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Do macro-economic factors influence the life insurance industry in India? An empirical approach

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Abstract: The insurance industry has marked its importance in augmenting the process of economic growth through its prominent contribution in terms of financial intermediation, capital accumulation, resource allocation and risk protection. The Indian insurance industry has shown a sharp rise since the formation of Insurance Regulatory and Development Authority in 1999. Assuming the important and potential role of insurance, this study aims to investigate the macro-economic factors that may influence the life insurance sector in India with time-series data covering a period of 39 years (1980–2018). Employing Engle-Granger co-integration, ordinary least square regression and causality analysis it is found that foreign direct investment (FDI), broad money (M2) and gross capital formation (GCF) positively and significantly influence insurance sector growth in India. Engle-Granger causality test reveals one way causal relationship from GCF to life insurance penetration, whereas FDI and M2 are in reverse causality that runs from insurance penetration. The practical implication of this study lies in utilising the findings of this study by the policymakers in framing favourable policies to ensure sustained growth of the life insurance sector in India. The study is limited to the consideration of macro-economic factors only.

Keywords: causality; co-integration; life insurance; macro-economic; penetration.

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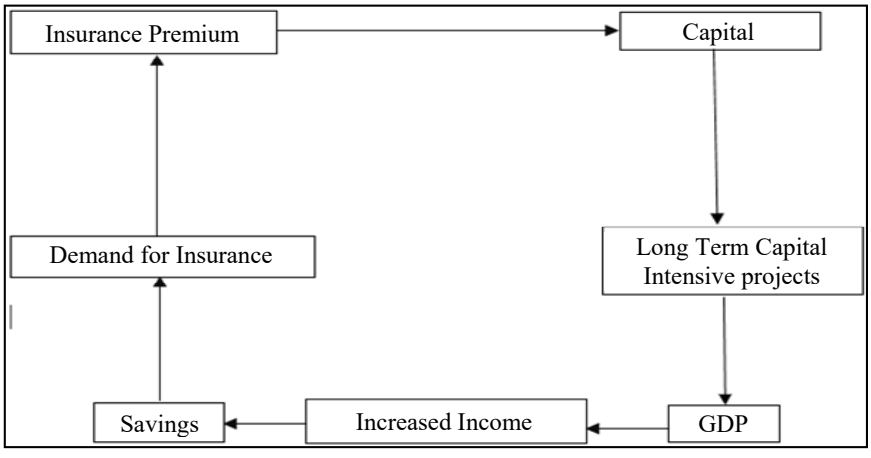
1 Introduction

The growth of an economy essentially calls for efficient financial intermediation. Banking is said to be the backbone of financial system since it intermediates the movement of financial resources. Insurance Industry has also established its role in the process of financial intermediation since it collects premiums from multiple pockets and directs them towards long term capital investment. This act of financial accumulation and resource allocation by the Insurance Industry has made it an integral element for growth enhancement of an economy. Insurance sector has become an important element of the financial industry across the globe (Batool and Sahi, 2019). The role of life insurance sector in the development of an economy is depicted with the help of diagram below (Figure 1). United Nations Conference on Trade and Development (UNCTAD) in 1964 has formally accepted the essential role of insurance in the economic development of a nation. The role of life insurance differs from that of non-life insurance in the context that the former facilitates efficient resource accumulation and allocation, whereas the latter encourages the commercial sector of an economy through its risk protection mechanism. The insurance products differ from other goods in the context that their benefits are not realised immediately (Senthilkumar et al., 2017). This study concentrates on Indian life insurance sector only.

Figure 1 Role of life insurance in economic growth



Note: The numbers 1 to 8 denotes the process flow.

Source: Authors' own compilation

The Indian life insurance industry registered phenomenal growth in the last two decades since the Industry was privatised and brought under the supervision of Insurance Regulatory and Development Authority of India since 1999. The structural changes, entry of private players and implementation of regulatory guidelines have helped the Insurance Industry to strive for competence. The share of Life Insurance premium to the GDP (insurance penetration) grew from 1% in 1980 to 2.74 in 2018. Similarly, the Per Capita Insurance premium (insurance density) grew from USD3 to USD55 for the same period (IRDA Annual Report 2018–2019).

In 1964, UNCTAD in its conference formally acknowledged the essential role played by insurance sector in the development of an economy. The concurrent literature also emphasised the critical role played by insurance sector in the development process of a nation (Pjanić et al., 2018; Tran et al., 2020). However, the share of insurance business is quite low in case of developing economies despite the fact that they accommodate 80% of the world's population (Outreville, 2011). Arena (2008) advocated that the impact of life insurance sector on the development of an economy is more in case of developed economies compared to developing or underdeveloped economies. Non-life insurance was found to have more impact on the economic development of developing economies (Ertl, 2017). The difference in the role of life insurance sector requires individual study of economies instead of cross-sectional studies and the factors influencing insurance sector development need to be determined. The research thrust on determinants of insurance consumption, insurance buying and demand for insurance is on the rise. The studies on life insurance demand or consumption by Truett and Truett (1990), Browne and Kim (1993), Beck and Webb (2003), among others, have found variables that explain consumption of life insurance. Outreville (2011) has identified different economic, demographic, structural and socio-cultural factors that influence life insurance consumption after considering 80 studies in this area. It was revealed in his study that the important factors that impact life insurance demand, consumption or buying include bequest motives at individual customer level, income level in the economy, savings rate, inflation, trade, price of insurance policy, level of education, legal system, religion, government control, dependency ratio, etc. The direction of influence of these factors on Insurance sector varies from country to country due to economic, political and socio-cultural factors. While some factors poses a positive impact on insurance buying, some others are pulling down the insurance demand. The adverse role of these factors on insurance industry hinders the growth momentum (Nguyen et al., 2020) and discourages the industry to maintain consistency in developing, which in turn negatively affects the economic growth of a nation (Sen and Madheswaran, 2013). Against this backdrop, need arises to investigate the determinants of life insurance sector growth and this study is an attempt towards that. Along with determining the macro-economic factors influencing the growth of life insurance sector in India the causality between the factors and life insurance sector will also be checked. This study is unique in the sense that while earlier studies in Indian scenario considered very limited number of factors and the time period considered was short. In this study, six macro-economic factors are considered for a period of 39 years. Broad money and FDI were rarely included in this type of studies related to India, which are well considered in this study. To confirm the findings, causality tests are also conducted for each and every significant variable to understand whether there exists any causal relationship.

The rest of the paper is structured in the following manner. Section 2 is 'literature review' discusses the different literature on factors influencing demand for insurance, determinants of insurance consumption and factors that affect insurance sector, followed by the 'objectives' of the study; Section 3 defines the variables and their sources, and then 'research methodology' discusses the statistical tools and techniques used in the analysis; Section 4 discusses the findings of the study; Section 5 concludes the study.

2 Literature review

Study related to insurance demand can be traced back to last century when Huebner (1916) established some qualitative aspects of human life that lead to economic value. Many researchers undertook studies in the areas of risk and uncertainty, need, demand and determinants of insurance which include Neumann and Morgenstern (1947), Yaari (1965), Hammond et al. (1967), Mossin (1968), Fisher (1973), Headen and Lee (1974), Borch (1977), Pissarides (1980), Campbell (1980), Babbel (1981), Karni and Zilcha (1985, 1986), Beenstock et al. (1986), Lewis (1989), Bernheim (1991) and Feyen et al. (2011). The researchers explored variety of factors mostly individualistic influencing the consumption pattern of insurance. The determinants of insurance vary largely from nation to nation depending on the socio-cultural norms, faith, economic status, demography and risk-averseness. Modigliani and Brumberg (1954) represented a theoretical approach to life insurance demand by proposing life cycle hypothesis of human consumption which was also supported by Friedman (1957). The consumption pattern of individual in response to income, rate of interest and price was explained in macro-economic literature by life cycle models together with Keynesian consumption hypothesis and hypothesis of permanent income (Sen and Madheswaran, 2013). Yaari (1965) advocated that bequest motives were responsible for making an insurance buying decision. Pissarides (1980) added that along with bequest, the uncertainties of income can also be smoothened by life insurance products. Insurance serves a variety of purposes like smoothening fluctuations of income, bequest and debt-settlement in the absence of family earner (Sen and Madheswaran, 2013) which plays an important role in motivating insurance buying. A majority of authors have identified and accepted the need to secure uncertainties of future as a primary motivation to buy insurance. But with the changes of time and nature of competition among the insurers that lead to introduction of much customised product, customers are now buying insurance product not only to secure uncertainties in their absence but also to fulfil different other motives including saving of tax, enabling pension, meeting uprising education expenditure, etc. The study of an individual having wealth and his degree of risk averseness was undertaken using simple demand models by Mossin (1968) and Smith (1968). Their study revealed that wealth has an inverse relationship with demand for insurance, as because a wealthy person capable of managing uncertainties of income has a low demand for insurance product. Borch (1977) found rate of interest having an inverse relationship with life insurance demand and in that direction he advocated that life insurance product are more preferred as a saving instrument by customers compared to traditional saving products. This finding of Borch (1977) is contradictory with Hoy and Robson (1981) who considered insurance product

as a 'Giffen' good and Yaari (1965) who quoted bequest motive to be the driving force for insurance buying. Lewis (1989) held the opinion that demand for life insurance product is also influenced by number of dependents in the family as the risk associated with uncertainty of income has a direct connection with the need for insurance. The demand for life insurance was also found to be influenced by non-human wealth, discount rate, income, wages and consumer confidence (Fortune, 1973). There were some studies undertaken to investigate the determinants of insurance sector performance which ended up concluding that a variety of internal and external factors were responsible for performance of an insurance firm. Those internal and external factors can further be divided into micro and macro factors (Alomari and Azzam, 2017). The factors included different economic, market related and customer specific factors which were responsible for the performance of both life and non-life insurance sector (Browne et al., 2001; Lee, 2011; Kaya, 2015). Browne et al. (2001) found that the performance of a firm is impacted positively by the liquidity, return from portfolio and size of the firm. Two different models – return on assets (ROA) and operating ratio (OR) were used by Lee (2011) to measure profitability of a firm. He concluded that return on investment, financial holding, input cost, underwriting risk and reinsurance were the significant factors influencing performance of an insurance firm in both the ROA and OR models. These studies basically dealt with the internal factors to an insurance firm which were rather controllable. Studies related to external macro factors were undertaken by Browne et al. (2001), Doumpos and Gaganis (2012), Hailegebreal (2016), Datu (2016), among others. Influence of external macro factors on insurance firm performance were carried out by Browne et al. (2001) and he found negative impact of unanticipated inflation on the performance of an insurance firm. Performance determinants of non-life insurance sector considering the macro-economic factors were investigated by Doumpos and Gaganis (2012) and they revealed that GDP growth, fluctuation in income and inflation were the influencing factors. A study on Taiwanese property-liability insurance by Lee (2011) found that growth rate of the economy is significantly influencing profit when measured using OR model, but the result is contrary if ROA model is used to indicate profitability. Hailegebreal (2016) found positive impact of gross domestic product on profitability of an insurance enterprise, whereas inflation was found to have negative influence. Contrary to the finding of Hailegebreal (2016) and Datu (2016) undertook a study on the Philippine non-life insurance sector using both ROA and OR model and revealed that both GDP and inflation has no influence on the profitability of an insurance firm. Whereas Camino-Mogro and Bermúdez-Barrezueta (2019) and Deyganto and Alemu (2019) found significantly negative impact of inflation on insurance sector.

The recent studies on Indian insurance sector revealed that GDP per capita has a positive influence on insurance sector, but inflation and unemployment have a negative influence (Bhatia and Jain, 2018). Using confirmatory factor analysis to determine the factors and multiple regression analysis to see the degree of influence, Dash (2018) found GDP per capita to have positive and significant impact on life insurance sector. In another study, Reddy and Seelam (2020) applied multiple regression analysis and advocated that life expectancy, development in the banking sector, level of education, expenditure on social security measures and savings to GDP ratio are the factors having significant and positive impact on the growth of life insurance sector.

Existing literature reveals that though there were studies on the determinants of insurance sector, but most of them were either cross-sectional or panel that considers group of nations, mostly advanced economies, which neutralises the country-specific

information or analysis. It is also observed that the nation-specific studies using time series data are limited. Studies on Indian insurance sector mainly concentrated on firm-specific micro factors that are internal to a firm. The life insurance sector in India is growing and has a high potential to expand and multiply the current business volume, provided favourable environment is there to support the growth and supply the requirements of the industry. Since the determinants of insurance sector largely vary depending on the economic, political, demographic and socio-economic setup of economies across globe, the individualistic investigation of an economy is required for better insight. Since India is a fast growing economy with a population of more than 1.3 billion, it is a potential market for insurance industry which can contribute towards economic development of the nation. Therefore, it calls for an investigation on the determinants of insurance sector growth. The macro-economic factors concerning growth of Indian life insurance sector are rarely investigated and this study is intended to fill up this research gap. This study will concentrate on macro-economic factors and empirically investigate their influence on the life insurance sector in India.

3 Data and research methodology

The study uses time series data in annual mode covering a period of 39 years from 1980 to 2018. The data were collected from Sigma Explorer managed by Swiss Re, World Development Indicators and IRDA Annual Reports. The nature of data is secondary. Life insurance penetration (LIFEPEN) was considered as a dependent variable while six independent variables considered are broad money (M2), foreign direct investment (FDI), inflation (INF), rate of interest (deposit) (INT), gross capital formation (GCF) and gross domestic product per capita (GDPPC). These six independent variables were chosen based on relevant theory and literature. LIFEPEN represents growth in the life insurance industry, M2 represents money circulation, FDI represents inflow of FDI, INF represents rate of inflation, INT represents rate of interest on deposits, GCF represents government outlays on infrastructure building and additions to fixed assets, GDPPC represents income of an individual.

3.1 Model estimation procedure

The following methods were used in the analysis of data for the study:

- *Transformation of variables:* All the variables were transformed to log values to have more flexibility in the process of analysis.
- *Unit root test:* The time series data analysis can end up with good results provided that the data are stationary, meaning that they revert to mean in the long run. A non-stationary dataset cannot be used to make comments which can be generalised later. As such, estimating a regression model using time series data can give spurious results, if the series is not stationary (Gujarati and Sangeetha, 2007). Hence, the stationarity of the data needs to be tested before estimating any regression equation to avoid spurious regression (Philip, 2014). In this study, the stationarity of the data was checked using augmented dickey-fuller (ADF) test.

- *Co-integration test:* Economic data in time series analysis are often found to be non-stationary. Although, non-stationary variables can also be incorporated in a regression equation provided they are co-integrated, which will ensure that the variables under study demonstrate long run association. To confirm the co-integration of the time series variables, Engle and Granger (1987) co-integration test was conducted.
- *Estimating equation using least square technique:* Majority of the literatures working with time series data were found using ordinary least square (OLS) technique to frame the empirical model in order to determine the factors influencing life insurance consumption, demand or performance. Depending on the nature of the data and their characteristics, OLS technique was used to estimate the regression equation. The estimated models were simplified by removing the most insignificant variables individually to test the redundancy of those variables.

  The initial equation is estimated as follows:

$$LIFEPEN_t = \alpha + \beta_1 M2_t + \beta_2 FDI_t + \beta_3 INF_t + \beta_4 INT_t + \beta_5 GCF_t + \beta_6 GDPPC_t + e_t \quad (1)$$

  where

LIFEPEN	life insurance penetration
*M*2	broad money (money circulation in the economy)
FDI	foreign direct investment
INF	inflation
INT	rate of interest (deposit)
GCF	gross capital formation
GDPPC	gross domestic product per capita
e	error term.

- *Engle-Granger causality test:* To check the existence of any causal relationship between the significant independent variables and the dependent variable, the Engle-Granger causality test was applied.

4 Findings and discussion

4.1 Stationarity test

Use of non-stationary data in a regression equation leads to spurious results ending up with erroneous conclusions (Gujarati and Sangeetha, 2007). Since the study uses time series data, the stationarity check of the data series is imperative. The macro-economic time series data that are used in this study are expected to follow random walk. In this stage, all the variables were subjected to unit root test to check for their stationarity using ADF unit root test. The result of the test is shown in Table 1.

Table 1 ADF test

Variables	*OD*	*t-statistics*
GDP per capita	1	–3.98 (b)**
Broad money (% of GDP)	1	–3.89 (a)***
Foreign direct investment, net inflows (% of GDP)	1	–6.99 (c)***
Gross capital formation (% of GDP)	1	–6.02 (c)***
Inflation, consumer prices (annual %)	1	–6.66 (c)***
Interest rate deposit (>5 yrs) (annual %)	1	–4.88 (c)***
Life insurance penetration (% of GDP)	1	–3.26 (c)***

Notes: 1 OD indicates order of difference: 1 indicates first difference.
2 ***denotes statistical significance at 1% level. **denotes statistical significance at 5% level.
3 Within parentheses 'a' indicates with drift only, 'b' indicates with drift and trend and 'c' indicates 'none'. Optimal lag length (not shown) is determined by AIC.

The ADF unit root test indicates that all the variables – dependent and independent – at level values have unit root at 1%, 5% and 10% level of significance. The absolute ADF test statistics value for each variable was smaller than the absolute critical values which disallow us to reject null hypothesis, indicating that the concerned variable has a unit root. So, accepting the null hypothesis, it can be concluded that the series are non-stationary and not integrated of the order zero, i.e., $I(0)$. But after taking first difference of the variables, they were found to be stationary which indicates that the time series are integrated of order one, i.e., $I(1)$. The stationarity of all the variables at first difference suggests the use of OLS technique.

4.2 Co-integration test

To deal with the non-stationarity problem, econometric studies involving time series data has increasingly started preferring the use of co-integration as it has been established as a powerful tool for detecting existence of steady-state equilibrium condition between variables. The use of co-integration is considered as an over-riding requirement to use non-stationary data in economic modelling. If the variables are found to be not co-integrating, then the results of such regression will be meaningless. On the other hand, if they are found to have co-integration, they can be used to frame regression equation resulting in meaningful data. The co-integration test indicates whether a group of non-stationary variables is having any long-run equilibrium relationship or not. As all the time series variables used in this study are integrated of order $I(1)$, the Engle-Granger co-integration test was applied to check for the existence of co-integration among them. The result is depicted in Table 2.

Table 2 Engle-Granger co-integration test

Null hypothesis: series are not cointegrated
Series: LNGDPPC LNM2 LNFDI LNINF LNINT LNLIFEPEN LNGCF
Included observations: 39
Automatic lags specification based on Akaike criterion (maxlag = 9)

Dependent variable	*Tau-statistic*	*Probability*	*z-statistic*	*Probability*
LNLIFEPEN	–4.984926	0.0706	–160.8046	0.0000

The null hypothesis of the Engle-Granger co-integration test is 'series are not co-integrated'. The test results indicate Tau-stat to be –4.98 and the corresponding P-value at 0.07 allowing the rejection of null hypothesis and acceptance of alternative hypothesis confirming the existence of co-integration. This shows that though the series are non-stationary at level or are not integrated of order zero, i.e., $I(0)$, but in the long run they show association. These variables can now be used in econometric modelling.

4.3 OLS model estimation

The variables were all transformed to their log values and the equation is re-written as follows:

$$LNLIFEPEN_t = \alpha + \beta_1 LNM2_t + \beta_2 LNFDI_t + \beta_3 LNINF_t + \beta_4 LNINT_t + \beta_5 LNGCF_t + \beta_6 LNGDPPC_t + e_t \quad (2)$$

where LN = logged value of the variables.

In order to frame the regression equation, OLS technique was used, as all the variables were integrated of the order $I(1)$ and are co-integrated as evidence by the results of the Engle-Granger co-integration test. Life insurance penetration (LIFEPEN) was considered as a dependent variable while six independent variables, broad money (M2), FDI, inflation (INF), rate of interest (deposit) (INT), GCF and GDPPC were included. The results are represented in Table 4. The initial estimation of equation (3) revealed that out of six independent variables three variables, viz., M2, FDI and INT were significant with adjusted R-square at 0.959460. The insignificant variables were INF, GCF and GDPPC. To check for the redundancy of the insignificant variables, the equation (2) was simplified further by removing the most insignificant variable INF with t-stat value of 0.79. So, the equation can now be written as:

$$LNLIFEPEN_t = \alpha + \beta_1 LNM2_t + \beta_2 LNFDI_t + \beta_3 LNINT_t + \beta_4 LNGCF_t + \beta_5 LNGDPPC_t + e_t \quad (3)$$

After the removal of INF variable, a new model (simplified model_1 in Table 4) was derived which shows improvement in the adjusted R-square value at 0.960268. Thus, INF variable was found to be redundant and is removed from the model. The new model shows four significant variables, viz., M2, FDI, INT and GCF. The GDPPC variable was still insignificant with t-stat value of –1.33. So, the equation (3) was further simplified by removing insignificant variable GDPPC. The equation is re-written as follows:

$$LNLIFEPEN_t = \alpha + \beta_1 LNM2_t + \beta_2 LNFDI_t + \beta_3 LNINT_t + \beta_4 LNGCF_t + e_t \quad (4)$$

The result of the revised regression model based on equation (4) is depicted in Table 3 (simplified model_2). The removal of GDPPC resulted in decrease in adjusted R-square value at 0.959466 directing that GDPPC is not a redundant variable and as such it cannot be removed from the model.

Hence, equation (3) with the highest adjusted R-squared value is accepted as the final model which can be represented as:

$$LIFEPEN = 1.569673 * M2 + 0.079596 * FDI + 0.572706 * GCF$$
$$-0.367508 * INT - 0.220243 * GDPPC - 2.337161$$

The above model reveals that four factors out of six considered for this study are significantly influencing insurance sector growth as represented by insurance penetration. broad money (M2) and interest rate (deposit) are significant at 99% confidence level and the other two factors FDI and GCF are significant at 95% level of confidence. The Inflation variable was found to be redundant and excluded from the final model. The GDP per capita is an insignificant variable in the model but it is included as it was not found to be redundant. The adjusted R-square for the final model is 0.960268.

Table 3 OLS estimation results

Variables	*Initial model [equation (2)]*	*Simplified model_1 [equation (3)]*	*Simplified model _2 [equation (4)]*
Constant	–2.219794 *** (–4.15)	–2.337161 *** (–4.21)	–2.476016 *** (–4.40)
M2	1.576989 *** (4.09)	1.569673 *** (4.16)	1.164523 *** (4.12)
FDI	0.086781 ** (2.43)	0.079596 ** (2.19)	0.072879 ** (2.09)
INF	0.041965 (0.79)		
INT	–0.423095 *** (–3.33)	–0.367508 *** (–3.10)	–0.361885 *** (–2.98)
GCF	0.499817 (1.67)	0.572706 ** (2.05)	0.702794 ** (2.18)
GDPPC	–0.221519 (–1.32)	–0.220243 (–1.33)	
Adjusted R-squared	0.959460	*0.960268*	0.959466
F-statistic	150.8904	184.6794	225.8727
Prob (F-statistic)	0.00	0.00	0.00
Number of observations	39	39	39

Notes: 1 ***denotes statistical significance at 1% level. **denotes statistical significance at 5% level.
2 Figures in parenthesis denote t-stat values.

M2, i.e., broad money (money circulation in India) is significantly and positively influencing life insurance penetration (share of life insurance premium to GDP). The Broad money has also been represented as a proxy for financial development and its impact on insurance consumption was found positive in earlier studies by Beck and Webb (2003), Feyen et al. (2011), Alhassan and Biekpe (2016) and Zerriaa et al. (2017). The money circulation is an important macro-economic factor that encourages financial intermediation and simultaneously gets influenced by the efficient financial intermediation. The increase of broad money is expected to positively impact the insurance buying and the estimated model supports that. With one unit increase in the money circulation there is 1.569673 unit increase in insurance penetration.

FDI has been a very important factor in the development process of many developing nations (Kivyiro and Arminen, 2015). It has played an important role in the rise of the Indian insurance industry in last two decades. Insurance is a capital-intensive industry requiring lots of funds to pump in during the initial phase. In India, initially the FDI was allowed up to 26% in insurance sector, which was enhanced to 49% in 2015, that has helped the insurance industry extensively in sustaining the global crisis that began in 2007–2008. This study finds FDI as positively and significantly influencing life insurance penetration. This is also supported by Ma and Pope (2008) and Ye et al. (2009). With one unit change in FDI, there is 0.079596 unit change in life insurance penetration. Government initiatives towards FDI inflow to insurance sector may help the industry in the long run. The reforms in the Indian financial market like demonetisation, introduction of GST, etc. had a short-term adverse impact on the financial sector and insurance sector was not an exception. FDI inflow in insurance sector has helped the sector to overcome such adverse situations.

Interest rate (deposit) was found to be significant, but it negatively influences the life insurance sector. A unit change in interest rate causes 0.367508 unit change in the life insurance penetration inversely. The interest rate (deposit) is a very important determinant factor for clients in choosing a saving product. Banks being the most trustworthy institute in general, a slight increase in deposit interest rate influences the client base extensively. The primary aim of majority of customer is 'secured return' along with 'liquidity'. The banking products have a competitive edge in this regard as compared to insurance products. The guaranteed interest rates are more attractive element than the uncertain bonus to be declared by the insurance company on a future date. The banking products are more liquid as compared to investments in insurance. Though, insurance products come with inherent features like 'risk protection' and 'tax benefits', still many customers lean towards the security element, which is better available with banking products. As such, a movement in the interest rate has an impact on the investment decision of the consumers. An increase in bank interest rate attracts a client to shift his money to bank deposits in order to have higher returns and vice versa. Which affects the investment in insurance inversely. The findings are in line with Rubayah and Zaidi (2000). Though Fortune (1973) and Beck and Webb (2003) found interest rate to be positively and significantly related to life insurance penetration.

GCF was found to be positively and significantly influencing life insurance penetration as a unit change in GCF results in 0.572706 unit change in the life insurance penetration. GCF adds to the capital assets of the nation and as such creates new infrastructure, new employment opportunities and supports increase in income. This positively influences the buying behaviour of clients and provides them option to invest in insurance products. The contribution of GCF towards development of infrastructure also helps in growth of insurance sector by way of enabling the industry to improve quality servicing resulting in more sales. The rural market in India is highly untapped where majority of the Indian population inhabits. But the insurers are not able to explore this potential of the rural market due to insufficient infrastructure like power, internet connectivity etc. that are very much required to operate a modern office. An increase in GCF would result in better infrastructure that will have a cascading impact on the expansion of insurance offices and thereby resulting in the growth in insurance penetration.

The model is strong one as evident by the adjusted R-square at 0.960268 and as such this model is able to predict 96% change in life insurance penetration.

4.4 Causality test

To take the investigation deeper, it was felt necessary to check whether the significant factors as per equation (3) hold any causal relationship with dependent factor – life insurance penetration. In that regard, the Engle-Granger causality test was done to check for their pairwise causality. The result of the causality test is depicted in Table 4.

The result of pairwise Granger causality test indicates that out of four significant variables as revealed by equation (3), only GCF demonstrate causal relationship with life insurance penetration at 90% confidence level. This indicates that GCF causes life insurance penetration. This is true in the light that with more spending on GCF, the infrastructure of the economy is developed which enables the insurance sector to improve its service quality, enhance customer reach, early grievance resolution, more control on distribution channels and continuous development in insurance product to cater the ever changing need of customer.

Table 4 Engle-Granger causality test results

Pairwise Granger causality test *Sample 1980–2018 lags: 2 (automatic selection)*			
Null hypothesis	*F-statistic*	*Probability*	*Result*
D(LNFDI) does not Granger cause D(LNLIFEPEN)	0.49355	0.6152	No causality
D(LNLIFEPEN) does not Granger cause D(LNFDI)	0.70789	0.5005	No causality
D(LNGCF) does not Granger cause D(LNLIFEPEN)	*2.61153*	*0.0895*	*Causality*
D(LNLIFEPEN) does not Granger cause D(LNGCF)	0.94767	0.3986	No causality
D(LNINT) does not Granger cause D(LNLIFEPEN)	0.60722	0.5512	No causality
D(LNLIFEPEN) does not Granger cause D(LNINT)	*3.98090*	*0.0289*	*Causality*
D(LNM2) does not Granger cause D(LNLIFEPEN)	0.19950	0.8202	No causality
D(LNLIFEPEN) does not Granger cause D(LNM2)	*2.96560*	*0.0663*	*Causality*

In case of FDI, there is no causality or reverse causality to life insurance penetration. But in case of money circulation (M2) and interest rate (INT), reverse causality was detected. Though M2 or INT does not cause insurance penetration, but instead insurance penetration causes interest rate (deposit) and money circulation. The increase in life insurance business helps in bringing out small savings from households in the form of 'insurance premiums' which is channelised subsequently to long-term capital intensive projects. Simultaneously, the paying out of remuneration to a large number of stakeholders working in insurance segment certainly helps in enhanced money circulation in the economy as is supported by this causal relationship. The causal relationship of life insurance penetration with Interest rate is due to utilisation of the bank accounts to build the corpus to pay out the insurance premium, which are in many cases found to be in annual mode. Both these variables – M2 and INT are in one way causal relationship with life insurance penetration and does not show up any causal relationship running from the dependent variable under study.

5 Conclusions

This study uses Engle-Granger co-integration, OLS regression and Granger causality to analyse the macro-economic determinants of life insurance industry in India. It included overlooked factors like FDI and GCF in similar studies that were done previously in India. This helped better understanding of their overall as well as individual impact on life insurance sector. The study concludes that macro-economic factors, viz., FDI, INT, GCF and M2 are significant determinants of life insurance sector growth as represented by life insurance penetration. While FDI, M2 and GCF were found to have significantly positive impact on life insurance penetration, INT demonstrates a negative relationship. GDPPC was found to be insignificant but non-redundant variable in determination of life insurance penetration in India. The FDI has been a supporting factor since privatisation of insurance sector in India. The inflow of FDI helped insurance industry to take a strong leap and introduction of better product and service quality. Smoothening of FDI norms and taking appropriate steps in inviting more FDIs will boost up the insurance industry even further. GCF was found to have one way causal relationship with life insurance penetration. The addition to capital stock of the nation which results in development of infrastructure helps insurance industry both directly and indirectly. The direct impact of GCF can be in the form of better infrastructure allowing Insurance firms to improve their product and service quality. While, indirectly GCF promoted government spending allowing more income in the hands of people, more purchasing power and ultimately increased capacity to invest. M2 (money circulation) also significantly and positively influences life insurance penetration as it promotes availability of money in the market. Interest rate (INT) negatively influences life insurance buying. A control on the interest rate may encourage people to choose insurance products as an alternative saving instrument with life insurance coverage as an additional benefit. The favourable controlling of FDI, INT, GCF and M2 variable will result in growth of the life insurance sector in India.

6 Limitation of the research

The study included macro-economic determinants only. There are other categories of factors like demographic, socio-cultural, institutional factors that were not considered in this study due to lack of time and resources.

7 Opportunity for further research

The scope for future research lies in the consideration of other categories of factors like demographic, socio-cultural and institutional factors that were not included in the present study. The factors can be studied individually as well as in association with other categories of factors to see their combined impact on the life insurance sector.

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