# FACTORS AFFECTING PROFITABILITY OF SELCTED INSURANCE COMPANIES IN ETHIOPIA

**A THESIS SUBMITTED TO THE DEPARTMENT OF ACCOUNTING AND FINANCE PRSENTED IN PARTIAL FULFILLMENTOF THE REQUIRMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN ACCOUNTING AND FINANCE**


**By: MUHABA KEDIR**


**Advisor**

**Dr. GURUSWAMY**


**DEPARTMENT OF ACCOUNTING AND FINANCE**

**SCHOOL OF BUSINESS AND ECONOMICS,**

**ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY**


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# Declaration

I, the undersigned, declare that the thesis work entitled "Factors Affecting Profitability of selected Insurance Companies in Ethiopia" submitted by me for the award of Master of Science Degree in Accounting and Finance from Adama Science and Technology University, is my original work and it has not been submitted or presented forthe award of any other degree or other similar titles at any other university or institution.

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# Certification

This is to certify that AtoMuhabaKedir has carried out his research work on the title of“Factors Affecting Profitability of selected Insurance Companies in Ethiopia”under my supervision. This work is complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Name: Dr. Guruswamy

Signature: __________________

Date: _____________________

Department of Accounting and Finance

School of Business & Economics

Adama Science and Technology University

Advisor

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This is to certify that the thesis prepared by AtoMuhabaKedir entitled“Factors Affecting Profitability of selected Insurance Companies in Ethiopia”, Panel Evidence submitted in partial fulfillments of the requirements for the Degree ofMasters of Science in Accounting and Finance complies with the rules and regulations of the university and meets the expected standards with respect of originality and quality. Hence all reference materials contained therein have been duly acknowledged.

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External examiner Signature________________ Date ______________

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# Abstract

*The main aim of this research was to examine the factors affecting the profitability of selected insurance companies in Ethiopia. Profitability was dependent variable while size, age, leverage, firm growth, liquidity, tangibility of assets, economic growth rate and inflation are independent variables. Explanatory research design and purposive sampling method were employed in this study. The sample in this study includes nine of the listed insurance companies for ten years (2004 -2013).Secondary data obtained from the annual financial statement of selected insurance companies, National Bank of Ethiopia (NBE) and Ministry of Finance and Economic Development (MoFED). The balanced panel data was analyzed by using descriptive, correlation and multiple regression analysis. From the regressions; size, leverage, firm growth, economic growth rate, and inflation are identified as most important determinant factors of profitability hence size and firm growth are positively related. In contrast, leverage, economic growth rate and inflation are negatively but significant impact on profitability. Finally, age, liquidity, and tangibility of assets had insignificant impact on the profitability of insurance companies.*



***Key words: - profitability, balanced panel data, fixed effect model, Ethiopia***

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# List of acronyms

| | |
|---|---|
| AG: | Age |
| CLRM: | Classical Linear Regression Model |
| CSA: | Central Statistics Authority |
| DW: | Durbin -Watson |
| EGR: | Economic growth rate |
| FEM | Fixed Effect Model |
| FG: | Firm growth |
| IF: | Inflation |
| LQ: | Liquidity |
| LV: | Leverage |
| MOFED: | Ministry of Finance and Economic Development |
| NBE: | National Bank of Ethiopia |
| OLS: | Ordinary List Square |
| REM: | Random Effect Model |
| ROA: | Return on Asset |
| ROE: | Return on Equity |
| ROIC: | Return on Invested Capital |
| SZ: | Size |
| TA: | Tangibility of assets |
| UAE: | United Arab Emirates |
| UK: | United Kingdom |
| US: | United States of America |

# CHAPTER- ONE

# INTRODUCTION

This chapter presents the overall introduction of the research. It includes background of the study,statement of the problem, research objectives, research hypothesis formulated, significance of the study, scope of the study, limitation of the study and organization of the paper.

## 1.1. Background of the study

A financial institution is an establishment that conducts financial transactions such as investments, loans and deposits. Almost everyone deals with financial institutions on a regular basis. Everything from depositing money to taking out loans and exchanging currencies must be done through financial institutions. The major categories of financial institutions are: commercial banks, investment banks, insurance companies, investment companies, credit unions, brokerage and mutual funds (Jeff M, 2008).

The insurance sector plays significant role in the financial services industry in almost developed and developing countries, contributing to economic growth, efficient resource allocation, reduction of transaction costs, creation of liquidity, facilitation of economics of scale in investment, and spread of financial losses (Haiss and Sümegi, 2008). The business world without insurance is unsustainable since risky business may not have the capacity to retain all kinds of risks in this ever changing and uncertain global economy (Ahmed et al., 2010). Therefore, the worthy performance and sustainability of insurance companies are necessary for the healthiness of the national economy. The performance of insurance industry can express in many ways, such as competition, concentration, efficiency and profitability. The profitability of insurance industry has been one of the hot issues in the financial environment. Profit does not only improve upon insurer's solvency state but it also plays an essential role in persuading policyholders and shareholders to supply funds into insurance firms (Chen-Ying Lee, 2009).

Thus, one of the objectives of management of insurance companies is to attain profit as an underlying requirement for conducting any insurance business.

Profitability of insurance companies could be affected by number of determining factors. These factors, classified as internal, industry and macro-economic factors (Ayele, 2012). According to Hafiz Malik (2011) defines internal determinants of profitability as factors that could be influenced by management decision.As stated by Hamadan Ahamed Ali – Al- Alshami (2008) internal determinants can be broadly classified in to two sub-categories namely financial statement variables and non-financial statement variables. The financial statement variables are determining factors which are directly driven from items in balance sheet and profit and loss accounting of insurance companies. On the other hand, the non-financial statement variables are those factors which are not directly displayed on the financial statements accounts. The external determinants of insurance companies profitability are those factors which are external to the insurance companies and hence outside the control of management. There are several external factors suggested as impacting of insurance companies among them economic growth, interest rate, and inflation are included.

Like other nations in Ethiopia also, insurance companies play important role as financial intermediaries in the economy growth process like: Indemnify for Losses, reduction of worry and fear, means of loss control, enhancing credit and source of investment funds (Fasil and Merhatbeb, 2009). As such, it is essential to know which factors may affect profitability as well as survival insurance industry. Therefore, this research aimed to identify those factors affecting the profitability of insurance companies in Ethiopia.

### 1.2. Statement of the problem

During the last decade, Ethiopia has experienced a remarkable GDP growth and it is expected to continue for the future. Financial institutions intermediate between the savers of funds and users of funds. As recognized by economists and finance specialists, the role of insurance is essential for the development of an economy. After the change in the political environment in 1991, the proclamation for the licensing and supervision of insurance business heralded the beginning of a new era in Ethiopia. Immediately after the enactment of the Proclamation No. 86/1994, helped a new era in the history of insurance business in which Ethiopian insurance market has become a ground where the public and private insurance companies competition to take a large portion of the market. The healthiness of insurance industry is very critical to the wellbeing of the financial system in specific and Ethiopian economy at large (Fasil and Merhatbeb, 2009).

Researches in different countries have made investigation on this area are by considering the importance of profitability in insurance sectors, Hafiz Malik (2011),Chen and Wong (2004),Ahmed et al., (2011),Choi and Weiss (2005), Jay Angoff Roger Brown (2007), Swiss Re (2008), Naveed Ahmed, Zulfqar Ahmed, Desheng Wu Z., Sandra V. &Lianga (2007), Wright, K. M. (1992), Ahmad Usman (2011), Adams M., Hardwick P. and Zou H., (2008), Ayele (2012),Yuqi Li (2007),Adams and Buckle(2000), Hamadan Ahamed Ali Al-Shami (2008), andSylwesterKozak (2011).

Hafiz Malik (2011) study found that there is significantly positive association between age of the company and profitability. In contrast, Hamadan Ahamed Ali Al-Shami (2008) and Ayele (2012), found no significant statistical relation between age and profitability of insurance companies. Hafiz Malik (2011), Hamadan Ahamed Ali Al-Shami (2008) and Ayele (2012), found that there is significantly positive association between size and profitability of insurance companies. However, company size is not found to be an important determinant of operational performance in the Bermuda insurance market during the period 1993-1997 (Adams and Buckle, 2000). Naveed Ahmed et.al, (2011), in his investigation found that profitability has statistically insignificant relationship with liquidity. In contrast, Chen and Wong (2004) and Ayele (2012) examined that, liquidity is the important determinants of financial health of insurance companies with a negative relationship.

Renbao Chen and Kie Ann Wong (2004), Hamadan Ahamed Ali Al-Shami (2008), Hifza Malik (2011), SylwesterKozak (2011), Swiss Re (2008) and Ayele (2012), found that negative but statistically significant relationship between leverage and profitability of firms. Hafiz Malik (2011) and Hamadan Ahamed Ali Al-Shami (2008) found in their investigation that there exists a positive and significant relationship between volume of capital and profitability.Naveed Ahmed et.al, (2011) and Ayele (2012), investigates that profitability has statistically more of insignificant relationship with, tangibility of assets. However, Hafiz Malik (2011) found that there exists a positive and significant relationship between tangibility of assets and profitability of insurance companies. Naveed Ahmed et al (2011) and Hamadin Ahmed Ali Al-Shami (2008), of their investigation found a positive and statistically significant relationship between growth and profitability of insurance companies.

The results found by the researchers mentioned above occurred inconsistencies regarding tosome determinants of profitability of the insurance sector because countries unique each other by their economic systems, financial systems, political systems and operating environments.

Not only the different conclusions and finding by different studies but also this research paper is initiated by a chain of question: why are some insurance companies more successful than others? To what extent differences in insurance profitability due to variation in internal factors under the control insurance management and to what extent, do external factors impact on the profitability of these insurances? Answers to the questions were helpful to identify and examine the factors that affect the profitability of Ethiopian insurance companies. Thus, an understanding of the factors that affect the profitability insurance companies is helpful matter in order to have profitable and stable insurances. However, substantial amount of studies have not been conducted to investigate the status of insurance profitability as well as the determinants Ethiopian insurance industry. Therefore, this research tried to examine the factors affecting the profitability of insurance companies over the period of 2004 – 2013.

## 1.3. Objectives of the study

### 1.3.1. General objective

The main objective of the study is to examine the factors determining the profitability of selected insurance companies in Ethiopia.

### 1.3.2. Specific Objectives

Based on the above general objective, the researcher reveals the following specific objectives:

- To assess the extent of specific (internal) determinants effect on profitability.
- To know the effects of external (macroeconomic) determinants on profitability.
- To determine the relationship between these factors and profitability.
- To rank the factors according to their degree of influence onprofitability.

### 1.4. Literature driven hypotheses

Based on review of relevant and related literatures, it is hypothesized that age, size, leverage, firm growth,liquidity, tangibility of assets, economic growth rate and inflation were expected to influence insurances profitability which was proxied by ROA. This study undertakes the issue identifying factors that influence profitability of insurances in Ethiopia. Variables hypothesized are classified as dependent and independent variables, accordingly the following hypotheses were tested by this study:

### 1.4.1. Dependent variable

**Return on Assets (ROA)**

The Researcher is use return on assets to represent insurance companies' profitability. Return on assets is calculated as net profit before tax by total assets. It shows the profit earned per dollar of assets and most importantly, reflects the management's ability to utilize the insurance's financial and real investment resources to generate profits, although it may be biased due to off-balance-sheet activities. For any insurance, ROA depends on the insurances policy decisions as well as uncontrollable factors relating to the economy and government regulations. Many researchers believe return on assets is the best measure of firms' profitability. Philip Hardwick and Mike Adams (1999), and Hafiz Malik (2011) are among others, who have suggested that although there are different ways to measure profitability better it is to use ROA.

### 1.4.2. Independent variables

**Size**

Swiss Re (2008) indicated that larger firms are found to grow faster than smaller and younger firms found to grow faster than older firms. Flamini et.al (2009) specified thatsize is used to capture the fact that larger firms are better placed than smaller firms in harnessing economies of scale in transactions and enjoy a higher level of profits.Earlier research papers such as Sharma and Kesner, (2006) and Mitchell, (2004) strongly support the effect of firm size on business survival and variance in operating performance. They argue that firm size is a basis of competitive advantage in the sense that larger companies tend to be more efficient than their smaller counterparts and have better resources to survive economic downturns.One of the most important questions underlying insurance policy is which size optimizes insurance profitability.

***Ho: There is no positive significant relationship between size and profitability of insurance companies in Ethiopia.***

***H1: There is positive significant relationship between size and profitability of insurance companies in Ethiopia.***

**Age**

Study of Vigaykumar and Kadirvelu (2004), age of firm is an important determinant of profitability. Older the firm the more will be the profitability due to experience and efficiency cost decreases. They found the positive relationship between firms` profitability and age of the firm.Hafiz Malik (2011) found that there is significantly positive association between age of the company and profitability. The older the firm the more may be the profitability of the firm. This could be justified as experience and efficiency in the operation process may decrease cost of production and he found even that age is the strongest determinant of profitability. Recently established firms are not particularly profitable in their first years of operation, as they place greater emphasis on increasing their market share, rather than on improving profitability Athanasoglou*et al.*, (2005). Obviously, the above empirical studies those include age as one of their explanatory determinant indicates a positive relationship between age and profitability.

***Ho: There is no positive significant relationship between age and profitability of insurance companies in Ethiopia*.**

***H1: There is positive significant relationship between age and profitability of insurance companies in Ethiopia.***

**Leverage**

Literatures in capital structure confirm that a firm's value will increase up to optimum point as leverage increases and then declines if leverage is further increased beyond that optimum level. For instance Renbao Chen and Rie Ann Wong (2004) stated that leverage beyond the optimum level could result in higher risk and low value of the firm. Empirical evidences with regard to leverage found to be statistically significant relationship but negative. For instance Renbao Chen and Kie Ann Wong (2004), in Canada, Hamadan Ahamed Ali Al-Shami (2008) in UAE, Hafiz Malik (2011) in Pakistan, SylwesterKozak (2011) in poland, Swiss Re (2008) in Egypt and Flaminiet..al (2009) in Sub-Saharan countries found that negative but statistically significant relationship between leverage and profitability of firms.According to Adams and Buckle (2003) provided evidence that insurance companies with high leverage have better operational performance than insurance companies with low leverage.

***Ho: There is no negative significant relationship between Leverage and profitability of insurance companies in Ethiopia.***

***H1: There is negative significant relationship between Leverage and profitability of insurance companies in Ethiopia.***

**Firm Growth**

Insurance companies having more and more assets over the years have also better chance of being profitable for the reason that they do have internal capacity though it depends on their ability to exploit external opportunities. Empirical evidence by Naveed Ahmed et al (2011) in Pakistan, Yuqi Li (2007) in UK and Hamadin Ahmed Ali Al-Shami (2008) in UAE of their investigation found a positive and statistically significant relationship between growth and profitability of insurance companies.

***Ho: There is no positive significant relationship between firm Growth and profitability of insurance companies in Ethiopia.***

***H1: There is positive significant relationship between firm Growth and profitability of insurance companies in Ethiopia.***

**Liquidity**

Liquidity from the perspective of insurance companies is the probability of an insurer to pay liabilities which include operating expenses and payments for losses/benefits under insurance policies, when due then shows us that more current assets are held and idle if the ratio becomes more which could be invested in profitable investments. For an insurer, cash flow (mainly premium and investment income) and liquidation of assets are the main sources of liquidity Renbao Chen and Kie Ann Wong (2004).FlaminiValentina, Calvin McDonald, and Liliana Schumacher (2009) in their investigation regarding Sub-Saharan countries found significant and negative relationship between firm profitability and liquidity. Chen and Wong (2004) examined that, liquidity is the important determinants of financial health of insurance companies with a negative relationship. Similarly, Hakim and Neaime (2005) observed that liquidity is the important determinants of firms' profitability.

***Ho: There is no negative significant relationship between Liquidity and profitability of insurance companies in Ethiopia.***

***H1: There is negative significant relationship between Liquidity and profitability of insurance companies in Ethiopia.***

**Tangibility of Assets**

Tangibility of assets in insurance companies in most studies is measured by the ratio of fixed assets to total assets. Hafiz Malik (2011) found that there exists a positive and significant relationship between tangibility of assets and profitability of insurance companies and argued that the highest the level of fixed assets formation, the older and larger the insurance company is. The study made by Naveed Ahmed et.al... (2011) examines the impact of firm level characteristics on performance of the life insurance sector of Pakistan over the period of seven years.

For this purpose, size, profitability, age, risk, growth and tangibility are selected as explanatory variables while ROA is taken as dependent variable. The results of OLS regression analysis discovered that leverage, size and risk are most important 21determinant of performance of life insurance sector whereas ROA has statistically more of insignificant relationship with, tangibility of assets.

***Ho: There is no negative significant relationship between Tangibility of assets and profitability of insurance companies in Ethiopia.***

***H1: There is negative significant relationship between Tangibility of assets and profitability of insurance companies in Ethiopia.***

**Economic Growth rate**

Economic growth is measured by the real GDP growthand it is expected to have influence on the insurance companies' financial performance, since economic growth improves the living standards and the levels of income, increasing the purchasing power of population. According to Athanasoglous P. *et al.,* (2005) the economic growth positively and significantly affects firm profitability. Similarly, Kozak, (2011), as quoted by Doumpos andGaganis (2012) GDP growth rate positively influence the insurance companies' profitability. In contrast, Grace and Hotchkiss (1995) documented a link between insurance industry performance and long-run general economic conditions using co-integration technique and they found that real GDP is negatively related to premium and interest rates have reverse effects on the underwriting profits.

***Ho: There is no negative significant relationship between Economic Growth and profitability of insurance companies in Ethiopia.***

***H1: There is negative significant relationship between Economic Growth and profitability of insurance companies in Ethiopia.***

**Inflation**

Inflation is one of economic condition indicator which has impact on insurance profitability. When there is high inflation rates in the economy interest rate will be high and eventually results in high income (Perry, 1992).

Past studies indicate that countries with high inflation have underdeveloped financial systems and experience financial crises (Boyd, Levine, & Smith, 2001; Demirgüç-Kunt&Detragiache, 1998). Doumpos and Gaganis (2012) estimated the performance of non-life insurers and found that inflation influence the over performance of firms. Hoggrth, G, Milne, A., and Wood, G. (1998) state that unexpected increase in inflation cause cash flow difficulties for borrowers of the banks. Browne et al. (2001) identified important economics and market factors and insurer specific characteristics related to life insurer performance. In their paper, firm performance was negatively related to unanticipated inflation.

***Ho: There is no negative significant relationship between Inflation and profitability of insurance companies in Ethiopia.***

***H1: There is negative significant relationship between Inflation and profitability of insurance companies in Ethiopia.***

## 1.5. Significance of the study

This study is expected to provide empirical evidence on the profitability of selected insurance companies in Ethiopia. In addition to this, many stakeholders would benefit from the result of the study. These stakeholders are as follows:

- Management of insurances needs to know which indictors of success and failure to take the necessary actions to advance the performance insurance and to made correct course of action and decisions.
- Investors need to know such studies in order to safeguard their investment, and directing it to the best investment.
- Government need to know which companies operate effectively or unsuccessful to take the necessary measures to avoid crises of the insolvency in these companies.
- Customers need to know the ability of insurance companies to pay their duties based on the indicators of success of the companies.
- Policy makers need to know such studies in order to contribute incentives to insurance sector.

In addition to the above mentioned once, this study does have a contribution towards extending research in the area of factors affecting the profitability of insurance companies in Ethiopia. Moreover, the researcher thinks this study can potentially serve as a stepping stone for further research in the area.

### 1.6. Scope of the study

This study was delimited in its title to examination of the factors affecting the profitability of selected insurance companies in Ethiopia. In order to undertake this study, only nine insurance companies was use by the researcher. Namely: Ethiopian Insurance Corporation, Africa Insurance company S.C, Awash insurance company S.C, National Insurance Company of Ethiopia S.C, Nyala Insurance company S.C, Nile Insurance Company S.C, The United Insurance S.C, Global Insurance Company S.C and NIB insurance company. The study was limited to the following variables: age, size, leverage, firm growth, liquidity, tangibility of assets, economic growth rate, and inflation. For the analysis purpose the study took only ten years data starting from year 2004 – 2013.

### 1.7. Limitation of the study

The study on the factors affecting profitability of selected insurance companies in Ethiopia has the following major limitations. First, the researcher was planned to evaluate the profitability of insurance companies from year 2004 up to 2014, but some of the insurance companies financial statement of 2014 was not audited until the researcher collect the data that is why it is not possible to assess the basic determining factors of insurance profitability in year 2014. Second, since this study employed the quantitative research approach, the qualitative aspects of factors affecting the profitability of insurance companies were not included in the model. Third, the econometric model used in the study was not fully explained the variability in the determinants of insurances profitability. This shows that another explanatory variable which was not included in the model. This might fail to measure actual effect the internal and external determinants on the profitability of insurance companies.

### 1.8. Organization of the research paper

This research report is organized in five chapters. Chapter one provides the background of the study, statement of the problem, research objectives, literature driven hypothesis, scope, limitation and organization of the paper. Chapter two presents the most significant theoretical and empirical studies including Ethiopian insurance business environment. Chapter three presents the research methodology as well as model specification. Chapter four presents the results and discussions and chapter five presents the conclusions, possible recommendations and implications of the results.

# CHAPTER-TWO

# LITERATURE REVIEW

This chapterdeals with theoretical literatures as well as empirical literatures relating to the topic and the chapter is divided in to the following sections. First, this chapter explains the theoretical frame works that are helpful in assessing the factors affecting the profitability of insurance companies was discusses. Next, the empirical review was discusses. Finally, knowledge gap and conceptual frame work was conducted.

## 2.1. Theoretical literature reviews

This part of literature review provides with the topic related the factors affecting the profitability of insurance companies. First, it provides an overview of Ethiopian insurance industry. Second, it provides some explanations about the role of insurance in economic growth and development. Third, it explains about concept of profitability. Fourth, it clarifies about quantitative framework for measuring profitability. Finally, it provides the determinants of profitability.

### 2.1.1. An overview of Ethiopian insurance industry

The Bank of Abysinia (Habesha Bank) started rendering what could be called modern insurance service for the first time in Ethiopia in 1905 as an agent for a foreign insurance company. Mr. Muzinger, an Austrian citizen, opened a full-fledged insurance branch in Addis Ababa as an agent for Balois Fire Insurance Company. Many representative offices were opened by expatriates until the Italian invasion in 1936. During the Italian occupation only Italian companies were allowed to operate in Addis Ababa and other central regions of the country and in Eritrea. After World War II several British and other overseas companies provided insurance service until 1950. In 1951, the Imperial Insurance Company was established by some enlightened Ethiopians(Fasil and Merhatbeb, 2009).

According to Hailu Zeleke (2007), in 19970 the first significant event that the Ethiopian insurance market observation was the issuance of proclamation No. 281/1970 and this proclamation was issued to provide for the control & regulation of insurance business in Ethiopia. Consequently, it created an insurance council and an insurance controller's office, its strange impact in the sector. The controller of insurance licensed 15 domestic insurance companies, 36 agents, 7 brokers, 3 actuaries & 11 assessors in accordance with the provisions of the proclamation immediately in the year after the issuance of the law.

Further, as per the Fasil and Merhatbeb, (2009), the following year two insurance companies were closed and only 13 remained; but these 13 lasted until 1974, when the Dergue Regime came to power. On January 1, 1975 all these 13 insurance companies were nationalized in accordance with the proclamation of the provisional military government. The Government merged the 13 companies and, by proclamation 26/ 1975, established the Ethiopian Insurance Corporation as a monopoly in insurance business. The Ethiopian Insurance Corporation functioned as a monopoly for nearly two decades until 1994. Following the 1974 Revolution, on January 1, 1975 all private banks and 13 insurance companies were nationalized and along with state owned banks, placed under the coordination, supervision and control of the National Bank of Ethiopia. The Ethiopian Insurance Corporation was formed by a merger of 13 insurance companies.

Thus, from 1975 to 1994 there were four state owned banks and one state owned insurance company, i.e., the National Bank of Ethiopia (Central Bank), the Commercial Bank of Ethiopia, the Housing and Savings Bank, the Development Bank of Ethiopia and the Ethiopian Insurance Corporation. After the change in the political environment in 1991, the proclamation for the licensing and supervision of insurance business indicated the beginning of a new era. Immediately after the enactment of the Proclamation No. 86/1994, private insurance Companies began to flourish (Fasil and Merhatbeb, 2009).

### 2.1.2. The role of insurance in economic growth and development.

Insurance is an important growing part of the financial sector in virtually all the developed and developing countries (Das et al., 2003). A strong and well regulated insurance industry can significantly contribute to economic growth and efficient resource allocation through transfer of risk and mobilization of savings. In addition, it can enhance financial system efficiency by reducing transaction costs, creating liquidity and facilitating economies of scale in investment. (Bodla et al., 2003).

Ward and Zurbruegg (2000) examine the casual relationship between growth in the insurance industry and economic development by recognizing that the economic benefits of insurance are conditioned by national regulations, economic systems and culture. Further, Ward and Zurbruegg (2000) argue that an examination of the interrelationship between insurance and economic growth needs to be conducted on a country-by-country basis. The study is important because in contrast to the available evidence on the importance of banks-typified by the work of Levine and Zervos (1998) little is known about Insurance.

Patrick, (1966) discusses that economic growth can be either supply-led through growth in financial development or alternatively financial development can be demand-led through growth in the economy. Whereas several studies establish that financial development is an important determinant of countries' economic growth, the aspect of understanding the casual relationship between insurance market growth and economic development is still lacking. Researchers (See for example Arestis and Demetriades (1997), Demetriades and Hussain, (1996), and Pesaran et al., (2002) have pointed out that it is important to accommodate the casual relationships to differences in size and direction across countries. The issue of "heterogeneity" is crucial in gauging the role of insurance in the economy across different countries.

Similarly Outreville (1990) investigated the economic significance of insurance in developing countries. He compares 45 developed and developing countries and concludes that there is a positive but non-linear relationship between general insurance premiums per capita and GDP per capita.

Although there is no doubt a positive link between insurance and economic growth, the direction of causation between the two is unclear. Research by Ward and Zurbruegg (2000) suggest that in some countries, the insurance industry plays a key role in economic growth.

From the demand perspective, Beenstock, et al., (1986) and Browne and Kim (1993) found that the role of the state in providing insurance services is a determinant of the demand for life insurance, because the level of education and the age dependency ratio are likely to differ across countries. According to Hofstede (1995) the level of insurance within an economy will depend on the national culture and the willingness of individuals to use insurance contracts as a means of dealing with risk.

Fukuyama (1995) confirms that the finding of heterogeneity is likely to be conditional on the culture context of a given economy. Insurance will offer important economic benefits when the activities are generally seen as risky and risks are optimally managed through insurance contracts rather than by other risk transfer mechanisms. In this context, Fukuyama connects these cultural differences with the level of trust in the economy.

Webb (2000) investigated the mechanism by which insurance and banking jointly stimulate economic growth. The above author adding banking and insurance to existing models asked whether it might explain economic growth. The more developed and efficient a country's financial market the greater will be its contribution to economic prosperity. Skipper (2000) argues for insurance as simple pass through mechanism for diversifying risks and indemnification. He highlights insurance as a fundamental contributor of prosperity and greater economic opportunities.

While the role of insurance as contributor to the process of economic development has not been properly appreciated and examined in economic literature. Among Indian authors Shrivastava and Shrivastava (2002) hold the view that there is shortage of material inter linkage between economic development on one hand and insurance services on the other, whereas role played by other services like banking, transport, communication, public administration, defense etc. in accelerating the national income of an economy has been properly highlighted.

Michael Koller (2011) in his investigationidentified that insurance companies are playing the role of transferring risk channeling funds from one unit to the other (financial intermediation) such as general insurance companies and life insurance companies respectively. This implies that insurance companies are assisting the economy of a country one way by transferring and sharing of risk which can create confidence over the occurrences of uncertain event and in another way insurance companies like other financial institutions plays the role of financial intermediation so as to channel financial resources from one to the other.

Therefore, insurance companies divided in to two broad categories based on their role to the economy; the general insurance companies and life insurance companies. For instance, Renbao Chen et.al (2004) summarized firm specific factors affecting property/liability which is general insurers and life/health insurance profitability separately that again provide valuable guidelines for insurers financial health. This is because life/health insurance companies are different from property/liability insurers in terms of operation, investment activities, vulnerability and duration of liabilities. Life insurers are said to function as financial intermediaries while general insurers function as risk takers Renbao Chen et..al (2004).

To understand the relationship between the two it is necessary to have clear concept of insurance and more importantly the economic development, as the latter has undergone a paradigm shift. The definition of insurance, however, has been same without any ambiguity and difference of opinion. Insurance may be defined as a contract between insurer and insured under which insurer indemnifies the loss of the insured against the identified perils for which mutually agreed upon premium has been paid by the insured. The contract lays down the time framework within which the losses will be met by the insurer.

### 2.1.3. Concept of profitability

The term profit can take either its economic meaning or accounting concept which shows the excess of income over expenditure viewed during a specified period of time. On one hand, profit is one of the main reasons for the continued existence of every business organization.

On the other hand, profit is expected so as to meet the required return by owners and other outsiders. John J. Hampton (2009) clarified profitability ratio as a class of financial metrics that are used to assess a business's ability to generate earnings as compared to its expenses and other relevant costs incurred during a specific period of time. Accordingly, the term profitability' is a relative measure where profit is expressed as a ratio, generally as a percentage. Profitability shows the relationship of the absolute amount of profit with various other factors. Similarly, Michael Koller (2011) argued that profitability is the most important and reliable indicator as it gives a broad indicator of the ability of an insurance company to raise its income level. In practice, executives define profits as the difference between total earnings from all earning assets and total expenditure on managing entire asset -liabilities portfolio Kaur and Kapoor, (2007).

### 2.1.4. Quantitative framework for measuring profitability

According to Hamdan Ahmed Ali Al-Shami (2008) there are different ways to measure profitability such as: ROA, return on equity (ROE) and return on invested capital (ROIC). ROA is an indicator of how profitable a company is relative to its total assets. It gives us an idea as to how efficient management is in using its assets to generate earnings whereas ROE measures a company's profitability which reveals how much profit a company generates with the money shareholders have invested. ROIC is a measure used to asses a company's efficiency in allocating the capital under its control in profitable investments. This measure gives a sense of how well a company is in using its money to generate returns. Comparing a company's ROIC with its weighted average cost of capital (WACC) reveals whether invested capital is used efficiently or not. In contrast, William H. Greene and Dam Segal (2004) argued that the performance of insurance companies in financial terms is normally expressed in net premium earned, profitability from underwriting activities, annual turnover, return on investment, return on equity. These measures could be classified as profit performance measures and investment performance measures. However, most researchers in the field of insurance and their profitability stated that the key indicator of a firms profitability is ROA defined as the before tax profits divided by total assets. Philip Hardwick and Mike Adams (1999), Hafiz Malik (2011) are among others, who have suggested that although there are different ways to measure profitability it is better to use ROA. However,ROE does not consider the higher risk that is associated with a high leverage.

The difference of profit among insurance companies over the years in a given country would result to suggest that internal factors or firm specific factors and macroeconomic factors play a crucial role in influencing their profitability. It is therefore vital to identify what are these factors as it can help insurance companies to take action on what will increase their profitability and investors to forecast the profitability of insurance companies in Ethiopia. To do so, it is better to see what factors were considered in previous times by different individuals. The following points are some of the work of others among many others.

### 2.1.5. Determinants of profitability

**Specific Factors**

**Size**

In most literatures the effect of size on insurance profitability are represented by total asset.The empirical evidences of the linkage between profitability and size are somewhat inconsistent. An insurer's size has been found to share a relationship with insurer profitability. Cummins and Nini (2002) found that larger firms are more cost and revenue efficient, and which implies that larger firms may experience greater premium growth. Philip Hardwick and Mike Adams (1999) from UK companies suggest that there is a reverse relation between profitability and firm size. Similarly, the research conducted on the relationship between firm characteristics including size, age, location, industry group, profitability and growth by Swiss Re (2008) indicated that larger firms are found to grow faster than smaller and younger firms found to grow faster than older firms.Hafiz Malik (2011) in his Pakistan study found that there is significantly positive association between age & size of the company and profitability. IndranarainRamlall (2009) indicated that size is used to capture the fact that larger banks are better placed than smaller banks in harnessing economies of scale in transactions and enjoy a higher level of profits.One of the most important questions underlying bank policy is which size optimizes bank profitability. According to Athanasoglou*et al.*, (2005) the effect of a growing size of a bank on profitability has been proved to be positive to a certain extent. Earlier research papers such as Sharma and Kesner, (2006) and Mitchell, (2004) strongly support the effect of firm size on business survival and variance in operating performance. They argue that firm size is a basis of competitive advantage in the sense that larger companies tend to be more efficient than their smaller counterparts and have better resources to survive economic downturns.

**Age**

Newly established firms are not particularly profitable in their first years of operation, as they place greater emphasis on increasing their market share, rather than on improving profitability (Athanasoglou*et al.*, 2005). Jay Angoff Roger Brown (2007) found that there is a positive and significant relationship between the age of a company and its profitability. Dietrich. A.and G. Wanzenried (2009) indicates that older firms expected to be more profitable due to their longer tradition and the fact that they could build up a good reputation. Study of Vigaykumar and Kadirvelu (2004), age of firm is an important determinant of insurance profitability.

**Leverage**

Profitable firms should prefer debt financing to get benefit from tax shield. In contrast to this pecking order theory of capital structure is designed to minimize the inefficiencies in the firms' investment decisions. Due to asymmetric information cost, firms choose internal finance to external finance and, when outside financing is necessary, firms choose debt to equity because of the lower information costs. The pecking order theory states that there is no optimal capital structure since debt ratio occurs as a result of cumulative external financing requirements. Insurance leverage could be defined as reserves to surplus or debt to equity. The risk of an insurer may increase when it increases its leverage. Literatures in capital structure approve that a firm's value will increase up to optimum point as leverage increases and then declines if leverage is further increased beyond that optimum level. For instance Renbao Chen and Kie Ann Wong (2004), in Canada, Hamadan Ahamed Ali Al-Shami (2008) in UAE, Hifza Malik (2011) in Pakistan, SylwesterKozak (2011) in UK Swiss Re (2008) in Egypt and Flaminiet..al (2009) in Sub-Saharan countries found that negative but statistically significant relationship between leverage and profitability of firms. Harrington (2005) stated that the relationship between leverage and profitability has been studied extensively to support the theories of capital structure and argued also that insurance companies with lower leverage will generally report higher ROA, but lower ROE. Since an analysis for ROE pays no attention to the risk associated with high leverage

### Liquidity

Liquidity from the perspective of insurance companies is the probability of an insurer to pay liabilities which include operating expenses and payments for losses/benefits under insurance policies, when due then shows us that more current assets are held and idle if the ratio becomes more which could be invested in profitable investments. For an insurer, cash flow (mainly premium and investment income) and liquidation of assets are the main sources of liquidity Renbao Chen and Kie Ann Wong (2004). Empirical evidences with regard to liquidity had shown almost inconsistent results. For example, Chen and Wong (2004) examined that, liquidity is the important determinants of financial health of insurance companies with a negative relationship. Similarly, Hakim and Neaime (2005) observed that liquidity, current capital and investment are the important determinants of banks profitability. ValentinaFlamini, Calvin McDonald, and Liliana Schumacher (2009) in their investigation regarding Sub-Saharan countries found significant and negative relationship between bank profitability and liquidity. In contrast, research by Naveed Ahmed et.al. (2011) examined that, ROA has statistically insignificant relationship with liquidity. However, according to the theory of agency costs, high liquidity of assets could increase agency costs for owners because managers might take advantage of the benefits of liquid assets (Adams and Buckle, 2000).

### Firm growth

Growth as measured by the percentage change in total assets or sometimes percentage change in premiums of insurance companies is expected to positively related with profitability of insurance companies in Ethiopia. Insurance companies having more and more assets over the years have also better chance of being profitable for the reason that they do have internal ability though it depends on their ability to exploit external opportunities. Empirical evidence by Naveed Ahmed et al (2011) in Pakistan, Yuqi Li (2007) in UK and Hamadin Ahmed Ali Al-Shami (2008) in UAE of their investigation found a positive and statistically significant relationship between growth and profitability of insurance companies.

## Tangibility of Assets

Tangibility of assets in most studies is measured by the ratio of fixed assets to total assets. A firm with large amount of fixed asset tends to be more profitable because of increasing its future assets value. A recent study by Naveed, Zulfqar& Ahmad (2011) investigates the impact of firm level characteristics on performance public hospitals in India over the period of seven years. For this purpose, size, profitability, age, risk, growth and tangibility were selected as explanatory variables while ROA is taken as dependent variable. The results of OLS regression analysis revealed that leverage, size and risk are most important determinant of performance of a firm whereas ROA has statistically more of insignificant relationship with, tangibility of assets. However, Hafiz (2011) found that there exists a positive and significant relationship between tangibility of assets and profitability and argued that the highest the level of fixed assets formation, the older and larger the firm is.

## Macroeconomic factors

### Inflation

Inflation is one of economic condition indicator which has impact on insurance profitability. When there is high inflation rates in the economy interest rate will be high and eventually results in high income (Perry, 1992).Doumpos and Gaganis (2012) estimated the performance of non-life insurers and found that inflation influence the over performance of firms. . Browne et al. (2001) identified important economics and market factors and insurer specific characteristics related to life insurer performance. In their paper, firm performance was positively related to firm size, liquidity, bond portfolio returns, whereas negatively related to unanticipated inflation. Chen and Huang (2001) confirmed that a relationship exists among macroeconomic factors and premium receipt in the life insurance industry.

### Economic Growth rate

the growth of real GDP, it is a macroeconomic variable, and it is expected to have a positive influence on the insurers' financial performance, since economic growth improves the living standards and the levels of income, increasing the purchasing power of population.Doumpos and Gaganis (2012) estimated the performance of non-life insurers and found that macroeconomic indicators such as gross domestic product (GDP) influence the over performance of firms.

Grace and Hotchkiss (1995) documented a link between insurance industry performance and long-run general economic conditions using co-integration technique. They also show that real GDP is negatively related to premium and interest rates have reverse effects on the underwriting profits. The GDP per capita growth is expect to have a positive impact on banks' performance, according to the well-documented literature on the association between economic growth and financial sector performance. An important finding of the study is that the economic growth positively and significantly affects bank profits Athanasoglou (2005).

**2.2. Review of related empirical studies**

Chen and Wong (2004) analyzed the solvency of general and life insurance companies in Asia using firm data and macro data separately. It used different classification methods to classify the financial status of both the general and the life insurance companies. The research revealed that except Japan, failures of insurers' in Singapore, Malaysia and Taiwan are non-existent. The paper found that the factors which significantly affect general insurers' financial health in Asian economies are firm size, investment performance, liquidity ratio, surplus growth, combined ratio and operating margin. Similarly, the factors that significantly affect life insurers' financial health are firm size, change in asset mix, investment performance, and change in product mix but the last three factors are more applicable to Japan. The research indicated that the financial health of a Singapore insurer seems to be significantly weakened by the Asian financial crisis as the insurance industry in different Asian economies is at different stages of development. They require different regulatory guidelines.

Ahmed et al., (2011) examined the impact of firm level characteristics on the performance of the life insurance sector of Pakistan over the period of seven years from 2001 to 2007. The results of the OLS regression analysis revealed that leverage is negatively and significantly related to the performance of life insurance companies. Growth of written premium and age of a firm has also negative relation to performance of life insurance companies but they are statistically insignificant. The study also showed that firm size is positively and significantly related to the performance of insurance companies. This indicates that performance of the large size firm is better than the small size firm. According to this study tangibility of assets and liquidity have also a positive relation to performance of insurance companies but they are statistically insignificant.

Ben (2003), investigated the impact of financial structure, banks characteristics and macroeconomic variables on banks profitability, using data from 1983 to 2000 period in Tunisian. The researcher found that banks with large capital and overheads are associated with high profitability. The findings of his study also reveal an inverse relationship between concentration, inflation, economic growth and bank profitability.

Pervan and Pavic (2010) and Curak et al (2011) made a study on the impacts of firm-specific, industry-specific and macroeconomic variables on the financial performance of the Croatian non-life and composite insurance companies respectively. The results of Pervan and Pavic revealed an inverse and significant influence of ownership, expense ratio and inflation on profitability. In lending support to the findings of Pervan and Pevic (2010), Curak et al (2011) indicated that size, underwriting risk, inflation and equity returns have significant association with composite insurer's financial performance.

Alpera and Anbar (2011) conducted an empirical study on bank specific and macroeconomic determinants of commercial bank in turkey over the time period from 2002 to 2010. Return on assets and return on equity were represented the profitability of banks as a function of bank specific and macroeconomic determinants. The study used balanced panel data. the finding show that asset size and non-interest income have a positive significant effect on bank profitability while size of credit portfolio and loans under follow- up have an adverse significant impact on bank profitability. From macroeconomic variables, only the real interest rate has effect on the performance of banks positively.

Hafiz Malik (2011) examined the determinants of Pakistan` s insurance companies profitability proxied by return on total assets. The variables tested in this paper were age of company, size of company, the volume of capital, leverage ratio and loss ratio. The result shows that there is no relationship between profitability and age of the company and there is a significant and positive relationship between profitability and size. On the other hand the analysis suggests that leverage ratio and loss ratio have a negative impact on profitability of insurance companies in Pakistan.

Charumathi, B. (2012) conducted the Determinants of Profitability of Indian Life Insurers over the period of three financial years from 2008 to 2011. The paper examinedfirm specific characteristics such as; leverage, size; premium growth, liquidity, underwriting risk and equity capital. Profitability of life insurers is positively and significantly influenced by the size regressed against Return on Assets. The results of the OLS regression analysis revealed that (as explained by logarithm of net premium) and liquidity. The leverage, premium growth and logarithm of equity capital have negatively and significantly influenced the profitability of Indian life insurers. The study does not find any evidence for the relationship between underwriting risk and profitability.

Chen-Ying Lee, (2009) investigated the relationship between firm specific factors and macroeconomics on profitability in Taiwanese property-liability insurance industry using the panel data over the1999 through 2009 time period. Using operating ratio and return on assets (ROA) for the two kinds of profitability indicators to measure insurers' profitability. The results show that underwriting risk, reinsurance usage, input cost, return on investment (ROI) and financial holding group have significant influence on profitability in both operating ratio and ROA models. The insurance subsidiaries of financial holding group compared with other insurance companies, showing lower profitability. In addition, economic growth rate has significant influence on profitability in operating ratio model but insignificant influence on profitability in ROA model. The findings contribute to insurance operation in the property-liability insurance industry and should be of interest to regulators, investors and policyholders.

Joseph Oscar, (2013) revealed the determinants of profitability in the life insurance industry of Ghana. The study also examines the relationship among the three measures of insurers' profitability, which are investment income, underwriting profit and the overall (total) net profit. The financial statements of ten (10) life insurance companies covering a period of eleven years (2000 to 2010) were sampled and analyzed through panel regression. The findings indicate that whereas gross written premiums have a positive relationship with insurers' sales profitability, its relationship with investment income is a negative one. Also, the results showed that life insurers have been incurring large underwriting losses due to overtrading and price undercutting.

Almajali*et al*. (2012) analyzed the insurance companies listed on the Amman Stock Exchange during 2002-2007, by applying tests and multiple regressions. Their study shows that, in terms of financial performance, liquidity, leverage, company size and management competence index have a statistical positive effect on insurers. In this context, their recommendations include increasing of assets' number and hiring competent managers.

Yuqi (2007) did a study on the determinants of Banks' Profitability and its Implication on Risk Management Practices in the UK. The study was carried out in Nottingham city and involved 3000 respondents selected from 43 commercial banks in the city. The researcher found that for firms that become extremely large, the effect of size could be negative due to bureaucratic and other reasons. The researcher also found that no significant relationship between tangibility of assets and profitability of banks. However, the researcher found a positive and statistically significant relationship between growth and profitability of banks.

Abera, A. (2012) studied an empirical study on the factors affecting profitability of Ethiopian banking industry. The study examined the impact of three type's determinants such as bank specific, industry – specific and macro- economic determinants effect on bank profitability. The study was done on total of eight commercial banks in Ethiopia by taking as sample, covering the period of 2000- 2011. The study employed a mixed methods research approach by combining quantitative and qualitative approach. The researcher found that capital strength, income diversification, bank size and gross domestic product have statically significant and positive relationship with commercial banks' profitability in Ethiopia. However, factors like operational efficiency and asset quality have a negative and statically significant relationship with commercial banks' profitability in Ethiopia. The researcher concluded that the relationship for liquidity risk, concentration and inflation with profitability of commercial banks was found to be statically insignificant.

Ayele, (2012) investigated factors affecting profitability of insurance companies in Ethiopia. Panel evidence was used by the researcher to undertake this study by the researcher. The paper examined the effects of firm specific factors (age of company, size of company, volume of capital, leverage ratio, liquidity ratio, growth and tangibility of assets) on profitability of insurances measured by return on assets.

According to the researcher, profitability was the dependent variable while age of company, size of company, volume of capital, leverage, liquidity, growth and tangibility of assets were independent variables. The research covers nine of the listed insurance companies for nine years (2003-2011). The results of regression analysis reveal that growth, leverage, volume of capital, size, and liquidity are identified as most important determinant factors of profitability hence growth, size, and volume of capita are positively related. In contrast, liquidity ratio and leverage ratio are negatively but significantly related with profitability. Lastly, age of company and tangibility of assets are not significantly related with profitability.

Liargovas& Skandalis, (2008) carried out an empirical study on analytical framework of profitability in the case of Greek industrial firms during the period 1997-2004. The research examined the impact of key determinants of firms' profitability. The study results showed that size, tangibility, growth, debt to equity ratio, size and the index for management competence significantly affect firm profitability in Greece.

Daniel Mehari and TilahunAemiro (2013) studied the impact of firm level characteristics (size, leverage, tangibility, Loss ratio (risk), growth in writing premium, liquidity and age) on performance of insurance companies in Ethiopia. Return on total assets (ROA) - a key indicator of insurance company's performance- is used as dependent variable while age of company, size of the company, growth in writing premium, liquidity, leverage and loss ratio are independent variables. The sample includes 9 insurance companies over the period 2005- 2010.The audited annual report (Balance sheet and Profit/Loss account) of insurance companies was obtained from National Bank of Ethiopia (NBE) and insurance companies' annual publication reports. The results of regression analysis reveal that insurers' size, tangibility and leverage are statistically significant and positively related with return on total asset; however, loss ratio (risk) is statistically significant and negatively related with ROA. Thus, insurers' size, Loss ratio (risk), tangibility and leverage are important determinants of performance of insurance companies in Ethiopia. But, growth in writing premium, insurers' age and liquidity have statistically insignificant relationship with ROA.

Shiu (2004) analyzed the determinants of the performance of the UK general insurance companies, over the period 1986–1999, by using three key indicators: investment yield, percentage change in shareholders' funds and return on shareholders' funds. Based on a panel data set, the author empirically tested 12 explanatory variables and showed that the performance of insurers have a positive correlation with the interest rate, return on equity, solvency margin and liquidity, and a negative correlation with inflation and reinsurance dependence.

Sambasivam and Ayele (2013) conducted the performance of insurance companies in Ethiopia by making nine of the listed insurance companies as a sample size for the period of nine years (2003- 2011). The researchers examined on this paper the effects of firm specific factors such as leverage ratio, liquidity ratio, age of the company, size of the company, volume of capital, growth and tangibility of assets on profitability represented by return on assets. Return on asset is dependent variable. Independent variables are leverage ratio, liquidity ratio, age of the company, size of the company, volume of capital, growth and tangibility of assets. Secondary data was obtained from the financial statement of individual insurance companies. The result of the study shows that growth, size, volume of capital are positively related to profitability of insurances while liquidity ratio and leverage ratio has negatively significant on profitability. But, the age of companies and tangibility of assets have no significant on profitability.

Maja P., Marijana C. (2010), revealed the factors that influenced insurance companies' profitability in the Bosnia and Herzegovina (B&H) during the period from 2005 to 2010. Furthermore, having in mind that researches of this kind were much less prevalent in developing than developed countries, additional intention was to provide further insight into the impact of different variables on insurers' performance in a developing country. Results of the conducted dynamic panel analysis revealed negative and significant influence of claims ratio on profitability; and significant positive influence of age, market share and past performance on current profitability. Additionally, foreign owned firms performed better than domestically owned, while the level of the insurers' diversification had no significant role in determining the profitability.

Guru, Staunton and Balashanmugam (2002), studied the determinants of bank performance using a sample of seventeen commercial banks from 1986-1995 time periods in Malaysia. They concluded that efficient expenses management is one of the most significant explanatory variables of high bank profitability. Also, inflation is found to relate positively with bank performance, while interest ratio have a negative relationship with bank performance. They also suggest that banks usually transfer their overheads to depositors in terms of lower deposit rates and to borrowers in terms of high lending rates.

Birhanu T. (2012) made a study on the effect of bank-specific, industry specific and macroeconomic determinants of Ethiopian commercial banking industry profitability from the period 2000 – 2011. Ordinary Least Square (OLS) estimation method was applied by this study to measure the effects of internal and external determinants on profitability in terms of average return on asset and net interest margin. The estimation results show that profitability persists in some extent, implies that the indicator of the existence of relatively fairly competitive market in Ethiopian commercial banking environment, especially competition between private banks. Regarding the explanatory variables, all bank-specific determinants, with the exception of bank size, expense management and credit risk, affect bank profitability significantly and positively in the anticipated way. However, bank size, expense management and credit risk affect the commercial banks profitability significantly and negatively. In addition to this, no evidence is found in support of the presence of market concentration. Finally, from macroeconomic determinants GDP has positive and significant effect on both asset return and interest margin of the bank. But interest rate policy has significant and positive effect only on interest margin.

Adams and Buckle (2003) argued that highly geared and low liquid Bermuda insurers perform better and that their underwriting risk is directly related to a resilient financial performance. Thisseems to suggest that actuarial risk and operational risks are properly managed by Bermudainsurers. Adams and Buckle further posited that insurers' size and scope of business do not havesignificant influence on financial performance. The findings of Adams and Buckle about the Bermuda market confirm the results of an earlier study by Adams (1996) about the New Zealandinsurance market. Specifically, Adams (1996) found that firm-specific factors such as leverageand underwriting risk were positive and significantly related to investment earnings of lifeinsurers.

Curak et.al.. (2011) considered both firm- specific (internal) and macroeconomic (external) characteristics that influenced on Croatian composite insurance companies. The results of the panel data analysis indicated that size, underwriting risk, inflation and equity returns had significant impact on the insurer's ROA as profitability measure.

Kozak (2011) analyzed the determinants of the profitability of 25 general insurance companies from Poland during 2002–2009. By applying a regression model, the author notices that the reduction of motor insurance and simultaneously the increase of other classes of insurance, growth of gross written premiums, operating costs reduction, GDP growth and growth of the market share of the companies with foreign ownership have a positive impact on insurance companies during the period of integration. In contrast, providing a wide range of insurance classes affects negatively the profitability and the expenses efficiency.

**2.3. Research gap**

Research works has been taken place in the area of insurance profitability and its determinant by considering the importance of the area at international level. They verified that there is a direct association between profitability of insurance industries and its determinants such as (Hafiz Malik 2011, SylwesterKozak 2011, Hamadan Ahamed Ali Al-Shami 2008, Naveed Ahmed, Zulfqar Ahmed, Desheng Wu Z., Sandra V. &Lianga 2007, Swiss Re 2008, Wright, K. M. 1992, Ahmad Usman 2011, Adams M., Hardwick P. and Zou H., 2008, Ayele 2012, Daniel Mehari and TilahunAemiro 2013). Even though, all these researchers conducted study on this area, the determinants of profitability have been argued for many years and still unsolved issues in the corporate finance literature. Indeed what makes the profit determinants debate exciting is the determinant of profit is dynamic through time to time and differ with the nature of operating of the firm from place to place (Flamini et al., 2009).

In line with the above theoretical as well as empirical review, it revealed that insurance profitability can be affected by different factors such as insurance specific and macroeconomic factors. There is inconsistency in some determinants of profitability of the insurance sector because countries unique each other by their economic systems, financial systems, political systems and operating environments.

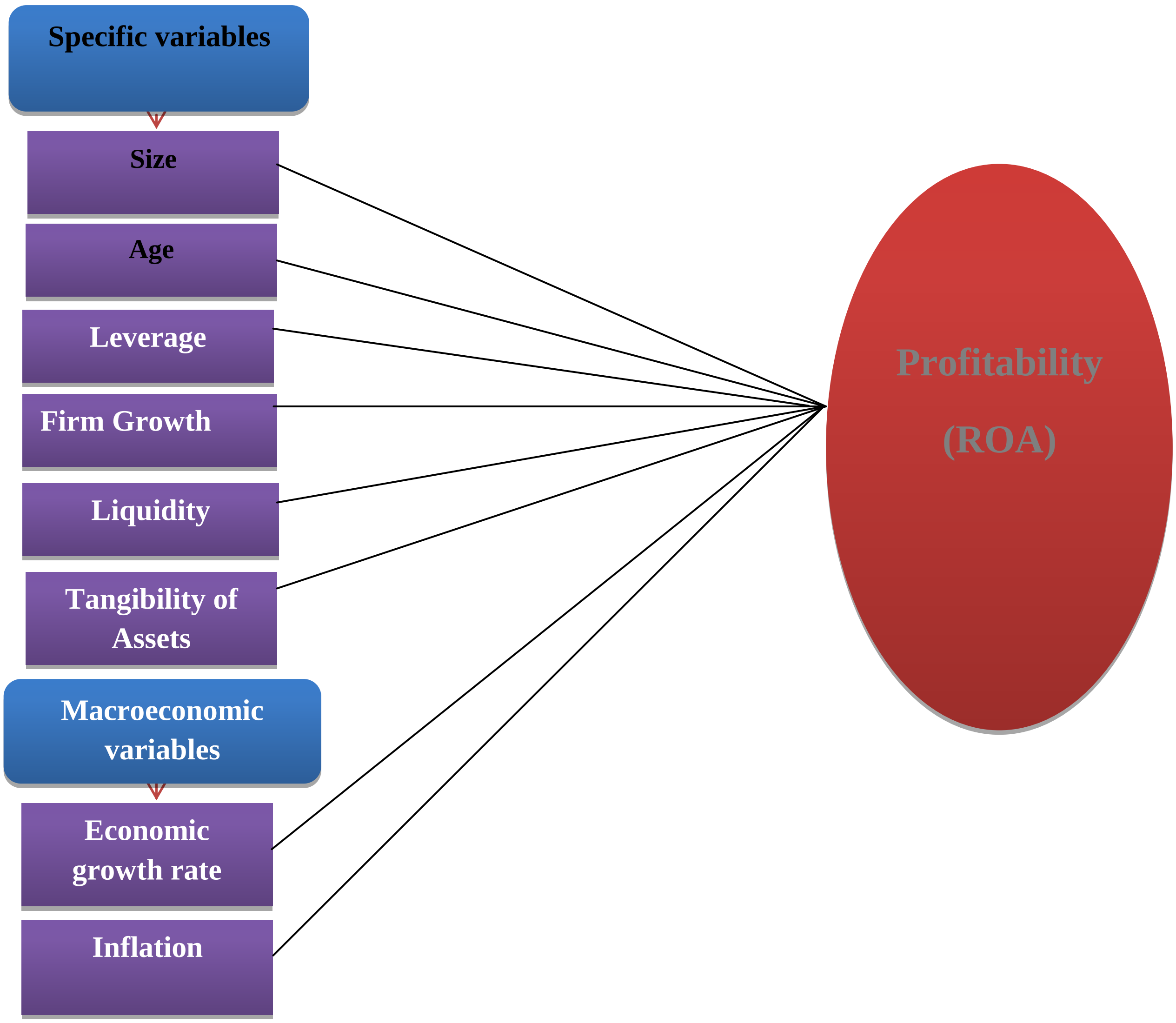
Although, numbers of earlier studies have made to add their own contribution to the theory of profitability and stated their own policy implication, they were inclined towards to the developed economy, and less developed countries. Consequently the conclusion and finding of the study in one country may not serve to another. Specifically in Ethiopia the insurance industry is unstudied area, however, few studies have been conducted on financial performance of Ethiopian insurance companies. For instance, study conducted on Factors Affecting Profitability of Insurance Companies in Ethiopia (Ayele, 2012) and firm specific factors that determine insurance companies performance in Ethiopia (Daniel Mehari and TilahunAemiro, 2013) indicated that, even if, the numbers of insurance in the industry are increased and the performance progress of the sector is better than the past. However, Ethiopia's financial sector remains closed and are much less developed than its neighbors.

Even though, the above studies conducted on this area, the researchers not included external variables. As a result, this area is not effectively studied because; these variables are the most important factors to determine the profitability of the insurance companies. Therefore, the intention of the researcher is to examine the main determinants of Ethiopian insurance industry profitability during the period of 2004-2013 by adding macroeconomic variables and other determinants of profitability which are not included in previous study.

**2.4. Conceptual frame work**

Theoretically, factors affecting the profitability insurance companies are divided in to two. These are specific variables and macroeconomic variables.

**Independent VariablesDependent Variable**

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# CHAPTER-THREE

# METHODOLOGY

The chapter three of this study describes the methodology employed in conducting the research on the factors affecting the profitability insurance companies of Ethiopia. It includes research design, data type and source, sampling technique, data analysis and presentation, model specification, and variables measurement.

## 3.1. Research design

Brian van Wyk, (2013) recommends that explanatory type research design for researches that study "identify any causal links between the factors or variables that pertain to the research problem". Since this study aimed to assess the factors affecting profitability insurance companies, by evaluating the relationship among different variables, the researcher chosen to use an explanatory study as suggested by above scholar.

## 3.2. Data type and source

This studywas employed quantitative data type such as annual audited financial statements and annual reports/publications. To collect the necessary data for this particular study, secondary data were used. The specific variables of the study were driven from the annual reports of the selected insurance companies of Ethiopia. Macroeconomic determinants of insurance companies of Ethiopia data has been obtained from National Bank of Ethiopia (NBE), which regulates the insurance sector of the country and from ministry of finance and economic development (MoFED) which regulates the macroeconomic issues of the country.

## 3.3. Sampling and Sampling technique

Target population of the study was all public and private insurance companies of Ethiopia. According to the report of the National Bank of Ethiopia (2014/15), there are seventeen insurance companies in the year 2014/2015. Purposive sampling was used in this study to select the nine insurance companies (such as Ethiopian Insurance Corporation, Africa Insurance company S.C, Awash insurance company S.C, National Insurance Company of Ethiopia S.C, Nyala Insurance company S.C, Nile Insurance Company S.C, The United Insurance S.C, Global

Insurance Company S.C and NIB insurance company) based on age criteria, which means that all insurance companies that have been operated for the last ten years in the Ethiopian insurance industry included in the sample unit of the study.The study was cover for sample period of ten years (2004- 2013).

### 3.4. Method of data analysis and presentation

Analysis of data was undertaken to describe data nature, important relationships between variables, impacting of independent variables on dependent variable and draw inferences from the data in the study. Data analysis was undertaken to show the important relationship of variable in the study. Data analysis was based on descriptive analysis, correlation analysis and regression analysis.

The descriptive statistics explores and present an overview of all variables used in the analysis. Mean, minimum, maximum and standard deviation value was used to analyze the general trends of the data from 2004 to 2013 for the variables which included in the study.

The correlation analysis shows how variables are related with each other. The results of this analysis represent the nature, direction and significant of the correlation of the variables considered under this study. The correlation analysis primary objective is to measure the degree of linear association between two variables and their correlation coefficient indicates the strength of association between variables (Gujarati, 2004).

The regression analysis was used by the researcher to examine the relationship between the profitability of selected Ethiopian insurance companies and explanatory variable such as size, age, leverage, firm growth,liquidity, tangibility of assets, economic growth rate, and inflation.

The balanced panel data of nine insurance companies in Ethiopia operating over the last ten years was used for running the regression equation. Panel data is selected by the researcher in order to meet the research objectives as it best fits better than the single time series or cross-sectional alone. Brookes (2008) in his book clearly presents the advantage of using panel data in the following way.

First, and perhaps most importantly, the researcher can address a broader range of issues and tackle more complex problems with panel data than would be possible with pure time-series or pure cross sectional data alone.

Second, it is often of interest to examine how variables, or the relationships between them, change dynamically (over time). To do this using pure time-series data would often require a long run of data simply to get a sufficient number of observations to be able to conduct any meaningful hypothesis tests. But by combining cross-sectional and time series data, one can increase the number of degrees of freedom, and thus the power of the test, by employing information on the dynamic behavior of a large number of entities at the same time. The additional variation introduced by combining the data in this way can also help to mitigate problems of multi-collinearity that may arise if time series are modeled individually. Third, structuring the model in an appropriate way, we can remove the impact of certain forms of omitted variables bias in regression results.

E-views programmed software package was used in the analysis of the data. The output generated by this software was presented by different tools.

### 3.5. Model specification

To achieve the aim of the study, the researcher use multiple linear regression model and ordinary least square (OLS) estimation method. Multiple regression analysis was run by the researcher to identify the independent variables that have impact on the profitability insurance companies of Ethiopia.

Based on the hypothesis stated in the study, the researcher first estimated the statistical model (equation 1 below) was derived based on existing study conducted in different areas such as Ayele, (2012), Daniel and Tilahun, (2013), Hafiz Malik, (2011), SylwesterKozak, (2011),Chen and Wong, (2004) and Ahmed et al. (2011).

The econometric model (equation 2 below) was estimated in the study in the following procedures;

$$\mathbf{ROA_{i,t} = \alpha + \sum \beta_j X_{ji,t} + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)}$$

Where $ROA_{i,t}$ is the return on total assets of insurances i for period t; α is the regression constant; $X_{ji,t}$ denotes insurances determinants ; $\varepsilon_{i,t}$ the disturbance term.

Talking all explanatory variables in to consideration, the extended equation to reflect the variables is formulated as follows:

$$ROA_{i,t} = \alpha + \beta_0 SZ_{i,t} + \beta_1 AG_{i,t} + \beta_3 LV_{i,t} + \beta_4 FG_{i,t} + \beta_5 LQ_{i,t} + \beta_6 TA_{i,t} + \beta_7 EGR_{i,t} + \beta_8 IF_{i,t} + \varepsilon_{i,t} \quad \ldots\ldots (2)$$

Where:

1. $ROA_{i,t}$ is the profitability in insurance company i at time t (dependent variable) in this study measured by return on assets to evaluate insurances profitability.
2. $\alpha$ is constant of the regression
3. SZ; size
4. AG; age
5. LV; leverage
6. TA; tangibility of assets
7. FG; firm growth
8. LQ ;liquidity
9. EGR; economic growth rate
10. IF; inflation
11. $\beta_0 \ldots\ldots \beta_8$ ; coefficient of independent variable
12. $\varepsilon$ is the error term
13. i is insurance companies

### 3.6. Variables measurement and sources

**Table.3.1. Summary of the variables with their notations, measurementand sources.**

| Category of the variables | | Name of the variables | Notation | Measurement | Sources |
|---|---|---|---|---|---|
| **Dependent variable** | | Return on assets | ROA | Profit before tax/ total assets | Hafiz M. (2011) and Ayele (2012) |
| **Independent variables** | **specific variables** | Size | SZ | Natural logarithm of total assets | Daniel &Tilahun, (2013) and Chen-Ying Lee(2009) |
| | | Age | AG | The difference between Establishment year and observation year | Ayele (2012),Daniel &Tilahun, (2013) and Hafiz M. (2011) |
| | | Leverage | LV | Total liability/book value of equity | Ayele (2012)and Swiss Re (2008) |
| | | Firm growth | FG | (Assets of current year – Assets of prior year) ÷ (Assets of prior year) | Chen-Ying Lee, (2009)and Hamadin Ahmed Ali Al-Shami (2008) |
| | | Liquidity | LQ | Total current assets/ total current liabilities | Daniel &Tilahun, (2013), Chen and Wong (2004) and Ayele (2012) |
| | | Tangibility of assets | TA | Fixed assets/Total assets | Daniel &Tilahun, (2013), Ayele (2012) andNaveed Ahmed et.al... (2011) |
| | **Macroeconomic variables** | Economic growth rate | EGR | Real GDP growth | Grace & Hotchkiss, (1995)and Doumpos&Gaganis (2012) |
| | | Inflation | IF | Inflation rate | Doumpos&Gaganis (2012) and Browne et al. (2001) |

# CHAPTER - FOUR
# DATA ANALYSIS AND DISCUSSION

| Variables | Mean | Maximum | Minimum | Standard deviation | Observations |
|---|---|---|---|---|---|

The main purpose of this study was to examine the factors affecting profitability of selectedinsurance companies in Ethiopia. To meet objective of the study and to test hypothesis stated in the study, the researcher obtained necessary quantitative data like financial statements of selected insurance companies and annual reports on macroeconomic variables from National bank of Ethiopia and ministry of finance and economic development through secondary sources. This chapter has four sections. Under the first section (section 4.1.) the descriptive statistics of the dependent and independent variables were presented followed by correlation analysis under section 4.2. Section 4.3 presents the test for the classical liner regression model/CLRM assumption. Finally, the multiple regression was run and its outputs were discussed under section 4.4.

## 4.1. Descriptive statistics analysis and its discussion

The descriptive statistics (such as mean of distribution, minimum/ maximum of the range of distribution, and standard deviation of the distribution) were employed to explore and present an overview of all variables (such as dependent variable (ROA) and independent variables (size, age, leverage, firm growth, liquidity, tangibility of assets, economic growth rate and inflation) used in the study. Table 4.1 bellow presents the descriptive statistics of the dependent and independent variables.

**Table 4.1 Descriptive Statistics of Variables**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Dependent** | **ROA** | 0.068517 | 0.174276 | -0.047560 | 0.044649 | 90 |
| **Insurance specific variables** | **SZ** | 8.259392 | 9.420288 | 7.177396 | 0.474028 | 90 |
| | **AG** | 15.83333 | 39.00000 | 12.00000 | 7.630880 | 90 |
| | **LV** | 1.877564 | 5.937539 | 0.502881 | 0.745259 | 90 |
| | **FG** | 0.208571 | 0.670072 | -0.133524 | 0.160001 | 90 |
| | **LQ** | 1.119691 | 2.604086 | 0.548463 | 0.300973 | 90 |
| | **TA** | 0.166902 | 0.541653 | 0.015549 | 0.109427 | 90 |
| **Macroeconomic variables** | **EGR** | 0.109100 | 0.126000 | 0.088000 | 0.011130 | 90 |
| | **IF** | 0.170000 | 0.364000 | 0.028000 | 0.110528 | 90 |

***Source: Output of Eview6***

Table 4.1 shows the descriptive statistical results of corresponding 90 total observations of each variable in the study. It also describes the overall nature of variables employed in the study and their interpretations were discussed as follow;

**Descriptive statistics result interpretation for dependent variable**

The mean distribution of the dependent variable (ROA) of the study is 0.068517, which indicates that the balancing point of ROA distribution for the last ten years. The maximum return on assets earned over the last ten years is 0.174276, which indicates that the most profitable insurance company has earned almost 17.42 cents of net income for each birr invested in the total assets of insurance company and the minimum return on assets earned is -0.047560, which shows that the maximum loss incurred by one of the sample insurance companies are a loss of 4.75 cents on each birr of investment.

The standard deviation statistics for ROA was 0.044649, which indicates that how individual values of ROA in a data set vary from the mean of ROA over the last ten years. This figure also indicates that insurance's profitability variation around its mean among insurance companies was very small as compared to the dispersion of insurance age data set over its mean value. The result implies that insurance companies have to optimize the utilization of their total assets to increase the return on their assets because the volatility of returns over past periods was very small.

**Descriptive statistics result interpretation for independent variables**

On average, the insurance size value was 8.259392, which is the center of the distribution of insurance size value among selected insurance companies over last ten years. The maximum value of insurance size distribution was 9.420288. Whereas, the minimum value of insurance size was 7.177396. The standard deviation of insurances size was 0.474028. It indicates that the insurance size has great dispersion around the mean. And it also shows that the existence of relatively higher variation of insurance size data of insurances as compared to the variation in ROA.

The mean distribution of age over the last ten years was 15.83333 years. The maximum value of age distribution was 39 years. Whereas, the minimum value of age was 12 years and there are significant differences among the value of age because the value of standard deviation as shown in the table is 7.630880years.

The mean value of leverage variable was 1.877564. The maximum and the minimum value of leverage was 5.937539 and 0.502881 respectively. The standard deviation of variation of the value of leverage around it mean was 0.745259. It shows that the existence of low difference among the value of leverage under consideration as compared to the standard deviation of age.

On average the value of growth was 0.208571.The maximum and the minimum value of growth was 0.670072 and -0.133524 respectively. The standard deviation of growth was 0.160001, which shows that there were no significant variations among the values of growth as measured by the change in total assets over the years across the sample insurance companies.

The mean value of liquidity was 1.119691. The maximum and the minimum value of liquidity was 2.604086 and 0.548463. The standard deviation of liquidity value variable was0.300973, which shows the existence of lower variation of the value of liquidity over the last ten years as compared to standard deviation of age.

The mean value of tangibility of assets was 0.166902.The maximum and the minimum value of tangibility of assets was 0.541653 and 0.015549 respectively. The standard deviation of tangibility of assets value variable was 0.109427, which shows the existence relatively moderate variation of tangibility of assets over the last ten years as compared to the standard deviation of size.

The mean value of economic growth rate was 0.109100. The maximum and the minimum value of economic growth rate was 0.126000and 0.088000 respectively. The standard deviation of economic growth rate value variable was 0.011130, which shows the existence of lower variation of the value economic growth rate over the last ten years as compared to the standard deviation of size.

The mean value of inflation rate of assets was 0.170000. The maximum and the minimum value of inflation rate was 0.364000and 0.028000respectively. The standard deviation of inflation rate value variable was 0.110528, which shows the existence relatively moderate variation of inflation rate over the last ten years as compared to the standard deviation of size.

Generally, the mean value of all variables ranges from minimum value of 0.068517 for ROA to a maximum value of 15.83333 for age. Whereas, the standard deviation of all variables range from minimum value of 0.044649 for ROA (which indicate that ROA is least volatile variable) to maximum value of 7.630880 for age (which shows that age is the highest volatile variable).

**4.2. Correlation analysis and its discussion**

According to Brooks (2008), if it is stated that *y* and *x* are correlated, it means that *y* and *x* are being treated in a completely symmetrical way. Thus, it is notimplied that changes in *x* cause changes in *y*, or indeed that changes in *y* cause changes in *x* rather, it is simply stated that there is evidencefor a linear relationship between the two variables, and that movementsin the two are on average related to an extent given by the correlationcoefficient.

The correlation coefficient represents the linear relationship between two variables. Thecorrelation coefficient, which always lies between -1 and +1, was used to measure strength and magnitude or degree of linear relationship between two variables in the study. If the correlation coefficient is +1, it indicates that the linear relationship between two variables is perfect or strong and positive. On the other side, -1 correlation coefficient indicates that two variables are perfectly or strong related but in negative way. A correlation coefficient of 0 indicates that there is little or no linear association between the two variables.

**Table 4.2 Correlations between ROA and independent variables**

| | ROA | SZ | AG | LV | FG | LQ | TA | EGR | IF |
|---|---|---|---|---|---|---|---|---|---|
| ROA | 1.000000 | | | | | | | | |
| SZ | 0.396444 | 1.000000 | | | | | | | |
| AG | 0.276748 | 0.767018 | 1.000000 | | | | | | |
| LV | -0.098464 | 0.355134 | 0.314768 | 1.000000 | | | | | |
| FG | 0.426781 | 0.051134 | -0.058263 | 0.211051 | 1.000000 | | | | |
| LQ | 0.142279 | -0.075004 | 0.064448 | -0.437237 | 0.061623 | 1.000000 | | | |
| TA | -0.101745 | -0.391030 | -0.236537 | -0.187803 | -0.014942 | -0.334641 | 1.000000 | | |
| EGR | -0.437749 | -0.426917 | -0.298270 | -0.307082 | -0.362465 | 0.174334 | -0.015750 | 1.000000 | |
| IF | 0.097656 | 0.215665 | 0.156705 | 0.259495 | 0.291070 | -0.199860 | 0.055208 | -0.592461 | 1.000000 |

***Source: Output of Eview6***

**Correlation analysis results discussion between ROA and specific variables**

The coefficient of correlation between ROA and size was 0.396444. It indicates that there is weak positive correlation between them. Another insurance specific variable employed in the study was age. The coefficient of correlation between ROA and age was 0.276748. This figure reveals that there is weak positive relationship between ROA and age of insurance companies over the last ten years.

The coefficient of correlation between ROA and leverage was -0.098464, which shows the relationship between ROA and leverage is weak negative over the last ten years. The coefficient of correlation between ROA and firm growth was 0.426781, which shows the relationship between ROA and firm growth is weak positive over the last ten years but it is little bit greater than relationship between ROA and size. The coefficient of correlation between ROA and liquidity was 0.142279. This figure reveals that there is weak positive relationship between ROA and liquidity over the last ten years. The last specific variable used in the study was tangibility of assets. The coefficient of correlation between ROA and tangibility of assets was -0.101745, which shows that the relationship between ROA and tangibility of assets is weak negative over the last ten years.

**Correlation analysis results discussion between ROA and macroeconomic variables**

The coefficient of correlation between ROA and economic growth rate was -0.437749. Their relationship is negative but strong as compared to tangibility of assets and leverage. The coefficient of correlation between ROA and inflation was 0.097656. This figure shows that ROA and inflation had weak positive relationship as compared to the relationship between ROA and liquidity, and ROA and growth.

**Correlation analysis results discussion between two independent variables**

Insurance size variable was positively correlated to age, leverage, firm growth and inflation with correlation coefficient of 0.767018, 0.355134, 0.051134, and 0.215665 respectively whereas it was negatively correlated with liquidity, tangibility of assets and economic growth rate with correlation coefficient of -0.075004, -0.391030, and -0.426917 respectively. Age variable was positively correlated with leverage, liquidity and inflation by having correlation coefficient of 0.314768, 0.064448, and 0.064448 respectively whereas it was negatively correlated with firm growth, tangibility of assets and economic growth rate by having correlation coefficient of -0.058263, -0.236537, and -0.298270. Leverage variable was positively correlated with firm growth and inflation with coefficient of 0.211051 and 0.259495 respectively. Liquidity, tangibility of assets and economic growth rate were correlated negatively with leverage with coefficient of -0.437237, -0.187803 and -0.307082 respectively.

Firm growth was positively correlated with liquidity and inflation by having correlation coefficient of 0.061623 and 0.291070 respectively whereas tangibility of assets and economic growth rate were negatively correlated with it with coefficient of -0.014942 and -0.362465 respectively. Liquidity was negatively correlated with tangibility of assets and inflation with correlation coefficient of -0.334641 and -0.199860 respectively. But it is positively correlated with economic growth rate with correlation coefficient of 0.174334. Tangibility of assets was negatively correlated with economic growth rate with coefficient of -0.015750 and positively correlated with inflation with coefficient of 0.055208. Economic growth rate was negatively correlated with inflation with coefficient of -0.592461.

In general, ROA was positively correlated with size, age, firm growth, liquidity and inflation by having correlation coefficient of 39.64%, 27.67%, 42.67%, 14.22% and 9.76% respectively. However, leverage, tangibility of assets and economic growth rate were negatively correlated with ROA with correlation coefficient of -9.84%, -10.17% and -43.77% respectively. The highest correlation coefficient is 76.7%, which was between insurance size and age. However, the lowest correlation coefficient is -1.49%, which is between firm growth and tangibility of assets.

**4.3. Testing assumptions of classical linear regression model (CLRM)**

### ⌗ Test for average value of the error term is zero (E (ut) = 0) Assumption

The first assumption required is that the average value of the errors is zero. In fact, if a constant term is included in the regression equation, this assumption will never be violated. Therefore, since the constant term was included in the regression equation, the average value of the error term in this study is expected to be zero.

### ⌗ Test for no Heteroscedasticity Assumption (Var (ut) = $\boldsymbol{\sigma^2}$)

The second assumption of CLRM which is conducted in this study is heteroscedastic test. This theoretically expressed as by Brooks (2008) var (ut) =$\boldsymbol{\sigma^2}$<∞; it has been assumed thus far that the variance of the errors is constant, $\boldsymbol{\sigma^2}$ - this is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be heteroscedastic.

As it can be seen from table 4.3, both the F- statistic and Chi-square versions of the test statistic given the same conclusion that there is no evidence for the presence of heteroscedasticity, since the P-values were in excess of 0.05. The third version of the test statistic, Scaled explained SS, which is based on a normalized version of the explained sum of squares from the auxiliary regression, also give the same conclusion that there is no evidence for the presence of heteroscedasticity problem, since the P- value was considerably in excess of 0.05.

**Table 4.3: Heteroscedasticity test: white's test result**

| | | | |
|---|---|---|---|
| F-statistic | 0.778387 | Prob. F(8,81) | 0.6228 |
| Obs*R-squared | 6.425055 | Prob. Chi-Square(8) | 0.5997 |
| Scaled explained SS | 4.100907 | Prob. Chi-Square(8) | 0.8479 |

***Source: Output of Eview6***

### ⌗ Test for absence of Autocorrelation Assumption (cov($u_i$ , $u_j$) = 0 for $i \neq j$)

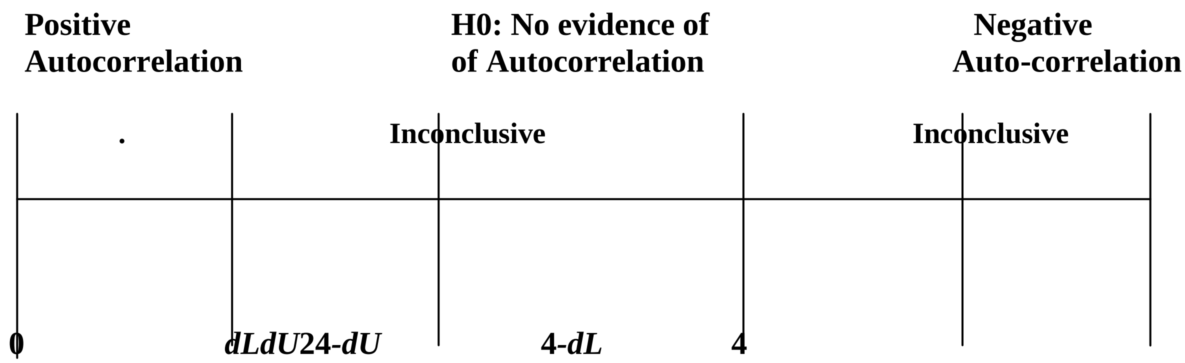
Autocorrelation assumption says that given any two X values, Xi and Xj (i≠ *j*)**,** the correlation between any two *ui* and *uj(i≠ j)* is zero (Gujarati, 2004). This assumption was tasted in this study by the Durbin- Watson test. The Durbin-Watson diagnostic test is one of testing for autocorrelation. It tests for first order autocorrelation, a relationship between an error and its immediate previous value (Brooks, 2008).

The DW test statistic has null and alternative hypotheses. The null hypothesis says that the errors at time t -1 and t are independent and the alternative hypothesis says that the errors at time t -1 and t are not independent. So,

**Ho:** $\rho = 0$ ***(no autocorrelation)***

**H1:** $\rho \neq 0$ ***(autocorrelation)***

**Figure 4.1 Rejection and Non-Rejection Regions for DW Test *(Brooks, 2008)***



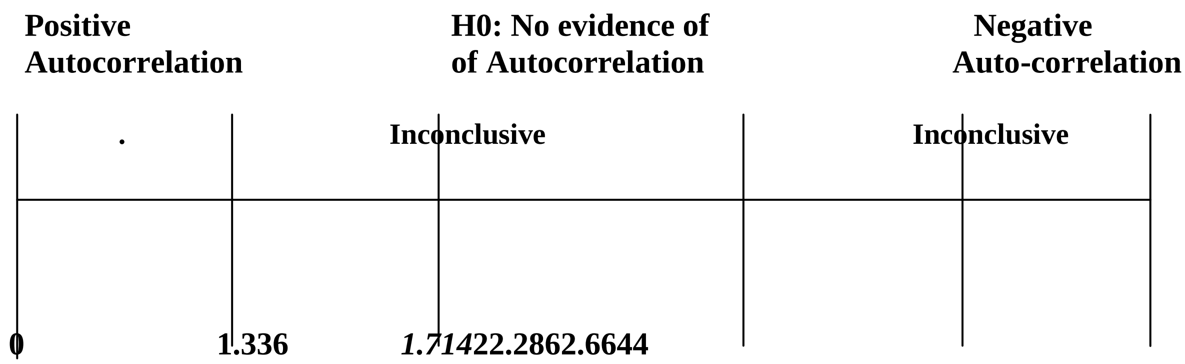

According to Brooks (2008), DW has 2 critical values: an upper critical value (du) and lower critical value (DL), and there is also an intermediate region leveled inconclusive. It is the region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected. The rejection, non-rejection, and inconclusive regions are shown on the number line in figure 4.1.

The decision rule:

- Reject the null hypothesis if DW is less than the lower critical (DL) value since it shows the existence of positive autocorrelation; or if DW is greater than 4 minus the lower critical value which indicates that there is negative autocorrelation.
- The null hypothesis is not rejected if the DW is between the upper and 4 minus the upper limits since it indicates that there is no autocorrelation.
- If the DW is between dL, and du, or 4-du and 4-dL, then the null hypothesis is neither accepted nor rejected since it cannot be sure if there is any autocorrelation.

The DW value of dL, du, 4-du and 4-dL at N 90, K 8 and 1% significance for this study was presented below graphically.

**Figure 4.2: Presentation of DW test**




The Durbin- Watson test statistic was 1.786036. Totally, 90 (9*10) observations were used in the model and 8 regressors and an intercept term were modeled. Therefore, the relevant critical values for the test are dL = 1.336, dU = 1.714, 4-dU = 4-1.714= 2.286, and 4-dL = 4-1.336 = 2.664. The Durbin- Watson test statistic, 1.786036, is clearly between the upper limit which is 1.714 and four minus upper limit which is 2.286. Thus,there is no evidence for the presence of autocorrelation in the study. Therefore, the null hypothesis of no autocorrelation is not possible to reject

### ⌗ Test for absence of Multicollinearity Assumption

Another CLRM assumption tested in this study was the absence of multicollinearity assumption which says that there are no perfect linear relationships among the explanatory variables (Gujarati, 2004). According to Brooks (2008), perfect multicollinearity occurs when there is an exact relationship between two or more independent variables. If there is no relationship between the independent variables, they would be said to be orthogonal to one another which means there is no evidence that one independent variable affects the other. If the independent variables were orthogonal to one another, adding or removing a variable from regression equation would not cause the value of the coefficients on the other variables to change (Brooks, 2008). And once more this author says that a small degree association between independent variables will almost always occurs but will not cause too much loss of precision in real world practice. But a problem arises when the explanatory variables are very highly correlated with each other, and this problem is called multicollinearity.

The following hypothesis were tested in this study for assumption of multicollinearity

***Ho: There is multicollinearity among the independent variables***

***H1: There is no multicollinearity among the independent variables***

Authors (such as Cooper and Schendlar, 2009 and Hair et al., 2006) suggested that the different level of acceptable of the degree of correlation among the independent variables. If the correlation coefficient below 0.9, it may not cause serious multicollinearity problem (Hair et al., 2006). Cooper and Schendlar (2009) stated that the correlation coefficient between independent variables should not exceed 0.8. In this study the maximum coefficient of correlation between two independent variables is 0.767018, which was between insurance size and age variable. This figure does not violated the acceptance level stated by above two authors, Hair et al., (2006) and Cooper and Schendlar (2009), criterion. Therefore, there is no multicollinearity among the independent variables in this study.

**Table 4.4: Multicollinearity test result between independent variables**

| Variables | SZ | AG | LV | FG | LQ | TA | EGR | IF |
|---|---|---|---|---|---|---|---|---|
| **SZ** | 1.000000 | | | | | | | |
| **AG** | 0.767018 | 1.000000 | | | | | | |
| **LV** | 0.355134 | 0.314768 | 1.000000 | | | | | |
| **FG** | 0.051134 | -0.058263 | 0.211051 | 1.000000 | | | | |
| **LQ** | -0.075004 | 0.064448 | -0.437237 | 0.061623 | 1.000000 | | | |
| **TA** | -0.391030 | -0.236537 | -0.187803 | -0.014942 | -0.334641 | 1.000000 | | |
| **EGR** | -0.426917 | -0.298270 | -0.307082 | -0.362465 | 0.174334 | -0.015750 | 1.000000 | |
| **IF** | 0.215665 | 0.156705 | 0.259495 | 0.291070 | -0.199860 | 0.055208 | -0.592461 | 1.000000 |

***Source: Output of Eview6***

## ⌗ Test for Normality assumption (ut~ N(0,$\sigma^2$)

The last assumption of CLRM tested in this study was normality assumption which says that the disturbances are normally distributed. Its normal distribution is not skewed and is defined to have a coefficient of kurtosis of 3. This assumption is required in order to conduct single or joint hypothesis test about the model parameters (Brooks, 2008). In this study the normality assumption was tested by one of the most universally applied tests for normality which is known as the Bera- Jarque test.

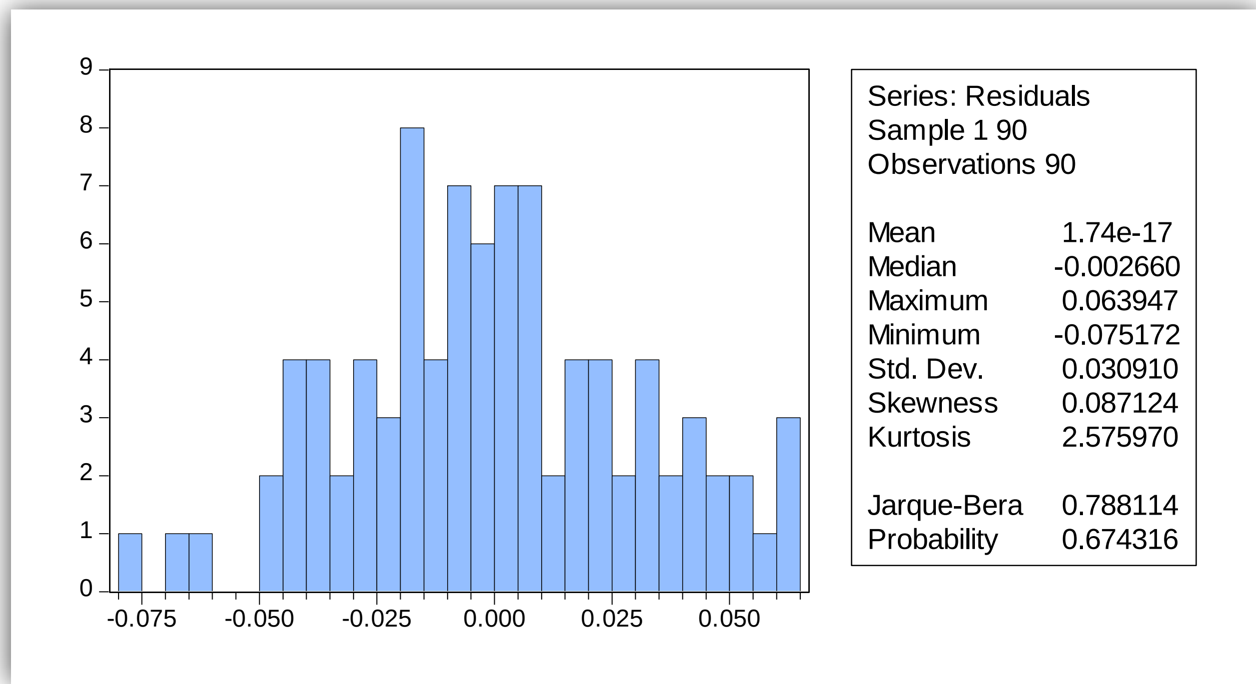
According to Brooks (2008), Bera- Jarque test uses the property of normally distributed random variable that the entire distribution is characterized by the first two moments (such as the mean and the variance). The standardized third and fourth moments of a distribution are known as its skewness and kurtosis. Skewness measures the extent to which a distribution is not symmetric about its mean value and kurtosis measures how fat the tails of the distribution are. A normal distribution is not skewed and it's defined to have a coefficient of kurtosis of 3.

Brooks (2008) also stated that if the residuals are normally distributed, the histogram should be bell-shaped and Bera- Jarque statistic would not be significant at 5% significant level. The null hypothesis for this test was that the data is not normally distributed and the alternative hypothesis of the data was normally distributed.

***Ho: The residuals do not follow a normal distribution***

***H1: The residuals follow a normal distribution***

**Figure 4.3: Presentation of normality test**




So, from the above figure, it can be seen that normality assumption holds and the disturbances are normally distributed because the p-value of Bera- Jarque test is greater than 5% significant level and the coefficient of kurtosis is 2.575970 which is close to 3 and the skewness is also close to zero with coefficient of 0.087124. So, the null hypothesis was rejected which says that error terms don’t follow normal distribution.

### 4.4 Multiple regression output and its discussion

To test the formulated hypotheses, the relationships between ROA which is the dependent variables of the model and the explanatory variables representing age, size, leverage, liquidity, firm growth, tangibility of assets, economic growth, and inflation were examined using multiple-regressions model. Under the following regression finding the beta coefficient may be negative or positive; but whatever it is, beta indicates that each variable’s level of influencing on the dependent variable which is return on asset. P-value also indicates at what percentage or precession level of each variable is significant.

On the other hand R-squared values indicate the explanatory power of the model and also the adjusted R-squared value which takes into account the loss of degrees of freedom associated with adding extra variables were inferred to see the explanatory powers of the independent variables in the regression model.

### 4.4.1 Choosing Fixed effect (FE) Versus Random effect (RE) models

According to Brooks (2008), there are two classes of panel estimator approaches that can be employed in financial research. These are fixed effect model (FEM) and random effect model (REM). From these two models this study was employed fixed effect model (FEM) for the following two reasons. First, According to Brooks (2008) and Gujarati (2004), random effect model is more appropriate when the entities in the sample can be thought of as having been randomly selected from the population, but a fixed effect model is more acceptable when the entities in the sample effectively constitute the entire population. In this study, samples were not selected randomly from the population. However, the entities in the sample effectively constitute the entire population. Second, According to Gujarati (2004), if the number of time series data (T) is large and the number of cross- sectional units (N) is small, there is likely to be little difference in the value of the parameters estimated by fixed effect model and random effect model. So, the choice is based on computation convenience. Therefore, fixed effect model is more appropriate and preferred in this study

The fixed effect model assumes that the marginal effects of the explanatory variables on the dependent units are the same for all units (i.e. insurances). However, the constant term is allowed to vary among the insurances to account for the differences between units. These constant terms capture all unobserved characteristics that differentiate the units from each other.

In addition, the model assumes that the error terms are homoscedastic and uncorrelated both over time and across insurance companies. Other advantage of the Fixed Effect model is that it leads to consistent estimates even if the time-invariant component of the error terms is correlated with the regressors.

The econometric model employed in this study as follows:

$$\mathbf{ROAi,t = \alpha + \beta 0\ SZi,t + \beta 1\ AGi,t + \beta 3\ LVi,t + \beta 4\ FGi,t + \beta 5\ LQi,t + \beta 6\ TAi,t + \beta 7\ EGRi,t + \beta 8\ IFi,t + \varepsilon i,t} \ldots\ldots\ldots \mathbf{(2)}$$

After running this equation using E-views 6, the regression model output was as follow:

**ROAi,t = 0.030 + 0.030 SZ + 0.001 AG - 0.025 LV + 0.123 FG - 0.007 LQ - 0.014TA – 1.490EGR - 0.094IF………………………………………………. (3)**

**Table 4.5: Fixed Effect Regression Result of Specific Variables**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.262597 | 0.118184 | -2.221931 | 0.0290* |
| SZ | 0.041491 | 0.013845 | 2.996805 | 0.0036* |
| AG | 0.000588 | 0.000829 | 0.708991 | 0.4803 |
| LV | -0.024155 | 0.006668 | -3.622569 | 0.0005* |
| FG | 0.138819 | 0.024736 | 5.612092 | 0.0000* |
| LQ | -0.004912 | 0.017044 | -0.288177 | 0.7739 |
| TA | 0.006077 | 0.043354 | 0.140164 | 0.8889 |

| | | | |
|---|---|---|---|
| R-squared | 0.448206 | Mean dependent var | 0.068517 |
| Adjusted R-squared | 0.408318 | S.D. dependent var | 0.044649 |
| S.E. of regression | 0.034344 | Akaike info criterion | -3.830167 |
| Sum squared resid | 0.097902 | Schwarz criterion | -3.635737 |
| Log likelihood | 179.3575 | Hannan-Quinn criter. | -3.751761 |
| F-statistic | 11.23643 | Durbin-Watson stat | 1.863962 |
| Prob(F-statistic) | 0.000000 | | |

** denote significance level at 1% level.*

***Source: Output of Eview6***

**Note;** the above table is required only for the purpose of identifying the explanatory power(R-square) of specific variables, but the explanation was presented under the following table.

**Table 4.6: Fixed effect regression result for all explanatory variables**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.030419 | 0.142092 | 0.214081 | 0.8310 |
| SZ | 0.028642 | 0.013749 | 2.083252 | 0.0404** |
| AG | 0.000713 | 0.000783 | 0.911279 | 0.3649 |
| LV | -0.025052 | 0.006317 | -3.965645 | 0.0002* |
| FG | 0.123566 | 0.025026 | 4.937422 | 0.0000* |
| LQ | -0.006918 | 0.016171 | -0.427793 | 0.6699 |
| TA | -0.014039 | 0.041632 | -0.337219 | 0.7368 |
| EGR | -1.487687 | 0.438669 | -3.391368 | 0.0011* |
| IF | -0.094743 | 0.039274 | -2.412327 | 0.0181* |

| | | | |
|---|---|---|---|
| R-squared | 0.520746 | Mean dependent var | 0.068517 |
| Adjusted R-squared | 0.473413 | S.D. dependent var | 0.044649 |
| S.E. of regression | 0.032400 | Akaike info criterion | -3.926666 |
| Sum squared resid | 0.085031 | Schwarz criterion | -3.676685 |
| Log likelihood | 185.7000 | Hannan-Quinn criter. | -3.825859 |
| F-statistic | 11.00160 | Durbin-Watson stat | 1.786036 |
| Prob(F-statistic) | 0.000000 | | |

**and ** denotes significance level at 1% and 5% levels respectively*

***Source: Output of Eview6***

As indicated in the table 4.5 the explanatory power of the specific determinants, in terms $R^2$ of the model is 45% but in case of table 4.6 when the external determinants enter into the regression the explanatory power of the model in terms of $R^2$ increased in to 52%. As expected, the researcher observes differences in the coefficients and the significance of the variables when the external factors are introduced. The explanatory power of the model (in terms of $R^2$) that examines the determinants of ROA increases when the external factors are considered. This indicates that studying of both internal and external determinants are significant.

Table 4.6 shows that size, age and firm growth variables had positive coefficient. It indicates that there was direct relationship between those variables and ROA, which imply that increase in these variables cause increase in ROA of insurance companies. However, only age had no significant impact on the profitability of insurances up to 10% significant level.

Leverage, tangibility of assets, liquidity, economic growth and inflation had negative coefficient. It indicate that there was an reverse relationship between those variables and ROA, which imply that increase in these variables cause decrease in ROA of insurance companies. However, liquidity and tangibility of assets had no significant impact on profitability of insurances up to 10% significant level.

The hypothesis testing based on fixed effect regression model output was discussed below;

***Hypothesis 1:***

> ***Ho: There is no positive significant relationship between size and profitability of insurance companies in Ethiopia.***
>
> ***H1: There is positive significant relationship between size and profitability of insurance companies in Ethiopia***

Size was one of independent variable used and hypothesized in the study. From table 4.6 it can be seen that size has 0.03 beta coefficient, which indicates that if the size increase by 100%, the ROA will increase by 3% by controlling other factors constant. Again, this indicates that size has positive impact on the profitability of insurance company's measure by ROA. Size is statistically significant at 5% significant level because the p-value of the size was 0.0404 which is less than 5% significant level. Therefore, the null hypothesis which stated that size has no positive significant impact on profitability was rejected by the researcher in this study. This finding supports to the economies of scale market-power hypothesis. Larger insurance companies make efficiency gains that can be captured as higher earnings due to the fact that they do not operate in very competitive markets. And large insurers are likely to perform better than small insurers because they can achieve operating cost efficiencies through increasing output and economizing on the unit cost of innovations in products and process development. This finding was consistent with researchers (Swiss Re, 2008; Hamadan Ahamed Ali Al-Shami, 2008; Hafiz Malik, 2011; Chen and Wong, 2004; Cummins and Nini, 2002; Ayele, 2012, and Daniel &Tilahun, 2013).

***Hypothesis2:***

***Ho: There is no positive significant relationship between age and profitability of insurance companies in Ethiopia.***

***H1: There is positive significant relationship between age and profitability of insurance companies in Ethiopia.***

As shown above in table 4.6, the regression coefficient of age was 0.000713 which indicates that if age variable increase by 100%, ROA will increase by 0.07% by controlling remain things constant. This shows age has positive impact on the profitability of insurance companies. However, this variable positive impact was statistically insignificant even 10% significance level because the variable p-value 0.3649 was far exceed 10% significant level.Therefore, the null hypothesis which stated that age has no positive significant impact on profitability was not possible to reject by the researcher in this study.This finding was consistent with researchers (Hamadan Ahamed Ali Al-Shami, 2008; Hafiz Malik, 2011; Ayele, 2012, and Daniel &Tilahun, 2013). However, the finding was inconsistent with Swiss Re (2008) which indicated that younger firms found to grow faster than older firms.

***Hypothesis3:***

***Ho: There is no negative significant relationship between Leverage and profitability of insurance companies in Ethiopia.***

***H1: There is negative significant relationship between Leverage and profitability of insurance companies in Ethiopia.***

Leverage was the third independent and specific variable modeled in the study to examine its impact on the profitability of insurance companies. The leverage variable has -0.025052 beta coefficient which indicate that if the leverage of insurances increase by 100%, ROA will decrease by 2.5% by controlling other factors constant. So, leverage variable has negative impact on the insurances profitability. In addition, the p-value of leverage was 0.0002 this shows that this variable has significant influence on the profitability by 1% significant level. Thus, this variable statistically significant and has negative impact on profitability of insurance companies. Therefore, the null hypothesis which stated that leverage has no negative impact on profitability was rejected by the researcher in this study.

This finding supports literatures in capital structure that a firm's value will increase up to optimum point as leverage increases and then declines if leverage is further increased beyond that optimum level. This finding was consistent with researchers (Hamadan Ahamed Ali Al-Shami, 2008; Hafiz Malik, 2011; SylwesterKozak, 2011;Swiss Re 2008, and Ayele, 2012).

***Hypothesis4:***

> ***Ho: There is no positive significant relationship between firm Growth and profitability of insurance companies in Ethiopia.***
>
> ***H1: There is positive significant relationship between firm Growth and profitability of insurance companies in Ethiopia.***

Firm growth was another independent variable employed in this study. This variable has 0.123566 beta coefficient which indicates that if the firm growth increased by 100%, the ROA will increase by 12.35% by controlling other factors constant. This indicates that firm growth variable has positive impact on the profitability of insurance companies. The p-value of firm growth variable was 0.0000 which indicates strong statistical significance between firm growth and profitability of insurance companies. Therefore, the null hypothesis which stated that firm growth has no positive significant impact on profitability was rejected in the study. This finding supports that the insurance companies having more and more assets over the years have also better chance of being profitable for the reason that they do have internal capacity though it depends on their ability to exploit external opportunities. This finding was consistent with researchers (Naveed Ahmed et al. 2011;Hamadin Ahmed Ali Al-Shami 2008, and Ayele, 2012).

***Hypothesis5:***

> ***Ho: There is no negative significant relationship between Liquidity and profitability of insurance companies in Ethiopia.***
>
> ***H1: There is negative significant relationship between Liquidity and profitability of insurance companies in Ethiopia.***

Liquidity was another independent variable employed in the study. It was specific variable which can be controlled by the management of insurance companies. -0.006918 was the beta coefficient of liquidity variable which indicates that if liquidity variable increase by 100%, ROA will decrease by 0.7% by controlling remain things constant.

This shows liquidity has negative impact on the profitability of insurance companies. However, this variable negative impact was statistically insignificant even 10% significance level because the variable p-value 0.6699 was far exceed 10% significance level. Therefore, the null hypothesis which stated that liquidity has not negative significant impact on profitability was not possible to reject in the study by the researcher. This finding supports the theory of agency costs; high liquidity of assets could increase agency costs for owners because managers might take advantage of the benefits of liquid assets. This finding was consistent with researchers (Ahmed et al. 2011, and Daniel &Tilahun, 2013).However, inconsistence finding was given by some researchers (Chen and Wong 2004, andAyele, 2012).

***Hypothesis6:***

> ***Ho: There is no negative significant relationship between Tangibility of assets and profitability of insurance companies in Ethiopia.***
>
> ***H1: There is negative significant relationship between Tangibility of assets and profitability of insurance companies in Ethiopia.***

Tangibility of assets was the last specific variable used in the study and it was one of independent variable employed in this study. The variable has -0.014039 beta coefficient which indicate that if the amount of tangibility of assets increase by 100%, the ROA will decrease by 1.4% by controlling other factors constant. This shows that tangibility of assets has negative impact on the profitability of insurance companies. However, this variable negative impact was statistically insignificant even 10% significance level because the variable p-value 0.7368was far exceed 10% significance level. Therefore, the null hypothesis which stated that tangibility of assets has not negative significant impact on profitability was not possible to reject in the study by the researcher. This finding was consistent with researchers (Naveed, Zulfqar& Ahmad, 2011, and Ayele, 2012). However, inconsistence finding was given by some researchers (Hafiz Malik, 2011, and Daniel &Tilahun, 2013).

***Hypothesis7:***

> ***Ho: There is no negative significant relationship between Economic Growth rate and profitability of insurance companies in Ethiopia.***
>
> ***H1: There is negative significant relationship between Economic Growth rate and profitability of insurance companies in Ethiopia.***

Economic growth rate was independent variable and the first macroeconomic variable employed by the researcher in this study. The beta coefficient of economic growth variable was -1.487687. This shows that economic growth has negative impact on insurance companies' profitability. Again, this variable is statistically significant at 1% significant level because of the p-value,0.0011; of economic growth is less than 1% significant level. Therefore, the null hypothesis which stated that economic growth has not negative significant impact on profitability was rejected in the study by the researcher. This finding was consistent with Grace and Hotchkiss (1995). However, it was inconsistent with Choi, (2010).

***Hypothesis8:***

> ***Ho: There is no negative significant relationship between Inflation and profitability of insurance companies in Ethiopia.***
>
> ***H1: There is negative significant relationship between Inflation and profitability of insurance companies in Ethiopia.***

Inflation was another independent variable and the last macroeconomic variable employed by the researcher in this study. The beta coefficient of inflation variable was -0.094743. This shows that if the inflation increases by 100%, ROA will decrease by 9.4% by controlling other things constant. This shows that inflation has negative impact on insurance companies' profitability. Again, this variable is statistically significant at 5% significant level because of the p-value,0.0181; of inflation is less than 5% significant level. Therefore, the null hypothesis which stated that inflation has not negative significant impact on profitability was rejected in the study by the researcher. This finding was consistent with Browne et al. (2001). However, it was inconsistent with Gale, (1972).

Generally, ROA is affected positively by size and firm growth but negatively by leverage, economy growth and inflation. Leverage and economic growth are significant at 1% significance level. Size and inflation are significant at 5% significance level. Therefore, firm growth, leverage, economic growth, size and inflation are identified as factors affecting the profitability of insurance companies in Ethiopia. The result of fixed effect model shows that economic growth, firm growth, inflation, size and leverage are the most important factors affecting the profitability of insurance companies in Ethiopia respectively in order of their degree of influence.

The result also shows that age, liquidity and tangibility of assets had insignificant impact on the profitability of insurance companies in Ethiopia.

**Table.4.7: Summary of actual and hypothesized impact of explanatory variables on the dependent variable**

| Independent variables | | Hypothesized impact | Actual impact |
|---|---|---|---|
| **Specific variables** | **Size** | Positive and significant | Positive and significant |
| | **Age** | Positive and significant | Positive and insignificant |
| | **Leverage** | Negative and significant | Negative and significant |
| | **Firm growth** | Positive and significant | Positive and significant |
| | **Liquidity** | Negative and significant | Negative and insignificant |
| | **Tangibility of assets** | Negative and significant | Negative and insignificant |
| **Macroeconomic variables** | **Economic growth rate** | Negative and significant | Negative and significant |
| | **Inflation** | Negative and significant | Negative and significant |

# CHAPTER - FIVE

# CONCLUSIONS AND RECOMMENDATIONS

This part of the study has three sections. First section covers conclusions drawn from the data results and discussions. Second section presents the possible recommendations forwarded based on the conclusions drawn and final section deals with about indicator for future research.

## 5.1. Conclusions

The insurance sector plays key role in the financial services industry in almost developed and developing countries, contributing to economic growth, efficient resource allocation, reduction of transaction costs and spread of financial losses. However, when an insurance sector of the country does not perform well, there will be substantial and far consequence economic costs. Therefore, having clear understood about the things which drive insurance sector profitability is important to enhance economic growth. For that reason, the researcher collected the secondary data from selected insurance companies, National bank of Ethiopia and ministry of finance and economic development.Six specific variables (size, age, leverage, firm growth, liquidity, tangibility of asset) and two macroeconomic variables (economic growth rate and inflation) were chosen and analyzed.The panel data was used for the sample of nine insurance companies in Ethiopia from 2004 to 2013. Data was presented by using descriptive statistics. The balanced correlation and regression analysis was conducted. Before performing regressions the models were tested for the classical linear regression model assumptions.

The descriptive statistics shows that from insurance specific variable, tangibility of assets least mean value which is 0.166902 and age variable has highest mean value which is 15.83333. Again,tangibility of assets is least volatile variable which has standard deviation of 0.109427 and age is the highest volatile variable with standard deviation of 7.630880. Regarding to macroeconomic variables, economic growth rate has least mean value which is 0.109100 and inflation variable has highest mean value which is 0.170000.

Economic growth rate is least volatile variable which has standard deviation of 0.011130 and inflation is the highest volatile variable with standard deviation of 0.110528.

Generally, the mean value of all variables ranges from minimum value of 0.068517 for ROA to a maximum value of 15.83333 for age. Whereas, the standard deviation of all variables range from minimum value of 0.044649 for ROA (which indicate that ROA is least volatile variable) to maximum value of 7.630880 for age (which shows that age is the highest volatile variable).

Correlation analysis shows that ROA was positively correlated with size, age, firm growth, liquidity and inflation by having correlation coefficient of 39.64%, 27.67%, 42.67%, 14.22% and 9.76% respectively. However, leverage, tangibility of assets and economic growth rate were negatively correlated with ROA with correlation coefficient of -9.84%, -10.17% and -43.77% respectively. The highest correlation coefficient is 76.7%, which was between insurance size and age. However, the lowest correlation coefficient is -1.49%, which is between firm growth and tangibility of assets.

The study found that, from regression analysis, size and firm growth has positive and significant impact on profitability of insurance companies in Ethiopia. It shows that if size and firm growth increase, profitability will increase. However, leverage, economic growth rate and inflation variables have negative and significant impact on profitability of insurance companies in Ethiopia. This indicates that increase in these variables will decrease profitability. The result of fixed effect model shows economic growth rate, firm growth, inflation, size and leverage are the most important factors affecting the profitability of insurance companies in Ethiopia respectively in order of their degree of influence. The result also shows that age, liquidity and tangibility of assets had insignificant impact on the profitability of insurance companies in Ethiopia.

**5.2. Recommendation**

Based on the above findingsthe researcher forwards the following possible recommendations:

- The researcher would like to recommend that insurance companies should expand in a controlled way with the aim of achieving an optimum size so as to enjoy economies of scale which will ultimately result in higher level of financial performance.

However if an insurance expands beyond the optimum size diseconomies of scale will set in and this can result in a decline in the financial performance of the insurance.

- Leverage is negatively and significantly related with the performance of the insurance companies. This predicts that the performances of highly levered Ethiopian insurance companies are going to be less profitable and implies equity financing is better than debt financing in Ethiopian insurance companies. Therefore, the study recommends that Ethiopian insurance companies should reline on internally generated funds and equity capital to the maximum they have.
- Firm growth is positive and statistical significant related with the profitability of selected insurance companies. Therefore, the study recommends that it is betterfor insurance companies with high rate of growth in terms of their total assets to obtain sustainable profit.

**5.3. Indication for future research**

This study examined factors affecting the profitability insurance companies in Ethiopia. Still, the study is not exhaustive. Because, the employed variables explanatory power, adjusted R-square, was 0.473413 which indicating that some important variables that affect the profitability of insurance companies might have been left for other researchers in the future. So, future researcher can model uninvestigated qualitative variables like employee motivation, customer satisfaction, management talent, and others.

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# APPENDIES

## Appendix I: Quantitative data

| firm | year | ROA | SZ | AG | LV | FG | LQ | TA | EGR | IF |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2004 | 0.075379 | 8.8938 | 30 | 2.612202 | 0.004656 | 1.213442 | 0.092508 | 0.117 | 0.073 |
| 1 | 2005 | 0.078476 | 8.924571 | 31 | 2.566979 | 0.073425 | 1.358451 | 0.080689 | 0.126 | 0.061 |
| 1 | 2006 | 0.057329 | 8.986364 | 32 | 1.437707 | 0.152903 | 1.412982 | 0.07831 | 0.115 | 0.106 |
| 1 | 2007 | 0.068781 | 8.999633 | 33 | 1.458936 | 0.031025 | 1.428161 | 0.062678 | 0.118 | 0.158 |
| 1 | 2008 | 0.070099 | 9.047725 | 34 | 1.671278 | 0.1171 | 1.226313 | 0.056615 | 0.112 | 0.253 |
| 1 | 2009 | 0.066174 | 9.100062 | 35 | 1.746309 | 0.128071 | 1.348497 | 0.052568 | 0.099 | 0.364 |
| 1 | 2010 | 0.102078 | 9.158383 | 36 | 1.787632 | 0.143724 | 1.309486 | 0.054149 | 0.104 | 0.028 |
| 1 | 2011 | 0.087805 | 9.215578 | 37 | 1.763067 | 0.140762 | 1.263715 | 0.068658 | 0.115 | 0.181 |
| 1 | 2012 | 0.108573 | 9.351481 | 38 | 5.937539 | 0.367422 | 0.934718 | 0.050574 | 0.088 | 0.341 |
| 1 | 2013 | 0.130611 | 9.420288 | 39 | 2.019893 | 0.171676 | 1.222216 | 0.057711 | 0.097 | 0.135 |
| 2 | 2004 | 0.081567 | 7.927639 | 11 | 1.436373 | 0.023354 | 1.139539 | 0.103993 | 0.117 | 0.073 |
| 2 | 2005 | 0.074785 | 7.972783 | 12 | 1.340366 | 0.01374 | 1.257852 | 0.107777 | 0.126 | 0.061 |
| 2 | 2006 | 0.056011 | 8.058379 | 13 | 1.586961 | 0.021786 | 1.208849 | 0.102243 | 0.115 | 0.106 |
| 2 | 2007 | 0.060255 | 8.161608 | 14 | 1.792543 | 0.26832 | 1.087596 | 0.138567 | 0.118 | 0.158 |
| 2 | 2008 | 0.062898 | 8.222607 | 15 | 1.850739 | 0.150799 | 0.930695 | 0.189973 | 0.112 | 0.253 |
| 2 | 2009 | 0.047047 | 8.302112 | 16 | 2.014781 | 0.200896 | 0.912103 | 0.222145 | 0.099 | 0.364 |
| 2 | 2010 | 0.110807 | 8.336726 | 17 | 2.292735 | 0.082963 | 0.978986 | 0.254213 | 0.104 | 0.028 |
| 2 | 2011 | 0.072637 | 8.559043 | 18 | 2.149867 | 0.668462 | 0.915595 | 0.314548 | 0.115 | 0.181 |
| 2 | 2012 | 0.07228 | 8.711127 | 19 | 2.413528 | 0.419332 | 0.958614 | 0.2084 | 0.088 | 0.341 |
| 2 | 2013 | 0.125049 | 8.821759 | 20 | 1.688824 | 0.290127 | 1.09989 | 0.173848 | 0.097 | 0.135 |
| 3 | 2004 | 0.033329 | 7.177396 | 8 | 0.502881 | 0.066435 | 2.604086 | 0.029149 | 0.117 | 0.073 |
| 3 | 2005 | 0.040445 | 7.363083 | 9 | 0.909877 | 0.533514 | 2.24557 | 0.253015 | 0.126 | 0.061 |
| 3 | 2006 | 0.04349 | 7.482535 | 10 | 0.827627 | 0.311659 | 2.306164 | 0.19711 | 0.115 | 0.106 |
| 3 | 2007 | 0.054569 | 7.564167 | 11 | 0.920276 | 0.20679 | 1.54321 | 0.360175 | 0.118 | 0.158 |
| 3 | 2008 | 0.045189 | 7.646083 | 12 | 1.243768 | 0.207582 | 0.846608 | 0.541653 | 0.112 | 0.253 |
| 3 | 2009 | 0.05411 | 7.732358 | 13 | 1.362273 | 0.219762 | 0.961882 | 0.452914 | 0.099 | 0.364 |
| 3 | 2010 | 0.080492 | 7.783706 | 14 | 1.469964 | 0.125505 | 0.839504 | 0.494378 | 0.104 | 0.028 |
| 3 | 2011 | 0.036416 | 7.815313 | 15 | 1.34824 | 0.075491 | 0.919467 | 0.454034 | 0.115 | 0.181 |
| 3 | 2012 | 0.020302 | 7.971257 | 16 | 2.13946 | 0.432005 | 0.915972 | 0.348862 | 0.088 | 0.341 |
| 3 | 2013 | 0.153184 | 8.094143 | 17 | 1.83662 | 0.327044 | 1.134974 | 0.271524 | 0.097 | 0.135 |
| 4 | 2004 | 0.014774 | 8.13737 | 10 | 1.396245 | 0.088726 | 1.03653 | 0.084248 | 0.117 | 0.073 |
| 4 | 2005 | 0.038888 | 8.208528 | 11 | 1.667464 | 0.178035 | 0.922063 | 0.162417 | 0.126 | 0.061 |
| 4 | 2006 | 0.033902 | 8.280677 | 12 | 2.294792 | 0.180725 | 1.086855 | 0.168344 | 0.115 | 0.106 |
| 4 | 2007 | 0.021518 | 8.307 | 13 | 2.648813 | 0.062485 | 0.941358 | 0.170845 | 0.118 | 0.158 |
| 4 | 2008 | -0.02456 | 8.308995 | 14 | 2.747082 | 0.004606 | 0.766399 | 0.214061 | 0.112 | 0.253 |
| 4 | 2009 | 0.019692 | 8.332792 | 15 | 2.34052 | 0.056323 | 0.837402 | 0.200475 | 0.099 | 0.364 |
| 4 | 2010 | 0.125582 | 8.392968 | 16 | 1.440641 | 0.148619 | 1.079914 | 0.184835 | 0.104 | 0.028 |
| 4 | 2011 | 0.088045 | 8.473781 | 17 | 1.177815 | 0.204517 | 1.041604 | 0.16082 | 0.115 | 0.181 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 2012 | 0.093372 | 8.599503 | 18 | 1.54779 | 0.335742 | 1.167904 | 0.118403 | 0.088 | 0.341 |
| 4 | 2013 | 0.098998 | 8.670682 | 19 | 1.517877 | 0.17809 | 1.218916 | 0.136551 | 0.097 | 0.135 |
| 5 | 2004 | 0.010677 | 8.02734 | 11 | 1.602091 | -0.03684 | 1.282923 | 0.057809 | 0.117 | 0.073 |
| 5 | 2005 | -0.00341 | 8.069765 | 12 | 2.089296 | 0.102617 | 1.140959 | 0.083399 | 0.126 | 0.061 |
| 5 | 2006 | 0.069616 | 8.221111 | 13 | 2.044627 | 0.416923 | 1.226633 | 0.048498 | 0.115 | 0.106 |
| 5 | 2007 | 0.019081 | 8.270548 | 14 | 2.353553 | 0.120566 | 1.144289 | 0.03659 | 0.118 | 0.158 |
| 5 | 2008 | 0.034645 | 8.393857 | 15 | 2.993266 | 0.328337 | 1.062583 | 0.044266 | 0.112 | 0.253 |
| 5 | 2009 | 0.043351 | 8.418816 | 16 | 2.5705 | 0.059154 | 1.036368 | 0.103542 | 0.099 | 0.364 |
| 5 | 2010 | 0.052638 | 8.564694 | 17 | 2.80993 | 0.399195 | 0.991693 | 0.161145 | 0.104 | 0.028 |
| 5 | 2011 | 0.047989 | 8.67716 | 18 | 3.04015 | 0.295584 | 0.931084 | 0.190274 | 0.115 | 0.181 |
| 5 | 2012 | 0.048032 | 8.748257 | 19 | 2.807763 | 0.17787 | 0.787417 | 0.273761 | 0.088 | 0.341 |
| 5 | 2013 | 0.009709 | 8.753837 | 20 | 2.223042 | 0.012932 | 0.548463 | 0.361617 | 0.097 | 0.135 |
| 6 | 2004 | 0.024431 | 7.388218 | 11 | 1.850188 | 0.134996 | 0.766613 | 0.298791 | 0.117 | 0.073 |
| 6 | 2005 | -0.04714 | 7.407928 | 12 | 2.447315 | 0.04643 | 0.705363 | 0.295979 | 0.126 | 0.061 |
| 6 | 2006 | 0.062004 | 7.498549 | 13 | 2.158845 | 0.232029 | 0.732121 | 0.236809 | 0.115 | 0.106 |
| 6 | 2007 | 0.084913 | 7.597976 | 14 | 2.140604 | 0.257266 | 0.948988 | 0.203464 | 0.118 | 0.158 |
| 6 | 2008 | 0.057416 | 7.64035 | 15 | 1.995666 | 0.102488 | 0.929901 | 0.183643 | 0.112 | 0.253 |
| 6 | 2009 | 0.046253 | 7.708654 | 16 | 2.127236 | 0.170318 | 0.811235 | 0.158847 | 0.099 | 0.364 |
| 6 | 2010 | 0.058833 | 7.799541 | 17 | 2.365409 | 0.232783 | 0.992054 | 0.126754 | 0.104 | 0.028 |
| 6 | 2011 | 0.002904 | 7.937098 | 18 | 3.692806 | 0.372641 | 1.120589 | 0.089755 | 0.115 | 0.181 |
| 6 | 2012 | 0.174276 | 8.159833 | 19 | 3.017721 | 0.670072 | 1.052505 | 0.063763 | 0.088 | 0.341 |
| 6 | 2013 | 0.10723 | 8.293122 | 20 | 2.24558 | 0.359217 | 1.202349 | 0.049813 | 0.097 | 0.135 |
| 7 | 2004 | -0.00227 | 7.603074 | 3 | 1.540784 | 0.096316 | 0.740303 | 0.220466 | 0.117 | 0.073 |
| 7 | 2005 | 0.091934 | 7.790533 | 4 | 1.42382 | 0.537103 | 0.98249 | 0.160047 | 0.126 | 0.061 |
| 7 | 2006 | 0.046689 | 7.862224 | 5 | 1.465748 | 0.179479 | 1.004971 | 0.125421 | 0.115 | 0.106 |
| 7 | 2007 | 0.075693 | 7.994394 | 6 | 1.689386 | 0.355721 | 1.054088 | 0.085877 | 0.118 | 0.158 |
| 7 | 2008 | 0.103302 | 8.13667 | 7 | 2.133844 | 0.387638 | 0.90973 | 0.150873 | 0.112 | 0.253 |
| 7 | 2009 | 0.090807 | 8.316929 | 8 | 2.305167 | 0.514464 | 0.97592 | 0.115035 | 0.099 | 0.364 |
| 7 | 2010 | 0.087484 | 8.428533 | 9 | 2.520463 | 0.293018 | 1.028467 | 0.111234 | 0.104 | 0.028 |
| 7 | 2011 | 0.084225 | 8.513652 | 10 | 2.437902 | 0.216518 | 1.047693 | 0.118181 | 0.115 | 0.181 |
| 7 | 2012 | 0.084178 | 8.698546 | 11 | 3.140018 | 0.530715 | 1.001701 | 0.092087 | 0.088 | 0.341 |
| 7 | 2013 | 0.105379 | 8.737259 | 12 | 2.432105 | 0.093234 | 1.088598 | 0.09109 | 0.097 | 0.135 |
| 8 | 2004 | 0.058015 | 8.056372 | 10 | 1.269283 | 0.069913 | 1.075681 | 0.279422 | 0.117 | 0.073 |
| 8 | 2005 | 0.071972 | 8.038033 | 11 | 1.099247 | -0.04135 | 1.083744 | 0.299668 | 0.126 | 0.061 |
| 8 | 2006 | 0.091171 | 8.108387 | 12 | 1.272572 | 0.175856 | 1.241021 | 0.266082 | 0.115 | 0.106 |
| 8 | 2007 | 0.092597 | 8.123637 | 13 | 1.244002 | 0.035738 | 1.148559 | 0.248558 | 0.118 | 0.158 |
| 8 | 2008 | 0.052834 | 8.178446 | 14 | 1.74796 | 0.134511 | 1.020127 | 0.242522 | 0.112 | 0.253 |
| 8 | 2009 | 0.121474 | 8.222199 | 15 | 1.216123 | 0.105996 | 1.010994 | 0.278463 | 0.099 | 0.364 |
| 8 | 2010 | 0.121801 | 8.326986 | 16 | 1.669508 | 0.272878 | 1.00933 | 0.221145 | 0.104 | 0.028 |
| 8 | 2011 | 0.137996 | 8.394695 | 17 | 1.11591 | 0.168715 | 1.210421 | 0.223914 | 0.115 | 0.181 |
| 8 | 2012 | 0.158441 | 8.548926 | 18 | 1.101006 | 0.426369 | 1.329275 | 0.164993 | 0.088 | 0.341 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 2013 | 0.14751 | 8.677648 | 19 | 1.463203 | 0.344998 | 1.236857 | 0.157008 | 0.097 | 0.135 |
| 9 | 2004 | -0.04756 | 7.876997 | 8 | 1.724632 | -0.13352 | 1.132132 | 0.015549 | 0.117 | 0.073 |
| 9 | 2005 | -0.01316 | 7.863258 | 9 | 1.123096 | -0.03114 | 1.145968 | 0.022781 | 0.126 | 0.061 |
| 9 | 2006 | 0.081102 | 7.998086 | 10 | 0.982502 | 0.364042 | 1.316319 | 0.132369 | 0.115 | 0.106 |
| 9 | 2007 | 0.0896 | 8.095891 | 11 | 1.182228 | 0.25258 | 1.199743 | 0.126386 | 0.118 | 0.158 |
| 9 | 2008 | 0.147723 | 8.221342 | 12 | 1.260336 | 0.334907 | 1.199886 | 0.11396 | 0.112 | 0.253 |
| 9 | 2009 | 0.041224 | 8.296289 | 13 | 1.575183 | 0.188358 | 1.148921 | 0.107796 | 0.099 | 0.364 |
| 9 | 2010 | 0.126002 | 8.375146 | 14 | 1.323426 | 0.199103 | 1.276817 | 0.089931 | 0.104 | 0.028 |
| 9 | 2011 | 0.07671 | 8.4699 | 15 | 1.350079 | 0.243809 | 1.357106 | 0.074869 | 0.115 | 0.181 |
| 9 | 2012 | 0.107471 | 8.609087 | 16 | 1.416376 | 0.377804 | 1.357106 | 0.060187 | 0.088 | 0.341 |
| 9 | 2013 | 0.152326 | 8.691464 | 17 | 1.270973 | 0.208864 | 1.400052 | 0.082726 | 0.097 | 0.135 |

## Appendix II: regression result for all variables

Dependent Variable: ROA
Method: Least Squares
Date: 05/16/15 Time: 09:03
Sample: 1 90
Included observations: 90

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.030419 | 0.142092 | 0.214081 | 0.8310 |
| SZ | 0.028642 | 0.013749 | 2.083252 | 0.0404 |
| AG | 0.000713 | 0.000783 | 0.911279 | 0.3649 |
| LV | -0.025052 | 0.006317 | -3.965645 | 0.0002 |
| FG | 0.123566 | 0.025026 | 4.937422 | 0.0000 |
| LQ | -0.006918 | 0.016171 | -0.427793 | 0.6699 |
| TA | -0.014039 | 0.041632 | -0.337219 | 0.7368 |
| EG | -1.487687 | 0.438669 | -3.391368 | 0.0011 |
| IF | -0.094743 | 0.039274 | -2.412327 | 0.0181 |

| | | | |
|---|---|---|---|
| R-squared | 0.520746 | Mean dependent var | 0.068517 |
| Adjusted R-squared | 0.473413 | S.D. dependent var | 0.044649 |
| S.E. of regression | 0.032400 | Akaike info criterion | -3.926666 |
| Sum squared resid | 0.085031 | Schwarz criterion | -3.676685 |
| Log likelihood | 185.7000 | Hannan-Quinn criter. | -3.825859 |
| F-statistic | 11.00160 | Durbin-Watson stat | 1.786036 |
| Prob(F-statistic) | 0.000000 | | |

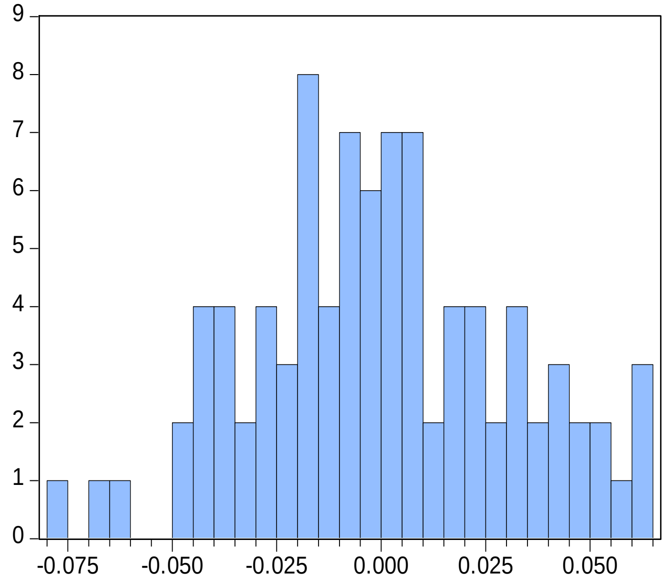
## Appendix III: regression result for specific variables

Dependent Variable: ROA
Method: Least Squares
Date: 05/16/15 Time: 09:09
Sample: 1 90
Included observations: 90

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.262597 | 0.118184 | -2.221931 | 0.0290 |
| SZ | 0.041491 | 0.013845 | 2.996805 | 0.0036 |
| AG | 0.000588 | 0.000829 | 0.708991 | 0.4803 |
| LV | -0.024155 | 0.006668 | -3.622569 | 0.0005 |
| FG | 0.138819 | 0.024736 | 5.612092 | 0.0000 |
| LQ | -0.004912 | 0.017044 | -0.288177 | 0.7739 |
| TA | 0.006077 | 0.043354 | 0.140164 | 0.8889 |

| | | | |
|---|---|---|---|
| R-squared | 0.448206 | Mean dependent var | 0.068517 |
| Adjusted R-squared | 0.408318 | S.D. dependent var | 0.044649 |
| S.E. of regression | 0.034344 | Akaike info criterion | -3.830167 |
| Sum squared resid | 0.097902 | Schwarz criterion | -3.635737 |
| Log likelihood | 179.3575 | Hannan-Quinn criter. | -3.751761 |
| F-statistic | 11.23643 | Durbin-Watson stat | 1.863962 |
| Prob(F-statistic) | 0.000000 | | |

## Appendix IV: Normality Test




| | |
|---|---|
| Series: Residuals | |
| Sample 1 90 | |
| Observations 90 | |
| Mean | 1.74e-17 |
| Median | -0.002660 |
| Maximum | 0.063947 |
| Minimum | -0.075172 |
| Std. Dev. | 0.030910 |
| Skewness | 0.087124 |
| Kurtosis | 2.575970 |
| Jarque-Bera | 0.788114 |
| Probability | 0.674316 |

## Appendix V: hetroskedasticity Test Result

Heteroskedasticity Test: White

| | | | |
|---|---|---|---|
| F-statistic | 0.778387 | Prob. F(8,81) | 0.6228 |
| Obs*R-squared | 6.425055 | Prob. Chi-Square(8) | 0.5997 |
| Scaled explained SS | 4.100907 | Prob. Chi-Square(8) | 0.8479 |

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/22/15 Time: 00:51
Sample: 1 90
Included observations: 90

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.002645 | 0.002818 | 0.938472 | 0.3508 |
| SZ^2 | -2.04E-05 | 3.22E-05 | -0.633100 | 0.5285 |
| AG^2 | 2.96E-07 | 6.68E-07 | 0.443249 | 0.6588 |
| LV^2 | 3.85E-05 | 3.68E-05 | 1.048606 | 0.2975 |
| FG^2 | 0.002065 | 0.001557 | 1.326474 | 0.1884 |
| LQ^2 | -0.000109 | 0.000165 | -0.662112 | 0.5098 |
| TA^2 | 0.000982 | 0.002864 | 0.342901 | 0.7326 |
| EG^2 | -0.045300 | 0.079930 | -0.566745 | 0.5725 |
| IF^2 | -0.001039 | 0.003735 | -0.278315 | 0.7815 |

| | | | |
|---|---|---|---|
| R-squared | 0.071390 | Mean dependent var | 0.000945 |
| Adjusted R-squared | -0.020325 | S.D. dependent var | 0.001193 |
| S.E. of regression | 0.001205 | Akaike info criterion | -10.51040 |
| Sum squared resid | 0.000118 | Schwarz criterion | -10.26042 |
| Log likelihood | 481.9682 | Hannan-Quinn criter. | -10.40960 |
| F-statistic | 0.778387 | Durbin-Watson stat | 2.160843 |
| Prob(F-statistic) | 0.622832 | | |

## Appendix VI: Descriptive Statistics Result

| | ROA | SZ | AG | LV | FG | LQ | TA | EG | IF |
|---|---|---|---|---|---|---|---|---|---|
| Mean | 0.068517 | 8.259392 | 15.83333 | 1.877564 | 0.208571 | 1.119691 | 0.166902 | 0.109100 | 0.170000 |
| Median | 0.069858 | 8.246578 | 14.00000 | 1.735471 | 0.178784 | 1.081829 | 0.144720 | 0.113500 | 0.146500 |
| Maximum | 0.174276 | 9.420288 | 39.00000 | 5.937539 | 0.670072 | 2.604086 | 0.541653 | 0.126000 | 0.364000 |
| Minimum | -0.047560 | 7.177396 | 12.00000 | 0.502881 | -0.133524 | 0.548463 | 0.015549 | 0.088000 | 0.028000 |
| Std. Dev. | 0.044649 | 0.474028 | 7.630880 | 0.745259 | 0.160001 | 0.300973 | 0.109427 | 0.011130 | 0.110528 |
| Skewness | -0.107129 | 0.153174 | 1.486691 | 1.981109 | 0.656422 | 2.450869 | 1.183390 | -0.432887 | 0.564616 |
| Kurtosis | 3.118965 | 2.764378 | 5.011470 | 11.23878 | 3.276439 | 12.17107 | 4.375318 | 2.165897 | 2.037503 |
| | | | | | | | | | |
| Jarque-Bera | 0.225221 | 0.560127 | 48.32628 | 313.4123 | 6.749912 | 405.5083 | 28.09931 | 5.419847 | 8.255873 |
| Probability | 0.893498 | 0.755736 | 0.000000 | 0.000000 | 0.034220 | 0.000000 | 0.000001 | 0.066542 | 0.016116 |
| | | | | | | | | | |
| Sum | 6.166487 | 743.3453 | 1425.000 | 168.9808 | 18.77141 | 100.7722 | 15.02114 | 9.819000 | 15.30000 |
| Sum Sq. Dev. | 0.177425 | 19.99854 | 5182.500 | 49.43153 | 2.278418 | 8.062040 | 1.065710 | 0.011024 | 1.087254 |
| | | | | | | | | | |
| Observations | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |