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On the Determinants of Solvency Margin of Indian General Insurers

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Abstract

Solvency ratio is an important indicator of the financial health of an insurance firm and denotes its ability to survive in the long run. It is the ratio of the amount of Available Solvency Margin (ASM) to the amount of Required Solvency Margin (RSM). Available Solvency Margin means the excess value of assets over the value of life insurance liabilities and other liabilities of policyholders' and shareholders' funds. While life insurers are considered financial intermediaries, general insurers are perceived as risk takers. This underlines the importance of solvency for general insurers as an indicator of their financial health. Indian general insurers have been striving hard to maintain the mandatory solvency ratio of 1.5. Although most of the companies have maintained the required solvency margin, the effect of the Motor Third party Insurance Pool is making their business difficult. The authority has hence relaxed the solvency norms for the future periods. In this context, this study aims to model the factors significantly affecting the financial health of Indian general insurers taking solvency ratio as dependent variable. This is an empirical study. It has taken all the 19 Indian general insurers (4 public and 15 private) as sample and used annual data pertaining to 7 financial years, viz., 2005-06 to 2011-12. The required data were taken from the Insurance Regulatory and Development Authority of India (IRDA) data base and Annual Reports of the respective firms. This study employs multiple linear regression model. For this purpose, the company specific characteristics such as capital adequacy, reinsurance actuarial issues, efficiency and profitability, investment performance and combined ratioare regressed against the solvency ratio. It is found that capital adequacy, earnings and profitability, investment performance, combined ratio and total assets (proxy for size) are the determinants of solvency ratio of general insurers in India.

Keywords: *Insurance regulation, Solvency ratio, Indian general insurers.*

1. Introduction

One of the principal concerns underlying the regulation of the insurance companies is the need to protect the interest of and secure fair treatment to policyholders. While life insurers are considered financial intermediaries, general insurers are perceived as risk takers. Increasing liberalization in the insurance industry, coupled with the uncertain economic conditions the world over, requires that the insurers' finances are in a sound condition and are being properly managed. The linchpin of insurance regulation is the use of early-warning systems designed to identify high-risk and troubled insurers for closer scrutiny and possible intervention. This

is done to ensure speedy and orderly growth of the insurance industry, along with providing benefit to the common man, and provide long term funds for accelerating growth of the economy.

In a period of less than half a century, the Indian insurance sector has come a full circle from being an open competitive market (pre 1956), to complete nationalization (1956-2000) and then back to a liberalized market(post 2000).[1] The Indian insurance industry was characterized by the presence of only public sector players devoid of even little competition. In non-life sector, in December, 2000, the subsidiaries of the General Insurance Corporation of India (GIC), viz., National Insurance Company, New India Assurance Company, Oriental Insurance Company and the United India Insurance Company, were restructured as independent companies and at the same time GIC was converted into a national re-insurer. In order to encourage competition and improve insurance penetration, to innovate insurance products which suit customers better, to improve servicing standards in the industry, to allocate resources efficiently by dynamic management of portfolios and to bring about a change in consumer outlook, the insurance sector was re-opened in 1999. A hybrid model of privatization with an efficient regulatory mechanism was adopted which led to the constitution of IRDA in 1999, an autonomous body to regulate and develop the Indian insurance industry.There are twenty-seven general insurers including the specialised insurers and standalone health insurers in India as on 30th September 2012. Several private players apart from the public general insurers have completed ten years of existence.

2. Insurance Market – Global and Indian Scenario

The global insurance industry is one of the largest sectors of finance. The major insurance markets of the world are obviously the US, Europe, Japan, and South Korea. Emerging markets are found throughout Asia, specifically in India and China, and also in Latin America. In 2012, the global insurance market is forecast to have a value of $4,608.5 billion, an increase of 24.9% since 2007. The insurance market in India has witnessed dynamic changes including entry of a number of global insurers in both life and general segment. The Indian general insurance sector witnessed a significant growth of 13.5 per cent during 2011-12. The share of Indian non-life insurance premium in global non-life insurance premium increased slightly from 0.57 per cent in 2010- 11 to 0.62 per cent in the year 2011-12. India stood at 19th rank in global non-life premium income. As per the World Insurance Report, published by the reinsurance major "Swiss Re", the global direct premium in non-life insurance business grew by 1.9 per cent with Latin America reporting a high growth in 2011. The public sector insurers exhibited growth of 21.50 per cent and the private sector general insurers registered a growth of 28.06 per cent in 2011-12. Insurance penetration of the non-life insurance sector in the country has remained nearly constant in the range of 0.55-0.75 per cent over the last 10 years. However, the insurance density of non-life sector reached the peak of USD 10.0 in 2011 from its level of USD 2.4 in 2001.[2]

3. Solvency Margin & Regulations in India

The solvency of an insurance firm refers to its ability to pay claims. An insurer is insolvent if its assets are inadequate or illiquid to pay the claims arising. The solvency of insurance company or its financial strength depends chiefly on whether sufficient technical reserves have been set up for the obligations entered into and whether the company has adequate

capital as security **(Kansal 2004)**[3]. Solvency margin is the excess of assets over liabilities that the insurance company has to maintain in the form of a safety margin. The minimum solvency margin and the methods of valuations of assets and liabilities of an insurer are prescribed in the insurance regulations.**Pentikainen Helsinki (1967)**[4] highlighted the importance of evaluating the assets and liabilities in a reliable way.

Solvency ratio is an important indicator of the financial health of an insurance company and indicates the ability of the firm to survive in the long run. Insurance Regulatory and Development Authority (IRDA), the apex body in India, has prescribed methods of valuation of assets and Liabilities of general insurance as: a) "Available Solvency Margin" means the excess of value of assets (furnished in IRDA-Form-AA in accordance with Schedule I) over the value of general insurance liabilities (furnished in Form HG as specified in Regulation 4 of Insurance Regulatoryand Development Authority (Assets, Liabilities, and Solvency Margin of Insurers) Regulations, 2000)[5] .b) "Solvency Ratio (SR)" means the ratio of the amount of Available Solvency Margin (ASM) to the amount of Required Solvency Margin (RSM). Every general insurer shall determine the RSM, the ASM and the SR in Form KG. Table – 1 portrays the solvency ratio maintained by the Indian general insurers (Refer Appendix for the list of general insurers in India) during 2005-06 to 2011-12. It is clear from the table that the SR maintained by SBI was the highest (12) in 2010-11 and Shriram was the lowest (0.92) in 2011-12.

Table : 1 Solvency Ratio of Indian General Insurers during 2005-06 to 2011-12

S. No	*General Insurers*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*
				Public Insurers				
1	National	1.08	1.76	2.22	1.56	1.6	1.34	1.37
2	New India	3.09	3.57	4	3.41	3.55	2.9	2.03
3	Oriental	1.97	2.17	1.91	1.66	1.56	1.34	1.38
4	United	2.23	3	3.24	3.32	3.41	2.89	2.71
				Private Insurers				
5	Royal	1.66	1.64	1.59	1.64	1.39	1.56	1.36
6	Reliance	3.04	1.95	1.64	1.59	1.7	1.15	1.39
7	IFFCO	1.95	1.7	1.51	1.77	1.76	1.23	1.22
8	TATA	1.68	1.85	1.91	1.97	1.88	1.68	1.4
9	ICICI	1.29	2.08	2.03	2.03	2.07	1.56	1.36
10	Bajaj	1.22	1.56	1.55	1.62	1.54	1.73	1.56
11	Chola	2.51	2.63	2	1.02	1.76	1.61	1.33
12	HDFC	1.78	1.69	2.02	2.48	1.49	1.71	1.57
13	Future	NE	NE	2.61	1.83	1.54	2.06	1.69
14	Universal	NE	NE	4.68	4.23	3.15	2.14	2.95
15	Shriram	NE	NE	NE	1.94	1.75	1.32	0.92
16	Bharti	NE	NE	NE	2.11	2.38	1.7	2.18
17	Raheja	NE	NE	NE	NE	3.79	3.65	3.77
18	SBI	NE	NE	NE	NE	NE	12	10.23
19	L&T	NE	NE	NE	NE	NE	2.3	2.41

Source: IRDA Annual Reports of various years. NE- Not in Existence

Every general insurer shall prepare a statement of solvency margin in Form KG in accordance with Schedule III B. The Required Solvency Margin (RSM) shall be the maximum of the fifty crore of rupees (one hundred crore of rupees in the case of reinsurer); or higher of RSM-1 and RSM-2. RSM-1 means the Required Solvency Margin based on net premiums, and shall be determined as twenty per cent of the amount which is higher of the Gross Premiums multiplied by Factor A and the Net Premiums. For the purpose of calculation of RSM-1, premium of the last 12 months on rolling basis will be taken into account.RSM-2 means the Required Solvency Margin based on net incurred claims, and shall be determined as thirty per cent of the amount which is the higher of the Gross Net Incurred Claims multiplied by a factor B and the Net Incurred claims.

The Authority had investigated actuarial valuation of the Indian Motor Third Party Insurance Pool (IMTPIP) under the Insurance Act, 1938 in order to assess the adequacy of the reserves, which are to be calculated as per the IRDA Regulations. The Authority has mandated the general insurers to provide for the Motor Third Party Pool liability at 159 per cent since 2007-08onwards. The Authority has also relaxed the solvency requirement of 150 per cent and has mandated the insurers to maintain solvency ratio of not less than 130per cent, 140 per cent, and 150 per cent for all lines of business not later than 31st March, 2012, 31st March 2013 and 31st March, 2014 respectively. By the end of March 2012, seventeen general insurers (excluding the health insurers) had complied with the stipulated solvency ratio and two companies have not met the minimum requirement of solvency margin ratio.

4. Review of Literature

Daykin (1984)[6] established a framework differentiating between technical reserves and solvency margin of general insurers particularly in the context of a company having adequate resources to continue underwriting of business. **Harrington & Nelson(1986)**[7] suggested a new methodology using regression analysis for assessing the financial strength of U.S. property-liability insurers. The relationship between premium to surplus ratios and insurers characteristics using asset and product mix variables was estimated using the model. The efficiency of the method in insolvency prediction was compared to the NAIC IRIS, but firm conclusions could not be drawn due to the small sample employed. **Daykin (1987)**[8] proposed an emerging costs approach for examining the strength of a general insurer, after reviewing the problems associated with traditional balance sheet concept. **Ambrose & Seward (1988)**[9] incorporated Best's ratings into the discriminant analysis through a system of dummy variables. Best's ratings were then compared to the results obtained by the use of financial variables. Finally, a two-stage discriminant technique was introduced and the results were shown to be better for predicting insolvency for U.S. property-liability firms.

Brockett, Cooper, Golden & Pitaktong(1994)[10] introduced a neural network artificial intelligence model as an early warning system for predicting insurer insolvency. The results of the neural network method were compared with those of discriminant analysis, A. M. Best ratings, and the NAIC's Insurance Regulatory Information System (IRIS) ratings. The neural network results showed high predictability and generalizability. **Kim, Anderson & Amburgey(1995)**[11] employed a dynamic statistical methodology, the event history analysis, to examine U.S. insurer insolvencies for a sample of insolvent and solvent insurers from 1984 through 1990 for property-liability insurers, and from 1987 through 1990 for life insurers. For property-liability insurers, statistically significant factors included organizational age,

premium growth, investment yields, underwriting results, expense ratios, loss reserve exposure, and realized and unrealized capital gains. **Cummins, Harrington & Klein (1995)**[12] analysed the accuracy of the risk-based capital formula for US property-liability insurers adopted by the NAIC in the year 1993. **Browne & Hoyt (1995)**[13] tested the relationships between insolvency rate of U.S. property-liability insurers and exogenous economic and insurance market variables. Insolvency rate was positively related to the combined ratio and the number of companies in the industry. Also, the rate of insolvencies was significantly higher during the first quarter of the year than during the remainder of the year, suggesting that more stringent regulation might reduce the insolvency rate.

Tennant, Starks & Stokes (1996)[14] developed a loss cost function supported by a model for identifying potentially insolvent insurers on a cost-effective basis. **Lee & Urrutia (1996)**[15] compared the performance of logit and hazard models in predicting U.S. property-liability insurer insolvency. The logit model detected four variables that had statistically significant impact on the probability of insolvency of a property-liability insurer-ratio of net premiums written to surplus, return to policyholders' surplus, proportion of premiums written in long-tailed lines, and market value of invested bonds as a proportion of total admitted assets. On the other hand, the hazard model detected eight statistically significant variables-the four identified by the logit model plus operating margin, current liquidity ratio, rate of growth of surplus, and rate of growth of premiums written. The study concluded that the combined use of both models provided a more complete analysis of the insurance insolvency problem. **Kramer (1996)**[16] analysed the financial solidity of Dutch non-life insurers. Solvency, profitability, investments and market share were found to be the most significant factors.

Grace, Harrington & Klein (1998)[17] compared the effectiveness of Financial Analysis Solvency Tracking (FAST) system with Insurance Regulatory and Information System (IRIS) in the solvency prediction of insurers. **Grace, Harrington & Klein (1998)**[18] examined the classification power of RBC standards and FAST solvency screening mechanism followed by NAIC. RBC ratios were less powerful than FAST scores in identifying financially weak property-liability insurers during the sample periods. Also, RBC ratios and FAST scores were jointly more powerful in identifying weak insurers than FAST scores alone, which suggested that RBC ratios may convey new information about insolvency risk despite their relatively low power on a univariate basis. **Cummins, Grace & Phillips (1999)**[19] analysed the accuracy of insolvency predicting models used by NAIC namely the risk-based capital (RBC) system and the Financial Analysis and Surveillance Tracking (FAST) audit ratio system with a cash flow simulation model developed by the authors. Both the RBC and FAST systems were static and ratio-based approaches to solvency testing, whereas the cash flow simulation model implemented dynamic financial analysis. The FAST system dominated RBC as a static method for predicting insurer insolvencies. Further, the cash flow simulation variables added significant explanatory power to the regressions and led to more accurate solvency prediction than the ratio-based models taken alone. **Cummins, Doherty & Lo (2002)**[20] presented a theoretical framework for insurers to hold a net of reinsurance underwriting portfolio, perfectly correlated with aggregate industry losses.

Ceccarelli (2003)[21] analysed the insolvency risk among the Italian non-life insurers by adopting a deterministic cash flow simulation model and found a strong ability of the model in identifying insolvent insurers during the period and suggested that cash flow simulation

models may provide regulators and managers with useful information on insurance solvency. **Chen & Wong (2004)**[22] focused on the solvency of the general and life insurers in Asia, using firm data and macro data separately. With the exception of Japan, failures of insurers were non-existent in Singapore, Malaysia and Taiwan. For general insurers, firm size and investment performance significantly affected their financial performance. **Simpson, Yaw, Daoah & Oben (2008)**[23] compared the evaluation tools used by the National Insurance Commission (NIC), the regulatory and supervisory body of Ghana and the CARAMELS model in determining the financial health of non-life insurers. The framework used by NIC was not comprehensive enough to give early warnings to the industry's stakeholders and the CARAMELS model was more suitable and helped to bring to the fore, the financial behaviour of non-life insurers in Ghana. **Sharpe & Stadnik (2008)**[24] modelled the determinants of general insurers (GIs) rating (given by the Australian Prudential Regulation Authority (APRA) to rate the risk of failure) and solvency cover. The study found sufficient predictive power in the statistical data to identify GIs for earlier review and assist in quality assurance of APRA's ratings and the profitability, solvency cover, investment, and underwriting risks played different roles in rating foreign branch and Australian incorporated GIs. The study concluded that the supervisors correctly incorporated the effects of risk indicators on GI risk into their ratings.

Eling, Gatzert & Schmeiser (2009)[25] developed an alternative approach to assessing an insurer's solvency as a proposal for a standard model for Solvency II and tested its applicability using data from a German non-life insurer. The results were compared when the safety level was derived under three risk measures typically used in solvency regulation: the ruin probability, tail value at risk, and expected policyholder deficit. The idea behind the new approach was that in a situation of weak solvency, an insurer's asset allocation can be adjusted much more easily in the short term than claims cost distributions, operating expenses, or equity capital. **Pottier & Sommer (2011)**[26] evaluated the benefit of using group-level data to predict insurer insolvencies for group-affiliated insurers. The group-level variables were found to be substantially more powerful and accurate than company-level variables in predicting individual insurer insolvencies.

Following are the Indian studies: **Kansal (2004)**[27] discussed the concept of solvency margin as the ability of the insurance company to pay claims depending chiefly on sufficient technical reserves and adequate capital. The items taken into consideration for the calculation of solvency ratio include capital/funds, various reserves, unrealised profits and risks related to underwriting, interest rates and asset management. The solvency margin requirements for Indian life and general insurers have also been explained. **Sen (2008)**[28] identified the determinants of solvency among the Indian life and general insurers. The study found that investment performance, size of the insurer and the total number of insurers were the important predictors of insurer solvency. **Mamtaben (2005)**[29] analysed the financial performance and managerial effectiveness of Indian public life and general insurers during 1999 to 2003. **Darzi (2010)**[30] investigated the financial performance of Indian general insurers using CARAMEL approach in the post liberalisation era. **Sen (2012)**[31] analysed the factors influencing the solvency of Indian life insurers using regression model. The study found that the solvency of Indian life insurers was influenced by size, returns from investible funds and interest rate. The solvency of non-life insurers was influenced by interest rates, size as explained by total assets to earned premiums and combined ratio. **Srivastava & Ray (2013)**[32] benchmarked the

solvency status of eight Indian general insurers using operational and business data. The NAIC IRIS ratios method was used to obtain an initial risk classification and later used as a proxy of insolvency risk. Linear regression and Logit techniques were applied to estimate the significant factors which influenced Indian general insurer solvency that included the lines of business, firm's market share, premium growth rate, underwriting performance and the claims incurred. Further, the factors which had the strongest effect were market share, change in inflation rate, firm size, lines of business and claims incurred.

Research Gap

The insurance regulatory and supervisory infrastructure in India is relatively well developed. IRDA has a clear mandate and is a leader among emerging markets.[33] As the Indian insurance sector has a relatively large footprint relative to other forms of financial intermediation given India's income level, there is a need to achieve a healthier competitive environment in the insurance industry.[34] The general insurance sector has been opened up to the private and foreign players post the formation of the Insurance Regulator, IRDA in 1999. There has been no case of insolvency and all the general insurers in India are solvent so far. It is evident from Table -1 that the ASM maintained by the majority of the general insurers is more than the RSM. In comparison with life insurers, Indian general insurers have been striving hard to maintain the mandatory solvency ratio of 1.5. Although most of the companies have maintained the required solvency margin, the effect of the Motor Third party Insurance Pool is making their business difficult. Hence, the authority has relaxed the solvency norms for the future periods. In the light of the above, this study tried to determine the factors influencing the solvency ratio of general insurers in India.

5. Objective of the Study

This study aims to model the factors influencing the financial health of Indian general insurers taking Solvency Ratio as a dependent variable.

6. Research Methodology

This is an empirical study. It has taken all the 19 general insurers (4 public and 15 private) as sample (*Refer Appendix*). The study has excluded 2 specialised insurers (Export Credit Guarantee Corporation of India & Agricultural Insurance Corporation) and 3 standalone health insurers (Apollo Munich Health Insurance Company, Star Health Insurance Company & Max Bupa Health Insurance Company). It has taken data pertaining to 7 financial years, viz., 2005-06 to 2011-12. The required data were taken from the IRDA data base and Annual Reports of the respective companies. This study employs multiple linear regression model. For this purpose, the company specific characteristics such as capital position, reinsurance and actuarial issues, profitability, investment performance, size (as explained by Total Assets) and Combined Ratio are regressed against the solvency ratio. The variables used and the formulae are shown in Table 2:

Table – 2 Variables chosen for the study

Variables	*Formulae*
Solvency Ratio (SOL)	Available Solvency Margin/
Required Solvency Margin	
Capital Position (CAP)	Net Premium/Net Worth
Reinsurance & Actuarial Issues (REAI)	Net Premium/Gross Premium
Profitability (PRO)	Operating Expenses/Net Premium
Investment Performance (INV)	(Policyholders Investment Incomes + Shareholders Investment Income)/
	Net Premium
Size (LnTA)	Log of Total Assets
Combined Ratio (COMB)	(Incurred Losses/Earned Premium) + (Incurred Expenses/ Written Premium)

Source: Compiled by the researcher based on earlier studies.

The linear multiple regression model developed for this study is as follows:

$$SR = \beta_0 + \beta_1 CAP + \beta_2 REAI + \beta_3 PRO + \beta_4 INV + \beta_5 LnTA + \beta_6 COMB + \varepsilon_1$$

In this study, Solvency Ratio (SR) is a dependent variable. Every insurer is required to maintain an excess of the value of assets over the amount of liabilities of not less than an amount prescribed by the IRDA, which is referred to as a Required Solvency Margin as per Section 64VA of the Insurance Act, 1938. The IRDA (Assets, Liabilities and Solvency Margin of Insurers) Regulations, 2000[35] describe in detail the method of computation of the RSM. Six Independent variables considered for this study are shown in model. This study also tested the assumptions of the linear multiple regression model, viz.,multicollinearity and auto correlation.

7. HYPOTHESES

To achieve the objectives, the study tested the following null hypotheses:

H_{01} : There is no significant relationship between Capital Position and Solvency Ratio.

H_{02} : There is no significant relationship between Reinsurance and Actuarial Issues and Solvency Ratio.

H_{03} : There is no significant relationship between Profitability and Solvency Ratio.

H_{04} : There is no significant relationship between Investment Performance and Solvency Ratio.

H_{05} : There is no significant relationship between Size (represented by Total Assets) and Solvency Ratio.

H_{06} : There is no significant relationship between Combined Ratio and Solvency Ratio.

8. RESULTS AND DISCUSSION

Table – 3 Descriptive Statistics – Variables of Analysis

	N	*Minimum*	*Maximum*	*Mean*	*Std.* Deviation
SOL	109	.92	12.00	2.2129	1.44414
CAP	109	-.02	3.06	1.4119	.85430
REAI	109	-2.51	.95	.5372	.40372
PROF	109	-31.53	218.18	1.3197	21.56735
INV	109	-19.92	11.79	-.2098	2.96054
LnTA	109	9.58	15.25	12.2197	1.60595
COMB	109	-3.75	15.33	1.0381	1.51136
Valid N	109				

Results obtained by using SPSS 17.0.

Table 3 portrays the descriptive statistics for the variables used in this study. The Solvency Ratio (Actual Solvency Margin/Required Solvency Margin) averaged 2.21and ranged from .92 (Shriram – Private Sector General Insurer) to 12(SBI – Private Sector General Insurer). The ratio of capital position (Net Premium/Net Worth) had an average of 1.41 and ranged from -.02 (Raheja - Private Sector General Insurer) to 3.06 (National – Public Sector General Insurer). The ratio of reinsurance and actuarial issues (Net Premium/Gross Premium) had an average of .53 and ranged from -2.51 (Raheja - Private Sector General Insurer) to .95 (New India – Public Sector General Insurer). The insurance company profitability as measured by the ratio of Operating Expenses/Net Premium had an average of 1.31 and ranged from -31.53 (Universal - Private Sector General Insurer) to 218.18 (L&T – Private Sector General Insurer).

The ratio of investment performance (Total Investment Income/Net Premium) had an average of -.20 and ranged from -19.92 (SBI - Private Sector General Insurer) to 11.79 (L&T – Private Sector General Insurer).The insurance company size as measured by the total assets had an average of 12.21. The largest general insurer in the sample was New India (Public sector general insurer in India) with a total asset size of INR 4216274 lakhs while the smallest life insurer was Future in the private sector with a total asset size of INR 14501.28 lakhs. The Combined ratio [(Incurred Losses/Earned Premium) + (Incurred Expenses/Written Premium)] had an average of 1.03 and ranged from -3.75 (Raheja- Private Sector General Insurer) to 15.33 (Universal – Private Sector General Insurer).

Table – 4 Model Summary

Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*	*Durbin-Watson*
1	.720[a]	.518	.490	1.03142	1.825

a. Predictors: (Constant), COMB, PROF, LnTA, CAP, REAI, INV b. Dependent Variable: SOL

Note: Results computed by using SPSS 17.0

Table 4 shows the model summary of the regression for the sample general insurance firms. The value of R is equal to 72% and R-Square of the model is equal to 51.8%. This means that 51.8% of the change in the dependent variable, viz., Solvency Ratio (SR) is due to the variations

in the independent variables used in this model. Table 5 shows the result of ANOVA. By using the analysis of variance, it is found that F test of the model is significant.

Table –5 Analysis of Variance

	Model	*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
1	Regression	116.729	6	19.455	18.288	.000[a]
	Residual	108.510	102	1.064		
	Total	225.239	108			

a. Predictors: (Constant), COMB, PROF, LnTA, CAP, REAI, INV b. Dependent Variable: SOL

Note: Results computed by using SPSS 17.0

Table – 6(a) Regression Coefficient

Model	*Unstandardised Coefficients*		*Stand. Coeffi*	*t*	*Sig.*	*Collinearity Statistics*	
	B	*Std. Error*	*Beta*			*Tolerance*	*VIF*
(Constant)	1.229	.852		1.443	.152		
CAP	**-.823**	**.134**	**-.487**	**-6.157**	**.000***	**.755**	**1.324**
REAI	.168	.352	.047	.479	.633	.489	2.046
PRO	**.017**	**.006**	**.248**	**2.559**	**.012****	**.501**	**1.995**
INV	**-.278**	**.049**	**-.685**	**-5.671**	**.000***	**.324**	**3.087**
LnTA	**.175**	**.076**	**.195**	**2.315**	**.023****	**.667**	**1.500**
COMB	**-.220**	**.086**	**-.230**	**-2.554**	**.012****	**.580**	**1.723**

Dependent Variable: SOL Note: Results computed by using SPSS 17.0

**Significant at 1% level; ** Significant at 5% level*

Table – 6(b) Residual Statistics

	Minimum	*Maximum*	*Mean*	*Std. Deviation*	*N*
Predicted Value	.8165	7.8536	2.2129	1.03963	109
Residual	-3.29756	7.51246	.00000	1.00236	109
Std. Predicted Value	-1.343	5.426	.000	1.000	109
Std. Residual	-3.197	7.284	.000	.972	109

Dependent Variable: SOL Note: Results computed by using SPSS 17.0

Capital Position: After the opening up of the Indian insurance industry, following the Malhotra Committee recommendations in the year 1999, many private players have entered the Indian insurance arena either as fully owned domestic insurers or in collaboration with foreign partners. This has made the Indian insurance industry rich in terms of the quantum of equity capital infusion made by these firms. Other things being unchanged, if the quantum of capital

is more, insurers tend to maintain lower solvency ratio. This study has used the ratio of net premium to net worth as an independent variable to explain the capital position. This ratio is an indicator of the capital adequacy of the non-life insurance sector. It demonstrates the risks associated with underwriting operations. From the Table 6(a), it is clear that there is a negative relationship between the solvency ratio and capital position(Net Premium/Net Worth).The coefficient of capital position is negative and significant at 1% level of significance. Its t-test value is -6.157, which is greater than the table value. Hence, *the null hypothesis H_{01} is rejected. Thus, there is a significant negative relationship between the capital position and solvency ratio.*The Beta value is -.487. Using the standardised coefficient and keeping all the other variables constant, if capital position increases by 100, the solvency ratio (ASM/RSM) will be reduced by 48.

Reinsurance and Actuarial Issues: The solvency position of an insurance company is assessed on a "net of reinsurance" basis. Every insurer needs a comprehensive and efficient reinsurance programme to enable it to operate within the constraints of its financial strength. The regulator also requires every insurer to maintain the maximum possible retention commensurate with its financial strength and volume of business. This study has used the ratio of net premium to gross premium. From the Table 6(a), it is clear that there is a positive relationship between the solvency ratio and the reinsurance and actuarial issues (Net Premium/Gross Premium). The Beta coefficient for reinsurance and actuarial issues is positive but not significant. Its t-test value is .479, which is less than the table value.Hence, *the null hypothesis H_{02} is accepted. Thus, there is no significant relationship between* reinsurance and actuarial issues *and solvency ratio.*

Profitability: It is one of the important factors determining the financial health of a general insurer. In the Indian context, as the insurance industry is growing, the players are yet to break even. In the year 2011-12, all the 4 public insurers reported profits and the 5 private players out of 15 general insurers were profitable. The study used the ratio of operating expenses to net premium. From the Table 6(a), it is clear that there is a positive relationship between the solvency ratio and the profitability (Operating Expenses/Net Premium). The Beta coefficient for profitability is positive and significant at 5% level. Its t-test value is 2.559, which is greater than the table value.Hence, *the null hypothesis H_{03} is rejected. Thus, there is a significant positive relationship between* profitability*and solvency ratio.*The Beta value is .248. Using the standardised coefficient and keeping all the other variables constant, if profitability increases by 100, the solvency ratio (ASM/RSM) will increase by 24.

Investment Performance: The investment income forms a major share of the total income of insurance firms. It is an indicator of the efficient investment decisions taken by the investment committee of a particular insurance firm. Hence, it is an important ingredient in deciding the financial stability of an insurance company. This study used total investment income as a ratio of net premium. Total investment income is the summation of policy holders and share holders' investment income.From the Table 6(a), it is clear that there is a negative relationship between the solvency ratio and investment performance (Total Investment Income/Net Premium).The coefficient of investment performance is negative and significant at 1% level of significance. Its t-test value is -5.671, which is greater than the table value. Hence, *the null hypothesis H_{04} is rejected. Thus, there is a significant negative relationship between the investment performance and solvency ratio.*The Beta value is -.685. Using the standardised coefficient and keeping all the other variables constant, if investment performance increases by 100, the

solvency ratio (ASM/RSM) will be reduced by 68.

Size: The financial health of insurance firms is influenced by their assets size. Total premium, total admitted assets, total assets and capital and surplus are some of the variables used to assess the firm size. This study used Total Assets (Total of Investments, Fixed Assets & Current Assets) to measure the financial strength of general insurers as used in some of the earlier studies. From the Table 6(a), it is clear that there is a positive relationship between the solvency ratio and size (as measured by the Total Assets). The Beta coefficient for size is positive and significant at 5% level. Its t-test value is 2.315, which is greater than the table value.Hence, *the null hypothesis H_{05} is rejected. Thus, there is a significant positive relationship between* size *and solvency ratio.*The Beta value is .195. Using the standardised coefficient and keeping all the other variables constant, if size increases by 100, the solvency ratio (ASM/RSM) will increase by 19.

Combined Ratio: Underwriting income forms a key element of any insurer's operating income. It is measured using the combined ratio (ratio of incurred losses to earned premium plus incurred expenses to written premium). Browne and Hoyt (1995) found that the combined ratio is positively co-related with the insolvency rate.From the Table 6(a), it is clear that there is a negative relationship between the solvency ratio and combined ratio [(Incurred Losses/ Earned Premium) + (Incurred Expenses/Written Premium)].The coefficient of combined ratio is negative and significant at 5% level of significance. Its t-test value is -2.554, which is greater than the table value.Hence, *the null hypothesis H_{06} is rejected.Thus, there is a significant negative relationship between combined ratio and solvency ratio.*The Beta value is -.230. Using the standardised coefficient and keeping all the other variables constant, if combined ratio increases by 100, the solvency ratio (ASM/RSM) will br reduced by 23.

Table - 7 Pearson Correlation Matrix

Variables	*SOL*	*CAP*	*REAI*	*PRO*	*INV*	*LnTA*	*COMB*
SOL	1.000						
CAP	-.550	1.000					
REAI	-.327	.464	1.000				
PROF	-.106	-.073	-.015	1.000			
INV	-.510	.252	.420	.519	1.000		
LnTA	-.079	.345	.565	-.086	.190	1.000	
COMB	.180	-.168	-.142	.076	-.485	-.080	1.000

Heteroscedasticity and Multicollinearity Test: From the Table 6(b), it is clear that the residuals are identically distributed with mean zero and equal variances and hence, the model does not face a problem of heteroscedasticity. From table 7, it is clear that no two independent variables are highly correlated. Hence, there exists no multicollinearity problem.

9. LIMITATIONS OF THE STUDY

Macro economic variables such as interest rate change, number of insurers, and inflation could not be included.

10. SCOPE FOR FUTURE RESEARCH

This study has considered only six independent variables to know the determinants of solvency ratio maintained by Indian general insurers. Future research studies may consider more variables, both company specific and macro economic variables.

11. CONCLUSION

This study led to the conclusion that the size of the general insurer (as explained by the total assets) and profitability have significant positive relationship with the solvency ratio. But, capital position, investment performance and combined ratio have significant negative relationship with solvency ratio. Further, it is found that solvency ratio of Indian general insurers is not influenced by reinsurance and actuarial issues. As general insurers are perceived as risk takers, solvency for general insurers is an indicator of their financial health. Indian general insurers have been striving hard to maintain the mandatory solvency ratio of 1.5. Although most of the companies have maintained the required solvency margin, the effect of the Motor Third party Insurance Pool is making their business difficult. Hence the authority has hence relaxed the solvency norms for the future periods.In view of the unique regulatory environment comprising a hybrid model of regulation with competition, Indian general insurers would improve their financial performance more efficiently than ever before.

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APPENDIX

List of Indian General Insurance Companies

S.No	*Abbreviations*	*Name of the general insurer*
Public		
1	New India	New India Assurance Co. Ltd
2	National	National Insurance Co. Ltd
3	United	United India Insurance Co. Ltd
4	Oriental	Oriental Insurance Co. Ltd
Private		
5	Reliance	Reliance General Insurance Co. Ltd
6	Royal	Royal Sundaram Alliance General Insurance Co. Ltd
7	Iffco	Iffco-Tokio General Insurance Co. Ltd
8	TATA	Tatat-AIG General Insurance Co. Ltd
9	Bajaj	Bajaj Allainz General Insurance Co. Ltd
10	ICICI	ICICI Lombard General Insurance Co. Ltd
11	Chola	Cholamandalam MS General Insurance Co. Ltd
12	HDFC	HDFC ERGO General Insurance Co. Ltd
13	Universal	Universal Sompo General Insurance Co. Ltd
14	Future	Future Generali India Insurance Co. Ltd
15	Shriram	Shriram General Insurance Co. Ltd
16	Bharti	Bharti AXA General Insurance Co. Ltd
17	Raheja	Raheja QBE General Insurance Co. Ltd
18	SBI	SBI General Insurance Co. Ltd
19	L&T	L & T General Insurance Co. Ltd.
20	Magma	Magma HDI General Insurance Co. Ltd.
21	Liberty	Liberty Videocon General Insurance Co. Ltd.

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