Efficiency & Productivity of Indian General Insurers: A post reform analysis

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Abstract

The present paper evaluates 10 Indian General Insurance Companies comprising of 4 Public Sector Companies and 6 Private Sector Companies from the year 2002-03 to 2009-10 using the increasingly popular technique Data Envelopment Analysis and Malmquist Analysis for computing the Efficiency and Productivity of this particular sector. The study uses two inputs i.e. Capital and Operating Expenses and one output i.e.Net Premium Income. It has been found that the Technical efficiency of the Private Sector Insurers has been 91.6% which is more as compared to the Technical Efficiency of the Public Sector i.e. 78.5% indicating that after a decade to liberalization the Private sector has marked its presence in the market. The results of the Productivity Analysis indicates that New India Insurance Company, Oriental Insurance Company, United India Insurance Company, Reliance General Insurance Company and ICICI General Insurance Company have improved their productivity whereas the rest of the insurers have showed the declining behavior while comparing the initial year with the year 2008-09 to 2009-10 .The analysis make it evident that the private insurers have improved their efficiency over the time still they should try to utilize the advantages of technological change and technical efficiency in order to improve their productivity. The results have managerial implications for the existing insurers to face the growing competition in the market.

Keywords: Data Envelopment Analysis, Malmquist Analysis, Productivity, Technical Efficiency.

INTRODUCTION

The insurance sector affects the economic growth of any nation. The relevance of the Insurance Sector is growing due to the increasing share of this very sector in the aggregate financial sector in almost every developing and developed economy.

The insurance sector is a strong pillar of the financial services sector of every economy of the world. It not only reduces the risks, but also provides the society with new investments, increased competition and new innovations. As is required by the regulations the insurance sector encourages long term investments in corporate securities, housing sector and infrastructure (Feyen, Lester and Rocha 2011).

The insurance industry in India has grown over the period which is attributable due to the rising income levels, low penetration for most consumer products, increased premiums, increased number of players, improved regulatory framework and wider choice of products and multiple agency functions. All these factors have led to increase in consumer awareness, rise in the savings and investment rates, improvement in the quality of services and increase in volume of business (Ernest and Young 2010).

ORGANIZATION OF THE STUDY:

The present paper is an effort to examine the efficiency and the productivity of 10 General Insurance Companies in India from the year 2002-03 to 2009-10. The paper is organized as follows: Section 1 describes the reviewed literature relating to the objectives. Section 2 discusses the methodological issues relating to the technique used for analysis. Section 3 states the results available from the study under consideration and also its interpretation. Last but not the least i.e. Section 4 deals with the managerial implications and concluding part.

SECTION 1: REVIEW OF LITERATURE

Various studies directly as well as indirectly related to the objectives have been reviewed. Some of these are as:

Weiss (1986) analyzed that the applicability of the output and productivity measurement technologies developed had not been limited to the specific insurers studied, rather could be utilized as a guide in measuring the productivity of any life insurer or the insurance industry.

Fecher et al.(1993) found that there had been a high correlation between parametric & non parametric results and a wide dispersion in the rates of inefficiency across the companies. This dispersion could be reduced when controlling for variations in scale, ownership, distribution, reinsurance and claims ratio. **Delhausse et al (1995)** concluded that French Companies on average had been more efficient than Belgium ones using the DEA and SFA on 434 non life companies during 1984-88. **Cummins et al.(1996)** stated that there was almost no efficiency change over the sample period whereas the productivity change declined significantly which was attributable to technological regress. **Donni and Fecher (1997)** had reviewed the efficiency of life and non life insurers of 15 OECD countries and had revealed that average efficiency levels have been rather high and dispersed; growth in productivity observed in all countries due to improvements in technical progress. **Bernstein (1999)** provided that technological change was the major element contributing to Total Factor Productivity. There had been a large residual element in the decomposition of TFP, reflecting possible adjustment costs associated with new information processing technologies. **Barros et al. (2005)** investigated the performance of 27 Insurers of Portugal from the period 1995 to 2001 using DEA and concluded that there had been improvement of technical efficiency over time but deterioration in terms of technological change. **Martinez and Estrada (2009)** concluded that there have been significant productivity changes in the Colombian insurance sector mainly driven by the shifts in the frontier of production. **Afza and Kausar (2010)** analyzed that the non life insurers in Pakistan were on average 82.4% technical efficient, 91.4% pure technical efficient and 89.9% scale efficient. The study also investigated the technical efficiency in the different size of the non life insurers and found that on an average the large size non life insurers were more technical efficient, while medium size were less efficient than the larger insurers with smaller insurers being the poorest performers. **Barros et al. (2010)** indicated that there was a decline in efficiency over the sample period, while the second stage analysis confirmed that the competition for market shares had been a major driver of efficiency in the Greek insurance industry. **Rao et al. (2010)** investigated that though there had been a considerable degree of managerial efficiency among the insurers with the least efficiency in 2000 and higher efficiency in 2004. Moreover the insurers on an average achieved a mere 0.8% annual gain in TFP over the period.

Objectives of the Study:

The main objectives on which the study focuses upon are as follows:

1. To analyze the efficiency of general insurance companies.
2. To examine the productivity as well as change in productivity of insurance business of general insurance companies.
3. To identify and explore the various drivers behind such productivity change.

SECTION 2: RESEARCH METHODOLOGY ADOPTED

Data Envelopment Analysis with Malmquist Index has extensively been utilized in exploring the efficiency and productivity performance of insurance sector.DEA evaluates the relative efficiency of homogeneous units by considering multiple inputs and outputs.

Over the past three decades, various DEA models have been widely used to evaluate the technical efficiency of DMUs in different industries.DEA can be used to evaluate the efficiency of a firm by comparing it with the "best practice" firm. An output efficient firm is one that cannot increase its output unless it also increases one or more of its input, whereas an output inefficient firm is one that can increase its output without increasing its inputs. A output efficient firm would be efficient which would have a score of 100% or 1 as being located on the output efficient frontier whereas an output inefficient firm would be inside the frontier and have a score of less than 100% or 1. Similarly an input efficient firm is one that cannot reduce its inputs without reducing its output whereas an input inefficient firm can.

Efficiency of any firm can be defined in terms of either output maximization for a set of inputs or input minimization for a given output. In DEA, relative efficiencies of a set of DMUs are calculated. It measures the efficiency frontier based on the best practice firms and calculates the other firm's relative efficiency value that ranges from 0 to 1. This calculation is done by using the best practice firms as benchmark. This method can also be used to estimate production, cost, revenue and profit frontiers and provides a particularly convenient means to categorize efficiency as purely technical, scale or allocative efficiency.

Pure Technical Efficiency: In pure technical efficiency, production line with variable return to scale is used. From the view point of economics, this will release the restrictions of scale. Therefore, the inefficiency only lies in the factors such as productivity, resource allocation and management.

Scale Efficiency: In contrary to the case of pure technical efficiency, only the factor of scale is effective here, while the factors of productivity, resource allocation and management are excluded. Scale Efficiency is measured by dividing Technical Efficiency with the Pure Technical Efficiency.

Technical Efficiency: Technical efficiency can be regarded as the product of pure technical efficiency and scale efficiency. It reflect the ability of the firm to obtain the maximum output from a given set of input or the efficiency with which inputs are transformed into output or just the output/input ratio.

Productivity is one important component of the monitoring, analysis and supervision of company performance. In 1950, the organization for European Economic Cooperation (OEEC), one of the oldest organizations espousing Productivity enhancement, particularly in Europe, issued a formal definition (OEEC 1950):

"Productivity is the quotient obtained by dividing output by one of the factors of production. In this way, it is possible to speak of the productivity of capital, Investment or raw materials, according to whether output is being considered in relation to capital, investment or raw materials etc."

The performance of a firm, converting inputs into outputs, can be defined in many ways. One possible measure of performance is a productivity ratio. Productivity is a relative concept. Therefore the productivity of a company in the present year could be measured relative to its productivity last year, or it could be measured relative to the productivity of another company in the same year (Ly Kirikal, 2005).

The main aim of the Malmquist Productivity index is to examine the productivity growth to examine the productivity growth of a DMU between 2 period's t and t+1.Malmquist Total Factor Productivity Index calculates the change in productivity between 2 points by estimating the ratio of the distances of each point relative to a common technology. A value of M greater than unity implies a positive Total Factor Productivity Growth from the period t to period t+1. Otherwise, a value of M less than 1 indicates a Total Factor Productivity Decline.

The Malmquist Total Factor Productivity Index measures changes in total output relative to output. It measures the change in efficiency and productivity during two periods. The

index captures two changes with respect to a production unit: the shift in the production frontier over time (technical change) and the shift in the firm's location relative to the production frontier over time (technical efficiency change).

DATABASE OF THE RESEARCH:

The present study is covering a period of 8 years from 2002-03 to 2009-2010. The base year is taken as 2002 i.e. the companies which are in General Insurance business since 2002 are forming a part of the study. The basic reason behind the selection of base year as 2002 lies in the fact that, this is the exclusive year in which maximum numbers of general insurance companies are operating in insurance industry. The 10 companies under the scope of study include Tata AIG General Insurance Company Limited, IFFCO Tokio General Insurance Company Limited, Reliance General Insurance Company Limited, Royal Sundram Alliance Insurance Company Limited, Bajaj Allianz General Insurance Company Limited, ICICI Lombard General Insurance Company Limited, United India Insurance company limited, Oriental Insurance Company Limited, New India Assurance Company Limited and National Insurance Company Limited. The study is completely based upon secondary data, which is mainly collected from the statistical year book of IRDA, annual reports of IRDA and other publication related with the insurance were used for the collection of certain facts and figures necessary for the achievement of the said objectives.

THE MODEL OF THE RESEARCH:

The following model has been framed to achieve the objectives.

Model Variables: The model of this article includes two inputs and one output of General Insurance Companies. These inputs and outputs have been described and expressed as:

The inputs:

Capital inputs (X1): We have taken capital as the first indicator of input. The Capital inputs here means share capital plus reserves and surpluses.

Operating Expenses(X2): The second input taken has been the expenses which are related to the insurance business. These are the expenses which are related purely to the insurance business only and not including the non-operating expenses. The operating expenses include the commission expenses also.

The output:

Premium Income is one of the major sources of the earnings of any insurance company. As literature suggests the net premium income as appropriate indicator of output, so we have also taken the same as the output indicator of model.

Finally for Model, we have selected two indicator of input as capital and operating expenses; and one indicator of output as net premium income , which is also in accordance with the assumption of DEA, that number of Decisions Making Units should be three time of number of inputs and outputs. The approach used has been input oriented VRS model to calculate TE, PTE and SE. The main concern of the approach has been to produce the same level of output using the lesser inputs i.e. to reduce the wastages of the inputs if any.

SECTION 3:EMPIRICAL RESULTS, ITS ANALYSIS AND INTERPRETATION

Analysis and interpretation of the output has been done by categorizing the results into two categories:

A. Efficiency Analysis B. Productivity Analysis

A. Efficiency Analysis of the insurance companies: Under the efficiency analysis results would be analyzed under the following headings:

A. Company Wise Analysis

B. Sector Wise Analysis

Company Wise Analysis: This has been done to arrive at conclusive findings of TE, PTE and SE of insurance business of general insurance companies in India during the period under consideration. In other words an attempt has been made to find out individually which of the company is most efficient and which inefficient ones are.

Table No 1

Efficiency Analysis of the Insurers

2002-03					2003-04				
Company	**TE**	**PTE**	**SE**	**RtoS**	**Company**	**TE**	**PTE**	**SE**	**RtoS**

NewIndia	.848	1	.848	Decreasing	NewIndia	.561	1	.561	Decreasing
Oriental	1	1	1	Constant	Oriental	.805	.806	.999	Increasing
National	1	1	1	Constant	National	1	1	1	Constant
United	.954	1	.954	Decreasing	United	.648	.822	.788	Decreasing
Royal	.684	.831	.822	Increasing	Royal	.724	.875	.827	Increasing
Bajaj	1	1	1	Increasing	Bajaj	1	1	1	Constant
TATA	.727	.877	.829	Increasing	TATA	.744	.956	.778	Increasing
Reliance	.202	.866	.233	Increasing	Reliance	.440	1	.440	Increasing
IFFCO	1	1	1	Constant	IFFCO	1	1	1	Constant
ICICI	.436	.976	.446	Increasing	ICICI	1	1	1	Constant
2004-05					**2005-06**				
Company	**TE**	**PTE**	**SE**	**RtoS**	**Company**	**TE**	**PTE**	**SE**	**RtoS**
NewIndia	.551	1	.551	Decreasing	NewIndia	.567	1	.567	Constant
Oriental	.583	.871	.669	Decreasing	Oriental	.581	.975	.596	Decreasing
National	.868	1	.868	Decreasing	National	.924	1	.924	Decreasing
United	.502	.773	.650	Decreasing	United	.470	.771	.609	Decreasing
Royal	.639	.963	.663	Increasing	Royal	.811	1	.811	Increasing
Bajaj	1	1	1	Constant	Bajaj	1	1	1	Constant
TATA	.774	1	.774	Increasing	TATA	.660	.805	.820	Increasing
Reliance	.824	1	.824	Increasing	Reliance	.918	1	.918	Increasing
IFFCO	.947	1	.947	Increasing	IFFCO	.934	.937	.996	Increasing
ICICI	1	1	1	Constant	ICICI	.934	.975	.958	Decreasing
2006-07					**2007-08**				

Company	TE	PTE	SE	RtoS	Company	TE	PTE	SE	RtoS
NewIndia	.619	1	.619	Decreasing	NewIndia	.794	1	.794	Decreasing
Oriental	.705	1	.705	Decreasing	Oriental	.753	.951	.792	Decreasing
National	.787	1	.787	Decreasing	National	.790	1	.790	Decreasing
United	.529	.745	.710	Decreasing	United	.656	.805	.814	Decreasing
Royal	1	1	1	Constant	Royal	.991	1	.991	Increasing
Bajaj	1	1	1	Constant	Bajaj	1	1	1	Constant
TATA	.650	.701	.928	Increasing	TATA	.669	.821	.815	Increasing
Reliance	1	1	1	Constant	Reliance	.777	.777	.999	Decreasing
IFFCO	.845	.872	.969	Increasing	IFFCO	1	1	1	Constant
ICICI	.947	1	.947	Decreasing	ICICI	1	1	1	Constant
2008-09					**2009-10**				
Company	**TE**	**PTE**	**SE**	**RtoS**	**Company**	**TE**	**PTE**	**SE**	**RtoS**
NewIndia	.728	1	.728	Decreasing	NewIndia	.650	1	.650	Decreasing
Oriental	.796	.907	.877	Decreasing	Oriental	.835	1	.835	Decreasing
National	.950	1	.950	Decreasing	National	.906	1	.906	Decreasing
United	.761	.904	.842	Decreasing	United	.750	1	.750	Decreasing
Royal	1	1	1	Constant	Royal	1	1	1	Constant
Bajaj	1	1	1	Constant	Bajaj	1	1	1	Constant
TATA	.617	.851	.725	Increasing	TATA	.652	.972	.671	Increasing
Reliance	.781	.801	.974	Decreasing	Reliance	.845	.846	.999	Decreasing
IFFCO	1	1	1	Constant	IFFCO	1	1	1	Constant
ICICI	.937	1	.937	Decreasing	ICICI	1	1	1	Constant

Table No 1 analyzes that during all the years under study one or two private sector companies have been found on the frontier. Among the private sector, Bajaj Allianz has been reporting the efficiency score of 1 for all the years of study i.e. 2002-03, 2003-04, 2004-05, 2005-06, 2006-07, 2007-08, 2008-09, and 2009-10. The results exhibits that among the private insurers second and third position regarding the enjoyment of the constant returns to scale i.e. the proportion of increase of output is equal to proportion of input increase have been attained by IFFCO and ICICI which have been showing the efficiency of 1 for 5 years out of 8 years and 4 years out of 8 years respectively. The rest of the Private insurers have been showing the increasing returns to scales in the rest of the years except ICICI and Reliance which have been indicating the Decreasing returns to scale in some of the years under consideration. Examining the public sector it could be concluded that National Insurance Company has been the only public sector insurer which has achieved the maximum efficiency level of 1 during the period 2002-03 and 2003-04. Oriental Insurance Company has also enjoyed the Constant Returns to scales in 2002-03.The rest of the public sector insurers have not joined the list of the bench markers in any of the years. Moreover these have recorded the decreasing returns to scale in all the years under study, which is an indication that after a decade to liberalization the private sector has made its presence realized in the insurance market.

Table No 2

Economies of Scale of the insurance companies

Year	IRS	CRS	DRS	Number of Companies
2002-03	4	4	2	10
2003-04	4	4	2	10
2004-05	4	2	4	10
2005-06	4	1	5	10
2006-07	2	3	5	10
2007-08	2	3	5	10
2008-09	1	3	6	10
2009-10	1	4	5	10

The above table mentions that in the year 2002-03,2003-04, 2004-05 and 2005-06 the maximum number of insurer have been marking the increasing returns to scale i.e. 4 insurers out of 10 insurers have depicted that the increase in output has been more than the proportional change in the input. In the year 2002-03,2003-04 and 2009-10 the maximum numbers of insurers have been enjoying the Constant returns to scale and it is the year 2008-09 when 6 insurers have displayed Decreasing returns to scale i.e. the increase in the output has been less than the proportional increase in the input.

Sector wise analysis: According to the background of the insurers in India it can be separated in two groups: 1) Public Sector Insurers; 2) Private Sector Insurers. In the sector wise analysis efforts has been made to evaluate the mean of technical efficiency, pure technical efficiency and scale efficiency of public sector as well as of private sector for the period under consideration.

Table No. 3

The Sector Wise Analysis of Insurers

Year	Sector	Mean of TE	Mean of PTE	Mean of SE
2002-03	Public	.950	1	.950
	Private	.674	.925	.721
2003-04	Public	.753	.907	.837
	Private	.818	.971	.840
2004-05	Public	.617	.911	.675
	Private	.864	.993	.868
2005-06	Public	.635	.936	.674
	Private	.876	.952	.917
2006-07	Public	.66	.936	.705
	Private	.907	.928	.974
2007-08	Public	.748	.939	.797
	Private	.906	.933	.967
2008-09	Public	.808	.952	.849
	Private	.889	.942	.939

2009-10	Public	.785	1	.785
	Private	.916	.969	.945

Table No. 3 states the Mean of TE, Mean of PTE and Mean of SE of both public and private sector insurers. The mean of TE of public sector has been depicting decreasing trends till 2004-05 and has reached at .617 in the same year. Afterwards it has increased during the years 2005-06 till 2008-09, and in the year 2009-10 it has been marked at .785.Whereas analyzing the private sector it could be said that the mean TE of this sector has been increasing till 2006-07, then goes on falling till 2008-09 and has been recorded at its maximum with the value .916 in 2009-10. After a slight increase and decrease in the values, the mean of PTE of public sector insurers has been marked at 1 in 2009-10. Same is the case with the private sector that after a slight increase and decrease in the value of mean PTE value of private sector, the value of the mean of the PTE has been marked as .969 in 2009-10 .The mean of the SE depicts that the public sector has been showing decrease over the time whereas the private sector has also been depicting the increasing trends over the study as its mean of SE has been .721 in 2002-03 which has gradually increased over the time and has reached to .945 in 2009-10. The mean SE of private sector has improved due to the improvement in the mean of the TE where the mean of PTE of this sector has remained static over time. The results of the Public sector emphasis that the decrease in the mean of SE has been due to the decrease in the mean of the Technical Efficiency over the study whereas the value of the mean of Pure Technical Efficiency has remained static. In order to be more operative in the coming future the public sector should give due emphasis on the improvement of the technical efficiency along with the managerial efficiency.

B. Productivity Analysis of the Insurance Companies:

The analysis has been done by studying the:

1. Direction of productivity change and Malmquist index
2. Drivers behind the productivity change and Malmquist index

DIRECTION OF PRODUCTIVITY CHANGE AND MALMQUIST INDEX SUMMARY:

An attempt has been made to measure changes in efficiency and productivity during the two

periods of time. Moreover if the changes are there in a year while comparing it with the previous year, then to find out whether these changes are positive or negative.

PRODUCTIVITY CHANGE AND MALMQUIST INDEX SUMMARY

The analysis has been made to know which company has improved its productivity over the years or vice-versa. Further, this evaluation helps to arrive at the year in which the maximum and minimum value of TFPC has been reported during the study period.

Table No. 4

The Productivity Change and Malmquist Index Summary

Year		EC	TC	PTEC	SEC	TFPC
2002-03	New India	.661	1.141	1	.661	.754
To	Oriental	.805	.993	.806	.999	.80
2003-04	National	1	1.064	1	1	1.064
	United	.679	1.120	.822	.825	.760
	Royal	1.058	1.139	1.053	1.005	1.206
	Bajaj	1	1.128	1	1	1.128
	TATA	1.023	1.133	1.091	.938	1.159
	Reliance	2.180	1.561	1.155	1.887	3.403
	IFFCO	1	1.216	1	1	1.216
	ICICI	2.295	1.594	1.024	2.24	3.657
2003-04	New India	.919	1.156	1	.919	1.062
To	Oriental	.723	1.210	1.081	.669	.876
2004-05	National	.868	1.193	1	.868	1.035
	United	.776	1.185	.940	.825	.919
	Royal	.883	1.184	1.10	.802	1.045
	Bajaj	1	1.221	1	1	1.221
	TATA	1.042	1.199	1.046	.996	1.249
	Reliance	1.873	.626	1	1.873	1.173
	IFFCO	.947	1.130	1	.947	1.069
	ICICI	1	.733	1	1	.733
2004-05	New India	1.099	.930	1	1.099	1.023
To	Oriental	.997	.976	1.199	.891	.973
2005-06	National	1.065	.975	1	1.065	1.038
	United	.935	.958	.998	.937	.896
	Royal	1.269	.975	1.038	1.223	1.238
	Bajaj	1	.980	1	1	.980
	TATA	.852	.975	.805	1.059	.831
	Reliance	1.113	.876	1	1.113	.975
	IFFCO	.986	.948	.937	1.053	.935
	ICICI	.934	.918	.975	.958	.858
2005-06	New India	1.093	1.092	1	1.093	1.193
To	Oriental	1.214	.979	1.026	1.184	1.188
2006-07	National	.852	1.003	1	.852	.854
	United	1.126	1.058	.966	1.166	1.191
	Royal	1.234	1.019	1	1.234	1.258
	Bajaj	1	.946	1	1	.946

	TATA	.985	.987	.871	1.131	.973
	Reliance	1.090	1.092	1	1.090	1.190
	IFFCO	.905	.998	.930	.973	.903
	ICICI	1.013	1.046	1.026	.988	1.060
2006-07 To 2007-08	New India	1.282	.842	1	1.282	1.080
	Oriental	1.068	.873	.951	1.123	.932
	National	1.004	.972	1	1.004	.976
	United	1.240	.842	1.081	1.146	1.044
	Royal	.991	1.110	1	.991	1.1
	Bajaj	1	1.038	1	1	1.038
	TATA	1.029	1.074	1.171	.878	1.105
	Reliance	.777	.949	.777	.999	.738
	IFFCO	1.183	.935	1.147	1.032	1.106
	ICICI	1.056	.845	1	1.056	.892
2007-08 To 2008-09	New India	.918	.895	1	.918	.821
	Oriental	1.057	.942	.953	1.108	.996
	National	1.202	.935	1	1.202	1.124
	United	1.161	.895	1.122	1.035	1.039
	Royal	1.009	.987	1	1.009	.996
	Bajaj	1	.958	1	1	.958
	TATA	.922	.944	1.037	.889	.871
	Reliance	1.005	.937	1.031	.975	.941
	IFFCO	1	.947	1	1	.947
	ICICI	.937	.895	1	.937	.839
2008-09 To 2009-10	New India	.892	1.073	1	.892	.958
	Oriental	1.049	.997	1.103	.952	1.046
	National	.953	.951	1	.953	.907
	United	.985	1.073	1.107	.890	1.057
	Royal	1	.992	1	1	.992
	Bajaj	1	.967	1	1	.967
	TATA	1.056	.967	1.142	.925	1.021
	Reliance	1.083	1.006	1.056	1.025	1.089
	IFFCO	1	.990	1	1	.990
	ICICI	1.067	1.061	1	1.067	1.132

The Productivity Index Table states the Total Factor productivity Change which is comprised of Efficiency Change, Technological Change, Pure Technical Change and Scale Efficiency Change. The TFPC has been depicting the mixed behavior over the years. It has been analyzed that three public sector general insurance companies i.e. New India Insurance Company, Oriental Insurance Company and United India Insurance Company have been stating an increase in the TFPC which has been .754, .80 and .760 respectively in the year 2002-03 to 2003-04 and has improved to .958, 1.046 and 1.057 respectively in 2008-09 to 2009-10. While the National Insurance Company has marked the decrease in TFPC as compared to the initial year which is an indication that it should give more emphasis on taking advantages of EC, TC, PTEC and SEC. Whereas the private insurers have became less efficient as their value of TFPC

has deteriorated while comparing the current year with the initial year. Moreover it has been the year 2002-03 to 2003-04 in which the maximum TFPC value of ICICI General Insurance Company has been recorded as 3.657 which states this company has been most efficient in the above said year and it is the year 2003-04 to 2004-05 when the minimum TFPC value of ICICI Insurance Company has been marked as 0.733, which represents the inefficiency of this company in the stated year.

DRIVERS BEHIND THE PRODUCTIVITY INDEX AND MALMQUIST ANALYSIS:

Under this analysis an attempt has been made to arrive at various drivers due to which the change in the TFP occurs i.e. in other words it has been found out whether the negative or positive change in the Total Factor Productivity has been due to technical efficiency change or due to technical progress.

Table No 5

The Drivers behind the Productivity Index and Malmquist Analysis

Year	Drivers	Insurers
2002-03 to 2003-04	Driven by Technical Efficiency	Reliance, ICICI
	Driven by Technical Progress/ Technological Change	New India, National, United, Bajaj, IFFCO
	Driven by both	Oriental, Royal, TATA
2003-04 to 2004-05	Driven by Technical Efficiency	Reliance, ICICI
	Driven by Technical Progress/ Technological Change	New India, Oriental, National, United, Royal, Bajaj, IFFCO
	Driven by both	TATA
2004-05 to 2005-06	Driven by Technical Efficiency	New India, National, Royal, Bajaj, Reliance
	Driven by Technical Progress/ Technological Change	-
	Driven by both	Oriental, United, TATA, IFFCO, ICICI
2005-06 to 2006-07	Driven by Technical Efficiency	Oriental, Bajaj

	Driven by Technical Progress/ Technological Change	National
	Driven by both	New India, United, Royal, TATA, Reliance, IFFCO, ICICI
2006-07 to 2007-08	Driven by Technical Efficiency	New India, Oriental, National, United, IFFCO, ICICI
	Driven by Technical Progress/ Technological Change	Royal, Bajaj
	Driven by both	TATA, Reliance
2007-08 to 2008-09	Driven by Technical Efficiency	Oriental, National, United, Royal, Bajaj, Reliance, IFFCO
	Driven by Technical Progress/ Technological Change	-
	Driven by both	New India, TATA, ICICI
2008-09 to 2009-10	Driven by Technical Efficiency	Oriental, Royal, Bajaj, TATA, IFFCO
	Driven by Technical Progress/ Technological Change	New India, United
	Driven by both	National, Reliance, ICICI

The drivers behind the Malmquist Index and Productivity Change could either be the change in technical efficiency or be the change in the technology. The above table displays that in the years 2006-07 to 2007-08,2007-08 to 2008-09 and 2008-09 to 2009-10 the drivers behind the Malmquist index and Productivity change has been mainly due to change in technical efficiency i.e. the productivity change and Malmquist index has been the result of technical efficiency in the above mentioned years. This efficiency change is based upon an index of a firm's efficiency relative to past and future frontiers. In the year 2003-04 to 2004-05 the drivers behind the change has been mainly due to change in technical progress, which has been represented by a shift in the production frontier whereas in the rest of the years the drivers behind the change has been due to the change in the technical efficiency and technical progress both.

Section 4: Managerial Implications and Conclusion:

MANAGERIAL IMPLICATIONS:

Management in the insurance sector should consider the Data Envelopment Analysis as a diagnostic measure to improve productivity as well as the efficiency. Managers should understand the scope of DEA and its potential to achieve the desired level of performance either by output maximization or by input minimization approach. DEA allows managers to identify the most efficient establishments and compare them against relatively inefficient units. Thus, managers can determine the magnitude of inefficiency and suggest alternative strategies to produce an optimal level of efficiency. The study aims to help the insurers to take required managerial steps to improve the efficiency and productivity of their operations. The results have managerial implications for the existing insurers to face the growing competition in the market.

CONCLUSION:

The main purpose of the paper has been to find out the efficiency and productivity of Indian General Insurance Sector. For the achievement of this very purpose a sample of 10 General Insurers has been selected, which have been studied from the period 2002-03 till 2009-10. The technique used for the analysis has been the input oriented VRS Data Envelopment Analysis and the Malmquist Analysis. The study uses two inputs i.e. Capital and Operating Expenses including commission expenses and one output i.e.Net Premium Income. It has been found that the Technical efficiency of the Private Sector Insurers has been 91.6% which is more as compared to the Technical Efficiency of the Public Sector which has been recorded as 78.5% indicating that after a decade to liberalization the Private sector has marked its presence in the market. The public sector should try to improve both its technical efficiency and pure technical efficiency in order to improve their efficiency in the coming future. The results of the Productivity Analysis indicates that New India Insurance Company, Oriental Insurance Company, United India Insurance Company have improved their productivity whereas the rest of the insurers have showed the declining behavior while comparing the initial year with the year 2008-09 to 2009-10 . The analysis make it evident that the private insurers have improved their efficiency over the time still they should try to utilize the advantages of technological change and technical efficiency in order to improve their productivity.

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