PROFITABILITY ANALYSIS OF IRAN'S INSURANCE COMPANIES

CANDIDATE
NAME:

Reihaneh
JannatiKashani

REGRESSION ANALYSIS COURSE

SEMESTER: WINTER 2016

Contents

Introduction

Insurance companies are playing a pivotal role in encouraging investors to start their business even with high risk probability, by sharing a part of their risk. This risk absorbing role of insurance companies is vital in today's economoy. As with all other companiens, the performance of insurance companies need to be evaluated from time to time. Performance of an insurance company can be measured using the primary data that is published in annual reports and yearbooks. The aim of this report is to analyze the performance of Iran's life insurance companies in terms of their profitability. Profitablity will be calculated using a multiple regression model where the independent variables are the determinants like age, size, liquidity and loss ratio etc. Three life insurance private sector insurance companies have been selected for this purpose and their performance has been evaluated in this report.

Iran's insurance industry has two major branches:

1. Life insurance
2. Non-Life insurance

These both branches are performing in a competitive method. Under these categories lie many companies providing protection to their customers. This protection covers the policy holder's risk in case of losing life, declining health, damaging property, auto theftning etc. Insurers are trying to provide their customers best possible way of protection which can give them a sense of peace. Iran's life insurance sector is showing significant and rapid growth as the years are passing by.

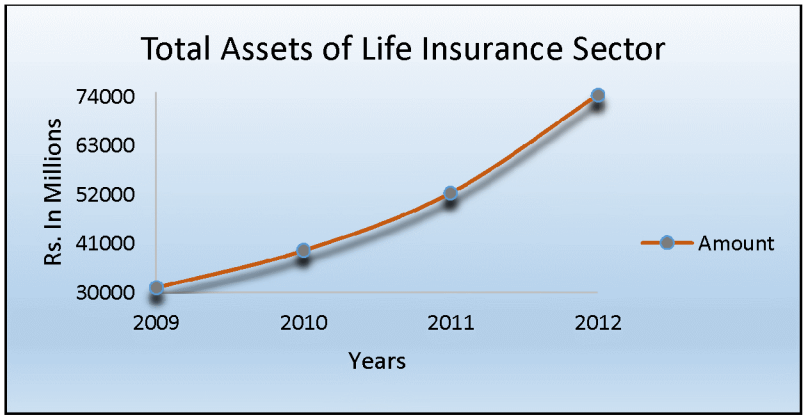

Figure 1: Total assets of life insurance sector of Iran

Figure shows increasing pattern of assets in Iran's insurance industry (life). Refered to Appendix A for details of assets. Since Life insurance private sector includes 3 major companies named as Asia Life, Alborz Life and Saman, this project analyze their data.

Literature Review

Performance evaluation parameters of Insurance companies:

Performance of any firm in particular and any industry in general is based on the profit of the industry which can be demonstrated by calculating its firm's assets, equity and capital. The profit of any industry or firm is evaluated by calculating its profitability. This profitability is dependent upon the determinants like age, size, volume, leverage, tangibility of assets etc. Chen and Wong (2004) stated in their investigation that "higher profits provide both the greater availability of finance from retained profits or from the capital market and a higher rate of return for new investment."

Mohandoss and Balamurugan (2013) have done the performance analysis of twelve public and private sector insurance companies of India. They have pointed out several variable onto which the performance of insurance companies may depend. Similary Mudaki et al. (2012) in his paper has found the operational parameters that effect the organizational performance of Kenyan insurance companies.

The concept of probability:

Profitability is one of the key measures of success of the business. A business that is highly profitable has the ability to reward its owners with a large return on their investment.

Life insurers' financial performance according to Akotey et al. (2013) can be measured by three parameters which are investment income, underwriting profit and overall sales profitability. Overall sales profitability defined by him is the summation of investment income and underwriting profit.Sambasivam and Ayele (2013) thinks profitability as one of the most important objective of financial management because he says that one goal of financial management is to maximize the owner's wealth.The firm's performance can be estimated by measuring the firm's profitability. Malik (2011); Ahmed (2011) defined profitability as the returns on assets and calculated it by dividing profit before tax to total assets.

Determinants of profatability in insurance industry:

According to Akotey et al. (2013) insurers' profitability is influenced by internal factors which effects on insurers' specific characteristics and external factors, concern industry factors as well as macro-economic variables. They described determinants of profitability as a three-level factor. First the micro level, it considers how size, capital, efficiency, age affect profitability. Second level meso refers to the influence of support institution and third macro level influence macro-economic factors. His findings indicate that gross written premiums have a positive relationship with insurer's sales profitability and negative with investment income and his study also showed that life insurers of Ghana have been incurring large underwriting losses.

Malik (2011) considered age of company, size of company, volume of capital, leverage ratio and loss ratio as the determinants of profitability. It concluded that there is no relation between profitability and age. Significant and positive relation of profitability was found with size and volume but significant and negative relation was showed by loss ratio and leverage.

Chen and Wong (2004) study says that size, investment and liquidity are significant determinants of the profitability of insurers. Whereas Ahmed (2011) claimed that liquidity is not a significant determinant of profitability but found risk and size are significantly and positively related to profitability and found leverage to be negative and significant determinant of profitability.

The results of regression by Sambasivam and Ayele (2013) reveals that leverage, size volume, growth and liquidity are important determinants of life insurance sector of Ethiopia whereas ROA has statistically insignificant relationship with age and tangibility.Mehari and Aemiro (2013) have also performed the analysis of insurance companies in Ethiopia. They have used similar determinants and their results correlate with that of Sambasivam and Ayele (2013).

Parameters of the model

The performance of an insurance company can be assessed based on some parameters that have been discussed in detail in the literature. Some of these parameters are:

Age of the company:

The age of the company is defined as the number of years from the date of company stablishment to the date of study.

Size of the company:

Performance is likely to increase in size, because larger firms will have better risk diversification, more economic scale advantage, and overall better cost efficiency. In this study, total premiums is used as a proxy for Company Size.

$$Company\ Size = Natural \log of\ total\ premiums$$

Risk (Loss Ratios):

Loss ratio vary depending upon the type of insurance. This shows how well the insurance company is doing. This variable is measured as the ratio of incurred claims to earned premiums:

$$Loss\ ratio = \frac{Net\ claims\ incurred}{Net\ earned\ premiums}$$

This ratio reflects if compaies are collecting premiums higher then the amount paid in claims or it is not collecting enough premiums to cover claims.

Leverage:

It is a financial ratio that measures the extent to which a company utilizes debt to finance growth. This indicates debt is not a bad thing it can be positive provided it is used for productive purposes. The Leverage Ratio is measured as:

$$Leverage = \frac{Total\ Liabilities}{Total\ Assets}$$

This ratio provides an indicaton of a company's capital structure and whether the company is more reliant on borrowing or equity to fund assets.

Liquidity ratio:

The Liquidity Ratio measures the firm's ability to use its near cash or "quick" assets to retire its liabilities.

$$Liquidity\ Ratio\ = \frac{Current\ Assets}{Current\ iabilities}$$

This liquidity ratio measures a company's ability to repay short term liabilities. The ratio is

useful as it shows whether the company has adequate resources to repay short term debts or it will face cash flow problems.

Premium Growth(PG):

Proxy for Premium Growth is the percentage increase in Gross Written Premiums (GWP). The equation is expressed as follows:

$$PG = \frac{GWP(t) - GWP(t-1)}{GWP(t-1)}$$

The tangibility of assets (TA):

Tangible assets have physical form. Those assets are called tangible whose life is more than one year. It is a ratio that measures the share of Fixed Assets (assets which are purchased for long-term) from Total Assets.

$$TA = \frac{Fixed\ Assets}{Total\ Assets}$$

Profitability:

The performance of company can be judged on the basis of its profitability which provides an indication of its ability to generate profits. As profits are used to fund business development. It can be calculated by using formula:

$$ROA = \frac{Net\ Income}{Total\ Assets}\ x\ 100$$

It is a measurement of management performance. It tells how well the company uses its assets to genetare income. Higher ROA means higher level of management performance.

Working Pattern

There are different techniques to check the profitability but the most useful technique which is applied by many researchers, is to calculate the returns on assets (ROA) of a particular firm or for an overall industry. The determinants of profitability from literature review were found to be age of company, size of company, growth, tangibility of assets, liquidity, leverage and loss ratio. These determinants show a relationship with the profitability, which is determined by applying

regression. Each of the determinant has different influence on profitability and the impact of each factor on overall performance of company can be easily found. Correlation is another technique which is used to check the relationship between two or more determinant variables.

The report is going to check the validity of the hypothesized relationship between performance and its determinants. The analysis is done on a set of data that is available publicly. The data is processed in different software before applying the regression model.

Source of Data

Research topic indicates the analysis of different insurance companies' life working in Iran. For such analysis we have taken the published data of insurance industries working in Iran. Every year each private sector company releases its year book which shows its progress for the whole year. The data was in the form of balance sheet and profit and loss account. The raw data once obtained from published sources, was organized to obtain what is known as secondary data. Appendix A reveal the format of data.

Profitability Analysis

Regression analysis is a process used in statistics for estimating the relation among variables Regression analysis is used to discover how each of the determinant is related with the profitability either significantly/insignificantly or positively/negatively.

Table lists all the variables and their symbols which are used in the model.

Table 1: Variables for regression analysis

Variables	Symbols
Profitability	Prof
Age of Company	Age
Growth	Gro
Size of the Company	Size
Leverage	Lev
Tangibility of Assets	Tan
Liquidity	Liq
Risk (Loss Ratio)	Risk
Error	$\in$

The profitability can be described using a multiple regression model which can be stated in its most simple form as shown below.

$$Prof = \alpha + \beta_1(Age) + \beta_2(Gro) + \beta_3(Size) + \beta_4(Lev) + \beta_5(Tan) + \beta_6(Liq) + \beta_7(Risk) + \in$$

Regression coefficients β_i are calculated by running the regression which shows the relation of particular independent variable to the profitability. One more factor which should be checked during analysis is the significance of the regression estimates. The coefficient's significance can be checked by the p-value by using hypothesis testing.

Hypothesis Testing of Profitability Determinant's Coefficients

The hypothesis testing of regression coefficients tells us wether the coefficient is significant or insignificant at specified level of significance. The significance of regression coefficients can be tested by the help of p-value of t-statistics using the following steps.

STEP # 01: Null Hypothesis

$$H_o: the\ coefficients\ are\ insignificant$$

STEP # 02: Alternate Hypothesis

$$H_A: the\ coefficients\ are\ significant$$

STEP # 03: Level of Significance

$$\alpha = 0.001;\ \alpha = 0.01;\ \alpha = 0.05;\ \alpha = 0.1$$

STEP # 04: Decision

$$Reject\ the\ null\ hypothesis\ if$$

$$P - Value < \alpha\ (level\ of\ significance)$$

STEP # 05: Computation

$$On\ the\ basis\ of\ STEP\ \#\ 04\ do\ the\ conclusion$$

Hypothesis Testing for Overall Profitability Model

The hypothesis testing of overall regression model tells us wether the model is significant or insignificant at specified level of significance. The significance of regression model can be tested by the help of p-value of F-statistics using the following steps.

STEP # 01: Null Hypothesis

$$H_o: the\ model\ is\ insignificant$$

STEP # 02: Alternate Hypothesis

$$H_A: the\ model\ is\ significant$$

STEP # 03: Level of Significance

$$\alpha = 0.05$$

STEP # 04: Decision

$$Reject\ the\ null\ hypothesis\ if$$

$$P - Value < \alpha\ (level\ of\ significance)$$

STEP # 05: Computation

$$On\ the\ basis\ of\ STEP\ \#\ 04\ do\ the\ conclusion$$

Test for Heteroscedasticity

there are several formal methods for detecting that wheater the residuals suffer from heteroscedasticity or not. From all the methods we have chosen the method known as Breusch-Pegan test.

Hypothesis Testing for Breusch-Pegan Test

The hypothesis testing for verifying heterosedasticity using Breusch-Pegan test involves the following steps.

STEP # 01: Null Hypothesis

$$H_o: there\ exists\ constant\ variance$$

STEP # 02: Alternate Hypothesis

$$H_A: the\ exists\ non\ constant\ variance$$

STEP # 03: Level of Significance

$$\alpha = 0.05$$

STEP # 04: Decision

$$Reject\ the\ null\ hypothesis\ if$$

$$P - Value < \alpha\ (level\ of\ significance)$$

STEP # 05: Computation

$$On\ the\ basis\ of\ STEP\ \#\ 04\ do\ the\ conclusion$$

Test for Autocorrelation

There are several formal methods for detecting that whether the residuals suffer from autocorrelation or not. From all the methods we have choosen the method known as Durbin Watson test.

Hypothesis Testing for Durbin Watson Test

The description of Durbin Watson test is explained in Appendix B including the command used in R to generate the results.

STEP # 01: Null Hypothesis

$$H_o: no\ autocorrelation\ exists$$

STEP # 02: Alternate Hypothesis

$$H_A: autocorrelation\ exists$$

STEP # 03: Level of Significance

$$\alpha = 0.05$$

STEP # 04: Decision

$$Reject\ the\ null\ hypothesis\ if$$
$$P - Value < \alpha\ (level\ of\ significance)$$

STEP # 05: Computation

$$On\ the\ basis\ of\ STEP\ \#\ 04\ do\ the\ conclusion$$

Multi-collinearity Verification

Multicollinearity results in large variance and covariance or in short it directly increases the value of standard errors of coefficients. The standard errors are calculated by the formula:

$$S.E = \frac{\sqrt{\sum e_i^2}}{\sqrt{\sum (x_{1i} - \bar{x}_i)^2}\ \sqrt{(1 - r^2)}\ \sqrt{n - k - 1}}$$

Where r is the coefficient of correlation. The standard error depends upon the factor $\frac{1}{\sqrt{(1-r^2)}}$. This factor is known as SEIF (Standard Error Inflation Factor) and its square is known as VIF (Variance Inflation Factor). If the value of VIF is greater than 10 it causes multi-collinearity. The analysis of multi-collinearity will be performed on the basis of VIF value.

RESULTS

Regression Results

Table 2: Results of regression for life insurance

```
Residuals:
      Min        1Q    Median        3Q       Max
-0.012503 -0.009461  0.003792  0.006352  0.011716

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.0517911  0.2344765   0.221  0.82963
Age          0.0008576  0.0037209   0.230  0.82237
Gro         -0.0005839  0.0002467  -2.366  0.03952 *
Size        -0.0297367  0.0193986  -1.533  0.15630
Lev          0.5938959  0.2325986   2.553  0.02870 *
Tan         -1.5708533  0.5638097  -2.786  0.01925 *
Liq         -0.0149408  0.0092885  -1.609  0.13880
Risk        -0.2444010  0.0689661  -3.544  0.00532 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.0112 on 10 degrees of freedom
Multiple R-squared:  0.7568,    Adjusted R-squared:  0.5866
F-statistic: 4.446 on 7 and 10 DF,  p-value: 0.01705
```

Above table provides us the values of regression coefficients named as estimates, its standard errors, t-statistics value and p-value. The output is from R-programming language it provides us the results telling the significance of coefficients at different level of significance i.e. at 0, 0.001=0.1%, 0.01=1%, 0.05=5% and 0.1=10% otherwise insignificant.

The above result shows that liquidity and growth are negatively related to profitability but significant at 10% level of significance. Leverage and tangibility are also significant coefficients but at 5% level of significance. Leverage is positively related to profitability but tangibility is negatively related to profitability. Risk is also significantly and negatively related to profitability at 1% level of significance. Age is positively related to profitability and size is negatively related to profitability but they both forbade to reject the null hypothesis as their p-value is not less than α (level of significance) so they both are insignificant determinants of profitability.

The overall model is significant as it shows the p-value (0.014) of F-statistic is less than α (level of significance). Therefore we reject the null hypothesis and say that the model is significant. The model we considered and the data we collect says that 76% of our data is explained and

remaining 24% data remain unexplained as the value of $R^2 = 0.76$.

Assumptions Verification Graphically

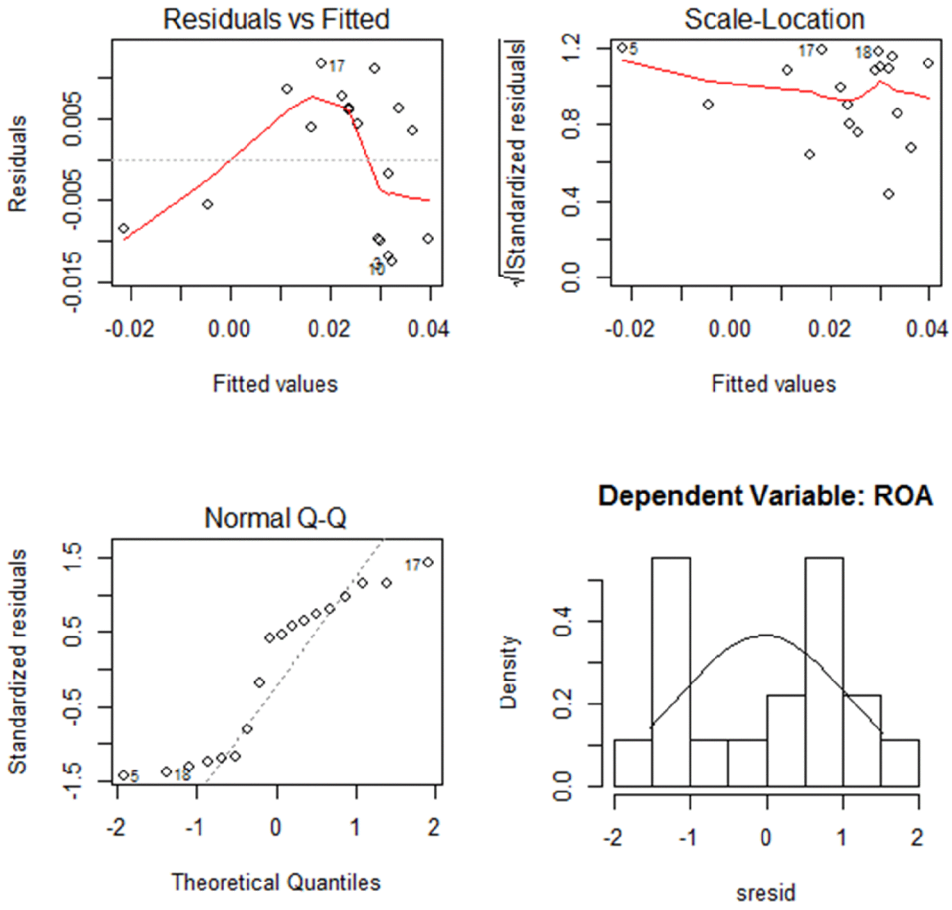

Figure 2: Verifying the regression model

After running the regression model it is necessary to check the assumptions of CLRM (classical linear regression model) and our data verifies the assumptions to run OLS estimate. The figures in the first row do not show any evidence of heteroscedasticity in the errors of data. The figures in the last row proves that residuals follow normal distribution.

Heteroscedasticity Breusch-Pegan Test

Table 3: Breusch-Pegan test results

```
        studentized Breusch-Pagan test

data:  reg
BP = 2.5618, df = 7, p-value = 0.9224
```

The results of test says that errors are homoscedastic. The p-value (0.439) is not less than 0.05

level of significance therefore we do not reject the null hypothesis and this gives prove that disturbances have equal variance.

Autocorrelation Durbin Watson Test

Table 4: Durbin Watson test results

lag	Autocorrelation	D-W Statistic	p-value
1	-0.1531233	2.198136	0.634

Alternative hypothesis: rho != 0

P-value (0.534) is greater than 0.05 level of significance so we do not reject null hypothesis and conclude that no auto correlation exists between the disturbances.

Verification of Multi-collinearity

Table 5: Variance inflation factor results

Age	Gro	Size	Lev	Tan	Liq	Risk
11.085856	1.892096	12.346403	8.438765	2.307478	1.945811	8.260933

Table 6: Square root of variance inflation factor results

Age	Gro	Size	Lev	Tan	Liq	Risk
3.329543	1.375535	3.513745	2.904955	1.519038	1.394923	2.874184

In Table the value of VIF for age and size are greater than ten and Table shows that value of age size are greater than 2 therefore from this we say data has multi collinearity in it.For more conformation we generate correlations between all dependent as well independent variables.

Correlation

Table 7: Correlation coefficients table

Correlation	PROF	AGE	GRO	SIZE	LEV	LIQ	RISK
PROF	1.000000						
AGE	0.303422	1.000000					
GRO	-0.122326	-0.001845	1.000000				
SIZE	0.251813	0.869308	0.269899	1.000000			
LEV	0.009877	0.278035	-0.073966	0.454983	1.000000		
LIQ	-0.245860	0.180234	-0.223650	-0.065792	-0.048708	1.000000	
RISK	-0.337063	-0.410195	-0.197392	-0.221848	0.673508	-0.234862	1.000000

In the Table correlations between the different variable used in the regression model including dependent variable are calculated from Eviews software. It is easily observable that the correlation between age and size is above the moderate relationship which shows strong correlation as the range of correlation is -1 to +1.

Removing Multi-collinearity

Table 8: Regression coefficients results after removing variables age and size of company

```
Residuals:
      Min        1Q    Median        3Q       Max
-0.012562 -0.008919  0.003076  0.006979  0.011202

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.0033334  0.0992234   0.034  0.97380
Gro         -0.0006133  0.0002019  -3.037  0.01130 *
Size        -0.0262267  0.0114868  -2.283  0.04329 *
Lev          0.6030936  0.2190650   2.753  0.01879 *
Tan         -1.5298415  0.5114479  -2.991  0.01227 *
Liq         -0.0147662  0.0088501  -1.668  0.12341
Risk        -0.2503209  0.0611878  -4.091  0.00179 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.01071 on 11 degrees of freedom
Multiple R-squared:  0.7555,    Adjusted R-squared:  0.6222
F-statistic: 5.665 on 6 and 11 DF,  p-value: 0.006634
```

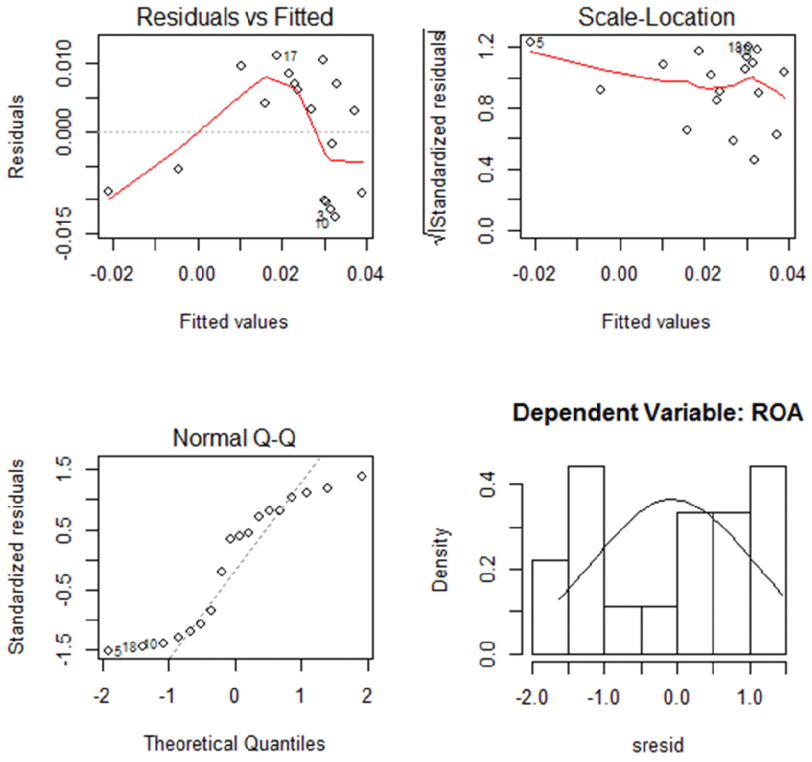

Figure 3: Verifying regression model after removing variables age and size of company

Table 9:

```
        studentized Breusch-Pagan test

data:  reg
BP = 3.2412, df = 6, p-value = 0.778
```

Table 10:

```
lag Autocorrelation D-W Statistic p-value
  1      -0.1669611      2.208106   0.912
Alternative hypothesis: rho != 0
```

Table 11:

```
     Gro      Size      Lev      Tan      Liq     Risk
1.386362 4.736830 8.190348 2.077625 1.932867 7.115066
```

Table 12:

```
     Gro      Size      Lev      Tan      Liq     Risk
1.177439 2.176426 2.861878 1.441397 1.390276 2.667408
```

Table 13:

Correlation	PROF	GRO	SIZE	LEV	TAN	LIQ	RISK
PROF	1.000000						
GRO	-0.168803	1.000000					
SIZE	0.206275	0.269899	1.000000				
LEV	0.004421	-0.073966	0.454983	1.000000			
TAN	-0.363797	-0.393192	-0.269008	-0.320959	1.000000		
LIQ	-0.230547	-0.223650	-0.065792	-0.048708	0.587437	1.000000	
RISK	-0.307070	-0.197392	-0.221848	0.673508	-0.276726	-0.234862	1.000000

Conclusion

Iran's insurance sector consists of companies that provide life as well as non-life insurance. These insurance companies have played a major role in attracting investors to Iran for starting their businesses. The performance of these companies has been imporving since their inception.

References

Ahmed, N. 2011. Determinants of Performance: A Case of Life Insurance Sector of Pakistan. *International Research Journal of Finance and Economics* (61):123-128.

Akotey, J. O., F. G. Sackey, L. Amoah, and R. F. Manso. 2013. The Financial Performance of Life Insurance Companies in Ghana. In *CSAE Conference 2013: Economic Development in Africa*. Oxford.

Chen, R., and K. A. Wong. 2004. The Determinants of Financial Health of Asian Insurance Companies. *Journal of Risk and Insurance* 71 (3):469-499.

Malik, H. 2011. Determinants of Insurance Companies Profitability: An Analysis of Insurance Sector of Pakistan. *Academic Research International* 1 (3):315-321.

Mehari, D., and T. Aemiro. 2013. FIRM SPECIFIC FACTORS THAT DETERMINE INSURANCE COMPANIES'PERFORMANCE IN ETHIOPIA. *European Scientific Journal* 9 (10).

Mohandoss, K., and M. Balamurugan. 2013. A STUDY ON PERFORMANCE OF INSURANCE INDUSTRY IN INDIA.

Mudaki, A. L., D. Wanjere, I. Ochieng, and O. Odera. 2012. Effects of operational factors on organizational performance in Kenyan insurance industry. *International Journal of Business and Social Science* 3 (17):237-241.

Sambasivam, Y., and A. G. Ayele. 2013. A Study on the Performance of Insurance Companies in Ethiopia. *International Journal of marketing, Financial Services and Management Research* 2 (7):138 - 150.

Appendix

	Assets Amount for Private Life Sector			
Years	2012	2013	2014	2015
Assets	31078.88	39431.98	52389.44	74411.11

Secondary Data of Life Insurance Sector									
Year	Company	Age of Company	Growth	Size of Company	Leverage	Tangibility of Assets	Liquidity	Risk	Profitability
2015	Asia Life	20	17.76	16.24	0.95	0.02	1.24	0.23	0.04
2014		19	21.18	16.08	0.94	0.02	1.3	0.25	0.03
2013		18	17	15.89	0.93	0.02	1.18	0.23	0.02
2012		17	-0.56	15.73	0.91	0.02	1.68	0.19	0.04
2011		16	45.66	15.73	0.89	0.03	1.85	0.19	-0.03
2010		15	53.61	15.3	0.9	0.02	1.42	0.2	0.02
2015	Alborz Life	16	48.28	16.26	0.92	0.01	0.67	0.2	0.03
2014		15	42.28	15.86	0.91	0.01	0.53	0.23	0.04
2013		14	34.46	15.51	0.9	0.01	0.8	0.3	0.02
2012		13	29.66	15.22	0.93	0.01	0.94	0.34	0.02
2011		12	12.61	14.96	0.93	0.02	0.87	0.5	-0.01
2010		11	33	14.84	0.92	0.01	1.32	0.36	0.03
2015	Saman	18	48.27	16.26	0.91	0.01	1.56	0.11	0.02
2014		17	42.27	15.86	0.89	0.02	1.06	0.08	0.03
2013		16	34.5	15.51	0.85	0.01	0.93	0.08	0.03
2012		15	29.66	15.22	0.83	0.02	0.8	0.09	0.03
2011		14	12.61	14.96	0.86	0.03	2.01	0.11	0.03
2010		13	18	14.84	0.85	0.03	1.14	0.09	0.02