CHAPTER I:
INTRODUCTION
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INTRODUCTION

1.1. BACKGROUND

The financial service sector all over the world has witnessed significant changes in recent past due to the impact of several reform measures. In insurance market also during the last two decades enormous structural changes have been occurred. All most all the developed as well as developing countries have opened up their insurance markets. The Third Generation Insurance Directive in 1994 has remarkably changed the market environment of insurance in the European Union and enactment of financial system deregulation in 1996 has also changed the scenario of Japanese insurance market. In case of US Gramm-Leach-Bliley Financial Services Modernization Act, 1999 and many other deregulatory acts have changed the insurance market (Weiss & Choi, 2008). Indian insurance sector has also experienced a 360-degree journey over a period of more than a hundred years. It started as an open competitive market with the establishment of Triton Insurance Company Ltd. by the British in the year 1850 in Calcutta and was nationalized in the year 1972. By nationalizing the sector the Government amalgamated 107 general insurance companies into four subsidiaries with a holding company named General Insurance Corporation and started monopoly in the sector (Sinha, 2005). In the year 1999 again the sector was opened up for private companies with the enactment of Insurance Regulatory and Development Authority (IRDA) Act, 1999. This reform processes have drastically changed the market structure of financial service sector as well as insurance sector.

Market structure of a sector includes the characteristics such as technology, business attitudes, product substitutes, the ability of new firms to enter into the market, cyclical and seasonal demand, and in particular the numbers of sellers and buyers. This structure of sellers and buyers affects selling and buying conduct, such as production and pricing strategies, research and innovation, pricing behavior, advertising, investment, and legal tactic which, in turn, affects the overall performance of the industry. Thus the performance of an industry in producing
benefits for the consumer depends on the conduct of its firms, which then depends on the structure i.e. the factors that determine the competitiveness of the market. Hence it is important to understand how the industries operate and perform in their market structure and how their interrelation impacts the efficiency of the industry so that the Government can make competitive enhancing strategies for overall economic growth. In this regard, literature has offered two hypotheses to explain this relationship.

The first hypothesis, propounded by Bain, (1951), is the Structure Conduct Performance (SCP) hypothesis, according to this hypothesis, profit rate of firms with high concentration will be more due to their oligopolistic behavior than the firms with less concentration. That is, high concentration will lead to collusion, which in turn will give more market power to the firm to charge higher price and higher price will lead to higher profit. Later, Demsetz, (1973) offered an alternative hypothesis named Efficiency Structure (ES) hypothesis which depict that a positive relationship between concentration and profit may arise due to efficiency of firms i.e. efficient firms will charge lower price than inefficient firms, enabling them to capture a larger market share, leading to high concentration and these firms will exhibit higher profit rate based on their efficiency. Thus, if firms have a competitive advantage in production or services provided, they will achieve higher profit without resorting to collusive measures such as raising price or restricting supply. That is increased profit will occur due to efficiency, rather than collusive activities. Further there is one more hypothesis which is known as Relative Market Power (RMP) hypothesis, advocated by Rhoades, (1985), focuses on the role of market share on profit and price. According to this hypothesis only firms having larger market shares and well differentiated product lines will be able to exercise market power to gain superior profit on non competitive price setting behavior (Berger, 1995 and Guillen, Rengifo & Ozsoz, 2015).

Since financial service sector particularly the insurance sector has significant potential to speed up the rate of growth of any economy and it is said that in an economy with well established insurance sector, all other sector can flourish more, as they get more risk taking power (Holsboer, 1999; Ward & Zurberg, 2000; Arena, 2008; and Han, Li, Moshirian & Tian, 2010). Further general insurance as a
constituent of overall insurance sector has an important advantage over most other financial activities in the present economic world as it pools funds, to compensate the real value of the cost of damages, accident and various losses in all fields of material activities.

In India the insurance sector plays a vital role in the growth and development of its economy (Parekh & Banerjee, 2010 and Rao & Srinivashulu, 2013). Bhatnagar, Chauhan & Banerjee, (2016) found a positive association between insurance and economic growth. Further Verma & Bala, (2013) also concluded that life insurance significantly influences the economic growth of India. Insurance is a financial instrument which effectively pools and transfers risk from individual and corporate consumers, thus encourage investments, house hold savings and drive Gross Domestic Product’s (GDP) growth. According to Dasgupta, (2013) one standard deviation increase in general insurance penetration induces a per capita GDP growth of 0.39 per cent. Together with banking sector, it adds about 7 per cent to the country’s GDP and provides a cover of Rs. 1,00,00,000 crores, which by itself speaks about the importance of insurance to the economy (Dasgupta, 2013, Kumari, 2013). It supports the Government and society by reinvesting funds and sharing the cost of catastrophes. It covered around 11–12 per cent of total losses incurred by the threat of natural catastrophes in India. Further, the sector as a whole invests 35 per cent of its total assets in Government securities (IRDA Annual report, 2014-15). The industry also helps a burning issue of India i.e. unemployment, by providing employment to around 7 lakh people both directly and indirectly. Thus it has played a parallel role in creating access to financial services as well as protection. So in case of insurance sector specially in general insurance sector if the interrelation among performance, structure and efficiency can be understood then it would be more easier for the Government and the regulatory authority to formulate competitive strategy for the wellbeing of the industry, the customer and the economy as a whole.
1.2. CONCEPTUAL FRAMEWORK

1.2.1. Concept of General Insurance

The basis of insurance is sharing of loss due to uncertain risk by those who are exposed to it. It makes good of the losses incurred by uncertain risk i.e. natural calamities, earthquake, tsunami, fire etc. (Bodla, Garg & Sing, 2003). Insurance is a contract between insurer and insured in consideration of money called premium paid by the insured to the insurer, subject to limit of a specified amount of risk suffered by specified perils during a stated period (Desai, 2006). It is not only a risk mitigation entity but also a catalyst of economic growth of a country (Outreville, 1990, Ward & Zurburg, 2000, Skipper, 2001, Arena, 2008 and Curak, Loncar & Poposki, 2009). Insurance companies create insurance policies by grouping risks according to their nature. This provides a measure of uniformity in the risks that are covered by a type of policy, which in turn allows insurers to anticipate their potential losses and to set premiums accordingly.

The structure of Indian insurance sector after liberalization is given in figure -1.1. In India Ministry of Finance along with the Insurance Regulatory and Development Authority (IRDA) is responsible for enacting and implementing legislation for the insurance sector. The industry is governed by IRDA which comes under the purview of Ministry of Finance. In India mainly insurance is of two types, life insurance and non life insurance. The ownership of life and non life insurance are of two types public and private. Other than life insurance all are non life insurance. The non life insurance is also called general insurance which includes Motor, Health, Marine, Fire and Others insurance. (IRDA Annual Report, 2001-02).
Among the non life insurance motor insurance policies include liability insurance, i.e. insurance against injury to another person or against damage to another person's vehicle caused by the insured's vehicle. Motor insurance also pays for the damage to the insured's motor vehicle. In India it is mandatory for all drivers to carry at least minimum motor liability insurance under a no-fault scheme (IRDA Annual Report, 2005-06). Health insurance policies cover only specified risks regarding to health issues. Generally, they pay for the expenses incurred from bodily injury, disability, sickness, and accidental death. Health insurance may be purchased for one's self and for others. Group health insurance plans are usually offered by employers to their employees. Fire insurance policies cover damage caused by fire, explosions, lightning, collisions etc. (Motihar, 2006). Casualty insurance protects the insured against losses due to legal liability, burglary and theft, accidents, property damage, injury to workers, and insurance on credit extended to others. Businesses as well as individual can insure against damage and liability to others by purchasing fire and casualty insurance policies. Fidelity and surety bonds are temporary, specialized forms of casualty insurance. A fidelity bond insures against losses incurred due to the dishonesty of employees. It also protects a business if it fails to fulfill its contractual obligations. Marine insurance policies insure transporters and owners of
cargo shipped on an ocean, a sea, or any navigable waterway. It covers damage to cargo, damage to the vessel, and injuries to passengers. Other insurance includes homeowner’s insurance which protects homeowners from losses relating to their dwelling, including damage to the dwelling, personal liability for injury to visitors and damage to property in and around the dwelling. Renter’s insurance also covers many of the same risks for persons who live in rented dwellings. Personal property insurance protects against the loss of certain items of personal property. It is useful when the liability limit on a homeowner's policy does not cover the value of a particular item (Motihar, 2006).

A person may purchase additional insurance to cover losses in excess of a stated amount or in excess of coverage provided by a particular insurance policy. Air-travel insurance provides life insurance benefits to beneficiary if the insured dies as a result of the specified airplane flight. Flood insurance is not included in most homeowner’s policies, but it can be purchased separately.

1.2.2. Structure Conduct Performance Paradigm

Structure, Conduct and Performance paradigm (SCP) was developed by Joe S. Bain in the year 1959 and described it in his book “Industrial Organizations”. It is used as an analytical framework, to make relations amongst structure, conduct and performance of a market and considered as a pillar of industrial organization theory. The SCP paradigm has three elements called structure, conduct and performance which are explained as given in the figure-1.2
Thus according to the SCP model (Figure-1.2), market structure affects market conduct, which in turn affects market performance. Industry characteristics such as concentration, numbers of buyers and sellers, product differentiation, technology, business attitudes, product substitutes and barriers to entry determine the structure of industry. This structure of market affects selling and buying conduct, such as production and pricing strategies, research and innovation, pricing behavior, advertising, investment, and legal tactics etc. Market conduct, in turn, affects the overall performance of the industry that is, number of policy issued, efficiency, gross direct premium income, net claim incurred, underwriting profit etc.

Thus, performance of insurance industry in providing claim to the policy holders are determined by the conduct of the firms within the boundaries of the industry, which in turn depend on the structure of the market.

1.2.3. Efficiency Structure Hypothesis

Efficiency structure hypothesis is an alternative explanation of the market structure performance relationship. It was developed by Harold Demsetz in the year 1973. According to this hypothesis efficiency determines market structure and performance not concentration like structure conduct performance hypothesis. An efficient firm
with low cost structure can reduce their prices and increase sales, which will in turn increase profit and market share of the firms. Thus there is a positive relationship between market structure and performance which is contributed by the efficiency (Molynuxse & Forbes, 1995). Hence a firm operating more efficiently than its competitors, gains higher profitability resulting from low operating cost & low pricing policy (Mensi & Zouary, 2011).

Figure- 1.3: Efficiency Structure Model

1.3. STATEMENT OF THE PROBLEM

Insurance is the backbone of a country’s economy as it takes care of the uncertainty. It diversifies the risk of individual as well as the firms or businesses. After liberalization in the year 2000 though Indian General Insurance Sector (IGIS) has grown manifold but still its position compared to world level is meager. As per the report published by Swiss Re, (2016), IGIS ranks 18th among 88 countries and its share of premium in global non life insurance premium is 0.75 per cent (Swiss Re, 2016). In India also the share of general insurance business in total insurance business is only 21 per cent (IRDA Annual Report, 2015-16). Further if we see the spread of IGIS then despite such a huge population, the insurance penetration (0.7 per cent) and density (11 USD) as compared to the world levels (2.7 per cent & 294 USD) is quite insignificant. After the financial crisis in the year 2008 the overall growth of the sector has declined (IRDA Annual Report, 2009-10). So the need of the hour is to have a detailed inquiry on how to improve this sector; whether by
increasing efficiency, product differentiation or by reducing concentration. In order to overcome the crisis first we need to understand how general insurance industry is behaving in the present market structure and how its firm’s conduct impacts its performance i.e. the SCP relationship of IGIS so that Government or the regulatory authority can take precautionary measures for the development of the industry.

In order to understand this relationship three hypotheses, SCP, ES and RMP have been already established by earlier researchers. Based on these hypotheses a large number of studies have been carried out on the relationship among market structure, efficiency and performance in the area of financial service sector in various countries.

Specially in financial services like banking sector, Smirlock, (1985); Goldberg & Rai, (1996); Maudos, (1998); Seelanatha, (2010) and Mensi & Zouari, (2011) in international level and Sathye & Sathye (2004); Sahoo & Mishra; (2012) and Barua, Roy & Raychoudhuri, (2016) in national level have studied SCP relationship. Particularly in insurance sector also many researchers like Carroll, (1993); Bajtelsmit & Bouzouita, (1998); Choi & Weiss, (2005); Liebenberg & Kamerschen, (2008); Weiss & Choi, (2008); Berry-Stolzle, Weiss & Wende, (2011); Alhassan & Addisson, (2013) and Alhassan, Addisson & Asamoah, (2015) in international level have analyzed the SCP relationship. All these researchers have found that different hypotheses satisfy different markets and accordingly helped the Government and the regulatory authority in formulating competitive strategy for the wellbeing of the industry, the customer and the economy as a whole.

In the international and national level though a large number studies have been carried out on this relationship but still some problems are there in terms of geographical coverage, inconsistency in findings, application of methodology, use of variables etc. From the review of literature it can be seen that most of the studies on the relationship of SCP are carried out in United State (US) and the studies are concentrated mostly on state level or group level data rather company level data. They found mixed evidence on the relationship between market structure and efficiency with performance. While in case of US property liability insurance and European insurance industry they found a strong positive relationship between efficiency and performance, in case of US private passenger automobile insurance
the researcher found strong positive relationship between profitability and concentration. Again in case of US worker’s compensation insurance and South African auto insurance the author could not establish any relationship. Different researchers have used different techniques like multiple regression model, ordinary least square regression model, generalized leased square model. Some used proxy value of efficiency and profitability and some used direct measure of efficiency. Again to determine efficiency different methods like Data Envelopment Analysis (DEA), Stochastic Frontier Analysis (SFA) have been used. As evidenced there is no unique methodology and use of variables in the analysis of these relationships. Geographical coverage in the sense that, though many researchers have studied the relationships in case of financial service sector in several countries but surprisingly little attention has been devoted to the same type of study on General Insurance Companies (GICs) of India despite the fact that this sector has significant potential to speed up the rate of growth of the economy. Considering this vacuum in the literature an attempt has been made to fill up the gap in order to find the applicability of the hypotheses in the context of India.

1.4. RESEARCH QUESTIONS

After a thorough survey of literature (Chapter-2), the following research questions were emerged.

1. What is the performance of General Insurance Companies (GICs) in India? Whether there is a difference between the performance of public and private GICs?
2. What are the determinants of the performance of IGIS?
3. What is the efficiency level of Indian General Insurance Companies (IGICs)?
4. Who are the most efficient companies?
5. Which of the following hypotheses better explains the IGIS?
   - Structure conduct performance
   - Efficient structure and
   - Relative market power
6. Whether market power which results from high market concentration and firm’s relative market share or the firm’s efficiency is important in determining overall performance of IGICs?
1.5. OBJECTIVES

In an attempt to address some of the above research questions the following objectives have been framed to fulfill the purpose of the study.

1. To examine the growth and market structure of GICs of India.
2. To assess the efficiency and to review the financial performance of GICs of India.
3. To find out the relationship between market structure and efficiency with performance and to identify the best fit hypothesis.

1.6. SIGNIFICANCE OF THE STUDY

From the review of literature, presented in chapter-2, it is clearly revealed that the issues are relevant i.e. structure conduct performance relationship will help the Government and the authority to make competitive strategy in order to develop and perk up the sector and will drive growth of Indian economy. The significance of this study arises, firstly, from the fact that the research will fill up the geographical gap by examining the relationship of market structure and efficiency with performance in case of IGIS. Further it will also empirically identify the inefficient GICs and the factors of their inefficiency, which will help the inefficient insurer to become efficient. Secondly, this piece of empirical research would invite researchers to pay more attention to the under-researched areas in this context including, methodological issues, variable used and unique method of examining the relationship among structure conduct and performance. On the other hand, mentioning the fact that IGIS has got a huge untapped market, this piece of research would be a unique opportunity for researchers, decision and strategy makers in India to plan and set up the strategies related to general insurance based on the findings.

1.7. RESEARCH METHODOLOGY

Research Methodology is the systematic theoretical analysis of the methods adopted to study this particular problem. The study is basically empirical in nature, based on secondary data and statistical techniques. In this section the research methodology used for analyzing market structure, growth, performance, efficiency and SCP
relationship during the post reform period in the context of IGIS has been discussed
in detail.

1.7.1. Period of Study and Data Source

The proposed research will cover a period of thirteen years, from 2002-03 to 2014-
15. We took the base year as 2002-03 only to include maximum number of companies in our sample. Because after liberalization there were eight private companies and four public companies which carry multi line operations in Indian General Insurance Market (IGIM). The data will be drawn mainly from secondary sources like Annual reports, Directors and Auditors report of GICs and IRDA, reports of Swiss Re and Handbook of Indian Insurance Statistics. Some of the data is also collected by making personal visits to the head offices of GICs. In due course of the study publications like IRDA Journal, Asia Insurance Post, The Insurance Time, Journal of Insurance Institute of India and Government Reports also consulted. Apart from these, other relevant published and unpublished papers which have covered the aspects of general insurance sector has been referred suitably to understand the complexities of general insurance market and to identify the factors which affect their performance.

1.7.2. Data

Panel data covering a period of thirteen years from the financial year 2002-2003 to financial year 2014-2015 representing post reform era from twelve companies both public and private companies all over India are collected.

1.7.3. Population and Sample

The population for this study will be all the General Insurance Companies (GICs) of India, who have started operations on or before the financial year 2002-03. GICs means all the non life insurance companies excluding those which are exclusively dealing with health insurance, crop insurance, credit insurance and reinsurance. We are excluding these companies because they are dealing with single service base product and others are dealing with all kind of general insurance products, i.e. they are operating in multi line business, which will make differences in their performances. There are 29 GICs in India (seven public & twenty two private
companies) as on 31\textsuperscript{st} March 2016. But as on 1\textsuperscript{st} April 2002, there were only 14 companies out of which six public and 8 private and among the public companies two were specialized general insurance companies which are still operating in Indian market (IRDA, Annual Report 2002-03). During the last decades more companies have entered into the market. But, since for the proposed study a period of 13 years is considered, the study will be confined to those 12 companies which were established on or before 1\textsuperscript{st} April 2002 and operating till today. Thus the study will be on the data collected from 4 public companies operating in multi line business (100 per cent of the total public GICs who are dealing with multi line insurance product) and 8 private companies operating in multi line business (100 per cent of the private GICs who were dealing with multi line insurance product).

1.7.4. Measurement of Competition

In order to assess competition both structural and non-structural approaches are employed. Among structural measures Concentration ratios (\(\text{CR}_K\) where \(K=1, 3, 4, 5 \& 8\)), Herfindahl-Hirschman Index (HHI) and Entropy Index (EI) are applied in this work which are widely referred in earlier studies (Nissan, 1996; Nissan & Caveny, 2001; Bikker & Haaf, 2002; Sharma & Bal, 2012; Sukpaiboonwat, Piputsitee, & Punyasavatsut, 2014 and Mirzaei & Moore, 2014). Under non structural approach the study used Panzor-Rrosse (P-R) model which is frequently applied by many researchers all over the world (Murat, Tonkin, & Juttner, 2002; Kasman & Turgtlu, 2008; Coccors, 2012 and Todorov, 2016). The details of the structural and non-structural approach are explained below.

1.7.4.1. Concentration Ratio (CR)

The concentration ratio is the measure of the percentage market share of \(k\) numbers of companies in an industry held by the largest firms within that industry. The most common concentration ratios are \(\text{CR}_4\) and \(\text{CR}_8\), which means the sum of market share of the four and the eight largest firms. Concentration ratios are usually used to show the extent of market control of the largest firms in the industry and to illustrate the degree to which an industry is competitive. Concentration ratios range from 0 to 100 per cent. 0 per cent means perfect competition or at the very least monopolistic competition. If for example \(\text{CR}_4=0\) per cent, the four largest firm in the industry
would not have any significant market share. CR₄ = 100 per cent means an extremely concentrated oligopoly. If for example CR₁ = 100 per cent, then there is a monopoly. 0 per cent to 50 per cent ranges from perfect competition to oligopoly. 50 per cent to 80 per cent indicate medium concentration and 80 per cent to 100 per cent ranges from oligopoly to high concentration i.e. oligopoly to monopoly.

1.7.4.2. Herfindahl-Hirschman Index (HHI)

The Herfindahl-Hirschman index (HHI) is regarded as the most widely treated summery measures of concentration in the theoretical literature and often serves as a benchmark for the evaluation of other concentration indices. It measures the size of the firm in relation to the industry and indicates the amount of competition among them. It is not a measure specific to any one insurer, though it is a function of each insurer’s market share. The HHI stresses the importance of larger firms by assigning them a greater weight than smaller firms, and it incorporates each firms individually, so that arbitrary cut offs and insensitivity to the share distribution are avoided. HHI can calculate from the following formula

$$HHI = \sum_{i=1}^{n} S_i^2$$

where $S_i$ is the market share of insurer i, i=1 to 12.

The HHI index ranges between 1/n and 1, reaches its lowest value (the reciprocal of the number of firms) when all the firms in a market are of equal size, and becomes unity in the case of monopoly. So a decrease in the H index indicates an increase in competition. The maximum value of HHI will be 1 when there is monopoly and the minimum value of HHI is 1/n in case of perfect competition. An HHI below 0.01 indicates a highly competitive market. An HHI below 0.15 indicates a concentrated market. An HHI between 0.15 to 0.25 indicates moderate concentration. An HHI above 0.25 indicates high concentration.

1.7.4.3. Entropy Index (EI)

It is similar to HHI, only in case of Entropy the weights assigned to the smaller units. It is defined as follows:

$$E = -\sum S_i \log S_i$$

where $s_i$ is the market share of $i^{th}$ insurer, i=1-12.
The entropy index is not restricted between 0 and 1, unlike most of the other measures of concentration. The value of the entropy varies inversely to the degree of concentration. It approaches to zero if the underlying market is monopoly and reaches its highest value when the market shares of all the firms are equal and market concentration is lowest.

### 1.7.4.4. Panzar –Rosse (P-R) Model

The P – R model was developed by Panzar and Rosse in the year 1987. It is generally known as H- Statistics. It measures the competitive behavior of a firm i.e. whether the firm is operating in a competitive, monopolistic or in monopoly condition. The competitive behavior is measured in this model on the basis of comparative static properties of reduced form revenue equations based on cross section data (Bikker & Haaf, 2002). H-Statistic measures the impact of changes in factor input price on the revenue earned by a particular firm and also assumes that the firms under investigation are in long-run equilibrium. It maximizes the profits of a firm, where marginal revenue equals to marginal cost.

\[
R'_i(x_i,n,z_i) - C'_i(x_i, w_i, t_i) = 0 \quad (1)
\]

Where, \( R'_i \) = Revenue, \( C'_i \) = Costs of insurer \( i \), \( x_i \) = Output of insurer \( i \), \( n \) = Number of insurer, \( w_i \) = Vector of m input prices for insurer \( i \), \( z & t \) are vectors of exogenous variables that shift the insurance companies revenue and costs functions respectively. The market power is measured by the extent to which the changes in factor input price (\( \partial w_{k1} \)) reflected in the equilibrium revenues (\( \partial R_i \)) earned by insurer \( i \). Thus H-Statistics is defined as the sum of the elasticity of reduced form revenues with respect to changes in factor price and it is estimated as –

\[
H = \sum_{k=1}^{k} \frac{\partial R_i}{\partial W_{k_i}} \cdot X \cdot \frac{W_{k_i}}{R'_i} \quad (2)
\]

The basic form of the P-R model is:

\[
\ln(TR) = \sum_i \ln(W_i) + \sum_j \ln(CF_j) + \mu \quad (3)
\]
Where TR is the total revenue, $W_i$ is the $i^{th}$ input factor and CF denotes other firm specific control variables. Some of the researchers also applied TR to Total Assets (TR/TA) as a measure of dependent variable instead of TR (Bikker & Groenfeld, 2000, Bikker & Haaf, 2002, and Rozas, 2007).

In this paper we used total revenue as the sum of earned premium and investment income as a proxy for output i.e. services provided by general insurance as we followed Murat, Tonkin, & Juttner, (2002), Coccorese, (2012) and Todorov, (2016). It is also justified as general insurance companies earn revenue both from collecting premium and investing assets. The independent variables include three proxies for input prices and two control variables as used by Murat, Tonkin, & Juttner, (2002) and Kasman & Turgutlu, (2008). The details of the variables are given with equation number 4.

In order to find out the appropriate panel data regression model for the present data, we have undertaken Breusch-Pagan test and Hausman test. While Breusch-Pagan test advocates in favour of random effect model than OLS model, Hausman test exhibits the appropriateness of fixed effect model than random effect. This fixed effect model was also used by Kassman & Turglut, (2008), Coccorese, (2012) and Todorove, (2016) in case of insurance sector. Hence, the following fixed effect regression model is employed in this study to measure the degree of competition in IGIS:

\[
\ln(R) = \alpha_i + \beta_1 \ln(W_{1i}) + \beta_2 \ln(W_{2i}) + \beta_3 \ln(W_{3i}) + \gamma_1 \ln(CF_{1i}) + \gamma_2 \ln(CF_{2i}) + \epsilon_{it} \tag{4}
\]

Where,

R= Total Revenue, the sum of Earned Premium and Investment Income as a proxy of outputs of general insurance services.

$W_1$ = Net Claim/ Net Premium as a proxy for input price of premium.

$W_2$ = Wages & Salaries / Total Asset as a proxy for input price of labor.

$W_3$ = Other Operating and Administrative Expense to Total Assets as proxy for input price of Equipment and Fixed Assets.

CF$_1$= Equity capital/ Total Assets,

CF$_2$ = Investment
The H-Statistic is sum of input elasticity, i.e. \( H = \sum_{i=1}^{3} b_i \)  

The interpretation of H-statistics is:
- \( H \leq 0 \) indicates monopoly
- \( 0 < H < 1 \) indicates monopolistic competition
- \( H = 1 \) indicates perfect competition.

In order to fulfill the assumption of long run equilibrium of P-R model we performed equilibrium test by taking Return on Asset (ROA) as dependent variable with same independent variables and same model (equation - 4) as suggested by (Murat, Tonkin, & Juttner, 2002; Kassman & Turglut, 2008; Coccorese, 2012 and Todorov, 2016). We estimated H-statistic by using ROA, the ratio between profit after tax and total asset, as dependant variable. In order to adjust for possible negative values due to losses in some year, return on asset is computed as \((1+ \text{ROA})\). For equilibrium test we have taken non log values for all the variables as used by Murat, Tonkin, & Juttner, (2002). For Equilibrium test

- \( H < 0 \) indicates disequilibrium
- \( H = 0 \) indicates equilibrium

### 1.7.5. Measurement of Growth and Performance

To analyze the growth of general insurance sector in post reform era trend analysis of the data has been conducted for identifying the appropriate growth rate for each variable separately. For that first we have plotted the actual data of each variable and compared with the figures of different growth rates by using SPSS software. On comparison, we find that exponential growth rate is appropriate for all the variables. Hence, we have computed the exponential growth rate by using SPSS software of various pertinent variables i.e. total asset, fixed asset, cash and bank balance, investment, capital, current liabilities, net premium income, investment income, commission and management expenses, net claim incurred and profit after tax etc. by dividing into four segment, Physical growth, Structural growth, Business growth and Profitability growth. Further, growth has been calculated as individual company wise and sector wise i.e. for public sector as well as private sector.
The performance of general insurance companies can be measured by using a number of ratios. However, in present study, CARAMEL model suggested by World Bank and IMF has been used to study the financial performance of GICs. Under CARAMEL model present study employs ratio analysis for measuring the performance. The ratios measured for each indicators of CARAMEL model are explained in table-1.1.

Table - 1.1: CARAMEL Model for Measurement of Performance

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Indicator</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Capital Adequacy</td>
<td>Net premium/ Capital (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capital/ Total Asset(2)</td>
</tr>
<tr>
<td>2</td>
<td>Asset Quality</td>
<td>Equity capital/ Total Asset (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fixed Asset/Total Asset (2)</td>
</tr>
<tr>
<td>3</td>
<td>Reinsurance and Actuaries</td>
<td>Risk Retention Ratio (RRR) (1)</td>
</tr>
<tr>
<td>4</td>
<td>Management Efficiency</td>
<td>Operating Expenses/ Grows Premium (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Management and Commission Expenses/ Gross Premium(2)</td>
</tr>
<tr>
<td>5</td>
<td>Earnings and Profitability</td>
<td>Loss Ratio, (1)</td>
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<tr>
<td></td>
<td></td>
<td>Expense Ratio(2)</td>
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<tr>
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<td>Combine Ratio (3)</td>
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<td>Investment Income/Net Premium (4)</td>
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<td></td>
<td></td>
<td>ROE (5)</td>
</tr>
<tr>
<td>6</td>
<td>Liquidity</td>
<td>Quick Asset/Current Liabilities (1)</td>
</tr>
</tbody>
</table>


To examine the impact of financial performance indicators (CARAMEL indicators) on market share of IGICs, following panel data technique fixed effect model is employed in this study-

\[
MKS_{it} = \alpha + \beta_1 CAR_{it} + \beta_2 RA_{it} + \beta_3 ME_{it} + \beta_4 ROE_{it} + \beta_5 LQ_{it} + \beta_6 AQ_{it} + \epsilon_{it} \tag{6}
\]

Where market share as a proxy to measure the market value of the insurer is applied as dependent variable and the components of CARAMEL indicators are used as explanatory variables.

In order to see the impact of detariffication in the sector Chow’s F-Test is employed to compare the mean value of two indicators in pre and post detariffication period. Net premium income and profit after tax has been used as dependent variable to see
the shift in case of all the three cases, over all, public and private sector in pre and post detariffication period.

1.7.6: Measurement of Efficiency

For measuring efficiency Data Envelopment Analysis (DEA) is employed as it has been frequently used in most of the studies on insurance (Diacon, 2001; Pop & Ma, 2008; Choi & Wesis, 2005; Luhen, 2009 and Alhassan, Addisson & Asmoah, 2015). DEA is a non parametric linear programming technique and can handle small sample size like present study (Iqbal & Awan, 2015). It measures the efficiency of organizational units such as insurance known as Decision Making Unit (DMU) relative to other DMUs. The efficiency of DMUs is assessed using the concept of the ratio of weighted outputs to weighted inputs. The most efficient DMU is assigned an efficiency score of unity and zero to inefficient DMU. The efficiency of a DMU varies between 0 and 1.

There are mainly two models of DEA, the first one was developed by Charnes, Cooper and Roodez in the year 1978 and known as CCR model with an assumption of constant return to scale (CRS) (Charnes, Cooper & Roodez, 1978). The second model was introduced by Banker, Charnes and Cooper in the year 1984 and known as BCC model with the assumption of variable return to scale (VRS) (Banker, Charnes & Cooper, 1984). Both the model was further divided into two models, input oriented and output oriented. Input oriented model minimizes inputs to produce similar amounts of outputs and output oriented model increases outputs with the similar amounts of inputs (Cooper, Sheiford & Tone, 2006). In this research input base CCR and BCC models of DEA have been applied to analyze the efficiency which are explained below-

Let there be N number of insurers whose efficiencies have to be compared. Let us take one of the insurers, say the mth insurance company and maximize its efficiency according to the formula given below:

\[ \text{Max}(Em) = \frac{\sum_{j=1}^l V_{jm} Y_{jm}}{\sum_{i=1}^l U_{im} X_{im}} \] ..(7)

Subject to constraint \[ 0 \leq \frac{\sum_{j=1}^l V_{jm} Y_{jm}}{\sum_{i=1}^l U_{im} X_{im}} \leq 1 ; n= 1,2, K, N \]
Where $V_{jm}, U_{im} \geq 0$ ; $i=1, 2, K, I$ and $j=1, 2, K, J$ and $E_m$ is the efficiency of the $m^{th}$ insurance company; $Y_{jm}$ is the $j^{th}$ output of the $m^{th}$ insurer; $V_{jm}$ is the weight of that output; $X_{im}$ is the $i^{th}$ input of the $m^{th}$ insurer; $U_{im}$ is the weight of that input; $Y_{jn}$ and $X_{in}$ are the $j^{th}$ output and $i^{th}$ input respectively of the insurer, $n=1, 2, \ldots, N$.

The objective function defined by $E_m$ aims to maximize the ratio of weighted outputs to weighted inputs of the insurer. This is subject to the condition that any other insurance company in the sample cannot exceed unit efficiency by using the same weight. These weights are assumed to be unknown but are obtained through optimization and computed separately for each unit.

Since the fractional program \{equation (7)\} is difficult to solve so, it needs to transform into linear programming formats by normalizing the numerator or the denominator of the fractional programming objective function. This is done by restricting the denominator of the objective function $E_m$ to unity, and adding this as a constraint to the problem as follows:

$$\text{Max } (E_m) = \frac{\sum_{j=1}^{J} V_{jm} Y_{jm}}{\sum_{i=1}^{I} U_{im} X_{im}}$$

Subject to the constraint $\sum_{i=1}^{I} U_{im} X_{im} = 1$
And $\sum_{j=1}^{J} V_{jm} Y_{jm} - \sum_{i=1}^{I} U_{im} X_{im} \leq 0$ ; $n = 1, 2, K, N$

Where $V_{jm}, U_{im} \geq 0$ ; $j=1, 2, K, J$ and $i=1, 2, K, I$

The maximizing linear programming setting in equation (8) assumes constant returns to scale technologies. When the formulation constraints the weighted sum of the inputs to unity and maximizes the outputs this becomes an input based efficiency measurement as shown above. Similarly a general input minimization CCR DEA model can also be constructed.

1.7.6.1. Input and Output Variables:

Three main inputs are there in case of insurance industry, which are labor, capital and business services and material. Present study uses operating expenses including employee expenses, capital resources and commission as input where the inputs of sales, administrative and managerial staff are proxied by the insurer’s total operating expenses as the data for number of employees are not available. Capital resources
include only shareholder’s capital. The outputs of financial service firms are measured according to three main approaches, the asset (intermediation) approach, the user-cost approach, and the value-added approach (Luhen, 2009). For output we used value added approach as most of the researchers have used (Luhen, 2009; Afja & Asghar, 2010 and Alhassan & Addisson, 2013). According to value added approach premium and investment income are chosen to represent output as these revenue measures are the available best proxies of the services that insurers provide to their customers and also used by many researchers.

1.7.7. Structure Conduct Performance Relationship

The relationship between insurer’s performance with market structure, market power and efficiency is captured through the profitability model suggested by Berger & Hannan (1993) and Choi & Weiss, (2005). The following modified model, on the basis of data availability is applied in this study.

\[ P_{it} = \beta_0 + \beta_1 HHI_{it} + \beta_2 MS_{it} + \beta_3 TE + \epsilon_{it} \] 

where \( i \) refers to insurer, \( t \) is time and \( \epsilon_{it} \) is the residual. The coefficients of explanatory variables i.e.\( \beta_1, \beta_2, \beta_3 \), are measured to evaluate the SCP, RMP, and ES hypotheses. A positive significant value of \( \beta_1 \) will satisfy SCP hypothesis, \( \beta_2 \) will satisfy RMP and \( \beta_3 \) will satisfy ES hypothesis.

Profit margin (P) is applied as dependent variable, as suggested by Choi & Weiss, (2005); Berger & Hannan, (1993) and Pope & Ma, (2008).

\[ P = 1 - \frac{\text{Losses Incurred}}{\text{Premiums Earned}} - \frac{\text{Expenses}}{\text{Premiums Written}} \]

\[ P = 1 - LR - ER \]

Where LR is the Loss ratio and ER is Expense ratio

As independent variable Herfindahl-Hirshman Index (HHI) is used to represent the market structure variable (Choi & Weiss, 2008, Pope & Ma, 2008 and Alhassan & Addisson, 2013). To represent the market power variable market share (MS) is used as increase in market share enhances the power of the individual company and which is also widely used by researchers like Pop & Ma, (2008), Alhassan & Adison,

1.8. CHAPTERIZATION

In order to achieve the objectives the present study consists of six chapters as hereunder-

Chapter I: Introduction, the chapter is introductory in nature dealing with concept of the hypotheses named SCP, ES, RMP, and general insurance, statement of the problem, research questions, objectives, significance of the study, Methodology and chapterization.

Chapter II: Literature Review presents a critical review of the relevant extant literatures, both empirical and conceptual nature.

Chapter III: Indian General Insurance Sector and its Market Structure deals with overview of IGIS its history, present scenario, development and market structure of GICs in India. Market structure is analyses by employing both structural and non structural measure of competition.

Chapter IV: Growth and Performance Analysis calculates growth and analyses performance of GICs in post reform era. Growth was analyzed by calculating exponential growth rate of various pertinent variables under different category and performance is analyzed through CARAMEL parameters with the help of ratio analysis.

Chapter V: Efficiency Analysis and Structure, Conduct, Performance Relationship deals with the efficiency of GICs and tested applicability SCP, ES, RMP hypotheses in IGIS. Efficiency has been evaluated by using frontier method, DEA and hypotheses tested through random effect regression model.

Chapter VI: Summary and Conclusion deals with a brief summary of findings, policy implications, suggestions, limitation, scope for further studies and ends with a concluding remark.
Reference:


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IRDA Annual Report (2009-2010). Insurance Regulatory and Development Authority, India


