

Macroeconomic and Firm Specific Determinants of Profitability of Insurance Industry in Ethiopia

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Abstract

This study was conducted on the determinants of profitability of Ethiopian insurance industry. The study attempts to examine the firm specific factors which are age of company, size of company, leverage ratio, liquidity ratio, premium growth, technical provision, underwriting risk, solvency, reinsurance dependency and tangibility of assets and macroeconomic factors; GDP and Inflation on profitability of Ethiopian insurance industry. Nine insurance companies from the total of 17 insurance companies established before 2008 were included in the study. Secondary data that was collected from the financial statements (Balance sheet and income statements) of insurance companies; and annual reports of National bank of Ethiopia are the major sources of data for this study. This study found that under writing risk, technical provision, leverage and inflation have negative and significant effect whereas premium growth, age of the company, solvency ratio and GDP have statically positive and significant relationship with the profitability of Ethiopian insurance industry. However, the study found that liquidity, re-insurance dependency, tangibility of assets and company size have no significant effect on the profitability of insurance industry in Ethiopia.

Index terms— Profitability of Insurance industry, Macroeconomic and Firm Specific Determinants, Insurance Industry in Ethiopia.

1 I. Introduction

Insurance companies are playing vital role through saving, pooling of funds for huge investment, risk sharing and protection from suffering from risk for economic growth of developed and developing countries. That is, insurance companies, by channeling funds from savers to those have shortage of funds but have business ideas, and transferring risks from insurers to the insureds, can facilitate fund mobilization, saving and investment in particular country.

Previous study, Naveed et al (2011), stated that the effectiveness of insurance companies and transfer of risk can have an influence on economic growth and institutional insolvencies can result in systemic risk which have adverse results in the country in general and in insurance industry in particular. Therefore, the vital role that financial institutions such as insurance companies remain in financing and insuring economic activities and contribute to the stability of the financial system in particular and the stability of the economy of a particular country in general, is part of protected and repaired system of the economy.

In doing so, insurance industry in general and insurance company in particular should be financially sound and examining the determinants of financial soundness of insurance industry, is a big concern of the business research.

Hence, the issue needs empirical analysis so as to sort out what are the major factors influencing profitability of insurance industry in Ethiopia too and this will help concerned bodies to focus on the relevant factors. The sound financial performance of insurance industry is important and studies by different previous researchers focus

on what factors affecting the financial performance of the sector. Likewise, this study examined firm specific and macro-economic determinants of profitability of Ethiopian insurance industry.

2 a) Problem statements

Insurance companies can support businesses and individuals through channeling funds and indemnifying the losses of other sectors in the economy. Moreover, insurance companies offer economic and social benefits in the society through loss prevention, anxiety reduction, fear reduction and increasing employment.

According to Hifza (2011), profitability is the ultimate goal of wealth maximization of financial management. The best soundness of any industry in general and any firm in particular plays the role of rising the market value of that specific firm attached with the role of leading towards the growth of the whole industry which finally leads to the overall success of the economy. measuring the financial performance of insurance industry is important and researchable area in the business research as the sector is not only providing the means of saving money and transferring risk but also helps channeling funds from surplus economic units to deficit economic units so investment activities in a country can be promoted.

The insurance industry is part of protected and repair scheme of an economy and successful operation of the industry can set energy for other industries and development of a country. For doing so, the insurance industry is expected to be financially sound enough or profitable in operation. Therefore, not only measuring the financial performance of insurance companies but also comprehensible imminent on factor influencing financial performance in the industry is the problem that must be examined. The Ethiopian economy is highly supported by insurance industry followed from the banking industry. As a result, the financial soundness of insurance industry in Ethiopia is not a compromising issue and examining the factors that can have an influence on the industry is highly researchable area.

The above critical issues motivated the researcher to put some sort of contribution on what factors have an effect on the financial performance of insurance companies. While taking importance of the issue of factors determining the profitability of insurance industry, the researcher tried to examine macroeconomic and firm specific factors that have influence on the profitability Ethiopian insurance industry.

3 b) Hypothesis

H1: age has significant and positive effect on Ethiopian insurance industry's profitability.

H2: size has positive and significant effect on insurance industry's profitability in Ethiopia.

H3: leverage has negative and significant effects on profitability of Ethiopian insurance industry.

H4: Tangibility of assets of insurance companies and their profitability are positively related.

4 H5:

Liquidity ratio and profitability of insurance companies are negatively related.

H6: solvency has positive and significant effect on profitability of Ethiopian insurance industry. H7: premium growth has significant and positive effect on insurance industry's profitability in Ethiopia.

H8: re-insurance dependency significantly and negatively affects the profitability of Ethiopian insurance industry.

H9: underwriting risk has a negative and significant effect on Ethiopian insurance industry's profitability. H10: technical provision has a negative and significant effect on profitability of Ethiopian insurance industry.

H11: GDP has positive and significant effect on profitability of insurance industry in Ethiopia.

H12: Inflation has negative and significant effect on Ethiopian insurance industry profitability.

5 c) Research objectives

The main objective of this study is to identify the major factors that affect the profitability of insurance industry in Ethiopia. Specifically, this study is designed to measure the extent to which these determinants exert impact on insurance companies' profitability; to determine the relationship between these factors and profitability in insurance companies and to make policy recommendations regarding the key drivers of profitability of insurance companies in Ethiopia based on the empirical findings.

6 d) Significant of the study

This research will help the policy makers and managers of insurance industry in Ethiopia to consider major determinants of insurance industry in Ethiopia. Despite the role of insurance for the overall growth of Ethiopian economy (that is affected by the performance or profitability of the industry), only few researches are conducted on the area. As far as the researcher's knowledge is concerned, there have not been empirical studies addressed the performance of insurance industry in Ethiopia. Thus, this research is aimed at filling this gap; motivate other researches to the area and providing appropriate recommendation.

7 e) Scope of the study

This study will be delimited on the firm specific determinants of profitability of insurance industry in Ethiopia from the fiscal year of 2008 to 2013. Both public and private and life and non life insurance companies will be included in the study.

8 II. Empirical Literature

Renbao Chen et.al (2004) investigated that "higher profit provide both the means (larger obtainability of money from retained earned or from the capital market) and the incentive (a high rate of return) for new investment". This shows that insurance companies are needed to profitable or financially sound so as to support other industries in the economy. Hifza (2011), stated that insurance companies plays vital role in promoting commercial and infrastructural businesses by encouraging financial and social stability; mobilizing and channeling savings; supporting trade, commerce and entrepreneurial activities and improves the standard of the lives of individuals and the overall wellbeing in a country. Renbao Chen et.al (2004) summarized firm specific factors affecting profitability of property or liability insurance of general insurers and life or health insurance and provide valuable guidelines for insurers financial soundness as life/health insurance companies are different from property/liability insurers in terms of business, investment, exposure and length of liabilities. According to Renbao Chen et.al 2004, Life insurers perform a function of financial intermediation though general insurers act as risk takers.

Hamdan (2008) stated that return on assets (ROA), return on equity (ROE) and return on invested capital (ROIC) are used for the measurement of insurance companies profitability. Accordingly, ROA is the measure of financial performance of the company using its total assets. This is an indication of how effective management is in using the total assets to generate earnings whereas ROE measures a company's profitability which tells how much a company generates earnings with the money shareholders have invested. ROIC is a measure used to measure a company's effectiveness in sharing the capital under its control in profitable business. This shows how well a company is in using its capital to generate returns. Comparing a company's ROIC with its weighted average cost of capital (WACC) indicates whether spent capital is used efficiently or not.

William H. Greene and Dam Segal (2004) in contrast, argued that the financial performance of insurance companies is normally expressed in net premium earned, underwriting profit, annual income, return on asset, return on equity. This can be categorized as profit performance and investment performance. Nevertheless, too many researchers in the field of insurance and their profitability stated that the key indicator of a firms' profitability is ROA. Philip Hardwick and Mike Adams (1999), Hafiz (2011) are among others, who have suggested among others, ROA can be the best proxy of profitability and better to use it.

Swiss Re (2008) indicated that profits are determined with underwriting performance (which are influenced by product pricing, risk selection, claims management, and marketing and administrative expenses) and investment performance.

Previous studies, Hifza(Athanasoglou et al. 2005), investigated newly established banks are not particularly profitable in their first years of operation, as they give higher focus on boosting their market share, rather than on improving profitability. Similarly, Yuqi li (2007) stated that older banks expected to be more profitable due to their longer tradition and they have good reputation.

Several studies have been conducted to evaluate the influence of company size and age on its profitability. However, the results on the relation of profitability with size of the company are somewhat different. For example, empirical study by Hardwick and Adams (1999) shows that there is an opposite relation between profitability and firm size. Brown (2007) found that age has a positive and significant effect on firms' profitability as measured by ROA.

Contrarily, Hamadan (2008) found that no significant statistical relation between age and profitability of insurance companies however, size has positive and significant effect on profitability. Also, Malik (2011) found that age has significantly and positive effect on company profitability.

Flamini et. al (2009) specified that size is used to show that larger companies are offering better economies of scale and providing a higher profits than smaller firms.

Accordingly, a positive relationship can exist between size and profitability by many insurance area researchers. However, for extremely large firms, the effect of size could be negative due to bureaucratic and other reasons (Yuqi Li, 2007). Therefore, the relationship between size and profitability may be expected to be non-linear. Athanasoglou et al. (2005) and Yuqi Li (2007) found positive relationship between size and profitability.

Liquidity is the probability of firm to pay liabilities which include operating expenses and payments for losses/benefits, reveals large current assets are held and idle if the ratio becomes high which could be examined in favorable investments. Naveed Ahmed et.al (2011) found that profitability (ROA) has no significant relationship with liquidity. Similarly, several researches evaluated the performance of the insurance companies. However, Chen and Wong (2004) found that liquidity is the important factor influencing of financial soundness of companies with a negative relationship.

Renbao Chen and Kie Ann Wong, (2004), Hamadan Ahamed Ali Al-Shami, (2008), Hifza Malik, (2011), Sylwester Kozak, (2011), Swiss Re, (2008) and Flamini et.al, (2009) found that negative and strong relationship between leverage and profitability of firms.

Tangibility of assets in insurance companies in most researches is determined by the proportion of fixed assets to total assets. Naveed Ahmed et.al (2011) investigated that size, profitability, age, risk, growth and tangibility

are selected as explanatory variables and ROA as the measure of profitability. The study revealed that leverage, size and risk are major factors of performance of long term insurance whilst tangibility of asset has significant effect on ROA contrary, Hafiz Malik (2011) and Yuqi Li (2007) investigated that tangibility of asset has positive and significant effect on profitability of insurers.

Chen-Ying Lee (2014) and Ana-Maria and Ghiorghe (2014) proved in their study that the financial leverage, company size, growth of gross written premiums, underwriting risk, and solvency margin are the most significant determinants of insurance industry's profitability.

In his study 'the effect of firm specific factors and macroeconomics on profitability property-liability insurance industry in Taiwan found that underwriting risk and reinsurance usage are the most determinants of profitability in Taiwan property-liability insurance industry. This study also found that economic growth is the most important determinants of profitability of insurance industry in Taiwan. Similarly, Doreen (2013) found there is a strong and positive relationship between GDP and insurance companies' profitability. Gatzlaff (2009) conducted research entitle dimensions of property-liability insurer performance and found that operational performance was negatively related to underwriting risk and premium growth. Lee and Lee (2012), Olajumoke Olaosebikan (2012) and Hsu-Hua and Chen (2012) found in their study that reinsurance, underwriting risks, and liquidity ratio have significant influence on firm performance.

Ana-Maria and Ghiorghe (2014) conducted a research on the Determinants of Financial Performance in the Romanian Insurance Market and the result shows that the financial leverage, company size, growth of gross written premiums, underwriting risk, and solvency margin are the most significant determinants of Romanian insurance industry's profitability.

Pervan and Pavi? (2010), Doreen (2013) and Y. Shiu (2004) in their study 'determinants of insurance companies' profitability in Croatia' found an inverse and significant effect of inflation on profitability of insurance industry.

B. Charumathi (2012) found that profitability of life insurers is positively and significantly influenced by the size and liquidity whereas, leverage, premium growth and negatively and significantly influenced the indicated that no significant relationship between underwriting risk and profitability.

9 III. Research Methodology a) Research design

Depending on the nature of the research problem and the research perspective, a research method could be based on the philosophy of quantitative or qualitative or a combination of these two approaches.

According to Creswell (2003), quantitative research uses a review of the existing literature to deductively develop theories and hypotheses to be tested; the research problem is translated to specific variables and hypotheses.

Similarly, Creswell (2003) described qualitative approach as it uses the philosophical assumption of social constructivism world view that provides an understanding of social reality based on the subjective interpretation. Besides, the third approach is mixed research approach that seeks a pragmatic knowledge claim philosophy that consists of both quantitative and qualitative approaches.

Thus, in order to achieve the objectives stated in the previous section, bearing in mind the nature of research problem and the research outlook, this study mainly employed mixed research approach.

10 b) Target Population and sample size

Currently, as of 2016, there are 17 insurance companies in Ethiopia (www.nbe.gov.et). All private and public insurance companies established before the year 2008 were selected as a sample purposely. Accordingly, nine insurance companies were included in this study.

11 c) Types and Sources of Data

The data used for this study was secondary data which was collected from the audited financial statements of each insurance companies and NBE from the fiscal year of 2004 to 2014.

12 d) Variables with its measurement

Variables Where ROA is return on assets, X it is dependent variables for insurance "i" at time "t", C is constant, β is the coefficient and ϵ is the error term.

13 IV. Result and Discussion

The data collected from annual reports of each insurance company was analyzed with the help of software (stata 12.0) and then was interpreted in the following section.

14 a) Testing multi-collinearity problem Table 4.1 : Testing multi-collinearity problem

15 Sources: author computation

The above table presents the multi-collinearity among the independent variables. According to Morgan et al, (2004), the variance inflation factor (VIF) above 10 or the tolerance value (1/VIF) below 0.1 is an indication that there is a problem of multi-collinearity among the variables. The above table shows that there is no VIF greater than 10 and 1/VIF below 0.1; in turn reveals any of the independent variable included in this study is not explained by the other. Hence all variables can be retained in the model of this study.

16 b) Testing hetroskedasticity problem Table 4.2 : Testing hetroskedasticity problem

17 Sources: author computation

Hetroskedastisty can be tested with Breush-Pagan test showing whether there is inconsistency (hetroskedastist) or consistency (homoskedastisty) in the variance of the error terms. The hetroskedastisty problem can be happened if the p-value of the test is below 0.05. However, the above table shows that the pvalue is above 0.05 which is 0.3572 meaning model is free from hetroskedastisty problem. As Morgan et al (2004) stated the adjusted Rsquare in the above table indicates how well the model variance explained. The adjusted R-square nearest to 1 is an indication that the model is strongly explained by the variables included in the study whereas the Adjusted R-square nearest to 0 is indicating that the model is not strongly explained by the variables used in the study. The above table shows that the adjusted R-square is 59.59% (0.5959), meaning 59.59% (0.5959) of profitability of insurance industry in Ethiopia is explained by under writing risk (CIEP), solvency ratio (NAPW), liquidity (CACL), company size (CS), premium growth (PG), re-insurance dependency (PCTA), leverage (IEV), technical provision (COE), tangibility of assets, age of the company, growth rate of GDP (GDP), and inflation (INF).

18 c) Hypothesis testing

This study found that under writing risk, technical provision, leverage and inflation have negative and significant effect whereas premium growth, age of the company, solvency ratio and GDP have statically positive and significant effect on the profitability of Ethiopian insurance industry. Despite, the study found that liquidity, re-insurance dependency, tangibility of assets and company size have no significant effect on the profitability of insurance industry in Ethiopia. From this it is possible to conclude that the most important determinants of Ethiopian insurance industry are under writing risk, solvency ratio, technical provision, leverage, inflation, premium growth, age of the company and GDP.

The regression result in the table 4.3 shows the relationship between profitability as proxied by Return on Assets (ROA) and age of the company is positive and significant (p-value of 0.0000) at 1 percent confidence interval. This is an indication that when the age of the companies increases, its return on assets will also raise. As a result the first hypothesis (H1) that age has a positive and significant effect on profitability of Ethiopian insurance industry's profitability is not rejected. The result of this study is similar with the result of Athanasoglou et al. (2005), Yuqi li (2007), Malik (2011), Swiss Re (2008), and Brown (2007) and contradicted with the result of previous study conducted by Hamadan (2008).

It is shown in the table above that size of the company has a positive and statistically significant (pvalue of 0.024) effect on the Ethiopian insurance industry's profitability. As a result the second hypothesis that size has positive and significant effect on insurance industry's profitability in Ethiopia is not rejected. The result of this research similar with the previous studies done by Ardwick and Adams (1999) Leverage and return on assets of Ethiopian insurance industry have negative and significant (with pvalue of 0.021) relationship. It was hypothesized that leverage has negative effect on the profitability of Ethiopian insurance industry. Thus the third hypothesis is not rejected showing that while the leverage of companies increased, the profitability of the industry will move to the opposite direction. This result tells us while the insurance companies increase their debt (if the insurance companies operate with huge debt), the 99 13.04 0.0000 0.6454 0.5959 profitability of the industry will significantly falls. This result was also proved by Renbao Chen and Kie Ann Wong (2004), Hamadan Ahamed Ali Al-Shami (2008), Hifza Malik (2011), Sylwester Kozak (2011), Swiss Re (2008) and Flamini et.al (2009) and contradict with the study of Mirie Mwangi and Jane Wanjugu Murigu (2015), which found no relationship between leverage and Kenyan insurance industry's profitability.

The regression in the above table 4.3 indicated that tangibility of assets have negative and insignificant effect on the profitability of insurance industry in Ethiopia. Even if there is a negative relationship between return on assets of insurance industry in Ethiopia and tangibility of assets, their relationship is not significant, hence, the fourth hypothesis is rejected. The result of this study on this variable is consistent with the result of Naveed Ahmed et.al (2011) and Yuqi Li (2007) and contracted with the result of the study conducted by Hafiz Malik (2011).

It is found that liquidity has positive and insignificant effect on ROA of Ethiopian insurance industry. Thus the fifth hypothesis that liquidity and profitability of insurance industry in Ethiopia are negatively related is rejected. This result is similar with ??Naveed Ahmed et.al, 2011), Daniel Mehari and Tilahun Aemiro, 2013), Adams and Buckle (2000) and Bilal et al (2013) and is not consistent with empirical results Wong, 2004), andValentina et al, 2009).

The solvency ratio and the return on assets of Ethiopian insurance industry have positive and significant relationship. This indicated that when the solvency of insurance companies is strong, the profitability of the industry will be increased. Thus, the hypothesis that solvency ratio has positive and significant effect on profitability of Ethiopian insurance industry, is not rejected. The result of this study is similar with result of the research previously conducted by Ana-Maria BURCA and Ghiorghe BATRÎNCA (2014), Shiu (2004), (B. Charumathi (2013). This is an indication that financially sound insurance companies are be able to maximaze their profitability.

The premium growth is considered the major determinants of insurance industry profitability everywhere. Similarly, the result of this study indicated that premium growth is positive and significant effect on the profitability of Ethiopian insurance industry and the seventh hypothesis is not rejected. The same result was proved in previous studies conducted by Emine Öner Kaya (2015), and contradicted with the result of Ana-Maria and Ghiorghe (2014) and B. Charumathi (2012) that found negative and significant relationship between profitability of Turkish insurance industry and premium growth.

It is proved from the above regression analysis that the re-insurance dependency doesn't have a significant effect on the profitability of Ethiopian insurance industry. Therefore, the eighth hypothesis is rejected. Basically, purchasing a re-insurance is for the purpose of providing protection against catastrophic losses. However, in Ethiopia, the catastrophic losses are not the headache of insurance companies. Hence, the insurance companies are be able to determine appropriate ceding level and this can lead to a reduction in cost of reinsurance. Due to this, the relationship between re-insurance dependency and ROA of insurance industry in Ethiopia, have no significant relationship. The result of this study is similar with the result conducted by Chen-Ying Lee (2014) and contradicted with the result of Hafiza and Mobeen (214), which found positive and significant relationship between re-insurance dependency and insurance companies' profitability and Hsu-Hua and Chen (2012) and Olajumoke (2012) that found significant but negative relationship between re-insurance dependency and ROA.

As it is found in this study, underwriting risk (CIEP) has negative and significant effect on Ethiopian insurance industry's profitability. Hence, the ninth hypothesis is not rejected. This result is not consistent with the previous study conducted in Kenya by Mirie Mwangi and Jane Wanjugu Murigu (2015), which found no relationship between Kenyans insurance industry's profitability and under writing risk and Chen-Ying Lee (2014) which found positive relationship between underwriting risk and profitability of insurance industry of Taiwan but consistent with Ana-Maria and Ghiorghe (2014).

The regression result of this study revealed that the effect of technical provision on the Ethiopian insurance industry's profitability is significant and negative. Thus, the tenth hypothesis that technical provision has a negative and significant effect on profitability of Ethiopian insurance industry not rejected. Technical provisions is used to cover (for general insurance) provisions for items such as unearned premiums, unexpired risks, claims outstanding (whether or not reported), equalisation. Which means insurance companies set aside some sort of funds for contingencies or companies' solvency, which is not used for immediate operation of the companies. Therefore, this can have a negative effect on the profitability of insurance companies, which is similarly proved in this study.

As it is indicated in previous studies, the economic growth proxied by GDP is the most important determinants of insurance industry's profitability in the world. Likewise, it is proved in this study that GDP has positive and significant effect on Ethiopian insurance industry's profitability. This shows that the economic growth is a favorable factor for the rise of profitability of insurance industry in Ethiopia. Thus, the eleventh hypothesis is not rejected. The result of this study was similarly proved in previous studies done by ??ustina and Abdullah (2012), Beck and Webb (2003), Çelik and Kayali (2009), Redzuan (2011).

In most cases, inflation is a macro-economic challenge for the development and profitability of insurance industry in any country. However, the result of this study indicated that inflation is not a significant factor of Ethiopian insurance industry's profitability and the tenth hypothesis is rejected. This result is similar with previous studies Chen-Ying Lee, 2014), and Doumpos et al., 2012), and is not consistent with the previously conducted research (Doreen, 2013) and Y. ??hiu (2000), that found no significant relationship between profitability of insurance industry and inflation.

19 d) Correlation between ROA and independent variables

Table 4.4 : Correlation coefficients

20 Sources: author computation

As per the above table, the correlation coefficient between ROA and underwriting risk (CIEP), solvency ratio (NAPW), liquidity (CACL), technical provision (COE), leverage and inflation is negative indicating that an increase in underwriting risk (CIEP), solvency ratio (NAPW), liquidity (CACL), technical provision (COE),

leverage and inflation underwriting risk (CIEP), solvency ratio (NAPW), liquidity (CACL), technical provision (COE), leverage and inflation will lead to a decrease in the profitability of insurance companies of Ethiopia. on the other hand, the correlation coefficient between ROA and company size (CS), premium growth (PG), re-insurance dependency (PCTA), age of the company, tangibility of assets and GDP is positive showing an increase in company size (CS), premium growth (PG), re-insurance dependency (PCTA), age of the company, tangibility of assets and GDP company size (CS), premium growth (PG), reinsurance dependency (PCTA), age of the company, tangibility of assets and GDP will lead to an increase in the profitability of Ethiopian insurance industries' profitability.

21 V. Conclusion and Recommendation

Profitability is the major objectives of financial management because one goal of financial management is to maximize the owner's wealth. This study attempts to examine the effects of firm specific factors (age of company, size of company, leverage ratio, liquidity ratio, premium growth, technical provision, underwriting risk, solvency, re-insurance dependency and tangibility of assets) and macroeconomic factors (GDP and Inflation) on profitability of Ethiopian insurance industry. nine insurance companies from the total of 17 companies established before 2008 were included in the study. Secondary data that was obtained from the financial statements of insurance companies; financial publications of NBE are the major sources of the study.

This study found that under writing risk, technical provision, leverage and inflation have negative and significant effect whereas premium growth, age of the company, solvency ratio and GDP have statically positive and significant effect on the profitability of Ethiopian insurance industry. However, the study found that liquidity, re-insurance dependency, tangibility of assets and company size have no significant effect on the profitability of insurance industry in Ethiopia.

This study suggests that insurance companies should critically consider underwriting risk and should minimize the accumulation used for technical provision and the level of leverage.



Figure 1:

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Variable	VIF	1/VIF
napw	3.64	0.275095
coe	2.57	0.389662
ciep	2.15	0.464082
cacl	2.12	0.470945
pcta	2.00	0.500610
age	1.63	0.614648
pg	1.49	0.671438
gdp	1.45	0.688739
lev	1.45	0.691366
inf	1.38	0.726781
tangiblity	1.21	0.823763
cs	1.13	0.882480
Mean VIF	1.85	

Figure 2:

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

H0: Constant variance

Variables: fitted values of roa

chi2(1) = 0.85

Prob > chi2 = 0.3572

Figure 3:

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: Hypothesis testing

Figure 4: Table 4 . 3

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