An Analysis of Efficiency Performance of Private life Insurance

Dr. Sanhita Athawale[1], Mrs. Philomena Fernandes[2]

T.J. College, Khadki, Pune & Modern College of Arts, Commerce And Science, Pune

Abstract: This paper deals with the analysis of the Efficiency of private life insurance industry since the liberlisation process of insurance sector in the country. Keeping in view the limitations of ratio analysis techniques, the methodology used to judge the efficiency of private life insurance companies is Data Envelopment Analysis (DEA). The result of the DEA analysis is used to assess the technical efficiency of individual firms with respect to the best practice or benchmark firms. It further allows the classification of the technical efficiency into pure technical and scale efficiency. The present study has used the Farrel model which was further developed by Charnes, Cooper, and Rhodes (1978). Data Envelopment Analysis(DEA) is a non parametric linear programming tool used to study the efficiency of the economic units (life insurers) through the construction of the economic frontier. The study takes into account ten private life insurance companies which commenced their business in the country in the year 2001-2002 .The study covers a period of 13 years from 2001-02 till 2013-14.It is found that the technical efficiency scores of the firms measured under pure technical efficiency and scale efficiency scores of the firms are rising over the years. Of the ten private companies taken for study, SBI life shows that it is operating at a full scale and technically highly efficient firm in par with public sector monopolist Life Insurance Corporation of India.

Keywords: Data Envelopment Analysis, Private sector, Scale Efficiency, Technical Efficiency, Insurance Companies.

1. INTRODUCTION

With the deregulation of Insurance industry at the end of 1999, private companies have paved way into insurance industry and have made rapid strides in terms of progress in terms of growth. In the wake of competition ,as many as 23 private life insurance companies are operating in life business along with public sector monopolist LICI till date. With the entry of so many firms into this industry ,it becomes essential to judge the performance of the firm. There are many ways to analyse a firm's performance such as the market share, Equity share capital of the firm, Status of claim etc. However these parameters do not show us the actual performance in terms of efficiency. Efficiency refers to the performance of the firms relative to the existing technology in the industry. Since the technology used by every firm is different it becomes difficult to use any other methodology except DEA. The concept of economic efficiency is borrowed from the microeconomic theory of the firm. In the theory of firm, production (or economic) efficiency of the firm is divided into technical and Allocative efficiency. A producer is said to be technically efficient if production occurs on the economic frontier of producer's production possibilities set and technically inefficient if the production occurs off the frontier. Thus, technical efficiency is said to be achieved when maximum possible output is achieved from a given combination of inputs. On the other hand a producer is said to be allocative efficient if the production occurs in a region of production possibilities set that satisfy the producer's behavioral objective.

Objective of the Study: In the wake of Insurance liberalisation, Evaluation of the firm's performance becomes necessary .Greater autonomy is given to the private life insurers since the liberlisation regime. Therefore it becomes necessary to check weak areas and improve its efficiency. The following objectives are identified for the study.

1. To study the efficiency performance of the private life insurers in the wake of competition.

2.To study the Technical Efficiency of the private life insurers.

3.To study the Scale efficiency of the private life insurers.

Hypothesis:

Ha: There is an improvement in the Efficiency performance of the private life insurers during the study period.

H0: There is no improvement in the Efficiency performance of the private life insurers during the study period.

2.   METHODOLOGICAL ISSUE

This study covers a sample of ten companies which started its business in 2000-2001.The following is the list of companies.

1) HDFC Standard Life Insurance Company Ltd.

2) Max New York Life Insurance Company Ltd (now,Max Life)

3) ICICI Prudential Life Insurance Company Ltd.

4) Kotak Mahindra Old Mutual Life Insurance Ltd.

5) Birla Sun Life Insurance Company Ltd.

6) Tata AIA Life Insurance Company Ltd.

7) SBI Life Insurance Company Ltd.

8) ING Vysya Life Insurance Company Private Ltd. Now(Exide life insurance)

9) Bajaj Allianz Life Insurance Company Ltd. .

10) Met life India Insurance Company Ltd.

A Firm's performance can be estimated using traditional financial ratios such as CARAMELS. However frontier methodologies have been regarded superior to the traditional methods in the economic theory. The frontier methodologies estimate firm's performance relative to 'best practice'. Frontiers have been employed to measure firm success in using technology (technical efficiency), achieving optimal size (scale efficiency), minimizing costs (cost efficiency), maximizing revenues (revenue efficiency), and maximizing profits (profit efficiency). There are various approaches towards the study of firms performance. However in this study Data Envelopment Analysis(DEA) which is a non parametric linear programming tool is used to study the efficiency of the economic units. The result of the DEA analysis is used to assess the technical efficiency of individual firms with respect to the best practice or benchmark firms. It further allows the classification of the technical efficiency into pure technical and scale efficiency.

Technical efficiency has been classified into pure technical efficiency (PTE) and scale efficiency (SE), where TE = PTE x SE, by solving additional linear programming problems. Pure technical efficiency is measured relative to a variable returns to scale (VRS) frontier, which may have segments where best practice firms operate with increasing returns to scale (IRS), constant returns to scale (CRS), and/or decreasing returns to scale (DRS). Pure technical efficiency is the reciprocal of the distance of firm i from the VRS frontier. Thus, the firm could achieve pure technical efficiency by moving to the VRS frontier. If the firm is operating in an IRS or DRS region of the frontier, it could further improve its efficiency by attaining CRS. Both pure technical and scale efficiency are bounded within the values 0 and 1.

Firms with pure technical efficiency equal to 1 are operating on the VRS frontier, and a scale efficiency score equal to 1 indicates that a firm is operating with CRS. The methodology also reveals whether a non-CRS firm is operating with IRS or DRS.

In the present study the efficiency of the first movers in the wake of competition has been analysed . Data for the period from 2001 to 2014 is gathered and analysed.

Efficiency is measured under two different assumptions, viz.

Variable Returns to Scale (VRS) model, allows increasing and decreasing returns to scale. Here, the sum of weights of linear program is equated to 1 .This gives the measure of pure Technical Efficiency.

The Constant Return to Scale (CRS) model which assume a non negativity constraint instead of the VRS constraint on weights. This gives the measure of Technical efficiency.

The input minimization model of DEA is used which is given as Min θo

$$\text{Subject to } \sum yrj \ \lambda j \geq y \ r0,$$

$$\theta o \ xi0 - \sum x_{ij} \lambda \ j \geq 0 \qquad \theta o_{free,} \ \lambda j \geq 0$$

$$\sum \lambda j = 1 \text{ for VRS}$$

$$\sum \lambda j \geq 0 \text{ for CRS}$$

Where,

θo stands for the efficiency score of the firm.

j indicates the number of firms, j=1….J

yrj is the rth output of the jth firm and xij is the ith input of the jth firm.

y and x are output and input of the firms where y=1……r and x=1,…..i.

The above procedure of minimizing efficiency score of θo of a single firm is repeated for each firm and thus the input oriented efficiency of each firm is obtained. Technical efficiency is decomposed into pure technical efficiency and scale efficiency. The scale efficiency (SE) which is the ratio of CRS efficiency to VRS efficiency is also calculated.

For one output and one input case, the envelope which fulfills the VRS condition is depicted in the following diagram with the green curve. The straight line at 45 degree from the origin indicates the envelope of CRS. The combinations of inputs and outputs of efficient firms support the efficiency frontier whereas that of inefficient one lies to the right or below the frontiers in the Figure. Technical efficiency is defined as the ratio of the input usage of a fully efficient firm producing the same output vector to the input usage of a specified firm. The point 'P' given is a case of inefficient firm which can either increase production using the same amount of input i.e. output maximization or decrease input holding the output constant i.e. input minimization. 'Y' indicates the point where a firm is operating optimally with available technology. At this point, the firm therefore is efficient under CRS as well as VRS. Under CRS, the ratio of distance PCRS P/0P serves the input oriented measure of technical efficiency and its value varies over the range (0, 1). The firm at P is inefficient and its ratio is smaller than 1 whereas for Y,ycrs and Y coincides so ratio is 1.The fraction (1- Pcrs P/0P), on the other hand shows the potential input savings that a shift to technically efficient production would bring about. In case of VRS, the ratio based on VRS as reference technology provide an efficiency technology under VRS assumption. So under VRS assumption firm X, Y and Z are efficient.

Graph No 1 Efficiency Frontiers Under CRS and VRS
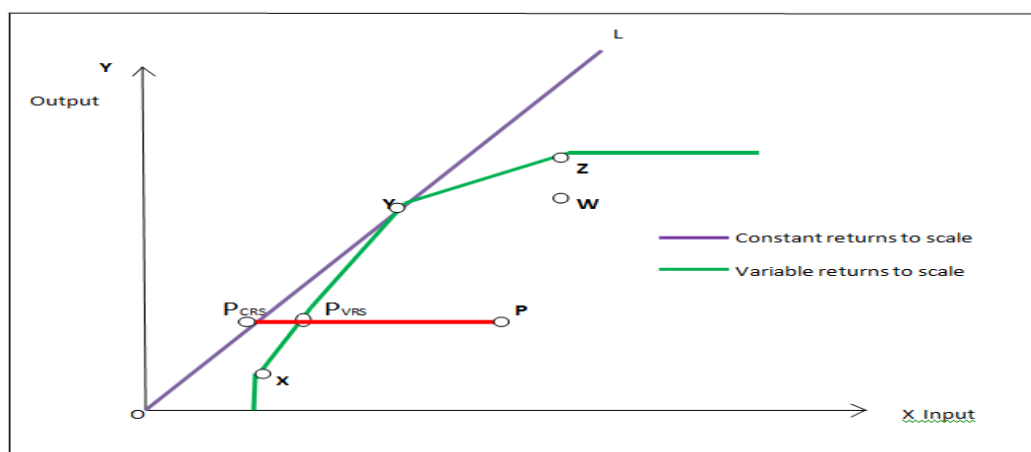
Specification of Input and Output:

OUTPUT: Based on the value added approach, this study has employed both premium income and benefit paid to customers as output. So premium income may be use as an appropriate proxy of output for risk pooling / risk bearing function of the life insurer. Benefits paid are correlated with the function of real financial services of the insurer.

 INPUT: operating expenses and commission expenses are used as input proxy. The use of operating expenses and commission expense as input is justifiable because, operating costs of life insurance will take into account the labor-related expenses, capital expenses, and materials consisting of all other expenses. In addition to operating expenses, commission expense is another input in line of labour input as agent and brokers are mainly responsible for marketing of products.

Related Literature Review:

Sterzynski Maciej,L.L.M (2003)studied the impact of liberalization and deregulation processes in European Union which brought about a creation of Single Insurance market (SIM) The study period covered time period from 1995-2000. The integration of insurance market brought about an reduction in the number of companies, but   a tremendous growth in the gross insurance premium was experienced during the period. It was found that 70 percent of non life insurance business was concentrated in five Member States such as: Germany France, Netherlands, Spain and UK and 67.8 percent of all life insurers were concentrated in UK, Germany, Netherlands ,Denmark and France. It was also found that there was predominance of life insurers over the non –life insurers.

Hussels and Ward (2004) examined the German life insurance industry over the period covering from 1991 to 2002 and assessed the cost efficiency with the help of data envelopment analysis of balanced panel data of 31. They found an overall average growth in efficiency and productivity.

Boonyasai, Grace and Skipper (2004)examined the impact of liberalization and deregulation on four life insurance markets viz. Korea, Philippines, Taiwan and Thailand .The data collected were from the late 1970s or 1980s, depending on data availability for each country..Using DEA to measure cost efficiency they found that liberalization and deregulation of Korean and Philippine life insurance industry have stimulated increase and improvement in productivity. However for Taiwanese and Thai Life insurance firms, liberalization has had little effects on increases and improvements in productivity. Their results suggest that liberalization should be closely followed by deregulation or otherwise a restrictive regulatory environment will reduce the welfare gain.

Leverty Tyler, Yijia Lin and Hao Zhou (2004) conducted an in depth analysis of the efficiency and productivity of the Chinese Insurance Industry after the state monopoly was dissolved allowing foreign owned insurers. They estimated total technical efficiency, purely technical efficiency and scale efficiency using DEA. The dataset covered time period from 1992 to 2002 for the life insurers. They observed rise in social welfare following liberalization of the insurance market.

Souma Toshiyuki and Yoshiro Tsutsui (2005) examined the change in the level of competition in the Japanese life insurance industry over the period of 17 years from 1986 to 2002. Utilizing the regression equations they established that there has been a change in the degree of competition during that period. Their results suggested that competition has become stronger since 1995 but the competition in the recent years was more than the pre war period and so indicated potential for more competition.

Cummins David and Maria Rubio Misas (2006) The research aimed at analyzing scale economies and efficiency in the Spanish insurance industry to find out whether or not the deregulation has had desired effect. They tested the efficiency by estimating best practice production function and cost frontiers for each year of the sample period, using data envelopment analysis (DEA). The result of the study showed that the deregulation has led to dramatic changes in the Spanish insurance industry such as decline in the number of firms, increase in the average size of firms and also the unit prices declined significantly in both life and non life insurance.

Yoshihiro Asai, Yanase Noriyoshi, Tomimura Kei and Ozeki Junya (2007) studied the efficiency and productivity of life insurance industry in Japan after mid 1990s. They employed DEA and Malmquist Index to calculate the efficiency and productivity of life insurance companies in Japan over a period of 9 years from 1996 to 2004. Their result showed no change in the efficiency of life insurance companies in Japan but productivity of insurance companies in Japan increased during the sample period. The productivity of stock companies dramatically increased while productivity of mutual companies decreased during the sample period.

Mahlberg and Url (2007) examined the development of the German insurance industry for a decade from 1991-2001, using DEA and Malmquist analysis. The results proved that the total factor productivity (TFP) increased during the study period, although the liberalization process did not lead to converging efficiency scores.

Fenn Paul, Dev Vencappa, Stephen Diacon, Paul Klumpes and Chris O'Brien(2008) estimated the cost and profit efficiency of fourteen major European countries in the advent of insurance liberalization covering the study period from 1995-2001 and used stochastic frontier to model the efficiency of the companies during the deregulation period. The results suggested that most of the European insurers were operating under conditions of decreasing costs (increasing return to scale) and that company size and market share were factors that significantly determine X efficiency with respect to cost as well as profits. Cost efficiency was found relatively higher for smaller companies. Profit efficiency by contrast was found increasing with size for firms in all insurance sectors. Therefore they concluded that larger firms, and those with high market shares, tend to have more cost inefficiency but less profit inefficiency.

In the Indian context, Tone and Sahoo (2005) were the pioneer to study the efficiency of the life insurance sector.They applied cost efficiency model to examine the performance of Life Insurance Corporation of India.A slight decline in performance was observed prior to liberlisation .However over the period Cost efficiency has improved due to modernisation .

Sinha Ram Pratap and Biswajit Chatterjee (2009) calculated the cost efficiency of 14 life insurance companies in India for the period 2002-03 to 2006-07.They estimated the cost efficiency using DEA method and found out an upward trend in the last three years i.e. between 2002-03 and 2004-05. The efficiency in the last two years however was in the reversed trend.

Rajendran and Natarajan (2009) found out the remarkable improvements that the acceptance and adaptation of Liberalization Privatization and Globalization has brought about in the Indian Life Insurance Industry specifically to LICI of India. They first compared the overall performance of LIC of India between pre and post LPG .They used method of least squares for the analysis and concluded that LPG was incorporating a positive influence on the performance of LICI.

Kshetrimayum ,Sobita Devi(2011)in her doctoral thesis has studied the impact of liberlisation and deregulation on the performance of life insurers including public and private sector for the period of ten years from 2001-2010 using DEA analysis. Her study highlights that the public sector is operating at increasing returns to scale and that of private sector SBI life is the only private sector being at par with public sector in its performance.

4. DATA ANALYSIS

For the purpose of the study ,data for ten private life insurers along with public sector LICI is taken for a period of 14 years from 2001-2014.It is so because in the initial years of commencement of business the life insurers are at the infancy stage hence the operating cost and commission expenses would be higher to set up the business. Hence the study is extended till 2014.However the focus is basically upto 2010.Life insurers take at least six to seven years to breakeven so in the initial years it would be difficult to identify the firms which are efficient. The following results display the descriptive statistics of the firms for various years.

The following Table No 1 displays the Gross efficiency score calculated at constant returns to scale which depicts the technical efficiency of the firms.

Table No. 1

Gross Efficiency Scores at Constant Return to Scale (CRS) i.e. Technical Efficiency (TE)

Years / Companies	2001-02 CRS	2002-03 CRS	2003-04 CRS	2004-05 CRS	2005-06 CRS	2006-07 CRS	2007-08 CRS	2008-09 CRS	2009-10 CRS	2010-11 CRS	2011-12 CRS	2012-13 CRS	2013-14 CRS
LIC	1	1	1	1	1	1	1	1	1	1	1	1	1
Bajaj	0.138	0.257	0.285	0.504	0.674	0.393	0.410	0.577	0.643	0.665	1	1	1
Birla	0.287	0.305	0.516	0.532	0.572	0.588	0.603	0.495	0.504	0.528	0.709	0.740	0.758
HDFC	0.297	0.438	0.509	0.497	0.846	0.904	0.841	0.597	0.599	0.671	0.695	0.904	1
ICICI	0.484	0.559	0.635	0.775	0.990	1	1	1	1	1	1	0.999	0.941
ING	0.106	0.108	0.210	0.409	0.399	0.499	0.657	0.596	0.524	0.418	0.496	0.621	0.547
Kotak	0.126	0.188	0.384	0.666	0.711	0.822	0.665	0.536	0.703	0.717	1	1	0.742
Met	0.053	0.122	0.179	0.219	0.330	0.313	0.273	0.325	0.428	0.901	0.865	0.785	0.657
MAX	0.182	0.224	0.283	0.304	0.387	0.438	0.436	0.449	0.464	0.416	0.434	0.568	0.590
SBI	1	1	1	1	1	1	0.972	0.931	1	1	1	1	1
TATA	0.206	0.288	0.388	0.347	0.439	0.478	0.541	0.522	0.494	0.514	0.976	1	0.929

Results computed through 'R' Software

Interpretation:

LICI the only dominant public sector has the gross efficiency score equal to 1 which indicates that it is technically efficient throughout the years. Since our study focuses on private sector, it becomes very important to know the highly efficient one and the less efficient. The following discussion throws light upon this aspect .Bajaj's efficiency score has shown an increasing trend till 2005-06 which has thereafter fallen for 2006-07 and thereby increased from 2007 onwards and remained highly efficient in par with LICI. Birla's efficiency score has shown an increasing trend till 2007-08 which has thereafter fallen for one year and then showing a upward trend from 2009-10. HDFC's efficiency score has shown an increasing trend till 2006-07 which has there after fallen for two years and then increased from 2010-11. ICICI's efficiency score has shown an increasing trend till 2006-07 which has there after remained constant for next five years and then decreasing from 2012-13. ING' Vsysa and Met life's efficiency score has shown has been fluctuating from 2001-2002 till 2013-14. Kotak's efficiency score has shown an increasing trend till 2006-07 which has thereafter fallen for two years and again increasing from 2009-10 and again fallen in 2013-2014. Max has shown an increasing trend till 2013-14with slight increase year after year with small amount of decrease in the year 2007-2008 and 2010-2011 SBI shows CRS 1 for all the years except for 2007-2008 and 2008-2009 which is in par with LICI.TATA has shown increasing trend with slight fluctuations till 2010-2011 and Thereafter 0.98 in 2011-2012, 1 in 2012-2013 and 0.93 in 2013-2014.
The following table no 2 shows the Pure Technical efficiency score of the firms calculated at variable returns to scale.

Table No. 2

Efficiency Scores at Variable Return to Scale (VRS) i.e. Pure Technical Efficiency (PTE)

Years / Companies	2001-02 VRS	2002-03 VRS	2003-04 VRS	2004-05 VRS	2005-06 VRS	2006-07 VRS	2007-08 VRS	2008-09 VRS	2009-10 VRS	2010-11 VRS	2011-12 VRS	2012-13 VRS	2013-14 VRS
LIC	1	1	1	1	1	1	1	1	1	1	1	1	1
Bajaj	0.292	0.349	0.431	0.716	0.674	0.422	0.417	0.600	0.689	0.769	1.000	1	1
Birla	0.323	0.329	0.565	0.827	0.720	0.728	0.694	0.591	0.603	0.629	0.720	0.751	0.789
HDFC	0.304	0.449	0.642	0.564	0.855	0.918	0.904	0.671	0.679	0.723	0.700	0.907	1
ICICI	0.651	0.887	0.825	0.958	1	1	1	1	1	1	1	1	0.992
ING	0.306	0.403	0.490	0.726	0.730	0.852	1	1	1	1	1	1	0.982
Kotak	0.223	0.380	0.585	1	1	1	1	0.815	1	1	1	1	0.875
Met	1	1	1	1	1	1	0.946	0.757	0.715	1	0.977	0.927	0.884
MAX	0.202	0.226	0.348	0.451	0.466	0.511	0.510	0.543	0.564	0.485	0.562	0.688	0.708
SBI	1	1	1	1	1	1	1	1	1	1	1	1	1
TATA	0.248	0.378	0.518	0.578	0.538	0.720	0.685	0.691	0.663	0.667	0.984	1	1

(Results computed through 'R' Software)

Interpretation:

Bajaj's efficiency score has shown an increasing trend till 2004-05 which has There after fallen for three years and again shown increasing trend from 2008-09 and remained constant from 2011-12 till 2013-14.Birla's efficiency score has shown fluctuating trend till 2008-2009 and then increasing trend from 2009-10 till 2013-2014. HDFC's efficiency score has shown fluctuating trend till 2011-12 but increasing from 2012-13.ICICI's efficiency score has shown an increasing trend which has remained constant from 2005-2006 with VRS equal to 1, and 0.99 in 2013-2014.ING's efficiency score has shown an increasing trend which has remained constant from 2007-2008 with VRS 1, and 0.98 in 2013-2014.Kotak's efficiency score has shown an increasing trend and remained 1 from 2004-2005 except in the year 2008-09 and 2013-2014.MET's efficiency score remains 1 for all the years except for some years. Max has shown an increasing trend year after year with small amount of decrease in the year 2010-2011.SBI shows Technical efficiency score at VRS equal to1 for all the years. TATA has shown increasing trend with slight fluctuations till 2011-2012 and thereafter with VRS being 1 for 2012-2013 and 2013-2014.SBI life is again in par with LICI with VRS score equal to 1.

The following table no 3 displays the scale efficiency of life insurers which is calculated as the the ratio of CRS efficiency score to VRS efficiency score.

ISSN 2349-7807

International Journal of Recent Research in Commerce Economics and Management (IJRRCEM)
Vol. 3, Issue 3, pp: (48-56), Month: July - September 2016, Available at: www.paperpublications.org

Table No. 3

Scale Efficiency Scores of the Companies

Years Companies	2001-02 SE	2002-03 SE	2003-04 SE	2004-05 SE	2005-06 SE	2006-07 SE	2007-08 SE	2008-09 SE	2009-10 SE	2010-11 SE	2011-12 SE	2012-13 SE	2013-14 SE
LIC	1	1	1	1	1	1	1	1	1	1	1	1	1
Bajaj	0.472	0.737	0.662	0.704	1.000	0.931	0.985	0.961	0.933	0.865	1	1	1
Birla	0.888	0.927	0.913	0.643	0.795	0.807	0.868	0.837	0.837	0.839	0.984	0.986	0.960
HDFC	0.977	0.976	0.792	0.880	0.989	0.986	0.930	0.890	0.882	0.928	0.994	0.996	1
ICICI	0.744	0.630	0.770	0.808	0.990	1	1	1	1	1	1	0.998	0.948
ING	0.345	0.269	0.428	0.563	0.547	0.586	0.657	0.596	0.524	0.418	0.496	0.621	0.557
Kotak	0.566	0.496	0.657	0.666	0.711	0.822	0.665	0.658	0.703	0.717	1	1	0.847
Met	0.053	0.122	0.179	0.219	0.330	0.313	0.289	0.430	0.598	0.901	0.886	0.847	0.743
MAX	0.901	0.991	0.814	0.675	0.831	0.857	0.854	0.827	0.823	0.859	0.773	0.826	0.833
SBI	1	1	1	1	1	1	0.972	0.931	1	1	1	1	1
TATA	0.829	0.761	0.750	0.601	0.816	0.664	0.790	0.756	0.746	0.771	0.992	1	0.929

Results computed through 'R' Software

Interpretation:

Bajaj's Scale efficiency score has shown an fluctuating till 2010-11 and thereafter scale efficiency 1 from 2011-2012 till 2013-14. Birla's Scale efficiency score has been fluctuating for all the years. HDFC's Scale efficiency score has shown an fluctuating till 2009-10 and thereafter increasing from 2010-2011 till 2013-14. ICICI's Scale efficiency score has shown an increasing trend till 2005-06 which has There after remained constant with scale 1 for next six years and then decreasing from 2012- 13. ING's, Met and Max Scale efficiency score has been fluctuating for all the years. Kotak's efficiency score has been fluctuating for all the years except for the years 2011-2012 and 2012-2013 with scale efficiency equal 1 SBI shows scale efficiency 1 for all the years except for 2007-2008 and 2008-2009 with scale efficiency with 0.97 and 0.93 respectively TATA scale efficiency has been fluctuating for all the years except for the year 2012-2013 with scale efficiency equal to 1.

To conclude it can be said that only SBI life has the efficiency score equal to 1 with is calculated at both VRS and CRS having PTE, TE and SE equal to 1 which is at par with LICI in all three scores. ICICI is said to be second in line among the private life insurers followed by BAJAJ, HDFC and Birla Life insurance company.

Number of firms at Variable returns to scale efficiency(VRS)

Table No. 4

PTE	VRS 2001-02	VRS 2002-03	VRS 2003-04	VRS 2004-05	VRS 2005-06	VRS 2006-07	VRS 2007-08	VRS 2008-09	VRS 2009-10	VRS 2010-11	VRS 2011-11	VRS 2012-13	VRS 2013-14
No. of firms	10	10	10	10	10	10	10	10	10	10	10	10	10
above 0.90	2	2	2	4	4	5	6	3	4	5	7	8	6
between 0.899 to 0.75	0	1	1	1	1	1	0	2	0	1	0	1	3
between 0.7499 to 0.5	1	0	4	4	4	3	3	5	6	3	3	1	1
below 0.499	7	7	3	1	1	1	1	0	0	1	0	0	0

Number of firms at Constant returns to scale efficiency(CRS)

Table No. 5

	CRS 2001-02	CRS 2002-03	CRS 2003-04	CRS 2004-05	CRS 2005-06	CRS 2006-07	CRS 2007-08	CRS 2008-09	CRS 2009-10	CRS 2010-11	CRS 2011-12	CRS 2012-13	CRS 2013-14
No.of firms	10	10	10	10	10	10	10	10	10	10	10	10	10
above 0.90	1	1	1	1	2	3	2	2	2	3	5	6	5
between 0.899 to 0.75	0	0	0	1	1	1	1	0	0	0	1	1	1
between 0.7499 to 0.5	0	1	3	3	3	0	4	5	5	5	2	3	4
below 0.499	9	8	6	5	4	5	3	3	3	2	2	0	0

Number of firms at Scale Efficiency

Table No. 6

	SE 2001-02	SE 2002-03	SE 2003-04	SE 2004-05	SE 2005-06	SE 2006-07	SE 2007-08	SE 2008-09	SE 2009-10	SE 2010-11	SE 2011-12	SE 2012-13	SE 2013-14
No.of firms	10	10	10	10	10	10	10	10	10	10	10	10	10
above 0.90	3	4	2	1	4	4	4	3	3	4	7	7	6
between 0.899 to 0.75	2	1	4	2	3	3	3	4	3	4	2	2	2
between 0.7499 to 0.5	3	2	2	6	3	2	2	2	4	1	0	1	2
below 0.499	2	3	2	1	0	1	1	1	0	1	1	0	0

Table no 4, 5 and 6 shows the number of firms operating in different efficiency zones. Highly efficient zone which is represented by the score 0.90 and above. Efficiency zone between 0.899 to 0.75 is a moderate zone .Efficiency score between 0.7499 to 0.5 represent average efficiency zone and the score below 0.499 represents inefficient zone. An analyses of the three tables which represents number of firms at Variable returns to scale, Constant returns to scale and scale efficiency shows that the number of firms operating in inefficient and average zone is declining over the years and the number of firms operating in highly efficient zone is rising. This is a clear indicator that liberlisation of the insurance companies have definite improvement in the Technical efficiency of the private companies due to the use of latest technology imbibed by it. Hence the above hypothesis which states that there is an improvement in the Efficiency performance of the private life insurers during the study period holds to be true.

5. CONCLUSION

From the above analysis It can be summed up that over the years since the liberlisation, there is a rise in the number of firms operating in lower efficiency score zone to higher efficiency score which clearly indicates that the operating and commission expenses which has been taken as proxy for input has been declining over the years with relation to output that premium amount and benefit amount paid to customers. Hence from the analysis it can be proved that there is an improvement in the efficiency performance of private life insurers in India.

REFERENCES

[1] Charnes, A,Cooper,W. W, Lewin,A.,& Seiford, U. (1994). Data Envelopment Analysis:

[2] Theory, Methodology and Applications. Boston: Kluwer Academic Publishers.

[3] Boonyasai T, & Grace, Skipper. (2002). The Effect of Liberalization and Deregulation on Life Insurer Efficiency. Center for Risk Management and Insurance Research Georgia State University, Atlanta.

[4] Ramanathan R. (2003). An Introduction to Data Envelopment Analysis: A Tool for Performance Measurement. New Delhi: Sage Publications.

[5] Mahlberg B, & Url Th. (2003). Effects of the Single Market on the Austrian Insurance Industry. Empirical Economics, 28, pp 813–838.

[6] Sterzynski M. (2003). The European Single Insurance Market ―Overview and Impact of the Liberalization and Deregulation Processes. Belgian Actuarial Bulletein, 3(1).

[7] Hussels,S, & Ward, D.R. (2004). Cost Efficiency and Total Factor Productivity in the European Life Insurance Industry: The Development of the German Life Insurance Industry Over the Years 1991-2002. University of Bradford, School of Management.

[8] Leverty J. T, Yijia L, & Hao Z. (2004). Firm Performance in the Chinese Insurance Industry. Georgia State University.

[9] Souma T, & Yoshiro T. (2005). Recent Competition in Japanese Life insurance Industry. The Institute of Social and Economic Research Osaka University. Japan.

[10] Sinha Ram Pratap, & Biswajit Chatterjee. (2009). "Are Indian Life Insurance Cost Efficient."Indira Gandhi Institute of Development Research, Mumbai.

[11] Fenn, P, Vencappa, D, Diacon, S, Klumpes, P, & O'Brien, C. (2008). Market Structure and the Efficiency of European Insurance Companies: A Stochastic Frontier Analysis Vol. 32 (1). Journal of Banking and Finance.

[12] Hussels, S., & Ward, D. R. (2006). The Impact of deregulation on German and UK life insurance markets: an Analysis Efficiency and Productivity between 1991 -2002.University of Bradford, School of Management

[13] Noriyoshi Yanase, Y Asai, K. Tomimura, & J Ozeki. (2007). Investigating Productivity Efficiency and Changes of Japanese Non life Insurance Companies after the Deregulation using Non Parametric Frontier Approach.

[14] Kshetrimayum Sobita Devi. (2011). An Impact of Liberlisation on the Indian Life Insurance Industry. Maharaja Sayajirao University of Baroda, Vadodara.