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Forecasting performance of Indian non-life insurance industry – an analysis of underwriting experience of public and private insurance companies

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ABSTRACT

This paper is an initial attempt towards the direction of analysis of performances of Indian public and private non-life insurance companies and towards forecasting of future growth potential of the sector. This paper also presents future prospects and growth potentiality of the non-life insurance sector in India along with the current state of the underwriting cycle prevalent in the Indian non-life insurance industry. This paper presents a detailed analysis of the underwriting performance of the non-life insurance sector as a whole during the post-liberalization period of 2000-2001 to 2014-2015. It depicts a colorful prospect for the Indian non-life insurance industry in the next 10 years. This paper has also been devoted to the determination of the presence of an underwriting cycle (pattern) that exists in the performances of the non-life insurance companies (public and private) during the last 15 years.

Contribution/Originality
The article entitled 'Forecasting Performance of Indian Non-life Insurance Industry – An Analysis of Underwriting Experience of Public and Private Insurance Companies' discusses performance of the Indian non-life insurance industry in the last decade after liberalization and future growth potential of the sector. This is an initial attempt towards this direction in the Indian perspective and it tries to identify the pattern of underwriting cycle existing in the Indian non-life insurance industry after liberalization along with forecasting future growth potential of the Indian non-life sector. This article is first such contribution in the study related to the Indian non-life insurance industry.

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1. INTRODUCTION

Bedi and Singh (2011) mentions that the liberalization of the insurance market through the Insurance Regulatory and Development Act (IRDA), 1999 paved the way for entry of private insurance players bringing in immense competition in the Indian non-life insurance sector. Starting journey in the non-life insurance market from the financial year 2000-2001, the 23 private non-life insurers present today have captured around 40 percent of the insurance market in terms of the net premium income (IRDA Indian Insurance Statistics 2014-15) (As per Indian Insurance Statistics Handbook, 2014). The importance of the non-life insurance sector can be understood from the fact that is mentioned in Indian Insurance Statistics Handbook (2014). The net premium income of the non-life sector is equivalent to 70 thousand Crore Indian Rupee (both public and private non-life insurers combined). The number of non-life insurance policies issued to individuals/corporates/groups in the financial year 2014-2015 stands to 13 crore (IRDA Statistics). As per the IBEF report, the Indian non-life insurance industry is 78000 crore INR premium income industry and it is growing at a pace of 17-18% per annum. As per IBEF report, the Indian insurance market is having a huge opportunity waiting to be harnessed as India currently is accounting for less than 1.5 percent of the World's total insurance premiums and about 2 percent of the world's life insurance premiums despite being the second most populous country in the world.

Rejda (1999) tells about underwriting cycle in non-life insurance. According to Rejda (1999), there exists a cyclical pattern in the underwriting results following which the property and casualty insurance and re-insurance premium, the profits and availability of coverage rise and fall over time. Property and liability Insurance markets fluctuate between the periods of tight underwriting standards and high premiums, called 'hard' insurance market, and periods of loose underwriting standards and low premiums, called 'soft' insurance market in the US market. As per Rejda (1999), these market conditions are direct or indirect effects of certain economic conditions. According to [3], in the US study, it was found that during the periods – 1956-1958, 1964-1966, 1972-1975, 1984-1988, 1992-1994, 2001-2003, the insurance market was hard while during the remaining part there was a soft insurance market.

Aquino (2008) made a time-series study as well as regression analysis study on different parameters, like, direct premium level, GDP, underwriting profit, operating profit and total investment return etc. based on property and casualty insurance data during the period 1984 to 2006 in order to identify the underwriting cycle pattern prevalent in the US market. Yu-na *et al.* (2009) worked on Chinese market Non-life insurance data for the period 1980 to 2006 to determine the presence of the underwriting cycle and concluded that there was a long cycle of 12.5-16.7 years and middle cycle was 5.6 years. Wang *et al.* (2010) did some work on modelling underwriting cycle pattern in the US property and casualty Insurance market.

In the Indian perspective, Pal and Mazumdar (2013) made a similar study based on the performance of the General Insurance Corporation of India, which is the largest and the only non-life re-insurer in India. The study indicated the existence of two cycles, each consisting of a six-year phase (1996-1997 to 2002-2003; 2002-2003 to 2008- 2009). Pal and Mazumdar (2013) also made a detailed analysis of the GIC underwriting performance and made forecast on the future performance of GIC in the coming years. Pal and Mazumdar (2014) studied the performance of the public non-life insurance companies during the period 2000-2001 to 2011-2012 and concluded presence of underwriting cycles during the decade.

This paper is an effort to investigate the performances of the non-life insurers during the period 2000-2001 to 2014-2015 and also to forecast the performance of non-life insurers more precisely with revised and accurate models in the next 10 years till 2025-2026. The current state of the underwriting cycle in the Indian non-life insurance market has also been studied in this paper.

2. MATERIALS AND METHODS

As per Rejda (1999), combined ratio is an important measure which is used to understand the underwriting cycle pattern. Combined ratio is the ratio of paid losses and loss adjustment expenses plus underwriting expenses to the premium income.

$$Combined\ Ratio = \frac{Paid\ Losses + Loss\ Adjustment\ Expenses}{Premium\ Income}$$

If the value of the combined ratio is less than 1, it is said that the underwriting operations are profitable. For example, if the combined ratio is 1.08 (or 108 after multiplying by 100), then for every INR 100 collected as premium, INR 108 is paid by the insurer as the expenses and the claims.

Premium Income – The revenue earned by the insurance company as premium in a particular financial year.

Incurred Claims-The claim is the expenses made by the insurer to meet up insure loss.

Operating Expenses – The operating expense are made by the insurer for running the insurance business. The operating expense includes office rent, expenditure on printing stationaries and other office expenses in the paper, major financial calculation has been made in terms of Lakh and Crore INR. Lakh and Crore are Indian measure and One Lakh means One Hundred Thousand and One Crore mean 10 million.

The below-mentioned data have been considered for analysis in the current study –

- Net Premium Income from 2000-2001 to 2014-2015 (Public Insurance Companies, Private Insurance Companies, Together)
- Incurred Claims from 2000-2001 to 2014-2015 (Public Insurance Companies, Private Insurance Companies, Together)
- Operating Expense from 2000-2001 to 2014-2015 (Public Insurance Companies, Private Insurance Companies, Together)

Two linear regression equations have been fitted on incurred claims as well as operating expenses as dependent variable and premium income as the independent variable in both cases. The R-square values are determined in the case of both the equations, values imply that the fits are excellent (very precise).

Regression Equation 1: $Y_t = A + B.X_t$ where Y_t = Claims at time-point t, X_t = Premium at time point t, A = intercept of the linear equation and B = Slope of the linear equation.

Regression Equation 2: $Y_t = A + B.X_t$ where Y_t = Expenses at time-point t, X_t = Premium at time point t, A = intercept of the linear equation and B = Slope of the linear equation.

The values of A and B are estimated for the best fit through the least square technique for both the regression equation for all public, private and combined data. So 6 regression equations are obtained.

The time-series analysis has been done on the premium income (non-life public insurers, non-life private insurers and both combined together). From the forecast values of net premiums till 2025-2026 financial year, the corresponding incurred claims as well as operating expenses are determined using the best fitted linear equations which are estimated through a least square technique. The future performances of the non-life insurance sectors are determined based on the forecast results using the formulae mentioned in the just preceding paragraph.

2.1. Data source

The data is collected from the IRDA annual reports as well as IRDA Indian Insurance Statistics Hand-book 2014-2015. The combined ratio has been calculated from the above data.

3. RESULTS AND DISCUSSION

The following Figure gives a glimpse of the combined ratio for the underwriting operations did in the public non-life insurance companies, the private non-life insurance companies as well as the combined performance of both.

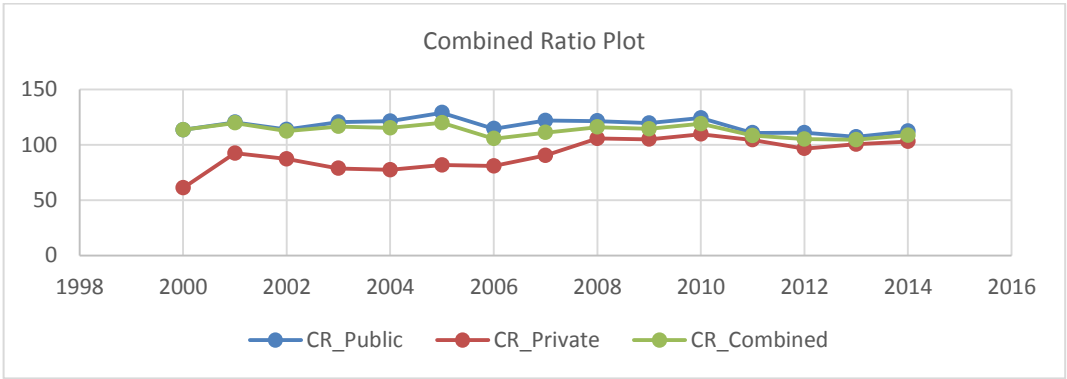

Figure 1: Combined ratio plot (Public, Private and Combined)

Two complete underwriting cycles are distinctly visible in all 3 categories – public non-life insurers, private non-life insurers and combined non-life insurers. For public non-life insurers, the cycles are: 2001-2002 to 2007-2008 and 2008-2009 to 2014-2015 (6 years and 6 years respectively). For private non-life insurers, the cycles are: 2000-2001 to 2007-2008 and 2008-2009 to 2014-2015 (7 years and 6 years respectively). For the combined non-life insurers' performance, the cycles are: 2001-2002 to 2006-2007 and 2007-2008 to 2014-2015 (5 years and 7 years respectively).

The linear regression equation of incurred claims data on premium income gives the following results (Table 1).

Table 1: Linear regression fit of incurred claims on premium income

	Non-life Public Insurers	Non-life Private Insurers	Combined
Linear Equation	Y = 988.13 + 0.7667 X	Y =-343.516 + 0.7527 X	Y = 769.115+0.7591 X
R-Square	0.994	0.995	0.997

Y – Incurred Claims; X – Premium Income

The linear regression equation of incurred claims data on premium income gives the following results (Table -2).

Table 2: Linear regression fit of operating expenses on premium income

	Non-life Public Insurers	Non-life Private Insurers	Combined
Linear Equation	Y = -20.5613 + 0.3263 X	Y = 117.138 + 0.2753 X	Y = 706.542 + 0.2931 X
R-Square	0.94	0.991	0.997

Y – Operating Expenses; X – Premium Income

The forecasting is done on the net premium data of the public non-life insurers, private non-life insurers and combined data on non-life insurers.

3.1. Public premium forecast

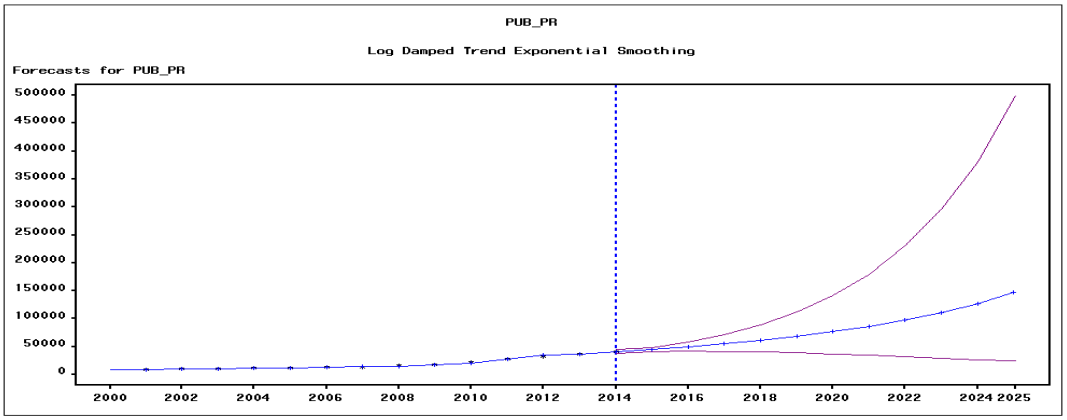

Figure 2: Log damped trend exponential smoothing model fit on public premium data

R-Square = 0.99

Table 3: Public non-life insurers' performance forecast results

Year	Net Premium (in Crores INR)	Claims (in Crores INR)	Operating Expenses (in Crores INR)	Combined Ratio
2000	8085.76	7020.36	2165.11	113.6006
2001	8748.59	7888.5	2643.58	120.386
2002	9473.22	7691.18	3100.15	113.9141
2003	10207.16	8253.3	4051.54	120.5511
2004	10949.93	9075.39	4221.12	121.4301
2005	11832.14	10569.85	4701.12	129.0635
2006	12928.6	10538.75	4279.061	114.6126
2007	13692.14	12124.81	4584.055	122.0325
2008	15767.18	13637.78	5526.67	121.5465
2009	17971.11	14967.23	6529.58	119.6187
2010	22310.46	19599.15	8150.15	124.378
2011	27740.23	22242.06	8503.76	110.8348
2012	31265.4	25061.37	9637.52	110.9818
2013	36172.51	27817.95	10997.51	107.3065
2014	40123.96	31567.75	13479.57	112.2704
	Premium Forecast	Forecasted Claims (Calculated from Fitted Model based on Premium)	Forecasted Operating Expenses (Calculated from Fitted Model based on Premium)	Forecasted Combined Ratio (Calculated from Forecasted Premium, Forecasted Claims as well as Forecasted Operating Expenses)
2015	44723	35277.25	14572.55	111.4635
2016	49630	39039.45	16173.71	111.2496
2017	55102	43234.83	17959.22	111.056
2018	61281	47972.27	19975.43	110.8789
2019	68347	53389.77	22281.06	110.7157
2020	76520	59656.01	24947.91	110.5645
2021	86081	66986.43	28067.67	110.424
2022	97381	75650.14	31754.86	110.2936
2023	110870	85992.16	36156.32	110.1727

2024	127124	98454.1	41460	110.0611
2025	146890	113608.7	47909.65	109.9587
2026	171141	132201.9	55822.75	109.8654

The log damped trend exponential smoothing has been fitted in the premium data for public non-life insurance companies and from the R-square value available from the fit, it is evident that the model has given a good fit. From the forecast value available, it is evident that the non-life premium income for the public insurers will surpass 1 Lakh Crore INR in around year 2022/2023. During the early years after liberalization of non-life insurance industry, the public insurance companies use to run with high combined ratio (they need to pay more than 120 INR for claims as well as operating expenses in order to earn 100 INR as premium). However, as seen from the forecasted results, the public insurance companies are gradually adapting to new competitive market drastically reducing different cost and so in the coming years the combined ratio will stay around 110 (they will be paying INR 110 as claims and operating expenses in order to earn 100 INR).

3.2. Private premium forecast

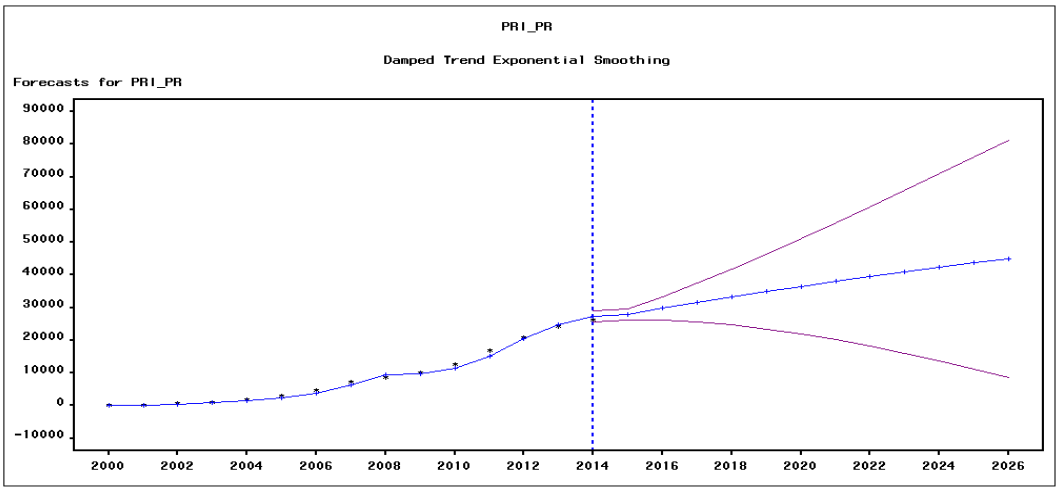

Figure 3: Damped trend exponential smoothing model fit on private premium data

R-Square = 0.99

Table 4: Private non-life insurers' performance forecast results

Year	Net Premium (in Crores INR)	Claims (in Crores INR)	Operating Expenses (in Crores INR)	Combined Ratio
2000	0.44	0.02	0.249	61.181
2001	183.33	42.24	127.25	92.450
2002	561.45	292.25	197.65	87.256
2003	1066.03	543.36	296.17	78.752
2004	1782.01	911.73	468.87	77.474
2005	2842.27	1548.22	777.4	81.822
2006	4673.164	2502.89	1283.37	81.021
2007	7158.713	4246.31	2231.78	90.492
2008	8511.99	6079.16	2927.15	105.807
2009	9945.94	7307.25	3139.76	105.037
2010	12622.35	9937.31	3917.07	109.760
2011	16710.77	12755.79	4702.85	104.475
2012	20841.56	14562.24	5584.3	96.665
2013	24115.63	17874.11	6395.28	100.637

2014	26081.37	19430.46	7448.57	103.058
	Premium Forecast	Forecasted Claims (Calculated from Fitted Model based on Premium)	Forecasted Operating Expenses (Calculated from Fitted Model based on Premium)	Forecasted Combined Ratio (Calculated from Forecasted Premium, Forecasted Claims as well as Forecasted Operating Expenses)
2015	27982	20718.54	7820.583	101.991
2016	29814	22097.48	8324.932	102.040
2017	31583	23429.01	8811.938	102.083
2018	33291	24714.62	9282.15	102.120
2019	34939	25955.07	9735.845	102.152
2020	36530	27152.62	10173.85	102.180
2021	38065	28308.01	10596.43	102.205
2022	39547	29423.51	11004.43	102.227
2023	40978	30500.62	11398.38	102.247
2024	42358	31539.35	11778.3	102.265
2025	43691	32542.7	12145.27	102.281
2026	44977	33510.67	12499.31	102.296

The damped trend exponential smoothing has been fitted in the premium data for private non-life insurance companies and from the R-square value available from the fit, it is evident that the model has given a good fit. As visible from the forecasted results, the private non-life insurance companies will be growing in good pace, however, growth will be less than the public non-life insurance companies in terms of premium revenue. In the initial years, the combined ratio for private non-life insurance companies use to show huge variability over years but in the coming years the combined ratio will be around 102 (i.e., in order to earn 100 INR as premium income, they need to spend 102 INR only). It means most of the private insurance companies will run in profit and only some will be facing loss.

3.3. Total premium forecast

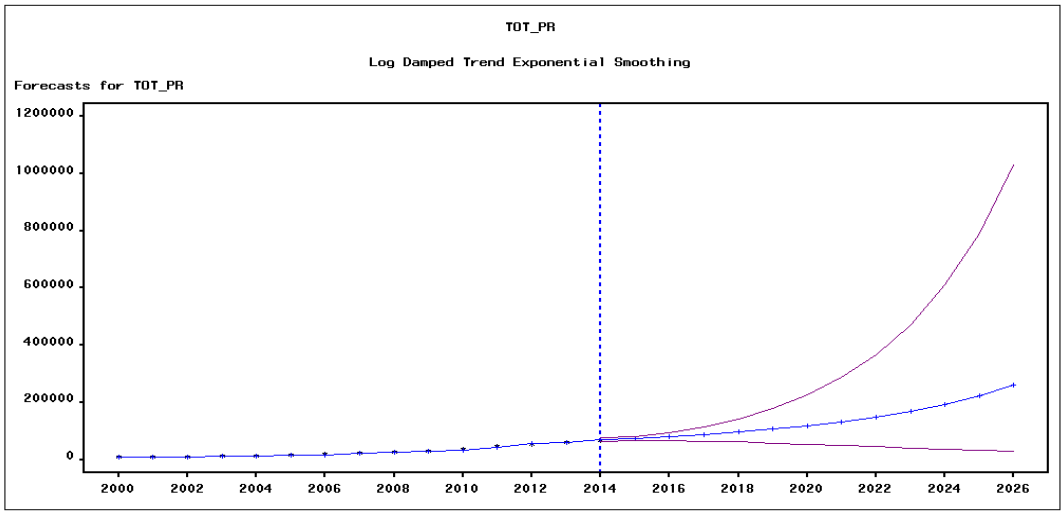

Figure 4: Log damped trend exponential smoothing fit on combined data

R-Square = 0.99

Table 5: Combined (public & private) non-life insurers' performance forecast results

Year	Net Premium (in Crore INR)	Claims (in Crore INR)	Operating Expenses (in Crores INR)	Combined Ratio
2000	8086.2	6907.349	2165.359	113.597
2001	8931.92	7549.335	2770.83	119.812
2002	10034.67	8386.433	3297.8	112.422
2003	11273.19	9326.594	4347.71	116.598
2004	12731.94	10433.93	4689.99	115.277
2005	14674.41	11908.46	5478.52	119.913
2006	17601.77	14130.61	5562.431	105.694
2007	20850.86	16597	6815.835	111.203
2008	24279.17	19199.43	8453.82	116.028
2009	27917.05	21960.95	9669.34	114.424
2010	34932.81	27286.61	12067.22	119.096
2011	44451	34511.87	13206.61	108.444
2012	52106.96	40323.51	15221.82	105.255
2013	60288.14	46533.84	17392.79	104.638
2014	66205.33	51025.58	20928.14	108.641
	Premium Forecast	Forecasted Claims (Calculated from Fitted Model based on Premium)	Forecasted Operating Expenses (Calculated from Fitted Model based on Premium)	Forecasted Combined Ratio (Calculated from Forecasted Premium, Forecasted Claims as well as Forecasted Operating Expenses)
2015	72583	55866.87	21980.62	107.253
2016	79558	61161.59	24024.99	107.074
2017	87318	67052.21	26299.45	106.91
2018	96092	73712.55	28871.11	106.755
2019	106164	81358.21	31823.21	106.61
2020	117889	90258.65	35259.81	106.471
2021	131711	100750.9	39311.04	106.340
2022	148197	113265.5	44143.08	106.215
2023	168073	128353.3	49968.74	106.098
2024	192279	146728.1	57063.52	105.987
2025	222051	169328	65789.69	105.884
2026	259017	197388.9	76624.42	105.789

The log damped trend exponential smoothing has been fitted in the premium data for non-life insurance companies and from the R-square value available from the fit, it is evident that the model has given a good fit. From the forecast value available, it is evident that the non-life premium income for the all non-life insurers will surpass 1 Lakh Crore INR in around year 2018/2019. During the early years after liberalization of non-life insurance industry, the sector as a whole use to run with little higher combined ratio (they need to pay more than 110 INR for claims as well as operating expenses in order to earn 100 INR as premium). However, the companies are gradually adapting to new competitive market drastically reducing different cost and so in the coming years the combined ratio will stay around 105 (they will be paying 105 INR as claims and operating expenses in order to earn 100 INR). This major achievement will be the private companies. Public companies also will reduce loss.

By 2024, the non-life insurance sector will be getting around INR 2 Lakh Crore INR as premium revenue and which will be a major boost to the insurance sector as well as the economy as a whole.

4. SUMMARY

The study shows two underwriting cycles visible in all 3 categories of Indian non-life insurance industry – public non-life insurers, private non-life insurers as well as for combined. For public non-life insurers, the cycles are – 2001-2002 to 2007-2008 and 2008-2009 to 2014-2015. For private non-life insurers, the cycles are – 2000-2001 to 2007-2008 and 2008-2009 to 2014-2015. For the combined non-life insurers' performance also, the cycles are – 2001-2002 to 2006-2007 and 2007-2008 to 2014-2015.

As visible from the forecasted results, the public non-life insurance companies will touch earning 1 Lakh Crore INR premium revenue by 2022-2023. The non-life insurance sector (both public and private together) will be fetching 1 Lakh Crore INR premium revenue by 2019 and 2 Lakh Crore INR as premium revenue from 2024 FY giving huge boost to the economy. As revealed from the forecasted results, the public insurance companies will become more economic in terms of operations and will maintain around 110 is combined ratio value in the coming years which will be a very good achievement for them. Private non-life insurance companies will maintain the combined ratio at around 102 due to their optimized operational capabilities.

This study is on future prospects of the Indian non-life insurance sector in the coming years. There is scope of further research in the granular level of non-life insurance sector like fire insurance, marine insurance, auto-insurance among others.

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