# INTROSPECTION OF INSURANCE SECTOR IN THE SPHERE OF DENSITY AND PENETRATION: EMPIRICAL EVIDENCE FROM INDIA ON LIFE INSURANCE AND NON LIFE INSURANCE

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**Abstract:**

Insurance industry provides enormous opportunities to the domestic as well as foreign investors. India has a great potential in this sector. This industry contributes a huge amount to country's GDP and economic development. This remarkable development in the insurance sector attracted foreign investors in India also. This present study considered two important factors insurance density and insurance penetration. For analyzing the data last 15 years' (2004-2018) insurance density and penetration of life, non-life and industry sector have been considered and different statistical tools have been used to judge the relationship between industry insurance sector with life and non-life insurance sector, significance difference between life and non-life insurance sector, breakpoint during this study period, normality of data, heteroscedasticity and auto-correlation between the 2 models. For this researchers used Multiple Linear Regression Model, ANOVA, Bai-Perron and Residual test. This study also identified the future scope of research and constructive conclusion a feasible recommendation for growth of the industry.

**Keywords: Economic Development, GDP, Insurance Density, Insurance Penetration, Investors**

## Introduction

Insurance is an arrangement by which a company or the state undertakes to provide a guarantee of compensation for specified loss, damage, illness, or death in return for payment of a specified premium. It is a form of risk management, primarily used to hedge against the risk of a contingent or uncertain loss. A person or entity entering into a contract with an insurance company for buying insurance is known as an insured or a policyholder. The insurer agrees to compensate the insured in the event of a covered loss in an exchange for a periodical payment of a sum of money called premium. The loss may or may not be financial, but it must be reducible to financial terms, and usually involves something in which the insured has an insurable interest established by ownership, possession, or pre-existing relationship.

Insurance affects in the economic development of a country positively. As an economy develops over the years, the insurance business starts making inroads into the various sectors of economic activity in the country. The term 'insurance' has both financial and legal interpretations. The financial interpretation focuses on an arrangement that redistributes the cost of unexpected losses. It is the collection of small premium payments from all the suspected and distribute it to those suffering actual losses. The legal definition focuses on the contractual arrangement whereby one party agrees to compensate the loss of other party. Thus the financial definition provides for the funding of the losses whereas the legal definition provides for the legally enforceable contract that spells out the legal rights, duties and obligations of all the parties to contract.

The insurance industry of India has 57 insurance companies - 24 are in the life insurance business, while 33 are non-life insurers. Among the life insurers, Life Insurance Corporation (LIC) is the sole public sector company. There are six public sector insurers in the non-life insurance segment. In addition to these, there is a sole national re-insurer, namely General Insurance Corporation of India (GIC Re). Other stakeholders in the Indian Insurance market include agents (individual and corporate), brokers, surveyors and third-party administrators servicing health insurance claims. (www.wikipedia.org)

Government's policy of insuring the uninsured has gradually pushed insurance penetration in the country and proliferation of insurance schemes. Gross premium collected by life insurance companies in India increased from Rs 2.56 trillion (US$ 39.7 billion) in FY12 to Rs 7.31 trillion (US$ 94.7 billion) in FY20. During FY12–FY20, premium from new business of life insurance companies in India increased at a CAGR of 15 per cent to reach Rs 2.13 trillion (US$ 37 billion) in FY20.

Overall insurance penetration (premiums as per cent of GDP) in India reached 3.69 per cent in 2017 from 2.71 per cent in 2001.
The market share of private sector companies in the non-life insurance market rose from 15 per cent in FY04 to 56 per cent in FY21 (till April 2020). In life insurance segment, private players had a market share of 31.3 percent in new business in financial year 2020. (https://www.ibef.org/industry/insurance-sector-india.aspx)


**Investments and Recent Developments**
The following are some of the major investments and developments in the Indian insurance sector.

➢ Enrolments under the Pradhan Mantri Suraksha Bima Yojana (PMSBY) reached 154.7 million till December 2019 since its launch.
➢ Over 53.8 million famers were benefitted by the Pradhan Mantri Fasal Bima Yojana (PMFBY) in FY20.
➢ In April 2020, Axis Bank acquired an additional 29 per cent stake in Max Life Insurance.
➢ In November 2019, Airtel partnered with Bharti AXA Life to launch prepaid bundle with insurance cover.
➢ In September 2019, Competition Commission of India (CCI) approved acquisition of shares in SBI General Insurance by Napean Opportunities LLP and Honey Wheat.


**Government Initiatives**
The Government of India has taken number of initiatives to boost the insurance industry. Some of them are as follows:

➢ As per Union Budget 2019-20, 100 per cent foreign direct investment (FDI) was permitted for insurance intermediaries.
➢ In September 2018, National Health Protection Scheme was launched under Ayushman Bharat to provide coverage of up to Rs 500,000 (US$ 7,723) to more than 100 million vulnerable families. The scheme is expected to increase penetration of health insurance in India from 34 per cent to 50 per cent.
➢ The Insurance Regulatory and Development Authority of India (IRDAI) plans to issue redesigned initial public offering (IPO) guidelines for insurance companies in India, which are to looking to divest equity through the IPO route.
➢ IRDAI has allowed insurers to invest up to 10 per cent in additional tier 1 (AT1) bonds that are issued by banks to augment their tier 1 capital, in order to expand the pool of eligible investors for the banks. (https://www.ibef.org/industry/insurance-sector-india.aspx)


In this situation this paper has made an attempt to analysis the growth of the life and non-life insurance business and overall industry business in our country by considering main two parameters namely insurance density and insurance penetration and also considered the factors which influenced positively or negatively on this sector. This study will also focus on the future scenario of this industry after current COVID-19 pandemic.


**Literature Review**
**Raavi & Satuluri (2019)** expressed her view through the article named "A study on life insurance penetration in India" that penetration in life insurance sector is most common and effective issue and researcher pointed out the corrective measures to improve the penetration.

**Satish, Kattamuri (2019)** expressed his opinion through his research paper **"**The Dynamics of General Insurance Sector in India - Growth and Performance Perspective" that general insurance company are playing an important role in this sector. These companies are contributing a huge portion in country's GDP and evaluate the performance with recent developments.

**Vimala & Alamelu (2018)** expressed their views in their article, "Insurance Penetration and Insurance Density in India – An Analysis" regarding insurance penetration and insurance density. Researchers' have considered the data of seven years for these two important issues in insurance sector and have used some arithmetical and statistical tool for analysis of the objectives.

**Agarwal & Mishra (2017)** have exposed their views through their research paper "Life Insurance Industry of India – Past, Present & Future (A Study of LIC of India) regarding analysis the performance and growth of LIC in pre and post LPG era and also depicts the future trend of business of LIC of India.

**Sughanthi & Rajaram (2016)** have found some important issues relating to insurance sector in India in their research article "An assessment of growth patterns of life insurance sector in India" performance measurement of public and private life insurer and they have selected some variables closely related to total premium for their purpose of analysis.

**Rajasekhar & Kumari (2014)** in their study titled "Life insurance Industry in India-An overview" measures the performance of life insurance industry in India and its potential growth for the period of 2001-02 to 2010-11.

**Nena, Sonal (2013)** in her study named "Performance Evaluation of Life Insurance Corporation (LIC) of India" discussed the growth and performance of LIC. The researcher also analyzed the major source of income (Premium Earned) of the sampled unit, as well as the significant heads of expenses of LIC to measure the performance during the period of the study.

**Research Gap**

So far known and after doing the literature review of many research papers, report and other secondary materials and other online platform it has been found that no research has been done by considering 15 years of data related with insurance density and insurance penetration. Another research gap is found by the researcher that future prospects of this industry can be influenced considering the COVID-19 situation and other factors in the context of insurance industry and it may be positive or negative.

**Objectives of the Study**

- To know the basic idea about insurance sectors and its components in Indian Business Environment.
- To analyze the relationship between industry insurance density with life insurance density and non-life insurance density, as well as the relationship between industry insurance penetration with life insurance penetration and non-life insurance penetration.
- To know the significant difference between the mean value of life insurance, non-life insurance and industry as a whole.
- To determine the break point during the study period.

**Research Methodology**

**Type of Research and Data Source**

The present study is based on the secondary data. Data has been collected from journals, articles, newspaper, websites of Insurance Institute of India and IRDA annual reports.

**Sample Period**

The sample period of study is 2004-2018 i.e. last 15 years available data of Insurance Penetration and Insurance Density have been considered for purpose of analysis.

**Tools Used**

The analysis has been done by using Microsoft Excel 2010, E-Views 8 and SPSS 20.0. On the basis of our objectives, the following tools have been used for data analysis:

- i)      Descriptive Statistics
- ii)     Multiple Linear Regression Model
- iii)    ANOVA Test
- iv)     Bai-Perron Test
- v)      Residual Tests

**Analytical Summary**

**Insurance Density and Penetration**

To analyze the performance of industry sector and judge the potentiality of this sector which is universally assessed in the context of two parameters, viz., Insurance penetration and Insurance density. Insurance penetration is the ratio of premium underwritten in a given year to the Gross Domestic Product (GDP) and insurance density is the ratio of premium underwritten in a given year to the total population. Following Table 1 shows the related data of density and penetration of life, non-life and industry as a whole of last 15 years.

**Table 1: Insurance Density and Penetration of Life, Non-Life and Industry**

| Year | Life | | Non-Life | | Industry | |
|------|------------------|-----------------------------|------------------|-----------------------------|------------------|-----------------------------|
|      | Density (USD) | Penetration (Percentage) | Density (USD) | Penetration (Percentage) | Density (USD) | Penetration (Percentage) |
| 2004 | 15.7 | 2.53 | 4    | 0.64 | 19.7 | 3.17 |
| 2005 | 18.3 | 2.53 | 4.4  | 0.61 | 22.7 | 3.14 |
| 2006 | 33.2 | 4.1  | 5.2  | 0.6  | 38.4 | 4.8  |
| 2007 | 40.4 | 4    | 6.2  | 0.6  | 46.6 | 4.7  |
| 2008 | 41.2 | 4    | 6.2  | 0.6  | 47.4 | 4.6  |
| 2009 | 47.7 | 4.6  | 6.7  | 0.6  | 54.3 | 5.2  |
| 2010 | 55.7 | 4.4  | 8.7  | 0.71 | 64.4 | 5.1  |
| 2011 | 49   | 3.4  | 10   | 0.7  | 59   | 4.1  |
| 2012 | 42.7 | 3.17 | 10.5 | 0.78 | 53.2 | 3.96 |
| 2013 | 41   | 3.1  | 11   | 0.8  | 52   | 3.9  |
| 2014 | 44   | 2.6  | 11   | 0.7  | 55   | 3.3  |
| 2015 | 43.2 | 2.72 | 11.5 | 0.72 | 54.7 | 3.44 |
| 2016 | 46.5 | 2.72 | 13.2 | 0.77 | 59.7 | 3.49 |
| 2017 | 55   | 2.76 | 18   | 0.93 | 73   | 3.69 |
| 2018 | 55   | 2.74 | 19   | 0.97 | 74   | 3.7  |

Source: Annual Report of IRDA, 2018-19

Note:  1. Insurance Density is measured as a ratio of premium (in USD) in total Population.

2. Insurance penetration is measured as ratio of premium (in USD) to GDP (in USD).

**Descriptive Statistics**

| | N | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| Life - Density | 15 | 15.70 | 55.70 | 41.9067 | 11.85703 | -1.189 | .580 | 1.163 | 1.121 |
| Life - Penetration | 15 | 2.53 | 4.60 | 3.2913 | .73385 | .612 | .580 | -1.245 | 1.121 |
| Non-life - Density | 15 | 4.00 | 19.00 | 9.7067 | 4.55372 | .772 | .580 | .066 | 1.121 |
| Non-life - Penetration | 15 | .60 | .97 | .7153 | .11825 | .982 | .580 | .317 | 1.121 |
| Industry - Density | 15 | 19.70 | 74.00 | 51.6067 | 15.45687 | -.781 | .580 | .584 | 1.121 |
| Industry - Penetration | 15 | 3.14 | 5.20 | 4.0193 | .69869 | .439 | .580 | -1.184 | 1.121 |
| Valid N (list wise) | 15 | | | | | | | | |

Source: Computed by the researchers using SPSS 20.0.

**Interpretation**: The above table shows the results of descriptive statistics with maximum mean value of 51.6067 is for industry density and minimum mean value of 0.7153 is for non- life penetration. It can be also conclude that for life insurance density value increased to 55.70 and decreased to 15.70, for life insurance penetration value increased to 4.60 and decreased to 2.53 and like that every variable can be explained. Highest value of standard deviation is shown in case of industry density i.e. 15.45687 and lowest value is 0.11825 for non-life penetration. Results of Skewness show that life insurance penetration, non-life density and non-life penetration are moderately skewed, industry penetration is symmetric and others are highly skewed in nature. The values of kurtosis for Life insurance Penetration and Industry Insurance Penetration show that the distribution is flat and has thin tails indicating platykurtic distributions.

**Multiple Linear Regression Model**

In our study, we have considered Insurance Sector Density as the dependent variable and the Life Insurance Density and Non-life Insurance Density as the independent variables in model 1. Similarly, we have considered Insurance Sector Penetration as the dependent variable and the Life Insurance Penetration and Non-life Insurance Penetration as the independent variables in model 2. Hence, the regression equation can be framed as follows:

$$Insurance\ Sector\ Density = \beta_0 + \beta_1 * Life\ Insurance\ Density + \beta_2 * Non-life\ Insurance\ Density + \varepsilon_t \dots\dots\dots\dots\dots Model\ (1)$$

$$Insurance\ Sector\ Penetration = \beta_0 + \beta_1 * Life\ Insurance\ Penetration + \beta_2 * Non-life\ Insurance\ Penetration + \varepsilon_t \dots\dots\dots\dots Model\ (2)$$

**Model 1 for Insurance Density:**

| Regression Statistics | |
|---|---|
| Multiple R | 0.971 |
| R Square | 0.942 |
| Adjusted R Square | 0.933 |
| Standard Error | 0 |
| Observations | 15 |

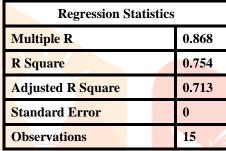Source: Computed by the researchers using SPSS 20.0.

**Interpretation**: In the above table, multiple R value of 0.971 suggests that there is high linear relationship among the variables. The R square value of 0.942 suggests that about 94.2 percent of the variation of y values around the mean are explained by x values.

|  | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% |
|---|---|---|---|---|---|---|
| **Intercept** | **7.606** | **.001** | **.001** | **0** | **7811.295** | **.000** |
| **Life Insurance Density** | **-.003** | **.001** | **-3.961** | **.002** | **-.004** | **-.001** |
| **Non-life Insurance Density** | **.005** | **.001** | **7.419** | **.000** | **.003** | **.006** |

Source: Computed by the researchers using SPSS 20.0.

$Insurance\ Sector\ Density = 7.606 - 0.003*Life Insurance\ Density + 0.005*Non-life Insurance\ Density + \varepsilon_t$ **Interpretation**: We find that there is negative relationship between Life Insurance Density (-0.003) and Industry Insurance Density. This indicates that a 1 unit change in Life Insurance Density will cause a negative change in Insurance Sector Density by 0.003. There is a positive relationship between Non-life Insurance Density (0.005) and Industry Insurance Density. This indicates that a 1 unit change in Non-life Insurance Density will cause a positive change in Industry Insurance Density by 0.005.

**Model 2 for Insurance Penetration**

| Regression Statistics | |
|---|---|
| **Multiple R** | 0.868 |
| **R Square** | 0.754 |
| **Adjusted R Square** | 0.713 |
| **Standard Error** | 0 |
| **Observations** | 15 |

Source: Computed by the researchers using SPSS 20.0.

**Interpretation**: In the above table, multiple R value of 0.868 suggests that there is high linear relationship among the variables. The R square value of 0.754 suggests that about 75.4 percent of the variation of y values around the mean are explained by x values.

|  | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% |
|---|---|---|---|---|---|---|
| Intercept | 7.61 | 0.002 | 4324.356 | 0 | 7.606 | 7.614 |
| Life Insurance Penetration | .001 | .002 | .347 | .734 | -.003 | .004 |
| Non-life Insurance Penetration | .013 | .002 | 5.500 | .000 | .008 | .018 |

Source: Computed by the researchers using SPSS 20.0.

$Insurance\ Sector\ Penetration = 7.606 + 0.001*Life Insurance\ Penetration +$

$0.013*Non-life Insurance\ Penetration + \varepsilon_t$

**Interpretation**: We find that there is positive relationship between Life Insurance Penetration (0.001) and Non-life Insurance Penetration (0.013) with Industry Insurance Penetration. This indicates that a 1 unit change in Life Insurance Penetration will cause a positive change in Industry Insurance Penetration by 0.001 and 1 unit change in Non-life Insurance Penetration will cause a positive change in Industry Insurance Penetration by 0.013.

**ANOVA Test**

**Hypothesis:** i) Null Hypothesis ($H_0$): There is no significant difference in the mean value of Life Insurance, Non-life Insurance, and Industry Insurance.

ii) Alternative Hypothesis ($H_1$): There is significant difference in the mean value of Life Insurance, Non-life Insurance, and Industry Insurance.

**ANOVA for Insurance Density**

| ANOVA | | | | | |
|---|---|---|---|---|---|
| Source of Variation | Sum of Squares | Df | Mean Squares | F | Sig. |
| Between Groups | 14432.7 | 2 | 7216.35 | 54.09009 | 0.000 |
| Within Groups | 5603.368 | 42 | 133.4135 | | |
| Total | 20036.07 | 44 | | | |

Source: Computed by the researchers using MS Excel 2010.

**Interpretation:** The table represents the result of ANOVA test to compare mean value of different types of Insurance Density. Here p value is less than 0.05 indicating that rejection of null hypothesis and acceptance of alternative hypothesis i.e. statistically significant at 1% as well as 5% level of significance. So we can conclude that there is significant difference in the mean value of Life, Non-life and Industry Insurance Density.

**ANOVA for Insurance Penetration**

| ANOVA | | | | | |
|---|---|---|---|---|---|
| Source of Variation | Sum of Squares | Df | Mean Squares | F | Sig. |
| Between Groups | 90.41088 | 2 | 45.20544 | 130.314 | 0.000 |
| Within Groups | 14.56964 | 42 | 0.346896 | | |
| Total | 104.9805 | 44 | | | |

Source: Computed by the researchers using MS Excel 2010.

**Interpretation**: The table represents the result of ANOVA test to compare mean value of different types of Insurance Penetration. Here p value is less than 0.05 indicating that rejection of null hypothesis and acceptance of alternative hypothesis i.e. statistically significant at 1% as well as 5% level of significance. So we can conclude that there is significant difference in the mean value of Life, Non-life and Industry Insurance Penetration.

**Bai-Perron Test**

| Bai-Perron Test | | | | | |
|---|---|---|---|---|---|
| Life Insurance Density | Non-life Insurance Density | Industry Insurance Density | Life Insurance Penetration | Non-life Insurance Penetration | Industry Insurance Penetration |
| 2006 | 2011 | 2007 | 2012 | 2017 | 2012 |

Source: Computed by the researchers using E-Views 8.

The Bai-Perron test was developed in the year 1998 to check the multipoint structural breaks in a time series data. This test provides us the benefit of selecting structural breaks endogenously. The Bai-Perron test can be represented through an equation in the following way:

$$y_t = x_t^{'} \beta + z_t^{'} \partial_j + u_t$$

The break point in a time series data indicates an alteration in the nature of a data due to any distress from the worldwide scenario.

**Residual Tests**
**Breusch-Pagan-Godfrey Test**

| Heteroscedasticity Test | | | |
|---|---|---|---|
| Model 1 | | Model 2 | |
| Obs*R-squared | P Chi-Square | Obs*R-squared | P Chi-Square |
| 9.655205 | 0.008 | 2.000929 | 0.1779 |

Source: Computed by the researchers using E-Views 8.

The above results suggests that model 1 is suffering from heteroscedasticity due to p value less than 0.05 but model 2 is homoscedastic in nature.

**Jarque-Bera Test**

| Normality Test | | | |
|---|---|---|---|
| Model 1 | | Model 2 | |
| Statistics | p value | Statistics | p value |
| 3.7108 | 0.1564 | 1.1342 | 0.498 |

Source: Computed by the researchers using E-Views 8.

The above results suggest that the residuals are normal in nature due to p value more than 0.05.

**Durbin-Watson Test**

| Autocorrelation Test | |
|---|---|
| Model 1 | Model 2 |
| 1.95 | 1.6741 |

Source: Computed by the researchers using E-Views 8.

The above table suggests that there is a positive autocorrelation as the statistics lies within the range 0 to 2.

Note: Model 1 is for Insurance Density and Model 2 is for Insurance Penetration.

**Limitations of the Study**
➢ This study is based on Secondary data and data has been taken till 2018 due to unavailability of recent data
➢ Study is all about whole industry where life and non-life both have been considered
➢ The inherent limitations of different statistical tools which is used for analysis are also there
➢ Study is based on Indian insurance industry that's why global market scenario could not be judged in our study

**Further Scope of Study**
The study can be further extended on the basis of pre-COVID era, COVID era and post- COVID era. Different other statistical tools for analyzing this comparative study can also be used. There are also other factors which are directly or indirectly influencing the behavior can also be considered for wider scope. Studies can also be conducted using monthly data and also using primary data. Another scope of research on this field will be world insurance industry with comparison with Indian market.

**Concluding Observations**
The results portrays that there exists linear relationship between life and non-life density with industry density and life and non-life penetration with industry penetration. Skewness shows that life insurance penetration, non-life density and non-life penetration are moderately skewed, industry penetration is symmetric and others are highly skewed in nature. The values of kurtosis for Life insurance Penetration and Industry Insurance Penetration show that the distribution is flat and has thin tails indicating platykurtic distributions. There is significant difference in the mean value of Life, Non-life and Industry Insurance Density and there is significant difference in the mean value of Life, Non-life and Industry Insurance Penetration according to ANOVA. The Bai-Perron test suggests change in nature of data which can be due to national and international events that affects insurance sector. The Jarque-Bera test indicates that residuals are normal in nature though model 1 suffers from heteroscedasticity. Both the models are bearing positive auto correlation.

**Recommendations**
At the end of the study, it is recommendable for all stakeholders that insurance industry in India has great potential. It has capacity to contribute towards GDP of Indian economy and insurance density can also be improved by investing more amount of insurance premium for life and non-life insurance policy. Investors should be more aware and should feel the importance of insurance in their life and non-life commodities. Under this situation many private companies should enter into sector to accumulate more amount of fund and sell their products through online. Moreover short run and less amount of premium product must be sold rather it can be said that necessity of customized product has been increasing.
Bancassurance is already a well-established channel of distribution. But still its achievements are far from Asian countries. For instances , Bancassurance contributes just 8% of total new life insurance premium during 2016 in India, however in Malaysia it is 49% in China it is 64% and in Singapore it is 27%.This position must be improved to make a growth on industry and its future prospect.
On the other hand regulatory body in India (IRDA) should take some initiative for improvement of this sector and in coordination with all insurers must launch awareness movement through various suitable people-oriented programmes through, corporate publicity, awareness camps in rural centers and communication through mass media.

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