bank failure, but also explain a high portion of the likelihood of distress for distressed banks (over 50%).

Equity to total asset and to total loan appeared as having significant and negative effect; this implies that higher capitalization has a negative impact on the probability of distress since the bank will be able to absorb losses. But equity plus loan loss reserve to loans was insignificantly positive; whereas loan loss reserve to gross loans and loan growth significantly increase the probability of financial distress. Better earning ability (i.e., ROA, ROE and net interest income to total revenue) tend to decrease financial distress insignificantly. Privately owned banks were significantly distressed than the public. This is because state owned banks had benefited from depositors' flight to safety.

A size of banks is significantly and negatively affects financial distress, which is also consistent with the "Too-big-to-fail" hypothesis. This may be due to the benefit of diversifications. There was also significant and negative relationship between management quality and probability of financial distress. However, probability of financial distress doesn't significantly affect by income to total revenue, loan loss provision, and personnel expenses while deposit to total assets is significantly and positively affect determinant of financial distress.

The second model that Sahut and Mili (2011) deployed involves both bank-level and macroeconomic variables to predict financial distress. This model revealed that macro economic variables do not significantly affect the probability of financial distress. That means, Real interest rate, exchange rate, and consumer price index are insignificant and contrary to previous studies of Goldstein, Kaminsky and Reinhart (2000).

Zhen-Jia-Liu (2015) tried to identify the determinants of financial distress using correlation analysis and logistic regression. The study comprises 772 sample banks, which represent banking sector of OECD, NAFTA, ASEAN, EU, NICs, G20 and G8 countries, for which data collected

from 2002 to 2015. Both bank specific and macroeconomic variables were considered in the regression and, based on correlation analysis, compared both factors across group of countries. Hence, the result of the study reveals that nonperforming loans have a significantly positive correlation with bank distress in the OECD, whereas provisions for loan losses, return of equity, interest income to interest expenses, and non-interest income to non-interest expenses have a significantly negative correlation. The loan ratio and non-performing loans have a significantly positive correlation with bank distress in the NAFTA. Capital ratio has a significantly negative correlation with bank distress in the ASEAN, whereas the loan ratio, non-performing loans, and fixed assets have a significantly positive correlation. The loan ratio and non-performing loans have a significantly positive correlation with bank distress in the EU, whereas provisions for loan losses have a significantly negative correlation.

Capital ratio and provisions for loan losses have a significantly negative correlation with bank distress in the NIC, whereas loan ratio, non-performing loans, and fixed assets have a significantly positive correlation. Capital ratio, provisions for loan losses, interest income to interest expenses, and non-interest income to non-interest expenses have a significantly negative correlation with bank distress in the G20. Capital ratio, provisions for loan losses, interest income to interest expenses, and non-interest income to non-interest expenses have a significantly negative correlation with bank distress in the G8, whereas fixed assets have a significantly positive correlation. In addition, the logistic model accuracy is higher for NAFTA banks than for other regions (1 year before a failure Vs 2 years before a failure), and the accuracy is higher for G20 banks than for other regions (3 years before a failure). Thus, the empirical results show that the OECD, NAFTA, ASEAN, EU, NICs, G20, and G8 have different bank-sector environments.

Most banks are protected by deposit insurance; bank collapses disappear because of government interventions during bank distress. However, banks enter capital markets worldwide; operating risks have been increasing, which disturbs economic stability. Consequently, predicting bank failure plays a critical role in the development of contemporary economies and in protecting depositors' funds. The major benefits of predicting bank failure may be that governments can optimize regulations regarding the assessment of bank risks and reduce potential international financial distress.

Most recently, Baklouti et al. (2016) investigated the relationship between governance mechanism, and the financial distress in European Union banking sector for the period of 2005-2011. The study involved a sample of 147 banks spread throughout 18 countries and used concentration of ownership, size of board of directors and accumulated function of CEO and investors protection as a measure of banking governance; the bank specific characteristics was represented by CAMEL in addition to bank size; and, the macroeconomic variables were also included.

Based on the binary logistic regression model, Baklouti et al. (2016) identified that a high level of investor protection contribute to the increase in financial distress. This is because best investors protection leads to a weak internal control and increases the excessive risk-taking and the likelihood of financial distress. The bank size was appeared to be a key determinant of financial distress. As far as the CAMEL type variables is concerned, the return on assets coefficient before the crisis has significantly negative association with the likelihood of financial distress, while was not significant for other periods.

However, the coefficients of the variables of CAMEL type quality assets, liquidity, capital adequacy and quality management were not significant for the various periods. They observed that the coefficient of the banks size for the entire period and during the crisis were significant, while not significant after the crisis. Based on the analysis for the entire period, the positive association indicates that large banks were more likely to encounter a situation of financial distress. As far as the macroeconomic factors are concerned, Baklouti et al (2016) documented a negative relationship between economic growth and distress of banks. This was because as the weaker the economic growth is, the more the businesses & households will reduce their inflows, resulting, in an increase in the probability of financial distress of banks.

As far as the banking sector of Sub-Saharan Africa is concerned, Daumont et al. (2004) had investigated the cause of the 1980s and 1990s banking crisis and manifestation of financial distress. Among sampled countries, the first group of banking crisis, had observed in Ghana, Guinea and Kenya in the early to mid 1980s; and, the last banking crisis were happened in the first half of 1990s in Guinea, Kenya, Nigeria, and Uganda. Looking at country level data the nonperforming loans in the study countries far exceeded the threshold of 5–10 percent of total

loan. To mention some: the share of nonperforming loans in the banking system reached 50 percent or more in Benin, Cameroon, Côte d'Ivoire, Guinea, Senegal, Tanzania, and Uganda, while it was about 45 percent in Nigeria at end of 1992.

Based on their investigation, the banking crisis in this region were very prototypes of endemic crises. Meaning that, banking crisis were primarily associated with heavy government intervention, poor banking supervision and regulation, and shortcomings in management in the banking system. Similar to the findings of Caprio and Klingebiel (1997), banking crisis in SSA region was also explained by inadequate capitalization, poor asset quality and macroeconomic shocks, including exchange rate shocks. In contrast with Poghosyan and Cihak (2009) and Daumont et al. (2004) have documented that banking crisis in this region were not explained by contagion effect.

2.4.3. Determinants of Financial Distress— Study in Ethiopia

As far as the Ethiopian banking sector is concerned, there is only one attempt made by Ephrem (2015). He tried to identify the determinants of financial distress based on six commercial banks, using Altman Z-score, which deviates from what it has to be. Based on the OLS regression the study reported that non-performing loan have significantly negative effect on the financial distress of commercial banks. The capital to total loan ratio and interest income to total revenue ratio was also significantly and positively influence financial distress level of private commercial banks. Both findings are consistence with the report of (Sahut and Mill 2011).

With regard to efficiency, Ephrem (2015) reported that non-interest income to non-interest expense had no significant effect on financial distress as measured by Altman Z-score, which contradict with the report of (Asquith, et al., 1994). Besides the study also conclude that size of banks had no significant effect on the level of Ethiopian commercial banks' financial distress.

2.5. SUMMARY AND RESEARCH GAP

As evidenced in the literatures discussed so far financial distress, in general, is determined by both bank-specific and macroeconomic indicators. Based on the research findings, as discussed above, capital, asset quality, management quality, earning ability and liquidity (CAMEL) have significant effect on banking financial distress. In addition to these bank specific factors, macroeconomic indicators have also significant effect on distress of financial institutions including commercial banks. However, these findings were not consistent across countries and regions. A better consistency is only observed on the negative effect of capital on distress (Bou-Said and Saucier, 2003; Konstandina, 2006; Poghosyan and Cihak, 2009; Sahut and Mili, 2011).

One contradiction, in this regard, is observed among the findings of cross country studies: for example, Poghosyan and Cihak (2009), using multiple logistic regressions, identified that under capitalization, deterioration in asset/loan quality and poor earning ability, as having significant effect on distress of European commercial banking sector; although management efficiency and liquidity were not significant. In contrast, using same method, Sahut and Mili (2011) concluded that management efficiency have negative and significant effect on financial distress of MENA banking sector. Besides, in line with Konstandina (2006) for Russian banks, this study disproved the significant and positive effect of asset quality.

Another contradiction is observed among the findings of countries study: for instance, Bou-Said and Saucier (2003) identified that under capitalization and deterioration in asset quality as a main cause for the 1990s Japanese banking distress, but their finding regarding earning ability was not significant. In contrast, Konstandina (2006) identified earning and liquidity as having significant effect in Russian banking distress. There is still another contradiction with regard to the macro economic factors. According to Goldstein et al. (2010) and Zhang et al. (2014) macroeconomic variables (i.e., GDP, inflation, interest rate and others) have significant effect on bank distress; however, Konstandina (2006) and Sahut and Mili (2011) disregard this effect.

However, apart from considerable researches that have been done in the area of financial distress of financial institutions around the world, there is no sufficient research in this area as far as the financial sector of Ethiopia is concerned. To best of the researcher knowledge, there is only one attempt by Ephrem (2015). Therefore, this research aimed to fill the gap observed in the previous

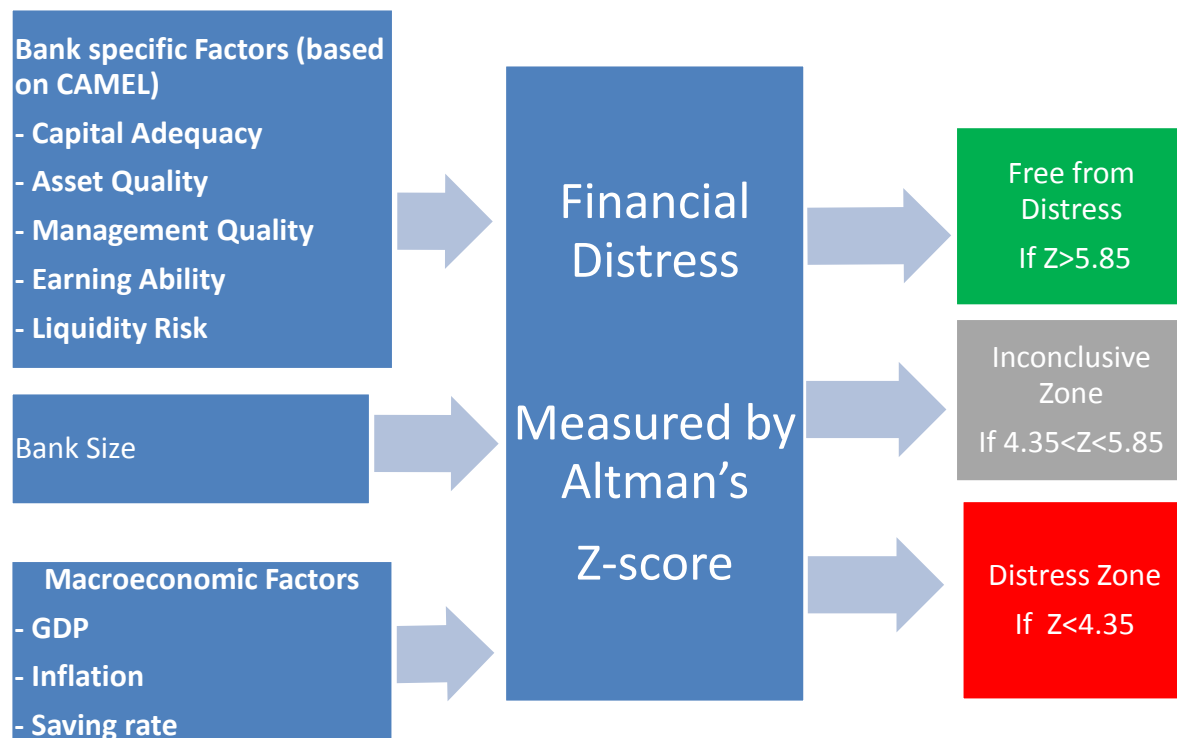
study while contributing to the body of knowledge. Specifically, the research is different in the following dimensions:

First, the study incorporate all commercial banks operating for at least ten years and have complete data needed for the research; Second, the study examines the effect of additional bank specific factors, which were not tested by Ephrem (2015); Third, the research test the effect of macroeconomic factors on the financial distress of Ethiopian commercial banks; and, Fourth, the study employed an appropriate model developed by Altman et al. (1993);

2.6. CONCEPTUAL FRAMEWORK

In light of the above empirical literatures and interest variables the research develops the following conceptual model, which was used by Ephrem (2015) and Kinyariro et al. (2016).

Figure 1: Conceptual Framework



Source: Self Constructed

CHAPTER THREE: METHODOLOGY

The purpose of this chapter is to present the research approach adopted by the research. The first part presents the model and hypothesis to be tested. The second part present the study design used for the research. Target population and sample present in the third part and the final part discussed the method used for data collection, analysis and presentation.

3.1. STUDY DESIGN

Quantitative research approach is used since it helps to conduct systematic empirical study of observable phenomena via statistical or mathematical techniques (Creswell, 2009). The objective of quantitative research is to develop and employ mathematical models, theories and hypotheses pertaining to phenomena. The process of measurement is central to quantitative research because it provides the fundamental connection between empirical observation and mathematical expression of quantitative relationships. Quantitative research is generally made using scientific methods, which can include: The generation of models, theories & hypotheses, the development of instruments and methods for measurement, Experimental control and manipulation of variables, Collection of empirical data and Modeling and analysis of data.

This study follows a deductive reasoning in describing the event. By applying the selected theory to explain the event, event characteristics will serve as empirical facts supporting the validity of the theory. Deduction is also the most commonly used research approach in combination with positivism (Sutrisna, 2009). However, it is believed the study is purely deductive as part of the research purpose was to figure out determinants of the financial distress of commercial banks.

A quantitative strategy is best suited as the research has a large focus on numbers and the use of hypothesis and statistical tools to analyze them. The knowledge that is sought-after has to be measured in order to answer the research problem and the knowledge gap. In this study, this approach enabled to see the determinants of the major bank specific and macroeconomic factors affecting Ethiopian commercial banks. Thus, this enabled to test the theory in the context of Ethiopia.

3.2. TARGET POPULATION AND SAMPLE

Population

The target population in this study covers commercial banks that are operating in the country during the sample period (i.e., 2006 to 2015). That means, it covers 18 banks of which three are state owned banks, namely Commercial Bank of Ethiopia, Construction and Business bank, and Development Bank of Ethiopia. However, Construction and Business bank, merged with another state owned bank, Commercial Bank of Ethiopia in the year 2016.

Sample

The researcher needs to have a large sample size in order to get more accurate results and have a high likelihood of detecting a true result. Thus the research used Purposive sampling method. Besides, since the number of banks in the country is small and due to the data nature (panel data), the sample should contain banks that have longer period so as to get sufficient observation, therefore, the research will take eight commercial banks, namely Construction and Business Bank (CBB), Awash international Bank (AIB), Dashen Bank (DB), Bank of Abyssinia (BOA), United Bank (UB), Wegagen bank (WGB), Nib International Bank (NIB), Cooperative bank of Oromiya (CBO), of which CBB is state owned bank.

3.3. METHOD OF DATA COLLECTION AND ANALYSIS

Data collection: Since the research use secondary data the study will use data sourced from National bank of Ethiopia (NBE) for macroeconomic data and from banks included in the sample for bank specific data. In order to increase the credibility and reliability of the research findings the study use audited financial statements (balance sheet and income statement) of each banks.

Data process: A description of data preparation processes such as checking, editing, coding, and transcribing as well as specifying any special or unusual treatments of data before they are analyzed. To get a robust result, the model has to be free from any econometric problems such as multicollinearity, Heteroskedasticity, autocorrelation, and must make sure the error term for each variable is stationary. This part of study is dedicated to describe the said econometric problem.

Data analysis: After the data collected and cleared, the panel data were analyzed using descriptive statistics, correlations coefficient and multiple linear regression analysis. Mean values and standard deviations were also used to analyze the general trends of the data from 2006 to 2015 based on the sample of eight commercial banks. Correlation matrix was used to examine the relationship between the dependent and explanatory variables. A fixed effect multiple linear regression model with ordinary least square (OLS) estimator was conducted using Eview 8 econometric software package, to test the casual relationship between financial distress and explanatory variables.

Data presentation: Data will be presented in a way that users or readers can easily understand and interpret. Particularly for the first objective the study will use tabular presentation of data. That means the results of distress measurement and regression output will be discussed in table.

3.4. MODEL SPECIFICATION AND HYPOTHESIS PRESENTATION

Based on the discussion, theoretical and empirical, that we had in the previous chapter, the study come up with the following model, variables and hypotheses that will be tested to meet the research objectives, identifying the determinants of banking distress. Besides, this section present

3.4.1. Model specification

According to Brooks (2008), unlike correlation, in the case of regression if x has significant effect on y , thus change in y is influenced by change in x . Therefore, to see the impact of bank specific and macroeconomic factors on bank distress, the significant factors affecting distress were used as the representatives for the variations. The regression model to be estimated is presented in the following linear form:

$$FD_{it} = \alpha + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \beta_4 x_{4it} + \beta_5 x_{5it} + \beta_6 x_{6it} + \beta_7 x_{7it} + \beta_8 x_{8it} + \beta_9 x_{9it} + \varepsilon_{it}$$

Where: i , represent individual bank; t , represent time; α , represent constant; β , represent coefficient for the respective explanatory variables; FD represent financial distress score of each banks and ε , represent the error term.

3.4.2. Research Hypotheses

Dependent variable

Although prediction of corporate financial distress and bankruptcy has gained a great deal of attention by researchers, such as Beaver (1966) and Altman (1968), yet there is no universally accepted classification tool to be used for the financial sector (Carapeto, et al., 2010). In this regard, according to Carapeto et al. (2010), accounting provides three broad alternative measures of financial distress in banking sector: one, capital or capitalization indicators (e.g., Tier I and Tier II); two, asset quality indicators (e.g., non-performing loans or loan losses provision to total loans); and three, multivariate indicators (e.g., discriminant analysis and logit). Based on their analysis aimed to identify the most accurate, reliable, simple, and consistent distress classification tool, measures that capture capital adequacy often depict the bank as healthy even if *de facto* distressed (underestimate); whereas measures of asset quality highly correlated with each other and tend to overestimate the number of distressed.

With similar effort, Aziz and Dar (2006) examined statistical models, such as UA, MDA, LPM, logit and probit; artificial intelligence models, such as CBR, NN and GA; and theoretical models (as discussed in chapter two) and identified that statistical approaches (MDA and Logit) provides consistently better predictive accuracy with lower type I and II error rate. Besides, they have also reported that classical researchers prefer MDA followed by logit models. Recently, Viziri et al. (2012) tested the signaling ability of Moody's, Standard and poor's, Vaziri's financial ratios, Altman's Z-score and logit model in predicting failure using a sample of financial institutions from USA, Europe and Asia, for which data collected for ten years. Based on their analysis Altman's model outperform in predicting 80% of failed banks and shows 70% correct prediction of bank failure two years ahead.

Therefore, this research use Altman's Z-score initially developed in 1993 to measure financial distress of Ethiopian commercial banks. Since the model has strong predictive ability of failure or bankruptcy by looking at distress, it enables the research to use the term probability of failure in addition to financial distress while discussing the regression output.

$$\text{Altman } Z'' - \text{score} = 3.25 + 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$$

Where: Z'' = financial distress score of banks as measured by Altman model,

X_1 = Working capital/total assets,

X_2 = Retained Earning/total assets,

X_3 = EBIT/total assets and

X_4 = Book value of equity/total debt.

Independent variables

The independent variables are broadly classified into two, namely bank specific and macroeconomic. The bank specific variables were selected based on the CAMEL framework and size of bank. CAMEL is a ratings system introduced by the US regulators in 1979, where the letters refer to Capital adequacy, Asset quality, Management quality, Earnings, Liquidity and is an internal supervisory tool for evaluating the soundness of financial institutions on a uniform basis and for identifying those institutions requiring special supervisory attention or concern. Several studies find that banks' balance-sheet indicators measuring capital adequacy, asset quality, and liquidity are significant in predicting bank failures in accounting-based models.

Bank-specific variables (CAMEL plus bank size)

Capital adequacy ratio: As measured by equity to total assets, is designed to ensure banks can absorb a reasonable level of loss before becoming insolvent. That means, the bank with the higher the capital adequacy ratio will be the greater the level of unexpected losses can be absorbed or highly resilient to financial distress.

H1: Capital adequacy ratio has significantly negative effect on financial distress of banks.

Asset Quality: As measured by loan loss provision to total loan, used to account for the extent of nonperforming assets in the portfolio of the banks and the extent of damage this particular asset class can have on the financial distress level. As a strategy to maintain customers' confidence, distressed banks tend to show systematic underestimation of bad loans thus the ratio may be blurred or underestimated (Bou-Said and Saucier, 2003).

H2: loan loss provision has significantly positive effect on financial distress of banks.

Management quality: As measured by cost to income, used to capture the possible dynamics of management efficiency affecting banking financial distress. A higher ratio is assumed to reduce profitability while increase the financial distress of banks.

H3: cost to income ratio has significantly positive effect on financial distress of banks.

Earning ability: As measured by return on equity (ROE), capture the bank's ability of earnings for performing the activities like funding dividends, maintaining adequate capital levels, providing for opportunities of investment for bank to grow and maintaining the competitive outlook while managing distress.

H4: Earning ability has significantly negative effect on financial distress of banks.

Liquidity: As measured by loan to deposit, capture the impact of liquidity problem in the banks and bring adverse impact on the financial performance of the banks while increasing financial distress. Inability of the banks to manage its short term liquidity liabilities and loan commitments can adversely impact the performance of the banks by substantially increasing its cost of fund and over exposure to unrated asset category.

H5: Liquidity risk has significantly positive effect on financial distress of banks.

Bank size: as measured by the natural logarithm of total assets. Here the research needs to capture the effect of size on financial distress. Empirical research provide inconsistent finding, they support either size related incentive of diversification or the "Too-big-to-fail" hypothesis.

H6: bank's size has significantly negative effect on financial distress of banks.

Macroeconomic variables

Gross Domestic Product: This is measured by the real GDP growth rate and it is hypothesized to affect banks' financial distress negative relationship with Z-score as a measure of financial distress. This is because the financial distress risk is lower in upturn than in downturn economy.

H7: GDP has significantly negative effect on financial distress of banks.

Inflation: literatures support the negative relationship of inflation, as measured by change in consumer price index, with distress but, here, the researcher expects the opposite since banks in Ethiopia are sluggish in adjusting their interest rate with market.

H8: inflation has significantly positive effect on financial distress of banks.

Saving Rate: to test the theoretical argument of Hellman et al. (2000) that states in an environment with only capital adequacy regulation and no regulation of interest rates banks may have an incentive to bid up deposit interest rates so as to gain the funding to “gamble”.

H9: Saving interest rate has significantly positive effect on financial distress of banks.

Table 1: Summary of Independent variables and Expected sign

Variables	Description	Expected		Final Result		Significance Level
		Z-Score	FD	Z-score	FD	
CAR	Equity to total assets (C)	+	-	+	-	Significant, 1%
AQ	Loan loss provision to total loan (A)	-	+	-	+	Insignificant
MQ	Cost to income (M)	-	+	+	-	Significant, 1%
ROE	Return on equity (E)	+	-	+	-	Significant, 1%
LNDP	Loan to deposit (L)	-	+	-	+	Significant, 1%
Ln(Size)	Natural logarithm of total assets	+/-	-/+	+	-	Insignificant
GDP	Gross Domestic Product	+	-	+	-	Significant, 5%
CPI	Consumers' Price Index	-	+	+	-	Insignificant
SIR	Saving interest rate	-	+	-	+	Significant, 5%

Source: researcher's summary

CHAPTER FOUR: RESULT AND DISCUSSION

This part of the research present the results of data analysis made for the attainment of the research objectives, identifying determinants of financial distress of Ethiopian commercial banks, based on the methodology that have discussed in the previous chapter.

4.1. DESCRIPTIVE STATISTICS OF THE DATA

Table 2 below shows summery of descriptive statistics intended to give general descriptions about the dependent and the independent variables. The total number of observations for each variable is 80 (i.e., data for 8 banks for ten years (2006 – 2015)). Accordingly, the mean, the median, the maximum, the minimum and the standard deviation values of each variable discussed here, so as to show the nature of the data used for detailed analysis.

Table 2: Summary of Descriptive Statistics for Dependent and Independent variables

Description	NoB	Mean	Median	Maximum	Minimum	SD
Z_SCORE	80	3.07	3.02	6.45	2.31	0.55
CAR	80	0.15	0.13	0.69	0.09	0.08
AQ	80	0.04	0.03	0.14	0.01	0.03
MQ	80	0.59	0.54	1.80	0.41	0.18
ROE	80	0.24	0.25	0.42	-0.04	0.09
LNDP	80	0.65	0.60	1.29	0.40	0.16
Ln(SIZE)	80	8.64	8.78	10.12	5.41	0.88
GDP	80	0.11	0.10	0.12	0.09	0.01
INF	80	0.20	0.17	0.36	0.03	0.10
SIR	80	0.04	0.05	0.05	0.03	0.01

***Note:** Capital adequacy ratio (CAR), Asset quality (AQ), Management Quality (MQ), Return on Equity (ROE), Loan to deposit (LNDP), Logarithm of total asset (Log (SIZE)), Gross Domestic Product (GDP), Inflation (INF), saving interest rate (SIR), Number of observation (Nob) and Standard deviation (SD)*

***Source:** National Bank of Ethiopia (financial statement of each bank), Own ratio computation and Eview (Analysis)*

The average value of Z-score, as a measure of financial distress, was 3.07. According to Altman (2006) classification, this demonstrated that, commercial banks included in the sample had been distressed. Although the standard deviation shows a 55.04% dispersion of Z-score from its mean, which might indicate the possibility of existence of non-distressed bank, the median score is also leads to the same conclusion— i.e., banks were distressed, which contradict with what was reported by Ephrem (2015). On one hand, this contradiction might reflect either the inappropriate model adopted by Ephrem or the inclusion of new sampled bank and the change in sampling period.

On the other hand, it could be justified with the findings of Alemayehu (2016), who was report that dry up of short term loan portfolio of private commercial banks in an effort to escape from NBE directive (MFA/NBEBILLS/001/2011) that requires banks to purchase a 27% NBE-bills for each birr loan disbursement. The problem here is that NBE-bill pays only 3% interest with 5 years maturity for which banks pay a minimum of 5% to depositors with unlimited maturity; that means, it has large cost and reduce their earning (Eaden, 2014; Shibru, 2014); and erodes their liquidity (Alemayehu, 2016); and, consequently, they exposed to financial distress.

Regarding the explanatory variables, the mean and median value of capital adequacy ratio, as measured by total equity to total average assets and indicates banks' ability to absorb problems emanates from assets value depreciation/deterioration, was 15.15% and 13.36% respectively; with a maximum of 69.12% and a minimum of 8.65%. The capital adequacy of the sampled bank also varied across bank with standard deviation 7.6%. The mean value of asset quality, as measured by the ratio of loan loss provisions to total loan, was 3.83% with a maximum of 14.07% and a minimum of 0.8%. It was higher than its international limits, which is 2% (Al-Smadi and Ahmad, 2009). It might be due to either holding less qualified loans or less prudential provisioning policy might enhance credit risk of the sampled banks. The credit risk of the sampled bank also varied across bank with standard deviation 2.94%.

As shown in table 2 above, the mean and median value of management quality, as measured by the ratio of interest and non-interest expense to total revenue (cost to income), was 58.77%; with a maximum of 180% and a minimum of 40.53%. This shows management ability to manage costs and increase efficiency. The managerial efficiency varied across banks with standard deviations of 176% for the sample period. Banks ability to use their capital in generating income,

as measured by income to total average equity (ROE), was 24.17% on average, with a minimum of -3.6% and a maximum of 42.29%. When we compared both the mean and the median (24.7%) of ROE with that of the international best practice, the sampled commercial banks were above what is expected to be considered as favorable for investment, which range from 18% to 20%. Sampled banks have also varied level of earnings performance with standard deviation of 9.13%.

The median score of liquidity, as measured by total loan to total deposit ratio, was 60.23% and ranges from a minimum of 39.68% to a maximum of 128.57%. Based on the mean of 65.05% and median of 60.23% sample banks were free from liquidity problem because they did not exceed the prudential loan to total deposit range (i.e., from 80% to 90%). However, there should be care since there is a loan to deposit ratio of 128% that is greater than the prudential maximum limit. The liquidity risk of the sampled banks has also varied across bank with standard deviation 16.11%. The mean and median score of size, as measured by natural logarithm of total asset, was 8.64 and 8.78 respectively, with a maximum of 10.12 and a minimum of 5.41. Size is highly varied across banks with standard deviation of 88.32%.

As far as the macroeconomic factors are concerned, the Ethiopian economy continued to grow and the overall economic performance reflected rapid expansion of the country. Among the expected macroeconomic factors that could affect banking financial distress GDP was growing by 10.56% on average for the last ten years. During the sample period, the maximum growth rate of the economy was recorded in the year 2007 (i.e., 11.8%) and the minimum was in the year 2012 (i.e., 8.7%). Except in the year 2012 and 2013, the country has been recording double digit economic growth rate with little dispersion from the mean over the period under study, standard deviation of 0.8%.

Due to the expansionary monetary policy, the country's economy had been experiencing an average of 19.76% inflationary effect. The rate of inflation was ranges from a minimum of 2.8% to a maximum of 36.4% with dispersion towards its mean of 10.08%. Accordingly, the National Bank of Ethiopia has been closely monitoring monetary development so as to arrest the speed of inflation and inflation expectation. The other macroeconomic factor considered in this study is deposit or saving interest rate. The average interest rate during the sample period was 4.4% with the maximum of 5% and a minimum of 3%. There was little variation of interest rate towards its mean value over the periods under study with the value of 0.67%.

4.2. CORRELATION ANALYSIS

Gujarati (2004) mentioned that the objective of correlation analysis is to describe the strength of relationship or the degree of linear association between two variables. In Pearson correlation matrix, the values of the correlation coefficient lie between -1 and +1. A correlation coefficient of +1 indicates that the two variables have perfect positive relation; while a correlation coefficient of -1 indicates that the two variables have perfect negative relation. A correlation coefficient of 0, on the other hand, indicates that there is no linear relationship between the two variables but there might be other form of relationship.

Table 3: Correlation coefficient between Dependent and Independent variables

	CAR	AQ	MQ	ROE	LNDP	LOG(SIZE)	GDP	INF	SIR
Z-SCORE	0.799	- 0.350	0.523	- 0.366	0.159	- 0.344	0.134	- 0.053	- 0.107

Source: Eview

Therefore, as revealed on table 3 above, all bank specific variables, except loan to deposit, had statistically significant relationships with financial distress; while macroeconomic variables had insignificant correlation with Z-score, as a measure of financial distress. The positive sign of capital adequacy ratio indicates that highly capitalized banks able to shoulder financial distress and these finding is consistent with Zhen-Jia-Liu (2015). The negative sign of asset quality was also consistent with Zhen-Jia-Liu (2015), and implying that the increase in loan loss contribute to bank financial distress. The positive sign of management quality was not expected but similar finding were observed in the work of Sahut and Mili (2003) that identified a positive association between quality management with distress. The negative sign of ROE was also another contradicting result along with the positive sign of liquidity, as measured by loan to deposit. The positive association between liquidity (LNDP) and Z-score was not as per the expectation. This implies that the increase in liquidity risk is related with low level of financial distress.

Based on the sign of macroeconomic indicators, economic growth is negatively related with financial distress; while the inflation rate and saving rate are positively associated with financial distress. The positive correlation between financial distress and consumer price index was also observed in OECD, NAFTA, ASEAN and EU countries (Zhen-Jia-Liu, 2015). In general, financial distress has higher correlation with bank specific factors than with macroeconomic.

4.3. CHOOSING THE MODEL: RANDOM EFFECT VS FIXED EFFECT

According to Gujarati (2004), if the number of time series data is greater than the number of cross-sectional units, there is likely little difference in the values of the parameters estimated by fixed effect model and random effect model. Hence the choice here is the fixed effect model since the number of time series (i.e., ten years) is greater than the number of cross-sectional units (i.e., eight commercial banks).

4.4. TESTING ASSUMPTIONS OF CLASSICAL LINEAR REGRESSION MODEL

As discussed in the methodology (chapter 3), multiple regression analysis is the most powerful tool that is widely used, but also is one of the most abused statistical techniques (Mendenhall, et al., 2003). Hence, before using the ordinary least square (OLS) estimator to test the significance of the slopes and analyzing the results, tests should be made on the assumptions of classical linear regression model (CLRM) so that we can be certain on the goodness of the data and accuracy of the model.

Test for average value of the error term is zero ($E(u_t) = 0$)

The first assumption required to be tested in CLRM is that the average value of the errors is zero. According to Brooks (2008), in fact, if a constant term is included in the regression equation, this assumption will never be violated. Therefore, it will not be the problem for this study since it has constant term (c).

Tests for Heteroskedasticity assumption ($\text{var}(u_t) = \sigma^2 < \infty$)

The classical linear regression model assumes that the variance of errors is constant across all levels of the independent variables. This means that researchers assume that errors are spread out consistently between the variables. This is evident when the variance around the regression line is the same for all values of the explanatory variable.

When Heteroskedasticity is present it can lead to distortion of the findings and weaken the overall analysis and statistical power of the analysis, which result in an increased possibility of Type I error, unreliable and untrustworthy F-test results, so that erroneous conclusions (Aguinis et al., 1999; Osborne and Waters, 2002). Therefore the incorrect estimates of the variance lead to

the statistical and inferential problems that may hinder theory development (Antonakis and Dietz, 2011). However, it is good to note that the regression is fairly robust to violation of this assumption (Keith, 2006).

Table 4: Test of Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	2.064228	Prob. F(9,70)	0.0446
Obs*R-squared	16.77892	Prob. Chi-Square(9)	0.0523
Scaled explained SS	12.39047	Prob. Chi-Square(9)	0.1922

Source: Eview

Therefore, in order to test for Heteroskedasticity problem, Breusch-Pagan-Godfrey test was conducted. This test states that if the p-value is less than 0.05, the data has Heteroskedasticity problem; whereas, if the value is insignificant or greater than 0.05, the data has no Heteroskedasticity problem or it is Bou-Said homoscedasticity. Thus, as shown in the table 4 above and appendix 2, there is no Heteroskedasticity problem for this study since the chi-square version of the test statistic's P value is 0.0523, which is greater than 0.05.

Tests of Autocorrelation assumption ($cov(u_i, u_j) = 0$ for $i \neq j$)

Another assumption of the classical linear regression model is that the covariance between the error terms over the time or cross-sectionally is zero. In other terms, it is assumed that the errors are uncorrelated with one another. In this regard Durbin-Watson (DW) provides a test for first order autocorrelation (Brooks, 2008). According to Brooks (2008), DW has 2 critical values: an upper critical value (d_u) & lower critical value (d_L), & there is also an inconclusive region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected (see figure 2).

Figure 2: Derbin-Watson test of Autocorrelation or Serial-correlation

Positive Autocorrelation		Inconclusive	No autocorrelation	Inconclusive	Negative Autocorrelation	
0	d_L	d_u	2	$4 - d_u$	$4 - d_L$	0
0	1.259	1.745	1.746	2	2.255	2.741

Source: researcher's drawing

Therefore, based on the DW criteria, figure 2 above, for 80 observations with nine explanatory variables at 1% level of significance, the dL and dU values are 1.259 and 1.745 respectively. The DW value for Z-score for 80 observations is 1.746 (see, Annex 1). This means that there is no first order autocorrelation in the regression model since the DW value (1.746) lies within the range of du (1.745) and 2.

Test of Normality Assumption

Normal distribution of the variables is one of the classical linear regression model (CLRM) requirement or assumptions that have to be met up. This means that errors terms are normally distributed, and that a plot of the values of the residuals will approximate a normal distribution curve. And, if the error terms not normally distributed, the linear relationships and significance test can be distorted (Osborne & Waters, 2002). The researcher can test this assumption through several pieces of information, such as Skewness, Kurtosis, and Jarque-Bera.

Table 5: Summary of statistic for measures of Normal distribution

	Jarque-Bera	JB probability	Skewness	Kurtosis
Altman's Z-Score	2.774235	0.249794	-0.304888	3.678559

Source: Evview

As shown in table 5 and Annex 3, Skewness approaches to zero (i.e. -0.304888) and Jarque-Bera statistics was not significant even at 10% level of significance based on the P-value (0.2498) shown in the above table. Hence, the null hypothesis that is the error term is normally distributed should not be rejected; therefore, the error term in all of the cases follows the normal distribution.

Test of Multicollinearity Assumption

The last but not the least, assumption of classical linear regression tested in this research is multicollinearity. The OLS estimator is implicitly assumed that the explanatory variables are not correlated each other. If there is a perfect multicollinearity it is difficult to get the correct coefficient of the independent variables and their standard errors are immeasurable (Gujarati, 2004). On the other hand, the presence of near multicollinearity does not affect the best linear unbiased estimator (BLUE) properties of the OLS estimator; i.e., it will still be consistent,

unbiased and efficient since the presence of near multicollinearity does not violate any of the CLRM assumptions discussed above.

Table 6: The correlation matrix for explanatory variables

	CAR	AQ	MQ	ROE	LNDP	LOG(SIZE)	GDP	INF	RATE
CAR	1								
AQ	- 0.2825	1							
MQ	0.6673	- 0.1527	1						
ROE	- 0.5409	0.1662	- 0.7331	1					
LNDP	0.4579	0.2225	0.3078	- 0.0998	1				
Ln(SIZE)	- 0.5147	- 0.2711	- 0.4069	0.3297	- 0.6182	1			
GDP	0.1407	0.1927	0.0538	0.0422	0.5033	- 0.4909	1		
INF	- 0.1013	0.2875	- 0.1738	0.0845	- 0.2309	- 0.1461	- 0.3978	1	
RATE	- 0.1826	- 0.3131	- 0.0912	- 0.0556	- 0.6549	0.6890	- 0.5480	- 0.1225	1

Source: Eview

However, there is a problem to test this assumption due to lack of a clear cut-off point to determine the existence of near multicollinearity. Hair et al. (2006) argued that correlation coefficient below 0.9 may not cause serious multicollinearity problem, while Malhotra (2007) stated that multicollinearity problem exists when the correlation coefficient among variables is greater than 0.75. Therefore, as can be revealed on table 6 above, there is no near multicollinearity that breach either of the two criteria.

4.5. RESULTS OF THE REGRESSION ANALYSIS

This section presents the general regression results of fixed effect model that made to identify the bank specific and macroeconomic determinants of financial distress of commercial banks in Ethiopia. Based on the information revealed on table 7 below and Annex 1, the research developed the following model.

$$FD=0.53+6.62CAR-1.65AQ+1.33MQ+2.43ROE-1.9LNDP+0.1Ln(Size)+13.88GDP+0.32INF-20.15SIR$$

R-square: R-square, measures the proportion of the total variation of the dependent variable that is explained by the variation of the explanatory variables. Hence, as can be shown from Table 8 and annex 1, the fixed effect regression model's R-square is 84.3% while the Adjusted R-squared is 80.31%. meaning that, the explanatory power of the model is significant and based on F-

statistic the model as a whole is statistically significant (P-value is less than 0.05) at 1% confidence level.

Table 7: Regression results for determinants of Financial Distress

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.526218	1.631115	0.322612	0.7481
CAR	6.619627	0.810576	8.166571	0.0000*
AQ	-1.647190	2.209217	-0.745599	0.4587
MQ	1.326649	0.381152	3.480629	0.0009*
ROE	2.428509	0.626074	3.878946	0.0003*
LNDP	-1.896915	0.329522	-5.756565	0.0000*
Ln(SIZE)	0.095523	0.124613	0.766559	0.4462
GDP	13.883340	6.490909	2.138890	0.0363**
INF	0.321073	0.581019	0.552603	0.5825
SIR	-20.146150	9.701230	-2.076659	0.0419**
R-squared	0.842945	Durbin-Watson stat		1.746443
Adjusted R-squared	0.803058			
F-statistic	21.133320	Prob (F-statistic) 0.000000		

Note: the starred coefficients are significant at 1% () and 5% (**)*

Source: Eview

The t-statistic of individual variables is also indicate that the bank specific factors, such as capital, management quality, earning ability, and liquidity, were statistically significant at 1% confidence level while the macroeconomic factors, GDP and saving rates, were significant at 5% confidence level. On the other hand, asset quality, bank size and inflation were not significant even at 10% of confidence level. Hence, in general, we can conclude that both bank-specific and macroeconomic factors have significant effect on the level of financial distress of commercial banks in Ethiopia.

4.6. DISCUSSION OF REGRESSION RESULTS

This section presents a detailed discussion on both bank specific and macroeconomic factors of banking financial distress. There should be care while determining the relationship between Z-score and financial distress to explanatory variables; that means, the positive coefficient of explanatory variable on Z-score indicates the explanatory variable as having negative effect on financial distress of commercial banks and vice versa.

4.6.1. Bank Specific Determinants of Financial Distress

Capital Adequacy and Financial Distress

The negative and statistically significant effect of capital adequacy on financial distress of Ethiopian commercial banks is consistent with the first hypothesis (H1). As it can be evidenced from the output of regression analysis present in table 7, capital adequacy (CAR) had statistically significant effect on banking financial distress with a coefficient of 6.62 and p-value of 0.0000. This enables the research to reject the null hypothesis at 1% level of significance. Based on beta coefficient, it can be concluded that a unit increase in capital bring a 6.62 unit increase in Z-score or decrease in the level of financial distress. Hence, as a bank increases capital, it becomes strong enough to absorb losses; and continue operations even under distressed environment and reduce the likelihood of failure and/or insolvency.

This finding is consistent with Bou-Said and Saucier (2003), Poghosyan and Cihak (2009), Sahut and Mili (2011) who found higher equity to assets ratio or adequate capitalization reduce financial distress or the likelihood of failure. According to Schütz (2014) this finding confirms economic theory that the probability of financial distress is negatively correlated with the capitalization of a bank. It is also in line with many other researches like Schütz (2014) that used capitalization as a good predictor of financial distress and failure; however, it is not consistent with Yauri et al. (2012) who argued that increasing capital only contributes to short term improvement in liquidity position and asset quality than forestalling distress. Finally, this research is in line with the advice of the NBE and Basel III to build up bank capital.

Asset Quality and Financial Distress

The positive effect of loan loss provision on financial distress of Ethiopian commercial banks is consistent with the second hypothesis (H2). However, it is surprising to know that asset quality had no statistically significant effect on bank financial distress during the test period. Based on beta coefficient, a unit increase in loan loss provision will bring a -1.65 unit decrease in Z-score or increase in financial distress; but, the study fails to reject the null hypothesis since p-value (i.e., 0.4587) was not statistically significant, even at 10% level of significance. As mentioned in the work of Berhanu (2015) this could be a sign of prudent credit risk management policy of

Ethiopian commercial banks which enables them to have better portfolio quality. Besides, according to (Pesola, 2005) bad loans only increased and appeared significant in a country where its business cycle is in contraction following long period of expansionary macroeconomic policy.

The positive but insignificant effect of asset quality is not consistent with Bou-said and Saucier (2003) who identified a statistically significant and positive effect of asset quality on probability of distress for the 1990s Japanese banking distress. However, similar to the current study, loan loss provision was not appeared as a significant determinant of banking distress of MENA region (Sahut and Mili, 2011). In general, these two and the current researches agreed on one thing; that is, deterioration in assets quality signals a higher probability of financial distress. This might be because of the perceived lifesaving guarantee that the government provide to the sector at a time of difficulties encouraged banks to take excessive risk, increase rate of non-performing loans, highlighting the leverage effect that usually contributes to a greater probability of financial distress (Louzis, et al., 2012).

Management Quality and Financial Distress

The negative and statistically significant effect of management quality on financial distress of Ethiopian banks is not consistent with the third hypothesis (H3) and more paradoxical. Based on beta coefficient, taking all other explanatory variables constant, a one unit increase in cost to income ratio leads to a 1.33 unit increase in Z-score or decrease in financial distress. The P-value (i.e., 0.0009) was also enable the research to reject the null hypothesis at 1% significance level. The negative effect show that management efficiency is related to higher level of bank financial distress, which seems unfair and contradicts with the finding of Sahut and Mili (2011) that had identified a significantly positive effect of quality management on distress.

In line with this finding, Bou-said and Saucier (2003) identified that a group of ailing banks were more efficient than their healthier counterpart. Using same proxy, Poghosyan and Cihak (2009) reported an inconclusive result (i.e., positive and negative effect) throughout different models; this implies that, lower cost do not indicated lower (higher) likelihood of financial distress. In general, although the research finding is not consistent with the hypothesized expectation, it is supported with the two reports, as also justified that highly distressed bank drastically improve their managerial efficiency in an effort to survive.

Earning Ability and Financial Distress

The negative and statistically significant effect of earning ability (ROE) on financial distress of Ethiopian commercial banks is in line with the fourth hypothesis (H4). As revealed on table 7, banks' earning ability had significantly negative effect on distress with a coefficient of 2.43; this implies that, a unit increase in ROE will bring a 2.43 unit increase in Z-score or decrease in the level of financial distress. The P-value (i.e., 0.0000) was also enable the research to reject the null hypothesis at 1% level of significance. Hence, even if, based on Altman's classification, the banking sector is identified as financially distressed; their continuous earning ability would keep them away from the risk of bankruptcy.

This finding is consistent with Poghosyan and Cihak (2009) and Sahut and Mili (2011) who had reported that bank with higher earning ability reduced the odds of experiencing financial distress and failure. However, in contrast with this and the research finding, Betz et al. (2013) and Bou-said and Saucier (2003) reported that bank with higher earning abilities are more likely to incur financial distress, as is also explained by the gamblers ruins theory. According to this theory, banks tend to take excessive risk which might be beyond what they could afford to lose and result in higher return followed by financial distress and failure (Schütz, 2014).

Liquidity and Financial Distress

The positive and statistically significant effect of liquidity on financial distress of Ethiopian commercial banks is also consistent with the fifth hypothesis (H5). As revealed in table 7 above, liquidity had significantly positive effect on Z-score with a beta coefficient of -1.9. The beta coefficient indicates that a one unit increase in loan to deposit ratio, as a measure of liquidity, bring a 1.9 unit decrease in Z-score or increase in the level of financial distress. The p-value (i.e., 0.000) was also enable the research to reject the null hypothesis at 1% level of significance. This implies that increasing the percentage of loan to deposit (i.e., ineffective management of liquidity) leads banks to higher liquidity risk and consequently exposed them to distress.

This finding is consistent with Konstandina (2006) and Schütz (2014) who identified that banks highly involved in lending activities are more likely to face difficulty of repaying short-term liabilities and exposed to bank distress and failure. On the other hand, liquidity was not appeared

to be a significant determinants of financial distress of banks (Sahut and Mili, 2011; Bou-Said and Saucier, 2003). This could be because of the deposit insurance scheme of banking sector makes deposits fled to safer banks steadily (Bou-Said and Saucier, 2003).

Bank Size and Financial Distress

The negative effect of bank size on financial distress of Ethiopian commercial banks is in line with the sixth hypothesis (H6). As shown on table 7 above, bank size had only positive impact on Z-score or negative impact on financial distress but not significant. The p-value (i.e., 0.45) was not enable the research to reject the null hypothesis, even at 10% level of significance. The positive sign indicates that financial distress tends to decreases as bank size increases, as is also supported with the finding of Konstandina (2006) and Sahut and Mili (2011). According to them, the negative effect could be associated with size related diversification benefits. Besides, Sahut and Mili (2011) were also identified size as having positive effect on the long term survival of banks in MENA region.

However, this finding is not consistent with the “too-big-to-fail” hypothesis which expects large banks take excessive risk in an anticipation of government support during difficulties. In this regard, Baklouti et al. (2016) report a significant and positive association between financial distress and size of European commercial banks for the pre and post financial crisis.

4.6.2. Macroeconomic Determinants of Financial Distress

Gross Domestic Product and Financial Distress

The negative and statistically significant effect of economic growth (GDP) on financial distress of Ethiopian commercial banks is consistent with the seventh hypothesis (H7). That means, among the macroeconomic indicators used in this research, GDP had significantly positive effect on financial distress with p-value 3.6%, which enables the research to reject the null hypothesis at 5% level of significance. The beta coefficient indicates that a one percent increase in GDP bring a 13.88 unit increase in Z-score or decrease in the level of financial distress; that means an increase in economic activity/growth is associated with lower probability of banking sector financial distress.

This finding is consistent with what was reported by Goldstein et al. (2000) and Betz et al. (2013). Baklouti et al. (2016) is explained this relationship: when the economic growth becomes weaker it is more likely that businesses and households will reduce their inflows, which result in higher level of financial distress. On the other hand, Konstandina (2006) and others were not found statistically significant relationship between financial distress and macroeconomic factors, including GDP. In general, based on the P-value (i.e., 3.6%), the research able to reject the null hypothesis; i.e., economic growth (GDP) had significantly negative effect on financial distress.

Inflation and Financial Distress

The negative and statistically insignificant effect of inflation (CPI) on financial distress of Ethiopian commercial banks is not consistent with the eighth hypothesis (H8). Here the research used consumer price index to capture the effect of inflation on distress. However, as revealed on table 7, inflation was not appeared to be significant, even at 10% level of significance. The beta coefficient indicates that a one percent increase in CPI bring a 0.32 unit increase in Z-score or decrease in the level of financial distress. But, the P-value (i.e., 0.6) was not enable the research to reject the null hypothesis. The negative and statistically insignificant effect of inflation can be supported by Sahut and Mili (2011), who were investigate the banking sector of MENA region.

Besides, Zhen-Jia-Liu (2015) was also reported a negative relationship between financial distress and inflation for G20 and newly industrialized countries for one to three years prior to the event of financial distress and failure. According to Sahut and Mili (2011) this relationship can be justified as either because bank assets are re-priced faster than their liabilities or inflation reduced the real value of non-performing loans.

Saving Rate and Financial Distress

The positive and statistically significant effect of saving interest rate on financial distress of Ethiopian commercial banks is not consistent with the last hypothesis (H9). As it can be evident from table 7, saving interest rate was significantly determine financial distress of banks with beta coefficient of -20.15; this implies that a one percent increase in saving rate result in a -20.15 unit decrease in Z-score or increase in the level of distress. This is because deposits are re-priced faster than their assets, so that banks will suffer more. Poghosyan and Cihak (2009) had also

documented similar finding for European banks. Based on their analysis, increasing bank level deposit rate to forestall current year distress tend to increase distress in the coming year.

4.7. SUMMARY OF FINDINGS

In general, based on the descriptive statistics and regression analysis, the research reached on the following findings: The mean score of descriptive statistics and Altman et al. (1993) classification demonstrated the existence of banking sector distress.

Based on the FE regression analysis made to identify the determinants of banking distress, capital adequacy, as measured by equity to total asset, had negative and statistically significant effect on financial distress of commercial banks. Asset quality, as measured by loan loss provision to gross loan, had positive but insignificant effect on financial distress of Ethiopian commercial banks; as a result, the research fails to reject the second null hypothesis.

In contrast with the third hypothesis, management efficiency, as measured by cost to income ratio, appeared to be significant and negatively affect financial distress of Ethiopian commercial banks. Whereas earning ability, as measured by equity to total assets, have significantly positive effect on financial distress, which is consistent with the fourth hypothesis. In line with the fifth hypothesis, liquidity, as measured by loan to deposit ratio, appeared as having statistically significant and negative effect on financial distress of Ethiopian commercial banks; as a result, the research reject the fifth null hypothesis. Finally, bank size, as measured by the natural logarithm of total assets, had negative but insignificant effect; as a result, the research fails to reject the sixth null hypothesis.

Regarding the macroeconomic factors, economic growth and saving interest rate appeared significant and had positive and negative effect on banking financial distress respectively. Inflation, as measured by CPI, positively affects financial distress of commercial banks during the test period. But, it does not appear significant, so that fails to reject the last null hypothesis.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1. CONCLUSIONS

The very objective of the research is to identify the determinants of financial distress based on a ten years (2006-2010) panel data of eight commercial banks. The research used MDA based model developed by Altman et al. (1993) as a measure of financial distress. Therefore, based on the analysis, the research reached on the following conclusions: Using the mean score of the descriptive statistics and Altman et al. (1993) classification, the research confirmed that the banking sector had been distressed.

Based on the FE regression analysis made to identify the determinants of banking distress capital adequacy appeared significant and positively affect financial distress of Ethiopian commercial banks. This implies that, increasing capital or sufficient capitalization tends to reduce the level of financial distress and probability of failure, as is consistent with the economic theory.

Deterioration of asset quality (i.e., loan loss provision/gross loan) has negative effect on financial distress although not appeared significant. The negative effect communicates that decline in asset value, which increases credit risk exposure, exposed banks to financial distress and failure.

It is paradoxical to know that management quality (i.e., cost/income) has significantly positive effect on distress of Ethiopian commercial banks. This can happen because of endangered banks tend to cut their operating costs and improve managerial efficiency in an effort to survive.

Bank earning ability (i.e., net income/equity) was also among the significant determinants of financial distress; that means, bank with higher level of earnings ability would be able to reduce distress and the likelihood of failure. This finding is against the gamblers ruin theory, which expected banks to take excessive risk and exposed to distress to get higher return until their net worth becomes negative (i.e., until the bank become insolvent or reached negative capital).

As per the hypothesized expectation, liquidity (i.e., loan to deposit) has significantly negative effect on financial distress of commercial banks. This implies that increasing the percentage of loan compared to deposit (i.e., ineffective liquidity management) leads banks to higher liquidity risk and consequently exposed them to financial distress.

Although bank size appeared insignificant, its negative effect indicates that large banks, due to size related diversification, have better incentive to reduce the odds of financial distress. This finding was not consistent with the “too-big-to-fail” hypothesis that expects large banks to take excessive risk in an anticipation of government support whenever they face difficulties.

Regarding the macroeconomic factors, economic growth (GDP) and saving interest rate appeared to be significant determinants of financial distress, but inflation wasn't. The negative effect of GDP on financial distress indicates that an increase in economic activity is associated with lower level of banking distress and failure. Besides, the positive sign of saving interest rate confirmed that raising deposit by paying higher interest rate would lead banks to higher level of financial distress and increase probability of failure.

Therefore, in general, the research has concluded that bank specific factors are not the only determinants of financial distress but the macroeconomic factors as well. Besides, since the findings indicate the existence of distress in the banking sector and capital and liquidity appeared to be significant, the research concludes in favor of the advice of NBE, Basel III and many empirical works (such as Bou-Said and Saucier, 2003; Poghosyan and Cihak, 2009; Sahut and Mili, 2011) that have recommended banks to increase capital. These findings are also consistent with NBE's directive (MFA/NBEBILLS/001/2011) which requires banks to maintain at least 40% short-term loan of their gross loan to maintain sufficient liquidity.

5.2. RECOMMENDATIONS

Following the findings of both descriptive statistics and regression analysis the research provides the following specific recommendations to various stakeholders of the banking sector.

To Regulators or Policy makers

The study concludes that banks had been distressed. As discussed earlier, one possible cause is related to the national bill directive that requires banks to purchase 27% NBE-bills for each birr loan disbursement. The problem here is that the bill pays only 3% interest with 5 years maturity for which banks pays at least 5% interest to depositors with unlimited maturity. As a result, it reduced their earnings (Eaden, 2014; Shibru, 2014) and erodes their liquidity (Alemayehu, 2016); consequently, banks could be exposed to distress. Therefore, in order to reduce financial

distress, policy makers shall reconsider this directive and improve using one or all of the following way/s: one, by increasing the return rate, at least, to the minimum regulatory deposit rate (i.e., 5%) and even including administrative costs; two, by reducing the 27%; three, excluding some form of loans that will disburse to priority sectors.

Following the significant effect of capital adequacy and liquidity on financial distress, the research recommends NBE to transform its advice (i.e., banks to increase capital) to enforcement so as to promote soundness of the banking sector. The research has also recommended the NBE to strengthen prudential banking practice that would protect banks from taking excessive liquidity risk. Since GDP and saving rate appeared as having significant effect on financial distress, macroeconomic policies should avoid producing unexpected shocks to the sector.

To Supervisors

“Preventing banking failure should not be an objective of bank supervision, although supervision should aim to reduce the probability and impact of a bank failure” (BCBS, 2012). Thus, the supervisory wing of the NBE and the public financial enterprise agency that tasked with ensuring safety and soundness of state owned banks should look after banks from the broader perspective; i.e., financial distress than only focusing on a dismantled ways (like liquidity risk, credit risk).

Besides, since banks are identified as financially distressed, there should be a close supervision to identify bank that has higher level of distress and take corrective or remedial actions ahead of failure. Similarly, the study identified deviations of ratios (loan to deposit); so supervisors should be committed to promote prudential banking practice that protect banks from taking excessive risk and exposed to distress that might bring unnecessary cost to the economy.

To Practitioners or Managers

The research identified that the existence of financial distress during the test period & identified capital and liquidity as significant determinants. Thus, banks are recommended: to increase their capital even beyond the regulatory requirement so as to boost risk absorbing ability including financial distress, and to increase liquidity through aggressively working on deposit mobilization or reducing long-term loans portfolio so that they can reduce the likelihood of financial distress and failure that primarily emanate from liquidity problem. Besides, since the economic growth

and interest rate appeared significant, the study recommend practitioners to take into account the effect of macroeconomic factors while making strategies and managing risks.

Therefore, in general, the research concludes that commercial banks could withstand financial distress and failure by controlling the effect of both bank specific and macroeconomic factors.

5.3. FURTHER RESEARCH

This research tried to bridge the gap on existing literatures as identified in the problem statement, outlined on research objective and hypothesized, but it has limitation that has to be addressed by other researchers. Therefore, further research should be conducted in the following two areas in order to get full fledged knowledge on the subject matter.

First, further research should be conducted using additional bank specific factors (such as off-balance sheet activities, corporate governance and ownership structure), regulation, bank culture and macroeconomic indicators that will affect banking financial distress.

Second, further study is required to identify the effect of financial distress on performance and macroeconomic environment of a country.

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APPENDIXES

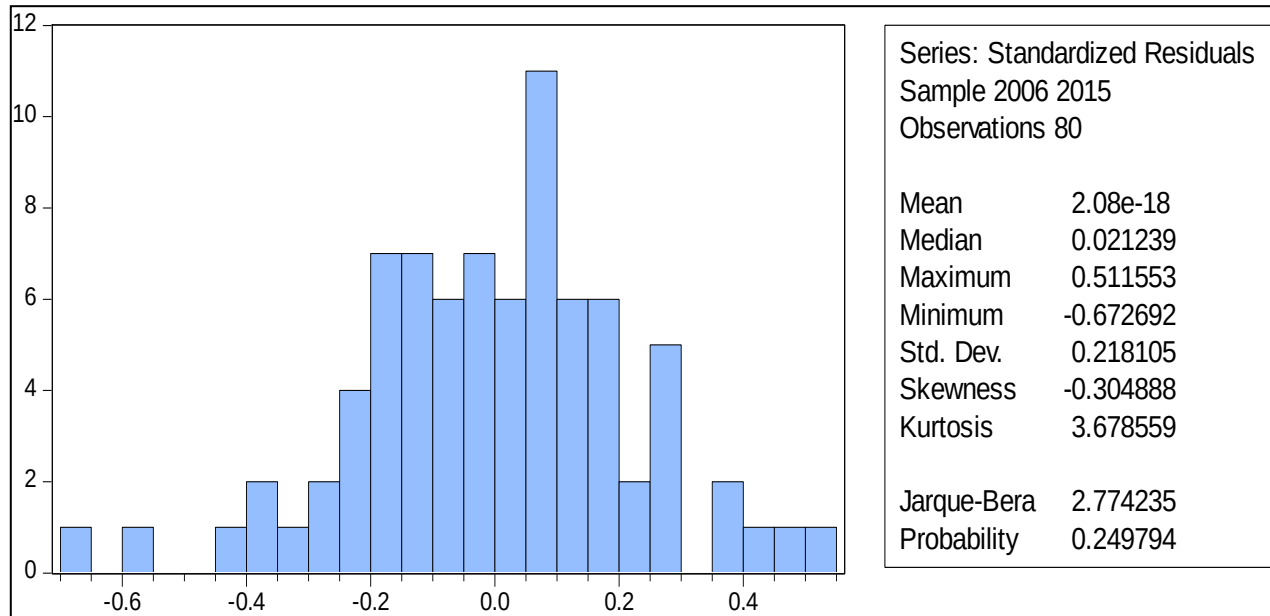
Appendix 1: Fixed Effect Regression Analysis

Dependent Variable: Z_SCORE				
Method: Panel Least Squares				
Date: 12/11/16 Time: 21:27				
Sample: 2006 2015				
Periods included: 10				
Cross-sections included: 8				
Total panel (balanced) observations: 80				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.526218	1.631115	0.322612	0.74810
CAR	6.619627	0.810576	8.166571	0.00000
AQ	-1.64719	2.209217	-0.745599	0.45870
MQ	1.326649	0.381152	3.480629	0.00090
ROE	2.428509	0.626074	3.878946	0.00030
LNDP	-1.896915	0.329522	-5.756565	0.00000
Ln(SIZE)	0.095523	0.124613	0.766559	0.44620
GDP	13.88334	6.490909	2.13889	0.03630
INF	0.321073	0.581019	0.552603	0.58250
RATE	-20.14615	9.70123	-2.076659	0.04190
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.842945	Mean dependent var		3.067262
Adjusted R-squared	0.803058	S.D. dependent var		0.55035
S.E. of regression	0.244235	Akaike info criterion		0.204737
Sum squared resid	3.757997	Schwarz criterion		0.710917
Log likelihood	8.810537	Hannan-Quinn criter.		0.407679
F-statistic	21.13332	Durbin-Watson stat		1.746443
Prob(F-statistic)	0.00000			

Appendix 2: Heteroskedasticity Assumption test

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	2.064228	Prob. F(9,70)	0.0446	
Obs*R-squared	16.77892	Prob. Chi-Square(9)	0.0523	
Scaled explained SS	12.39047	Prob. Chi-Square(9)	0.1922	
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 12/11/16 Time: 21:34				
Sample: 1 80				
Included observations: 80				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.724759	0.444506	1.630481	0.1075
CAR	-0.2356	0.255092	-0.923591	0.3589
AQ	0.118255	0.496418	0.238217	0.8124
MQ	0.016624	0.107935	0.15402	0.878
ROE	-0.42911	0.190734	-2.249782	0.0276
LNDP	-0.13281	0.122394	-1.08509	0.2816
Ln(SIZE)	0.00427	0.025076	0.170273	0.8653
GDP	-2.62755	1.996889	-1.31582	0.1925
INF	-0.31986	0.173199	-1.846803	0.069
RATE	-3.0779	3.017359	-1.020063	0.3112
R-squared	0.209737	Mean dependent var	0.07404	
Adjusted R-squared	0.108131	S.D. dependent var	0.103483	
S.E. of regression	0.097728	Akaike info criterion	-1.69679	
Sum squared resid	0.668553	Schwarz criterion	-1.39904	
Log likelihood	77.87157	Hannan-Quinn criter.	-1.57741	
F-statistic	2.064228	Durbin-Watson stat	1.408413	
Prob(F-statistic)	0.044585			

Appendix 3: Normality Assumption Test



Appendix 4: Correlation Matrices between Dependent and Independent

	CAR	AQ	MQ	ROE	LNDP	LOG(SIZE)	GDP	INF	RATE
CAR	1								
AQ	- 0.2825	1							
MQ	0.6673	- 0.1527	1						
ROE	- 0.5409	0.1662	- 0.7331	1					
LNDP	0.4579	0.2225	0.3078	- 0.0998	1				
Ln(SIZE)	- 0.5147	- 0.2711	- 0.4069	0.3297	- 0.6182	1			
GDP	0.1407	0.1927	0.0538	0.0422	0.5033	- 0.4909	1		
INF	- 0.1013	0.2875	- 0.1738	0.0845	- 0.2309	- 0.1461	- 0.3978	1	
RATE	- 0.1826	- 0.3131	- 0.0912	- 0.0556	- 0.6549	0.6890	- 0.5480	- 0.1225	1

Appendix 5: Raw Data used for Regression

ID	YEAR	Z-SCORE	CAR	AQ	MQ	ROE	LNDP	IND	SIZE	GDP	Inf	Rate
1	2006	2.3603	0.0865	0.1128	0.5000	0.3567	1.0750	0.4304	1,797.00	0.115	0.106	0.03
1	2007	2.3450	0.1150	0.1407	0.6284	0.2642	1.0053	0.4450	1,889.00	0.118	0.158	0.04
1	2008	2.4140	0.1210	0.1311	0.4770	0.3250	0.8093	0.3775	2,392.02	0.112	0.253	0.04
1	2009	2.3459	0.1080	0.1157	0.5354	0.2732	0.7585	0.4057	2,592.15	0.100	0.364	0.04
1	2010	2.6441	0.1113	0.1091	0.5085	0.2861	0.6617	0.3944	3,161.66	0.106	0.280	0.04
1	2011	2.8193	0.1089	0.1048	0.5909	0.2365	0.6166	0.4294	3,504.87	0.114	0.181	0.05
1	2012	3.1977	0.1013	0.0970	0.6134	0.2401	0.4630	0.5465	5,946.60	0.087	0.341	0.05
1	2013	2.3758	0.1052	0.0438	0.6125	0.2091	0.4585	0.5459	6,699.50	0.099	0.135	0.05
1	2014	3.2886	0.1006	0.0303	0.7815	0.1336	0.4596	0.5470	7,838.80	0.103	0.081	0.05
1	2015	3.1281	0.1020	0.0247	0.9195	0.0164	0.5055	0.3955	7,337.96	0.102	0.077	0.05
2	2006	2.6340	0.0969	0.0265	0.4959	0.4229	0.8342	0.3406	4,546.00	0.115	0.106	0.03
2	2007	2.8730	0.1029	0.0248	0.4680	0.4019	0.8000	0.3402	6,041.00	0.118	0.158	0.04
2	2008	3.2560	0.1054	0.0232	0.5335	0.3750	0.6958	0.3729	7,828.59	0.112	0.253	0.04
2	2009	3.0481	0.1035	0.0230	0.5335	0.3049	0.5488	0.4246	9,732.58	0.100	0.364	0.04
2	2010	3.0296	0.1017	0.0218	0.5248	0.3189	0.4868	0.4995	12,353.38	0.106	0.280	0.04
2	2011	2.9209	0.1034	0.0199	0.5087	0.3577	0.5146	0.5292	14,659.79	0.114	0.181	0.05
2	2012	2.8006	0.1136	0.0215	0.4823	0.4044	0.5652	0.4797	17,520.04	0.087	0.341	0.05
2	2013	3.0249	0.1098	0.0225	0.5525	0.3133	0.5465	0.4382	19,747.17	0.099	0.135	0.05
2	2014	3.0714	0.1246	0.0185	0.5536	0.3069	0.5333	0.4681	21,962.20	0.103	0.081	0.05
2	2015	2.9652	0.1252	0.0168	0.6168	0.2641	0.5720	0.4377	24,763.88	0.102	0.077	0.05
3	2006	2.5476	0.1174	0.0491	0.5132	0.2932	0.6934	0.3991	2,954.00	0.115	0.106	0.03
3	2007	2.8184	0.1278	0.0434	0.4052	0.3878	0.7722	0.3746	3,830.00	0.118	0.158	0.04
3	2008	2.8058	0.1381	0.0464	0.5177	0.2771	0.6747	0.4066	4,820.22	0.112	0.253	0.04
3	2009	2.9752	0.1334	0.0550	0.5759	0.2123	0.5166	0.4210	6,422.55	0.100	0.364	0.04
3	2010	2.9925	0.1309	0.0471	0.4891	0.2929	0.4909	0.5583	7,944.78	0.106	0.280	0.04
3	2011	3.1039	0.1480	0.0364	0.4555	0.3168	0.4961	0.5745	10,115.78	0.114	0.181	0.05
3	2012	2.7884	0.1420	0.0270	0.5223	0.2641	0.5819	0.3980	13,125.22	0.087	0.341	0.05
3	2013	2.5889	0.1337	0.0230	0.5620	0.2731	0.6004	0.4020	17,783.93	0.099	0.135	0.05
3	2014	2.6395	0.1336	0.0227	0.5687	0.2692	0.5963	0.4331	20,028.79	0.103	0.081	0.05
3	2015	2.9652	0.1408	0.0174	0.6257	0.2298	0.6622	0.3648	23,869.61	0.102	0.077	0.05

4	2006	2.8855	0.1644	0.0311	0.4455	0.2591	0.8737	0.2500	2,834.00	0.115	0.106	0.03
4	2007	2.4791	0.1294	0.0469	0.6442	0.1665	0.8074	0.2434	3,396.00	0.118	0.158	0.04
4	2008	2.3083	0.1095	0.0889	0.9369	0.0354	0.7380	0.2735	4,269.94	0.112	0.253	0.04
4	2009	2.8809	0.1065	0.0983	0.6406	0.2140	0.5435	0.3185	5,476.62	0.100	0.364	0.04
4	2010	2.6322	0.0996	0.0741	0.5813	0.2545	0.5682	0.4416	6,279.54	0.106	0.280	0.04
4	2011	2.7993	0.0975	0.0333	0.5819	0.2904	0.5276	0.3980	7,277.96	0.114	0.181	0.05
4	2012	2.8372	0.1168	0.0257	0.6009	0.2760	0.5608	0.3120	8,239.51	0.087	0.341	0.05
4	2013	2.8678	0.1206	0.0199	0.6009	0.2148	0.5424	0.3120	10,129.37	0.099	0.135	0.05
4	2014	2.7324	0.1429	0.0179	0.6530	0.2088	0.5564	0.2752	11,276.39	0.103	0.081	0.05
4	2015	2.7699	0.1452	0.0151	0.6902	0.1747	0.5311	0.2930	13,667.55	0.102	0.077	0.05
5	2006	3.1537	0.1316	0.0483	0.5727	0.3264	0.8526	0.4545	2,259.00	0.115	0.106	0.03
5	2007	3.1699	0.1404	0.0441	0.5219	0.3404	0.7564	0.4219	3,480.00	0.118	0.158	0.04
5	2008	3.4405	0.1592	0.0592	0.5584	0.2754	0.7443	0.4463	4,124.89	0.112	0.253	0.04
5	2009	3.7938	0.1810	0.0609	0.4576	0.2506	0.5321	0.5055	5,118.31	0.100	0.364	0.04
5	2010	3.7545	0.1937	0.0397	0.4383	0.2366	0.6056	0.5627	5,741.93	0.106	0.280	0.04
5	2011	3.5349	0.1938	0.0454	0.4378	0.2706	0.4663	0.6136	8,061.05	0.114	0.181	0.05
5	2012	3.1493	0.1955	0.0243	0.4610	0.2286	0.6042	0.4805	8,347.15	0.087	0.341	0.05
5	2013	2.7240	0.1953	0.0224	0.5238	0.1999	0.6072	0.3845	10,393.80	0.099	0.135	0.05
5	2014	3.0238	0.1982	0.0167	0.6255	0.1534	0.5400	0.3825	11,242.58	0.103	0.081	0.05
5	2015	2.9412	0.1935	0.0158	0.6588	0.1546	0.6151	0.3564	13,711.36	0.102	0.077	0.05
6	2006	3.2442	0.1430	0.0289	0.5238	0.2785	0.7992	0.4365	1,599.00	0.115	0.106	0.03
6	2007	3.2597	0.1904	0.0301	0.5469	0.2323	0.8874	0.3646	2,182.50	0.118	0.158	0.04
6	2008	3.2327	0.1722	0.0268	0.5500	0.2200	0.7407	0.3880	3,249.96	0.112	0.253	0.04
6	2009	3.0403	0.1316	0.0309	0.6128	0.1895	0.5769	0.3910	4,651.70	0.100	0.364	0.04
6	2010	3.3150	0.1209	0.0365	0.5150	0.3014	0.5330	0.5084	5,896.23	0.106	0.280	0.04
6	2011	3.3902	0.1323	0.0277	0.4885	0.3013	0.5253	0.4626	7,725.62	0.114	0.181	0.05
6	2012	2.3732	0.1334	0.0233	0.5112	0.2974	0.5905	0.3763	8,786.86	0.087	0.341	0.05
6	2013	3.1714	0.1280	0.0186	0.6624	0.1856	0.5734	0.3361	9,977.67	0.099	0.135	0.05
6	2014	3.7509	0.1442	0.0144	0.7072	0.1428	0.5611	0.2541	11,876.37	0.103	0.081	0.05
6	2015	3.6949	0.1285	0.0122	0.7314	0.1725	0.5740	0.2893	14,360.87	0.102	0.077	0.05

7	2006	3.0075	0.1516	0.0386	0.4969	0.2279	0.9766	0.3354	2,027.00	0.115	0.106	0.03
7	2007	3.0917	0.1834	0.0341	0.4904	0.2141	0.9340	0.2933	2,607.00	0.118	0.158	0.04
7	2008	3.3640	0.1912	0.0379	0.4985	0.2210	0.8234	0.3367	3,650.11	0.112	0.253	0.04
7	2009	3.4596	0.1724	0.0460	0.4851	0.2316	0.6425	0.4047	4,806.50	0.100	0.364	0.04
7	2010	3.5550	0.1701	0.0390	0.4874	0.2442	0.5929	0.5215	5,970.51	0.106	0.280	0.04
7	2011	3.7921	0.1790	0.0412	0.4760	0.2361	0.5143	0.4931	7,111.52	0.114	0.181	0.05
7	2012	3.3487	0.1986	0.0271	0.4871	0.2121	0.6181	0.4290	8,275.70	0.087	0.341	0.05
7	2013	3.2575	0.1913	0.0250	0.5398	0.1875	0.6655	0.3297	9,144.54	0.099	0.135	0.05
7	2014	3.1799	0.1975	0.0210	0.5410	0.1638	0.6825	0.3297	10,747.28	0.103	0.081	0.05
7	2015	3.0098	0.1814	0.0150	0.6353	0.1628	0.7053	0.2653	13,256.12	0.102	0.077	0.05
8	2006	6.4517	0.6912	0.0079	1.8042	- 0.0358	1.2857	0.0403	224.00	0.115	0.106	0.03
8	2007	4.2089	0.4012	0.0126	0.8824	0.0190	0.8520	0.2647	424.00	0.118	0.158	0.04
8	2008	3.6927	0.2691	0.0123	0.6546	0.0845	0.6498	0.2629	678.20	0.112	0.253	0.04
8	2009	2.5267	0.1838	0.0136	0.9356	0.0155	0.7454	0.2022	1,022.88	0.100	0.364	0.04
8	2010	3.0038	0.1354	0.0253	0.7187	0.1453	0.5128	0.4170	1,768.32	0.106	0.280	0.04
8	2011	3.3089	0.1152	0.0200	0.6451	0.2174	0.3968	0.5063	2,500.59	0.114	0.181	0.05
8	2012	3.1184	0.1352	0.0144	0.5402	0.3077	0.4874	0.4340	3,670.73	0.087	0.341	0.05
8	2013	3.2213	0.1363	0.0172	0.4773	0.3674	0.4658	0.5566	6,538.72	0.099	0.135	0.05
8	2014	3.2945	0.1570	0.0184	0.4614	0.3842	0.6686	0.5212	7,351.13	0.103	0.081	0.05
8	2015	2.3695	0.1500	0.0256	0.6077	0.2498	0.8912	0.4277	11,462.06	0.102	0.077	0.05