

# **Firm Performances in Indian Life Insurance Industry: A Non-Parametric Analysis**

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## **ABSTRACT**

*The present study makes a comparison between 15 life insurance firms in India over a period from 2006-07 to 2015-16. For the purpose of analysis, a single input and a single output performance variable in the form of 'Investments' and 'Gross Premiums Written' of the observed life insurance firms were considered in the present study, under the assumptions of an input-output relationship respectively. The study has used the application of the Kruskal-Wallis and Mann-Whitney non-parametric tests across a non-normal dataset of the sampled firms covering all the years of the period from 2006-07 to 2015-16. The results of the study has pointed out the differences in performance between the observed public-sector and the private-sector life insurance firms in India with respect to the two major performance variables. The present study has further pointed out the dominance of the state-owned Life Insurance Corporation of India (LICI) even after the privatization of the country's life insurance sector.*

**Key Words:** *Life Insurance, Investments, Gross Premiums Written, LICI, Non-parametric tests, IRDAI*

**JEL Classification:** *C14, G22, L25*

## **1. INTRODUCTION**

The country's life insurance business remained under the monopoly of the state-owned Life Insurance Corporation of India (LICI), since its inception in 1956. In the end-nineties, however, the scenario changed following the introduction of reform measures in the area of life insurance based on the recommendations of the R.N. Malhotra Committee on Insurance Deregulation (1994). Among its several reform initiatives, the committee suggested the need for a statutory body to monitor and regulate the growth of insurance business in India. This eventually paved the way for the establishment of Insurance Regulatory and Development Authority of India (IRDAI), based on the IRDAI Act in 1999. Since then, the country's life insurance sector witnessed an abrupt increase in the footfall of private players, either independently or in collaboration with foreign partners. From a single state-owned insurer (LICI) till the beginning of the year 2000, the country's life insurance sector registered a phenomenal growth with the number of private players having risen to 15 at the end of the FY 2006-07, within a span of just six years. During this period, the private life insurers collectively garnered a market share of 18.08 percent in contrast to LICI's 81.92 percent. At the end of the FY 2015-16, the market share of LICI further declined to 72.61 per cent in

contrast to 27.39 percent market-share recorded by the 23 private players. As life insurance is a long-term contract, the performances of the life insurance firms over time holds utmost importance from the view-point of safeguarding policyholders' interests in the backdrop of insurance sector reforms. The present study thus makes an attempt to compare the performances of 15 life insurance firms in India who has been consistently in operation during all the years of the study-period from 2006-07 to 2015-16. For the purpose of analysis, two major performance variables in the form of 'Investments' and 'Gross Premiums Written' of the observed life insurance firms in India were considered in the present study, under the assumptions of an input-output relationship respectively. The present study is expected to benefit the regulators and policy-makers in making effective policy decisions and to correct any shortcomings for future improvement in the performances of the life insurance firms in India.

The present study has hence been organized as follows: Section - 2 makes a review of the previous studies on the performances of Indian life insurance firms in the past as well as in recent times. Section-3 discusses the research objectives, sample selection and data-sources, methodologies used, limitations and future scope of the study. Section - 4 presents a brief conceptual framework of the Kruskal-Wallis and Mann-Whitney non-parametric tests as undertaken in the present study. Section - 5 describes the results as obtained from the present study. Section-6 highlights the concluding observations. A bibliography of the research materials used has been provided at the end for future references of the researchers.

## **2. LITERATURE REVIEW**

Having reviewed the past research papers, the researcher did not find enough evidence of relevant studies on non-parametric applications in India or in abroad that exclusively dealt with the performances of life insurance firms in India covering a longer time-horizon. Most of the studies on Indian insurance industry were found to have used the common statistical applications, data envelopment analysis or ratio-based approaches. The present study intended to fill that research gap by adding a new dimension in the field of insurance research through the application of non-parametric approaches. Some of the empirical studies reviewed by the researcher strictly on insurance sector has been briefly enumerated below.

Akotey et. al. (2013) assessed the financial performance of 10 life insurance companies in Ghana covering a period of 11 years from 2000 to 2010 using panel regression approach. The

study fulfills an urgent need to investigate the determinants that are crucial for the survival, growth and profitability of life insurers in an emerging economy. The authors has designed an empirical model to investigate the determinants of life insurers' profitability. The study also examines the relationship among the three measures of insurers' profitability which are investment income, underwriting profit and the overall (total) net profit. The results of the panel regression indicated that the gross written premiums were having a positive relationship with the insurers' profitability while its relationship with investment income was found to be negative. The results also pointed out that the sampled life insurers have been incurring large underwriting losses due to over-trading and price undercutting.

Bedi and Singh (2011) examined the overall performance of the life insurance industry in India between pre and post economic reform era, the volume of competition and challenges faced by LIC and the effectiveness of its investment strategy undertaken during the period from 1980 to 2009. To measure the performances of the life insurance players based on total life insurance premium income, and to judge the extent of competition prevailing in the country's life insurance sector during the post-LPG (Liberalization, Privatization & Globalization) era, the study included a sample size of 18 life insurance firms covering the period from 2001-02 to 2007-08. The data were analyzed using the t-test and the two-way anova approaches. The study has revealed that there was a tremendous growth in the performance of Indian life insurance industry and LIC due to the policy of LPG. Insurance industry also improved a lot due to the emergence of private-sector and foreign players. Further, there was also a significant change observed in the investment pattern of LIC over the period 1980 to 2009. There was an increasing trend towards investment in stock markets by LIC from 60 percent to 93 percent during the period from 1980 to 2009.

Chakraborty and Sengupta (2016) evaluated the financial soundness and market concentration of the four leading life insurers in India namely the Life Insurance Corporation of India (LIC), ICICI Prudential Life Insurance Company Limited (ICICI Prulife), HDFC Standard Life Insurance Company Limited (HDFC Standard), and SBI Life Insurance Company Limited (SBI Life). The four life insurance players were selected based on their market shares in terms of total premium incomes covering the period from 2008-09 to 2012-13. The researchers has used the application of the ratio-based CAMELS model for examining the financial soundness of the sampled life insurance firms, as recommended by Das, Davies and Podpiera (2003) for the insurance companies. Further, the application of the

widely-used k-concentration ratios, the Herfindahl-Hirschman Index (HHI) and the normalized HHI were used in the study to evaluate the extent of concentration and competition prevailing in the country's life insurance sector over the study-period. The findings of the study has pointed out the dominating performances of the public-sector giant LIC even after 15 years since the privatization of the country's life insurance sector, along with the existence of a fairly competitive market structure owing to the presence of private and foreign players.

Chakraborty (2016<sup>a</sup>) examined the extent of concentration and competition prevailing in the Indian life insurance sector covering the period from 2008-09 to 2014-15, against the backdrop of the global financial crisis. The sample size included 18 life insurance firms in India who has been consistently operating across all the years of the study-period, ignoring the new entrants during the period. The study has used the application of the Herfindahl-Hirschman Index (HHI) and the k-concentration ratios to evaluate the extent of competition prevailing among the 18 life insurance firms over the study-period. The study has further demonstrated the disparity in the performances of the sole public-sector and the 17 private-sector life insurance firms, since the outbreak of the global meltdown. The results of the study has revealed the pre-existing dominance of LIC in the Indian life insurance market, both in terms of market concentration and premiums underwritten, even after 15 years since the privatization of the country's insurance sector.

Chakraborty (2016<sup>b</sup>) assessed the efficiencies of the country's life insurance sector using a panel data-set of 18 life insurance companies covering the study-period from 2008-09 to 2014-15, against the backdrop of the US financial crisis. The paper aimed at understanding the efficiency levels and operating scales of the private life insurance players based on their Technical Efficiency (TE), Pure Technical Efficiency (PTE) and the Scale Efficiency (SE) scores, using the non-parametric Data Envelopment Analysis under both Constant Returns to Scale (CRS) and Variable Returns to Scale (VRS) assumptions. The three input-output framework consisted of a panel data-set of 1 public-sector and 17 private-sector life insurance firms in India that were chosen as the sample of the study. The study utilizes three inputs i.e. 'commission expenses', 'operating expenses' and 'Investments' against the three outputs namely 'net premium', 'benefits paid' and 'income from investments' respectively. The application of the output-orientated non-parametric Data Envelopment Analysis (DEA) has pointed out the inconsistencies in the operational efficiencies of the life insurers during the

initial years of the study-period, the reason for which was attributed to the global slowdown post 2007-08.

Chaudhary and Kiran (2011) examined the developments undertaken in the Indian life insurance industry for the period from 2006-07 to 2010-11, in the light of privatization of the country's insurance sector. The study was based on secondary data sources that included a sample size of 23 life insurance companies who has been operational during the period from 2006 to 2011. For the purpose of analysis, the researcher has used the statistical tools such as percentage analysis, ratio analysis, growth rates and coefficient of variation to highlight the changes in the country's life insurance sector during the post-deregulation study-period in terms of certain parameters such as growth in total number of offices of life insurers, growth in number of individual agents working in life insurance industry, number of products and riders, growth of life insurance business and premium income, lapse / forfeiture ratio and settlement of death claims. The findings of the study has pointed out that the solvency ratios of the private life insurers were much better than LIC, despite of the big losses suffered by the former during the initial years of their operations. Lapsation-ratio of private life insurers was found to be higher than that of LIC, whereas the servicing of claims was better in case of LIC as compared to the private life insurers over the study-period.

Gulati and Jain (2013) evaluated the changes in the financial performance of the sole public-sector player LIC w.r.t. market shares and several other aspects, owing to the impact of the Liberalization, Privatization and Globalization (LPG) policy of the Indian Government and the simultaneous rise in the entry of private life insurance players. The study was entirely based on secondary data sources covering the period from 1993-94 to 2008-09. A total of 6 parameters were used which were eventually analyzed to reflect the performance and growth in productivity of LIC after the liberalization policy regime introduced in the year 2000. It was observed that the performance of LIC in terms of growth of new business, business in force in India, new business under group insurance and other performance measures was found to be satisfactory over the years, despite of the rising presence of private players. Moreover, a significant improvement was noticed in the settlement of claims processes especially after the entry of private players in the country's life insurance sector.

Ibrahim and Rehman (2012) analyzed the comparative performances of the public-sector player LIC with 22 private-sector life insurance firms in India, in terms of the parameter i.e. settlement of consumer- grievances, covering the period from 2005-06 to 2009-10. The study

has provided insights into consumer protection and awareness with reference to the grievance settlement operations of the life insurance industry in India. The secondary data used for the study was analyzed using descriptive statistics and paired samples t-test using the tools such as Excel and SPSS. The study has shown LICI to be the most consistent performer in resolving consumer grievances during the period under review, as compared to the private life insurers. The consumers' grievance redressal system of the private life insurers manifested fluctuating trends and were found to be lagging behind LICI, thereby implying scope for improvement for the private life insurance industry.

Kotgiri (2013) evaluated the performances of public and private life insurance companies in India in terms of certain parameters such as growth in insurance industry and trend of customers' investments in particular plans. The purpose of the study was to find out the investment habits, change in attitude of customer's investment, growth in investments and premiums underwritten between the public and private-sector life insurers in India. The study was mostly descriptive in nature that included a sample of 22 life insurance firms who has been into operations from 2000-01 to 2011-12. The study has revealed the dominance of LICI in the Indian life insurance sector, with respect to all the parameters, but also pointed out a slow and steady rise in the market shares of the private life insurers during the period under review.

Kumar and Priyan (2012) examined the disparities in the performances of public and private-sector life insurance companies in India in terms of certain parameters such as growth rates of fresh business premium, number of new policies issued and total life insurance premium incomes. The study was based on secondary data-sources covering 23 life insurance companies (inclusive of LICI) covering the period from 2002-03 to 2009-10. The methodology used was the non-parametric Mann-Whitney U-test to test the hypothesis i.e. whether there were any significant differences in the performances of the public and private life insurers over the study-period. The results of the study has shown no significant differences between the life insurers in the growth rates of fresh business premium and number of new policies issued during the study-period, whereas significant differences were observed in the growth rates of total life insurance premium incomes for the public and private-sector life insurers' under review.

Mitra and Ghosh (2010) investigated the macro-economic factors that are responsible for the demand of life insurance in India. The study has tried to find out an empirical relationship

between several economic and non-economic factors with the consumption of life insurance in India during the post-reform period from 1991 to 2008. The researchers have used the Augmented Dickey Fuller (ADF) unit root test and the Engle & Granger Co-integration study for the purpose of analysis. The study has found that the economic factors such as 'Income' and 'Financial Development' were the most significant and positively-related in driving the life insurance demand in India; while 'interest rates on other alternative investments' were negatively related with life insurance demand in India.

Nagaraja (2015) vindicated the relationship between the performances of the Indian insurance industry with the country's economic development, followed by a comparative analysis of both private and public sectors of life and non-life insurance industry in India. Four indicators-Premium incomes, Market Share, New Policies Issued and Claims Settlement Ratio - have been used to analyse the performances of Insurance industry. The researcher made an analytical study of the country's insurance industry based on a sample size of 52 insurance companies, of which 24 are in life insurance business and 28 are non-life insurers, covering the period from 2004-05 to 2013-14. The findings of the study showed the impressive performances of LIC over its private-sector counterparts in the life insurance segment with respect to the parameters undertaken in the study. In the non-life segment, the performance of the public-sector players seemed to be stagnant in contrast to the fluctuating levels of performances among the private-sector general insurers over the study-period. The study concluded with the observation that the country's insurance-penetration and insurance-density was very low in India compared to the developed countries of the world, thereby indicating scope for improvement for the country's insurance industry.

Owusu-Ansah et. al. (2010) evaluated the relative efficiencies of the 10 Ghanaian general insurance companies covering the period from 2002 to 2007, using the non-parametric Data Envelopment Analysis (DEA). The study has used Debt capital, Equity capital and Management expenses as inputs against the total premiums, claims and investment incomes as outputs for the study. The study has also used the hypotheses-testing to find out the contributions made by insurer-related variables (such as dimension/size and market shares) upon the efficiency of the Ghanaian general insurance companies using the non-parametric Mann-Whitney U-tests. The study has found out that the Ghanaian general insurers were operating at an average overall efficiency of 68 percent, technical efficiency of 87 percent and scale efficiency of 78 percent respectively, thereby implying immense scope for



improvement for the Ghanaian general insurance industry. The results of the study have also shown higher efficiencies for the Ghanaian general insurers having higher dimension and market shares.

Shreedevi and Manimegalai (2013) analysed the comparative performances of the public-sector and private-sector non-life insurance companies in India covering the period from 2002-03 to 2010-11. The study was based on secondary data sources covering 24 general insurance companies, of which six are in the public-sector. An attempt was made to analyse whether there was any significant difference in the growth rates of number of new policies, gross direct premium collected and net incurred claims among the public- and private-sector non-life insurance companies, through the formulation of a hypothesis-test. For the purpose of data-analysis, the non-parametric Mann-Whitney – U Test was applied. The findings of the study showed statistical significant differences in the growth rates of number of new policies issued, gross direct premium collected and net incurred claims between the sampled public-sector and private-sector general insurers. The study has further pointed out that the public-sector firms have done well in contrast to the private-sector firms during the period under review mostly because of their aggressive pricing and the retention of business. The study finally concluded with the observation that New India Assurance (among the PSU companies) and ICICI Lombard (among the private-sector companies) will continue to hold the leadership position in the country's general insurance sector for the next few years.

Sinha (2013) has analysed the financial soundness of two leading private life insurance companies (in terms of market shares) operating in India, namely Bajaj Allianz Life Insurance and ICICI Prudential Life Insurance, based on 14 FSIs (Financial Soundness Indicators) covering the CAMELS framework, as recommended by Das, Davies and Podpiera (2003) for the insurance companies. The data-set covered a period of 6 years from 2004-05 to 2009-10 and the life insurers were selected based on the purposive sampling method. The results of the study indicated certain areas for improvement of the selected life insurers. Both the private players were found to wanting in capital due to low capital adequacy ratios. The study also pointed out that the life insurers should cut down on its operational expenses to achieve their break-even points. The liquidity ratios of the two firms also showed a declining trend during the period under review which indicates a serious concern for the firms. Furthermore, the researcher has found that there was a substantial decline in the investment incomes of the two life insurers during the global slow-down period

post-2007. The study finally concluded with a suggestion that the life insurance players should take a re-look at their investment-portfolios so that their businesses gets least hurt during such global or domestic events.

### **3. RESEARCH METHODOLOGY**

#### **3.1 Research Objectives**

Based on the research gap as found from the literature review, the present study has two-fold objectives which are listed as follows:-

- (a) To investigate any disparity in the relative performances of the 15 life insurance companies' in India under review, with respect to the performance indicators i.e. 'Investments' and 'Gross Premiums Written' during the period from 2006-07 to 2015-16.
- (b) To determine the nature and extent of differences between the performances of the sampled life insurance firms' through pairwise comparisons covering all the years of the period under observation, against the selected performance indicators,.

#### **3.2 Research Hypotheses**

In addition, the present study attempts to provide answers to the following null hypotheses:-

H<sub>01</sub>: No significant differences exist among the performances of the sampled life insurance firms with respect to the variable 'Gross Premiums Written' during the period under review.

H<sub>02</sub>: No significant differences exist among the performances of the sampled life insurance firms with respect to the variable 'Investments' during the period under review.

Against an alternative hypotheses which is defined as follows:-

H<sub>A1</sub>: Significant differences exist among the performances of the sampled life insurance firms with respect to the variable 'Gross Premiums Written' during the period under review.

H<sub>A2</sub>: Significant differences exist among the performances of the sampled life insurance firms with respect to the variable 'Investments' during the period under review.

### **3.3 Sample Selection**

The objective of the present study is confined only in the post-reform period after the liberalization of the country's insurance sector since the financial year 1999-2000, so the subsequent period of reforms has only been considered. Besides this, the reporting of the data was not so much structured before the FY 2006-07 and may be subject to volatile changes. Hence, the period before 2006-07 has not been considered in the present study to ensure authenticity and accuracy of the financial data. The purposive sampling approach has been employed in the selection of the sample that comprises of 01 public-sector and 14 private-sector life insurance firms in India, who has been consistently in operation covering all the years of the period from 2006-07 to 2015-16. Thus, the life insurers making entry in between the years covering the study period has not been considered, given their newness in the industry.

### **3.4 Research Methodology**

While deciding on the most suitable tool for analysis, the researcher has zeroed in on the application of the non-parametric analysis in view of the research gap as evident from the literature review on insurance industry. The study has used the application of the Kruskal-Wallis and Mann-Whitney non-parametric estimation techniques across a non-normal dataset of the sampled firms covering all the years of the period from 2006-07 to 2015-16. The results of the study has been presented with respect to two distinct performance variables namely 'Investments' and 'Gross Premiums Written' for the sampled life insurance firms during the period under review, using the IBM-SPSS software v20. It has been found from the previous studies that the nature and amount of investments made by the life insurance firms out of their investible funds determines their operational profits. Similarly, the amount of gross premiums collected by the life insurance firms is considered as a major outcome from their business activities. Both these variables are considered as determining variables in examining the performances of any life insurance firm, and hence has been viewed under the assumptions of an input-output relationship respectively in the present study.

### **3.5 Data Sources**

The financial data of the sampled life insurance firms has been collected from the IRDAI reports and from the websites of the respective life insurers during the period under review.

### **3.6 Limitations & Future Scope of the Study**

The data collected for the present study has been derived from the published financial statements of the respective life insurers without any emphasis on primary data. Hence, the study incorporates all the limitations that are inherent in the published financial statements. The study is restricted to a time span of 10 years primarily focussing on the post-deregulation phase of the country's insurance sector reforms. The study includes 15 life insurance firms in India who has been consistently in operation covering all the years of the period from 2006-07 to 2015-16, leaving aside the newer players making entry in between the years covering the study period. The analysis carried out in the present study has strictly restricted its application based on the non-parametric methods, in examining the performances of Indian life insurance firms' under review, in view of the selected performance indicators.

Hence, the future studies of research in this area could take into account more number of players, covering both the country's life insurance and general insurance sectors, across a larger data-set of performance indicators over an extended time-period. Moreover, many other areas that can be studied include the application of cost-efficiency models, stochastic frontier models, efficiency and productivity models, financial modelling, etc. of the insurance firms, in the backdrop of the country's insurance sector reforms. Like most of the studies in financial services, data availability for this study is also restricted to the information submitted by the life insurers in compliance with the regulatory authority, IRDAI.

## **4. CONCEPTUAL FRAMEWORK OF NON-PARAMETRIC MODELS USED**

### **4.1 Kruskal-Wallis test (or, H test)**

The Kruskal-Wallis test, or the H-test as it is popularly known, is a non-parametric test that is used to determine whether or not 'k' number of independent samples have been drawn from the same population. This test is used to test the null hypothesis that 'k' independent random samples came from identical population, against the alternative hypothesis that the means of the populations are not equal. This test is analogous to the one-way analysis of variance approach, but unlike the latter it does not require the assumption that the samples come from approximately normal populations having the same standard deviation. In this test, the entire data is taken together and ranked from low to high or high to low; as if they constituted a single sample.

The test-statistic H is worked out as follows:-

$$H = \frac{12}{N(N+1)} \sum_{j=1}^k \frac{R_j^2}{N_j} - 3(N+1)$$

Where, N represents the total size of all 'k' samples taken together, i.e.  $N = N_1 + N_2 + \dots + N_k$ , and  $R_j$  being the sum of the ranks assigned to 'k' samples i.e.  $R_j = R_1 + R_2 + \dots + R_k$ .  $N_j$  represented the sample sizes. The sampling distribution of H can be approximated with a chi-square distribution with (k-1) degrees of freedom, provided that the total size of all samples  $\geq 5$ , and that there are no ties in ranks. In case there are ties amongst the observations in the sample data, the value of H is subject to certain corrections. In practice, the correction is usually too negligible to warrant a change in the decision.

If the calculated (or, corrected) H-value falls within the concerned table value of chi-square for (k-1) degrees of freedom at a given significance level, the null hypothesis is accepted. If the calculated H-value exceeds the tabulated chi-square value at a given level of significance, we reject the null hypothesis thereby concluding that the samples do not belong to the same population.

#### **4.2 Mann-Whitney test (or, U test)**

The Mann-Whitney test, or the U-test as it is popularly known, is a non-parametric test that is used to determine whether any two independent samples have been drawn from the same population. This test requires less restrictive assumptions in practice, and is a relatively powerful non-parametric test that helps to determine whether there are any significant differences between any two independent samples, from a given population.

Thus in applying U-test, we take the null hypothesis that the two samples come from identical populations, against an alternative hypothesis that the means of the two populations are not equal. Both one-tailed and two-tailed tests can be performed, based on the alternate hypothesis at a given significance level. If the null hypothesis is true, it indicates that the observations come from the same identical population and the means of the ranks assigned to the values of the two samples should be more or less the same. A significant difference between the sum of the ranks assigned to the values of the first sample and to the values of the second sample implies a significant difference between the samples. To test the difference

between the rank sums, corresponding to the first sample, the test-statistic U would be worked out as follows:-

$$U = N_1 \cdot N_2 + \frac{N_1(N_1+1)}{2} - R_1$$

Where,  $N_1$  and  $N_2$  are the two sample sizes and  $R_1$  is the sum of the ranks assigned to the values of the first sample. For convenience, we normally choose  $N_1$  as the first sample, if the sample sizes are unequal and  $N_1 \leq N_2$ . If  $N_1$  and  $N_2$  are sufficiently large (i.e. both greater than 8), the sampling distribution of the test-statistic U can be approximated closely to the normal distribution with mean ( $\mu_U$ ) as  $N_1 \cdot N_2 / 2$  and standard deviation ( $\sigma_U$ ) as  $[(N_1 \cdot N_2 (N_1 + N_2 + 1) / 12)]^{1/2}$ . That is to say, the assumptions of normality is valid only when both  $N_1$  and  $N_2 > 8$ , which shows that the sampling distribution of U is symmetrical and follows normal distribution, with  $N(0, 1)$ . The z-value is hence computed as follows:  $Z = (U - \mu_U) / \sigma_U$ , which is then compared with the relevant z-table to draw the conclusion based on the hypothesised assumptions. Similarly, to test the difference between the rank sums corresponding to the second sample, the U test-statistic can also be calculated by using the sum of the ranks of the second sample as given under:

$$U = N_1 \cdot N_2 + \frac{N_2(N_2+1)}{2} - R_2$$

Where,  $N_1$  and  $N_2$  are the sample sizes and  $R_2$  is the sum of the ranks assigned to the values of the second sample. But if the sample sizes  $N_1$  and  $N_2 \leq 8$ , then the normal curve approximation to the sampling distribution of U cannot be applied. In such cases, the tabulated values of U are obtained based on special tables showing selected values of Wilcoxon Mann-Whitney (unpaired) distribution.

With regard to the applicability of the non-parametric Mann-Whitney U-test, the following two important thumb rules should be kept in mind:-

1. The aggregate of the U-test statistic, as obtained from the two individual samples, must be equal to the product of the sample sizes. That is to say,  $U_1 + U_2 = N_1 \cdot N_2$ .
2. The aggregate of the sum of the ranks assigned to the values of both the first and second samples, must be equal to  $[(N_1 + N_2) (N_1 + N_2 + 1)] / 2$ . That is to say,  $R_1 + R_2 = [(N_1 + N_2) (N_1 + N_2 + 1)] / 2$ .

## 5. FINDINGS & ANALYSIS

The descriptive statistics, as shown in Table - 1, depicted the means, standard deviations, minimum and maximum values (in Rs. Crores), followed by the coefficients of skewness and kurtosis of the sampled life insurance firms covering all the years of the period from 2006-07 to 2015-16 against the two financial indicators i.e. ‘Gross Premiums Written’ and ‘Investments’ respectively. It was evident from the following table that the mean values, standard deviation, minimum and maximum values were the highest in case of the variable ‘Investments’, followed by ‘Gross Premiums Written’. Nevertheless, the mean values and the relative measures of skewness and kurtosis of the selected variables confirmed the presence of an asymmetrical distribution across the data-set of the sampled life insurance firms.

**Table – 1: Descriptive Statistics of Selected Variables**

Variables	Sample size	Mean	Std. Deviation	Minimum	Maximum	Skewness	Kurtosis
Gross Premiums Written	150	17776.61	49676.92	51.00	266444.21	3.73	12.87
Investments	150	77359.43	290845.67	145.53	1872755.70	4.42	19.99

Source: - Calculated

In order to ensure a fair and proper application of the non-parametric models in the present study, each of the performance variables were further tested for normality at 1 percent significance level. Table – 2, as given below, presents the results of the two most popularly-used normality tests against the selected variables covering all the years of the study-period.

**Table – 2: Normality Tests of Selected Variables**

Variables	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	d.o.f	Sig.	Statistic	d.o.f	Sig.
Gross Premiums Written	0.430	150	0.000	0.349	150	0.000
Investments	0.487	150	0.000	0.283	150	0.000

a. Lilliefors Significance Correction

Source: - Calculated

The results of both the Kolmogorov-Smirnov and the Shapiro-Wilk tests clearly indicated statistically significant results ( $p$ -values  $\leq 0.01$ ) against both the performance variables as considered in the present study, thereby firmly corroborating the presence of a non-normal distribution across the data-set of the sampled firms during the period under review. Thus, the

normality test results clearly provided a favourable indication for the proper execution of the non-parametric analysis in the present study.

### 5.1 Testing of Hypothesis using Kruskal-Wallis H-Test

In the backdrop of the normality-test results, the Kruskal-Wallis non-parametric estimation technique was carried out to test the hypotheses that whether significant differences exist in the sample means of the observed life insurance firms, with respect to the two performance variables, during the period under review. The findings of the Kruskal-Wallis H-test statistic has been presented below in Tables 3 and 4 against the two financial indicators, as considered under the assumptions of an input-output relationship in the present study.

**Table – 3: Kruskal-Wallis Test Results (Output Variable: Gross Premiums Written)**

Hypothesis	Variable	Life Insurers	Mean Ranks	H-Test Statistics		Result of H <sub>0</sub> (at $\alpha = 0.01$ )
H <sub>01</sub>	Σ Gross Premiums Written by the Life Insurers	LICI	145.5	Chi-Square	131.274	Rejected
		ICICI Prulife	131.7			
		HDFC Std. Life	110.6			
		SBI Life	115.4			
		BAJAJ Allianz Life	108.9			
		Birla Sun Life	84.3	d.o.f	14	
		Max New York Life	90.2			
		ING Vysya Life	33.9			
		Reliance Life	81.2			
		Kotak Life	59.2			
		TATA-AIG Life	58.4	Asymp. Sig. (p-value)	0.000	
		PNB MetLife	48.7			
		AVIVA Life	42.3			
		Sahara Life	6.1			
Shriram Life	16.1					

Source: - Calculated

**Table – 4: Kruskal-Wallis Test Results (Input Variable: Total Investments)**

Hypothesis	Variable	Life Insurers	Mean Ranks	H-Test Statistics		Result of H <sub>0</sub> (at $\alpha = 0.01$ )
H <sub>02</sub>	Σ Total Investments made by the Life Insurers	LICI	145.5	Chi-Square	95.395	Rejected
		ICICI Prulife	108.0			
		HDFC Std. Life	100.8			
		SBI Life	117.7			
		BAJAJ Allianz Life	100.3			
		Birla Sun Life	61.6	d.o.f	14	
		Max New York Life	92.3			
		ING Vysya Life	64.6			
		Reliance Life	62.5			
		Kotak Life	57.6			



	TATA-AIG Life	84.7	Asymp. Sig. ( <i>p</i> - value)	0.000
	PNB MetLife	57.1		
	AVIVA Life	41.5		
	Sahara Life	19.1		
	Shriram Life	19.2		

Source: - Calculated

Based on the results obtained from Tables 3 and 4, we find that the sampling distribution H approximates closely with the chi-square distribution at 1 percent significance level, based on a total sample size of 150 observations. The calculated values of chi-square, as depicted in Tables 3 and 4 respectively, exceeds the tabulated chi-square value of 23.685 at 1 percent level of significance. The hypothesized Kruskal-Wallis H-test results, as obtained against both the performance variables, were found to be statistically significant ( $p$ -values  $\leq 0.01$ ) at given degrees of freedom. Thus, the results of the Kruskal-Wallis H-test clearly provided indications about the rejection of the null hypothesis of equal-sample means among the sampled life insurance firms during the period under observation. The mean ranks of LICI were even found to be the highest among the sample firms thereby indicating significant fluctuations in actual values between LICI and the private players, with respect to the variables 'investments' and 'gross premiums written' during the period under review. The H-test results clearly provided a favourable background for the execution of the non-parametric Mann-Whitney test for the life insurance firms under observation covering all the years of the period from 2006-07 to 2015-16.

## 5.2 Pairwise Comparisons using Mann-Whitney U-Test

The rejection of the null hypothesis of equal means under the Kruskal-Wallis H-tests leads to a conclusion that not all the group means are equal, but only some of the sample means may be statistically different. The differences among specific sample means may be further examined through the application of the Mann-Whitney U-tests. The application of the Mann-Whitney non-parametric estimation technique, considered as an extension to the Kruskal-Wallis H-test, specifically determines any two sample means that are statistically significant from a given population, with respect to a specified level of significance.

In applying the U-test, the null hypothesis is further considered under an assumption that any two samples come from an identical population, against an alternative hypothesis that the means of any two samples of life insurance firms are not equal. The hypothesized Mann-Whitney U-test thus helps in locating the unequal pair of means among the independent

samples of life insurance firms' under review, based on a given population. The Mann-Whitney test outcomes, at 1 percent level of significance, between the sampled life insurance firms (taken in pairs) has been summarised below in Tables 5 and 6, in the backdrop of the two performance variables 'Gross Premiums Written' and 'Investments' respectively during the period under observation.

**Table – 5: Mann-Whitney Test Results (Output Variable: Gross Premiums Written)**

Life Insurer (I)	Life Insurer (J)	Mean Ranks (I)	Mean Ranks (J)	Sample Size	U-Test Statistics	Asymp. Sig. (p-values)	Result of Hypothesis (H <sub>0</sub> ) (at $\alpha = 0.01$ )
LICICI	ICICI Prulife	15.50	5.50	10	0.000	0.000	<i>Rejected</i>
	HDFC Std. Life	15.50	5.50	10	0.000	0.000	
	SBI Life	15.50	5.50	10	0.000	0.000	
	Bajaj Allianz Life	15.50	5.50	10	0.000	0.000	
	Birla Sun Life	15.50	5.50	10	0.000	0.000	
	MNYL	15.50	5.50	10	0.000	0.000	
	ING Vysya Life	15.50	5.50	10	0.000	0.000	
	Reliance Life	15.50	5.50	10	0.000	0.000	
	Kotak Life	15.50	5.50	10	0.000	0.000	
	TATA-AIG Life	15.50	5.50	10	0.000	0.000	
	PNB MetLife	15.50	5.50	10	0.000	0.000	
	AVIVA Life	15.50	5.50	10	0.000	0.000	
	Sahara Life	15.50	5.50	10	0.000	0.000	
Shriram Life	15.50	5.50	10	0.000	0.000		
ICICI Prulife	HDFC Std. Life	13.90	7.10	10	16.000	0.010	<i>Rejected</i>
	SBI Life	13.90	7.10	10	16.000	0.010	
	Bajaj Allianz Life	15.10	5.90	10	4.000	0.001	
	Birla Sun Life	15.50	5.50	10	0.000	0.000	
	MNYL	15.30	5.70	10	2.000	0.000	
	ING Vysya Life	15.50	5.50	10	0.000	0.000	
	Reliance Life	15.50	5.50	10	0.000	0.000	
	Kotak Life	15.50	5.50	10	0.000	0.000	
	TATA-AIG Life	15.50	5.50	10	0.000	0.000	
	PNB MetLife	15.50	5.50	10	0.000	0.000	
	AVIVA Life	15.50	5.50	10	0.000	0.000	
	Sahara Life	15.50	5.50	10	0.000	0.000	
Shriram Life	15.50	5.50	10	0.000	0.000		
HDFC Std. Life	SBI Life	9.70	11.30	10	42.000	0.545	<i>Accepted</i>
	Bajaj Allianz Life	11.40	9.60	10	41.000	0.496	
	Birla Sun Life	13.70	7.30	10	18.000	0.016	
	MNYL	13.00	8.00	10	25.000	0.059	<i>Rejected</i>
	ING Vysya Life	15.50	5.50	10	0.000	0.000	
	Reliance Life	14.00	7.00	10	15.000	0.008	
	Kotak Life	15.00	6.00	10	5.000	0.001	
	TATA-AIG Life	15.20	5.80	10	3.000	0.000	
	PNB MetLife	15.50	5.50	10	0.000	0.000	
	AVIVA Life	15.50	5.50	10	0.000	0.000	
Sahara Life	15.50	5.50	10	0.000	0.000		

	Shriram Life	15.50	5.50	10	0.000	0.000	
SBI Life	Bajaj Allianz Life	12.60	8.40	10	29.000	0.112	<i>Accepted</i>
	Birla Sun Life	14.40	6.60	10	11.000	0.003	<i>Rejected</i>
	MNYL	13.80	7.20	10	17.000	0.013	<i>Accepted</i>
	ING Vysya Life	15.50	5.50	10	0.000	0.000	<i>Rejected</i>
	Reliance Life	14.40	6.60	10	11.000	0.003	
	Kotak Life	15.10	5.90	10	4.000	0.001	
	TATA-AIG Life	15.20	5.80	10	3.000	0.000	
	PNB MetLife	15.50	5.50	10	0.000	0.000	
	AVIVA Life	15.50	5.50	10	0.000	0.000	
	Sahara Life	15.50	5.50	10	0.000	0.000	
	Shriram Life	15.50	5.50	10	0.000	0.000	
Bajaj Allianz Life	Birla Sun Life	15.00	6.00	10	5.000	0.001	<i>Rejected</i>
	MNYL	12.90	8.10	10	26.000	0.070	<i>Accepted</i>
	ING Vysya Life	15.50	5.50	10	0.000	0.000	<i>Rejected</i>
	Reliance Life	14.60	6.40	10	9.000	0.002	
	Kotak Life	15.50	5.50	10	0.000	0.000	
	TATA-AIG Life	15.50	5.50	10	0.000	0.000	
	PNB MetLife	15.50	5.50	10	0.000	0.000	
	AVIVA Life	15.50	5.50	10	0.000	0.000	
	Sahara Life	15.50	5.50	10	0.000	0.000	
	Shriram Life	15.50	5.50	10	0.000	0.000	
Birla Sun Life	MNYL	8.90	12.10	10	34.000	0.226	<i>Accepted</i>
	ING Vysya Life	15.20	5.80	10	3.000	0.000	<i>Rejected</i>
	Reliance Life	11.50	9.50	10	40.000	0.450	<i>Accepted</i>
	Kotak Life	14.60	6.40	10	9.000	0.002	<i>Rejected</i>
	TATA-AIG Life	14.30	6.70	10	12.000	0.004	
	PNB MetLife	14.70	6.30	10	8.000	0.001	
	AVIVA Life	14.70	6.30	10	8.000	0.001	
	Sahara Life	15.50	5.50	10	0.000	0.000	
	Shriram Life	15.50	5.50	10	0.000	0.000	
MNYL	ING Vysya Life	14.80	6.20	10	7.000	0.001	<i>Rejected</i>
	Reliance Life	12.10	8.90	10	34.000	0.226	<i>Accepted</i>
	Kotak Life	13.90	7.10	10	16.000	0.010	<i>Rejected</i>
	TATA-AIG Life	14.00	7.00	10	15.000	0.008	
	PNB MetLife	14.60	6.40	10	9.000	0.002	
	AVIVA Life	14.70	6.30	10	8.000	0.001	
	Sahara Life	15.50	5.50	10	0.000	0.000	
	Shriram Life	15.50	5.50	10	0.000	0.000	
ING Vysya Life	Reliance Life	6.40	14.60	10	9.000	0.002	<i>Rejected</i>
	Kotak Life	6.90	14.10	10	14.000	0.007	
	TATA-AIG Life	6.40	14.60	10	9.000	0.002	
	PNB MetLife	7.50	13.50	10	20.000	0.023	<i>Accepted</i>
	AVIVA Life	8.00	13.00	10	25.000	0.059	<i>Accepted</i>
	Sahara Life	15.50	5.50	10	0.000	0.000	<i>Rejected</i>
	Shriram Life	15.20	5.80	10	3.000	0.000	
Reliance Life	Kotak Life	14.50	6.50	10	10.000	0.002	<i>Rejected</i>
	TATA-AIG Life	14.20	6.80	10	13.000	0.005	
	PNB MetLife	14.60	6.40	10	9.000	0.002	
	AVIVA Life	14.50	6.50	10	10.000	0.002	
	Sahara Life	15.50	5.50	10	0.000	0.000	
	Shriram Life	15.40	5.60	10	1.000	0.000	
Kotak Life	TATA-AIG Life	10.90	10.10	10	46.000	0.762	<i>Accepted</i>
	PNB MetLife	13.00	8.00	10	25.000	0.059	

	AVIVA Life	13.40	7.60	10	21.000	0.028	
	Sahara Life	15.50	5.50	10	0.000	0.000	<i>Rejected</i>
	Shriram Life	15.40	5.60	10	1.000	0.000	
TATA-AIG Life	PNB MetLife	12.10	8.90	10	34.000	0.226	
	AVIVA Life	13.50	7.50	10	20.000	0.023	
	Sahara Life	15.50	5.50	10	0.000	0.000	<i>Rejected</i>
	Shriram Life	15.50	5.50	10	0.000	0.000	
PNB MetLife	AVIVA Life	12.90	8.10	10	26.000	0.070	<i>Accepted</i>
	Sahara Life	15.50	5.50	10	0.000	0.000	<i>Rejected</i>
	Shriram Life	14.80	6.20	10	7.000	0.001	<i>Rejected</i>
AVIVA Life	Sahara Life	15.50	5.50	10	0.000	0.000	<i>Rejected</i>
	Shriram Life	15.50	5.50	10	0.000	0.000	
Sahara Life	Shriram Life	6.10	14.90	10	6.000	0.001	<i>Rejected</i>

Source: - Calculated

**Table – 6: Mann-Whitney Test Results (Input Variable: Investments)**

Life Insurer (I)	Life Insurer (J)	Mean Ranks (I)	Mean Ranks (J)	Sample Size	U-Test Statistics	Asymp. Sig. (p-values)	Result of Hypothesis (H <sub>0</sub> ) (at $\alpha = 0.01$ )
LICICI	ICICI Prulife	15.50	5.50	10	0.000	0.000	<i>Rejected</i>
	HDFC Std. Life	15.50	5.50	10	0.000	0.000	
	SBI Life	15.50	5.50	10	0.000	0.000	
	Bajaj Allianz Life	15.50	5.50	10	0.000	0.000	
	Birla Sun Life	15.50	5.50	10	0.000	0.000	
	MNYL	15.50	5.50	10	0.000	0.000	
	ING Vysya Life	15.50	5.50	10	0.000	0.000	
	Reliance Life	15.50	5.50	10	0.000	0.000	
	Kotak Life	15.50	5.50	10	0.000	0.000	
	TATA-AIG Life	15.50	5.50	10	0.000	0.000	
	PNB MetLife	15.50	5.50	10	0.000	0.000	
	AVIVA Life	15.50	5.50	10	0.000	0.000	
	Sahara Life	15.50	5.50	10	0.000	0.000	
Shriram Life	15.50	5.50	10	0.000	0.000		
ICICI Prulife	HDFC Std. Life	11.20	9.80	10	43.000	0.597	<i>Accepted</i>
	SBI Life	9.20	11.80	10	37.000	0.326	
	Bajaj Allianz Life	11.20	9.80	10	43.000	0.597	
	Birla Sun Life	14.30	6.70	10	12.000	0.004	<i>Rejected</i>
	MNYL	12.00	9.00	10	35.000	0.257	<i>Accepted</i>
	ING Vysya Life	14.10	6.90	10	14.000	0.007	<i>Rejected</i>
	Reliance Life	13.90	7.10	10	16.000	0.100	<i>Accepted</i>
	Kotak Life	14.50	6.50	10	10.000	0.002	<i>Rejected</i>
	TATA-AIG Life	13.10	7.90	10	24.000	0.049	<i>Accepted</i>
	PNB MetLife	14.40	6.60	10	11.000	0.003	<i>Rejected</i>
	AVIVA Life	15.10	5.90	10	4.000	0.001	
Sahara Life	15.50	5.50	10	0.000	0.000		
Shriram Life	15.50	5.50	10	0.000	0.000		
HDFC Std. Life	SBI Life	8.60	12.40	10	31.000	0.151	<i>Accepted</i>
	Bajaj Allianz Life	10.50	10.50	10	50.000	1.000	
	Birla Sun Life	13.70	7.30	10	18.000	0.016	
	MNYL	11.30	9.70	10	42.000	0.545	

	ING Vysya Life	13.50	7.50	10	20.000	0.023	
	Reliance Life	13.40	7.60	10	21.000	0.028	
	Kotak Life	14.00	7.00	10	15.000	0.008	<i>Rejected</i>
	TATA-AIG Life	12.30	8.70	10	32.000	0.174	<i>Accepted</i>
	PNB MetLife	14.00	7.00	10	15.000	0.008	
	AVIVA Life	14.70	6.30	10	8.000	0.001	<i>Rejected</i>
	Sahara Life	15.50	5.50	10	0.000	0.000	
	Shriram Life	15.50	5.50	10	0.000	0.000	
SBI Life	Bajaj Allianz Life	12.50	8.50	10	30.000	0.131	<i>Accepted</i>
	Birla Sun Life	14.80	6.20	10	7.000	0.001	<i>Rejected</i>
	MNYL	13.20	7.80	10	23.000	0.041	<i>Accepted</i>
	ING Vysya Life	14.70	6.30	10	8.000	0.001	
	Reliance Life	14.30	6.70	10	12.000	0.004	
	Kotak Life	14.90	6.10	10	6.000	0.001	
	TATA-AIG Life	14.00	7.00	10	15.000	0.008	<i>Rejected</i>
	PNB MetLife	14.90	6.10	10	6.000	0.001	
	AVIVA Life	15.20	5.80	10	3.000	0.000	
	Sahara Life	15.50	5.50	10	0.000	0.000	
	Shriram Life	15.50	5.50	10	0.000	0.000	
Bajaj Allianz Life	Birla Sun Life	13.60	7.40	10	19.000	0.019	
	MNYL	11.30	9.70	10	42.000	0.545	<i>Accepted</i>
	ING Vysya Life	13.70	7.30	10	18.000	0.016	
	Reliance Life	13.40	7.60	10	21.000	0.028	
	Kotak Life	13.90	7.10	10	16.000	0.010	<i>Rejected</i>
	TATA-AIG Life	12.20	8.80	10	33.000	0.199	<i>Accepted</i>
	PNB MetLife	13.90	7.10	10	16.000	0.010	
	AVIVA Life	14.60	6.40	10	9.000	0.002	<i>Rejected</i>
	Sahara Life	15.50	5.50	10	0.000	0.000	
	Shriram Life	15.40	5.60	10	1.000	0.000	
Birla Sun Life	MNYL	8.00	13.00	10	25.000	0.059	
	ING Vysya Life	10.30	10.70	10	48.000	0.880	
	Reliance Life	10.40	10.60	10	49.000	0.940	
	Kotak Life	11.00	10.00	10	45.000	0.705	<i>Accepted</i>
	TATA-AIG Life	8.30	12.70	10	28.000	0.096	
	PNB MetLife	10.80	10.20	10	47.000	0.821	
	AVIVA Life	12.50	8.50	10	30.000	0.131	
	Sahara Life	14.40	6.60	10	11.000	0.003	<i>Rejected</i>
	Shriram Life	14.30	6.70	10	12.000	0.004	<i>Rejected</i>
MNYL	ING Vysya Life	13.00	8.00	10	25.000	0.059	
	Reliance Life	12.80	8.20	10	27.000	0.082	
	Kotak Life	13.40	7.60	10	21.000	0.028	<i>Accepted</i>
	TATA-AIG Life	11.40	9.60	10	41.000	0.496	
	PNB MetLife	13.50	7.50	10	20.000	0.023	
	AVIVA Life	14.20	6.80	10	13.000	0.005	<i>Rejected</i>
	Sahara Life	15.50	5.50	10	0.000	0.000	<i>Rejected</i>
	Shriram Life	15.30	5.70	10	2.000	0.000	<i>Rejected</i>
ING Vysya Life	Reliance Life	10.60	10.40	10	49.000	0.940	
	Kotak Life	11.30	9.70	10	42.000	0.545	
	TATA-AIG Life	8.30	12.70	10	28.000	0.096	<i>Accepted</i>
	PNB MetLife	11.30	9.70	10	42.000	0.545	
	AVIVA Life	12.70	8.30	10	28.000	0.096	
	Sahara Life	15.10	5.90	10	4.000	0.001	<i>Rejected</i>
	Shriram Life	14.60	6.40	10	9.000	0.002	<i>Rejected</i>
Reliance	Kotak Life	10.80	10.20	10	47.000	0.821	<i>Accepted</i>

Life	TATA-AIG Life	8.90	12.10	10	34.000	0.226	
	PNB MetLife	10.90	10.10	10	46.000	0.762	
	AVIVA Life	12.00	9.00	10	35.000	0.257	
	Sahara Life	13.90	7.10	10	16.000	0.010	<i>Rejected</i>
	Shriram Life	13.80	7.20	10	17.000	0.013	<i>Accepted</i>
Kotak Life	TATA-AIG Life	7.80	13.20	10	23.000	0.041	<i>Accepted</i>
	PNB MetLife	10.60	10.40	10	49.000	0.940	
	AVIVA Life	12.20	8.80	10	33.000	0.199	
	Sahara Life	14.60	6.40	10	9.000	0.002	<i>Rejected</i>
	Shriram Life	14.20	6.80	10	13.000	0.005	<i>Rejected</i>
TATA-AIG Life	PNB MetLife	13.00	8.00	10	25.000	0.059	<i>Accepted</i>
	AVIVA Life	14.10	6.90	10	14.000	0.007	<i>Rejected</i>
	Sahara Life	15.50	5.50	10	0.000	0.000	
	Shriram Life	15.40	5.60	10	1.000	0.000	
PNB MetLife	AVIVA Life	12.10	8.90	10	34.000	0.226	<i>Accepted</i>
	Sahara Life	14.20	6.80	10	13.000	0.005	<i>Rejected</i>
	Shriram Life	14.10	6.90	10	14.000	0.007	<i>Rejected</i>
AVIVA Life	Sahara Life	12.70	8.30	10	28.000	0.096	<i>Accepted</i>
	Shriram Life	13.20	7.80	10	23.000	0.041	
Sahara Life	Shriram Life	11.00	10.00	10	45.000	0.705	<i>Accepted</i>

Source: - Calculated

Tables 5 and 6 depicted the existence of disparity in the performances of the state-owned LIC with all the private life insurers' under review against the two performance variables i.e. 'Gross Premiums Written' and 'Investments' respectively over the combined years of the study-period. The rejection of the null-hypothesis of equal sample means further acts as a testimony to the above facts based on the evidences of p-values being lower than the 2-tailed significance value of the Mann-Whitney test, against each of the above parameters. At the same time, the performances between the established and relatively new private life insurers were also found to be statistically significant (p-values  $\leq 0.01$ ) against both the performance variables as considered in the present study. Hence, LIC was found to be the dominant player with significant differences being observed with all the private life insurance firms during the period under review. This was further corroborated by the evidence of higher mean ranks being obtained in case of LIC in contrast to the remaining life insurers, against both the performance-related variables. This eventually points out to the fact that with respect to both the performance-related variables, LIC had the greater number of higher scores within it among the sampled life insurance firms during the period under review.

Furthermore, the performances of the established private-sector players significantly differed (p-values  $\leq 0.01$ ) with the performances of the relatively newer private-sector players in the industry, although they came into existence within a brief span of 2 to 3 years during the post-reform era. This can be observed from the above tables 5 & 6 respectively which

depicted statistically significant differences in the performances of the established players such as ICICI Prulife, HDFC Std. Life, SBI Life, etc. with the performances of the newly-inducted ones such as PNB MetLife, AVIVA Life, Sahara Life, Shriram Life, etc. At the same time, the performances of a few of the relatively newer private-sector players such as ING Vysya Life, Reliance Life, Kotak Life, etc. were found to be statistically insignificant ( $p$ -values  $> 0.01$ ) with the performances of a few of the established private-sector players such as TATA-AIG Life, MNYL, etc., despite of moving late in the country's insurance sector. This was further evident from the acceptance of the null hypothesis of equal sample means in above such cases with the  $p$ -values obtained being higher than the 2-tailed significance value of the Mann-Whitney test. This eventually confirms the presence of a healthy competition in the country's life insurance sector with the newer private-sector players fast catching up with the paces of the established ones in terms of premium collection and total investments through improved marketing strategies, customised product-base, technological inputs and fresh infusion of foreign capital.

## **6. CONCLUSION**

In view of the study undertaken, the results showed a significant disparity in the performances of the sampled private-sector life insurance firms with the state-owned giant LIC against the two performance variables i.e. 'Gross Premiums Written' and 'Investments' respectively, covering all the years of the study-period from 2006-07 to 2015-16. This was corroborated by the rejection of null hypothesis of equal sample means, based on the hypothesised non-parametric tests that were conducted to investigate the differences in performance between the sampled life insurance firms during the period under review. Though the differences among the sampled private-sector life insurance firms were found to be insignificant, but their differences with the public-sector giant LIC were found to be statistically significant primarily because of differences in firm sizes, customer-base and inexperience of the private players in contrast to LIC. The state-owned LIC continues to remain as the dominant player in the country's life insurance sector with a vast-premium and investment base that has been brought down over the years since its inception in 1956. Despite of the private players were found to be lagging behind LIC in terms of premium-collection and total investments, yet they are fast narrowing down their differences with the state-owned giant LIC through the introduction of customised products, infusion of fresh foreign capital, innovative marketing strategies and technological know-how derived from

their foreign partners. In contrast, LIC has been largely banking upon its conventional insurance products that has been rolled over from the past years, with no fresh infusion of capital during the period under review. It was only during recent times in the post-deregulation period that LIC has shown drastic improvements in widening its product-base in a bid to sustain competition from the private players. The observed differences in performance between LIC and the private-sector life insurance firms' over the post-deregulation study-period can be attributed to the stringent government policies that deterred the entry of private players till the late-1990s, until the decision to privatize the country's insurance sector was undertaken by the government. The recent relaxation of FDI norms from 26% to 49% in the country's insurance sector by the Indian Finance minister Mr. Arun Jaitley during the FY 2015-16 also speaks volumes about the consistency shown by the present BJP government towards insurance-sector reforms, in line with their predecessors'. The increase in the entry of private and foreign insurance players would help to bring in more foreign investments into India that would eventually aid the country's insurance sector to remain competitive with the rest of the world.

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