Operational Effectiveness of the General Insurance Industry in India: An Analytical Perspective

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Abstract

This study investigates the technical, managerial, and scale efficiency of public and private sector general insurance companies in India over a twenty-year period (2014–15 to 2023–24). Using an output-oriented Data Envelopment Analysis (DEA) approach, the study evaluates the performance of individual insurers and compares sector-wide efficiency trends. The results reveal that public sector insurers have generally outperformed private counterparts in terms of overall technical efficiency, with United India and Oriental Insurance consistently emerging as high performers. However, private insurers such as ICICI Lombard and IFFCO Tokyo have also shown strong and improving efficiency over the years. Statistical tests, including the Kolmogorov-Smirnov test for normality and significance testing between sectors, highlight increasing performance gaps in recent years. The study concludes with policy suggestions to enhance competitiveness, managerial effectiveness, and scale optimization across both sectors, emphasizing the need for strategic reforms and technology-driven operational improvements.

Keywords

Technical Efficiency, Data Envelopment Analysis, Public Sector Insurance, Private Sector Insurance, General Insurance, Managerial Efficiency, Scale Efficiency, ICICI Lombard, United India, Efficiency Comparison, DEA, Indian Insurance Industry

1. Introduction

The liberalization of India's insurance sector was significantly shaped by the recommendations of the Malhotra Committee in 1994, which laid the foundation for structural reforms across both life and non-life segments. While life insurance is fundamentally centered on providing financial protection against the risk of death or disability, non-life insurance commonly referred to as general insurance encompasses a diverse range of products that protect individuals and businesses from financial losses resulting from events such as accidents, theft, natural calamities, property damage, marine risks, and travel-related contingencies [1].

A pivotal development in the post-liberalization phase was the opening of the insurance sector to private players, aiming to foster competition, enhance service standards, and deepen insurance penetration in the country [2]. Since then, the general insurance landscape in India has undergone a notable transformation, marked by the entry of private companies, product innovation, and digitalization. However, the general insurance business is inherently characterized by high capital intensity and long gestation periods. Profitability in this sector typically manifests only after a significant operational maturity is achieved, given the complex nature of underwriting, risk pooling, and claim settlement [3].

With over two decades since the entry of private insurers, it becomes pertinent to evaluate the efficiency and performance of these firms. Efficiency, in this context, refers not merely to profitability but also to the optimal use of resources in delivering insurance services under varying economic conditions. Performance assessments must consider external macroeconomic factors, including economic booms and downturns. For instance, during periods of economic expansion, most firms tend to perform well; however, recessions often serve as stress tests, exposing operational vulnerabilities even in well-managed organizations [4].

The global financial crisis of 2008 serves as a critical benchmark for this study, given its widespread repercussions across the global financial landscape. Although India's regulated and conservative financial framework helped cushion the shock to a certain extent, the insurance sector was not entirely immune to its effects [5]. Thus, this paper aims to analyze the operational efficiency of the Indian general insurance industry in the pre- and post-crisis periods. Furthermore, it seeks to compare the performance of public and private insurers during these two phases, thereby providing insights into how market structure, ownership, and strategic focus influence efficiency in a developing economy context.

2. Literature Review

A substantial body of literature exists on evaluating the efficiency and performance of non-life insurance companies across various regions, including India and other Asian and non-Asian countries. For a structured understanding, the review is categorized into three sections: Indian studies, non-Indian Asian studies, and non-Asian (primarily Western and African) studies.

2.1 Indian Studies

Efficiency analysis within the Indian general insurance sector has drawn increasing scholarly attention, particularly after the liberalization of the insurance industry. Bawa and Ruchita [6] conducted an empirical investigation of health insurers in India during the period 2002–2010. Their findings highlighted the continued dominance of public sector insurers, with New India Assurance and National Insurance emerging as key performers. Interestingly, they noted a downward trend in performance over time for public sector firms, contrary to the private sector, which showed improvements.

Researcher tried to apply the Battese and Coelli (1995) stochastic frontier inefficiency-effect model and a fixed-effects stochastic frontier model to a sample of Indian non-life insurers [7]. Their results showed that nearly two-thirds of the firms had experienced productivity gains. Furthermore, variables such as net claims, operating expenses, and investment levels demonstrated a positive association with net premium income.

Researcher used stochastic frontier analysis to study the efficiency of private non-life insurers and found significant variation across companies [8]. Bharti AXA was identified as the most efficient among private firms; however, the average industry efficiency remained low, at approximately 35%. Notably, these studies did not examine efficiency differentials before and after major economic events like the 2008 global financial crisis.

2.2 Non-Indian Asian Studies

Several studies across East and Southeast Asia have employed both parametric and non-parametric methods to explore insurance efficiency. Researcher undertook a cross-country comparison and reported positive productivity growth in countries like Korea and the Philippines, while Taiwan and Thailand lagged behind [9].

Researcher evaluated that the investment efficiency among 25 Taiwanese life insurers from 1998 to 2002 and found total factor productivity growth of around 11%. However, there was minimal difference between the efficiency levels of domestic and foreign insurers [10]. Similarly, researcher employed a two-stage Data Envelopment Analysis (DEA) approach on Taiwanese non-life insurers [11]. They discovered that firms showing efficiency in the marketability stage did not necessarily perform well in profitability measures.

Researcher reported a declining efficiency trend in China's insurance sector, with mean technical efficiency ranging from 0.49 to 0.64 [12]. The performance of international insurers was notably weaker compared to domestic ones, primarily due to managerial and scale inefficiencies.

In Thailand, researcher explored technical and scale efficiency from 1997 to 2003 and concluded that most firms operated under constant returns to scale (CRS)[13]. In contrast, researcher found that foreign and privately owned insurers in China achieved better cost efficiency than their state-owned counterparts, although the results varied for profit efficiency [14].

Other notable studies include who examined Indonesian non-life insurers using DEA and Tobit regression. The latter they found that the ownership structure, firm size, and market share to be significant factors influencing efficiency [15], [16] and [17]. In Pakistan, researcher noted that an upward trend in insurer efficiency [18], while in Iran, they reported that public sector insurers outperformed private players in the life insurance segment [19].

2.3 Non-Asian Studies

In Western and African contexts, efficiency analysis of insurance companies has been widely explored. They also assessed the impact of mergers and acquisitions on the efficiency of U.S. life insurers using DEA, revealing significant improvements post-consolidation [20]. They conducted a comparative study between Belgian and French insurers and found that French firms, as well as nonprofit institutions, outperformed others in terms of technical and scale efficiency. Their regression models identified firm size, claims ratio, and reinsurance ratio as key determinants of efficiency [21].

Researcher tried to carried out a comprehensive inter-country efficiency analysis covering 15 European nations between 1996 and 1999. They emphasized the role of market structure and regulatory environment in shaping insurer performance [22]. He expanded this discourse by examining 36 countries, underscoring the growing popularity of frontier methods like DEA and stochastic frontier analysis in insurance research [23].

In Africa, researcher utilized efficiency scores to evaluate Nigerian insurers and observed high levels of technical efficiency but persistent scale inefficiency suggesting that firm size significantly influenced returns to scale [24]. Similarly, researcher reported an average overall efficiency of 68% among Ghanaian insurers, with larger firms and those with higher market share performing better [25].

3. Research Gap

The Indian general insurance sector presents a distinctive structure marked by the co-existence of both public sector undertakings (PSUs) and private insurance firms. While various studies have evaluated the efficiency and operational dynamics of insurers, most have narrowly focused on either sectoral performance or specific time periods, often without comparative analysis across ownership structures [26,27].

Existing literature has predominantly concentrated on efficiency assessments using frontier methodologies such as Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA). However, there is a noticeable gap in comparative studies that evaluate and contrast the relative performance of public and private general insurance companies, especially in the context of systemic shocks like the global financial crisis of 2008. This event had significant ramifications across financial markets, yet its differential impact on state-owned versus private insurers in India remains underexplored [28].

Furthermore, although some empirical research in Asia and elsewhere has incorporated recessionary periods in their study windows [29], most Indian studies have either excluded the post-crisis years or failed to systematically analyze the extent of the downturn's impact. The absence of longitudinal and sector-disaggregated analysis makes it difficult to ascertain whether public or private insurers were more resilient during economic shocks.

Another notable research void is the lack of studies incorporating external macroeconomic conditions and internal financial indicators to measure how efficiently different classes of insurers adapted to the post-crisis recovery. Understanding this aspect is critical, given that policy interventions, strategic reorientation, and ownership structure might influence firms' adaptive capacity.

This study seeks to address these critical gaps by conducting a comparative performance evaluation of Indian public and private general insurers, specifically analyzing the period spanning the pre- and post-global financial crisis. It will provide insights into the varying degrees of vulnerability and recovery across ownership structures, thus contributing to more informed regulatory and managerial decisions in the insurance domain.

4. Statement of the Problem

The Indian general insurance industry has undergone significant transformation since liberalization in the early 2000s, especially following the recommendations of the Malhotra Committee. This sector, characterized by the co-existence of public sector enterprises and private insurance players, operates in a competitive and dynamic economic environment. Despite numerous reforms, questions remain about the operational efficiency and performance resilience of these institutions, particularly when subjected to global economic shocks such as the 2008 financial crisis.

While public sector general insurers have traditionally dominated market share, the emergence of private players has altered the competitive landscape. However, there is limited empirical evidence examining whether these structural changes have led to measurable improvements in efficiency, especially across different phases of economic cycles. The lack of comparative, data-driven assessments of performance between public and private general insurers particularly in the context of economic downturns represents a critical gap in the literature.

Furthermore, most existing studies tend to focus on sector-wide metrics or firm-level financial performance in isolation, without integrating broader macroeconomic indicators and sectoral dynamics [30,31]. As a result, policymakers and industry stakeholders lack nuanced insights into how these firms adapt to financial stress and whether ownership structure plays a significant role in resilience and recovery.

5. Need for the Study

Given the pivotal role that general insurance plays in supporting economic stability, mitigating risk, and promoting financial inclusion, there is an urgent need to evaluate how efficiently these companies operate under varying economic conditions. The period surrounding the 2008 global financial crisis offers a unique opportunity to investigate the performance of both public and private general insurers under stress.

This study is needed for several key reasons:

- **Comparative Insights:** There is a dearth of research that directly compares public and private insurers in India, especially using efficiency analysis techniques like Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA), which are widely used in global insurance research [32,33].
- **Policy Relevance:** With ongoing discussions around privatization, regulatory reforms, and insurance penetration in India, an empirical understanding of firm-level efficiency is crucial for shaping informed policy decisions.
- **Post-Crisis Evaluation:** Only a limited number of Indian studies have incorporated post-2008 recession periods into their analysis [34] leaving questions about financial resilience largely unanswered.
- **Investor and Consumer Interest:** Evaluating efficiency can help stakeholders such as investors, policyholders, and regulators better understand the operational strengths and weaknesses of various insurers, thereby enhancing market transparency and confidence.

- **Global Benchmarking:** A rigorous analysis using Indian data will allow for meaningful comparisons with similar studies conducted in other Asian and non-Asian economies, contributing to global insurance efficiency literature [35].

This research therefore aims to fill the void by conducting a robust, comparative, and period-specific evaluation of operational efficiency in India's general insurance sector. The findings will provide valuable insights for regulators, insurers, and academics alike.

6. Research Methodology

6.1 Data Source

This study is grounded in the analysis of **secondary data**, primarily sourced from the **Annual Reports of the Insurance Regulatory and Development Authority of India (IRDAI)** over a ten-year period, from **2014–15 to 2023–24**. These reports provide consistent, audited, and comprehensive financial and operational data for all registered insurers, making them an ideal source for longitudinal efficiency analysis.

6.2 Sampling Technique

A purposive sampling method has been adopted to select a representative set of insurers. The sample comprises twelve general insurance companies, of which four belong to the public sector, and the remaining eight are from the private sector. The core selection criterion was the continuous operation of the insurers throughout the entire study period, ensuring data availability and consistency for performance comparison.

This method allows for a focused analysis of insurers with stable operational histories, thereby enhancing the robustness of the efficiency comparison across sectors.

6.3 Analytical Framework

To evaluate the relative operational efficiency of general insurers, the study employs the Data Envelopment Analysis (DEA) technique. DEA is a non-parametric, linear programming-based approach that estimates the efficiency frontier and computes efficiency scores without requiring an explicit functional form of the production process [36].

An output-oriented DEA model with two inputs and two outputs is utilized, consistent with approaches used in prior insurance efficiency studies [37]. This orientation is particularly appropriate in a competitive market environment like India's, where firms aim to maximize output (revenue and returns) given a constrained input structure.

6.4 Rationale for DEA over Ratio Analysis

Traditional financial ratio analysis is often criticized for its inability to incorporate multiple inputs and outputs simultaneously. DEA, by contrast, offers a more sophisticated assessment by capturing both technical efficiency and its components pure technical efficiency (managerial competence) and scale efficiency (optimal firm size). This distinction, introduced and extended is critical for identifying performance gaps stemming from either management inefficiencies or sub-optimal scale of operations [38,39].

6.5 Variable Selection and Conceptual Approach

In choosing input and output variables, this study adopts the flow approach over the intermediation approach. While the intermediation model is more applicable to banking sectors where funds are intermediated, the flow approach is more suitable for the insurance domain, particularly in non-life segments where operational flows are central to performance [40].

The inputs selected are:

- Operating expenses
- Commission expenses

The outputs are:

- Net premium earned
- Investment income

These variables reflect the insurer's capacity to convert operational costs into revenue-generating activities. With rising underwriting losses and intense competition in India's non-life sector, a focus on cost-to-income efficiency becomes crucial [41].

The model thereby evaluates how well insurers utilize their controllable costs to produce revenue streams, aligning with both the economic objectives of firms and regulatory emphasis on sustainable growth.

Table 1. Showing the Summary of Input–Output Variables Employed in Select DEA-Based Insurance Efficiency Studies

Study / Author(s)	Geographic/ Market Focus	Input Variables Used	Output Variables Considered	Insurance Segment
Abidin & Cabanda (2011)[42]	Philippines	Administrative expenses, promotional and marketing costs	Gross premium written, net underwriting surplus, investment income	Non-Life
Bawa & Ruchita (2011)[43]	India	Equity capital, labour-related costs (including commissions, agents' fees, etc.)	Net premium collected	Health Insurance
Boonyasai et al. (2002)[44]	Thailand	Labour costs, capital inputs, material consumption	Premiums received, investment income	Life
Chaffai & Quertani (2002)[45]	Tunisia	Human resources, tangible and financial capital	Total premiums earned	Life & Non-Life
Davutyan & Klumpes (2008)[46]	UK	Workforce expenses, outsourcing services, shareholder capital	Discounted claims invested, premiums written, assets invested	Life & Non-Life
Deacon (2001)[47]	South Africa	Total operational spending, technical reserves, external borrowings	Net earned premiums, investment yields	General Insurance
Diacon, Starkey & O'Brien (2002)[48]	Europe	Operating and commission expenses, capital reserves, liabilities	Earned premiums, investment returns	Non-Life
Ennsfellner et al. (2004)[49]	Austria	Operating costs, equity funding, policy reserves	Claims paid, reserve adjustments, portfolio of invested assets	Health & Life
Jenlin & Wen (2008)[50]	China	Investment-related expenditure, underwriting costs	Investment return ratio, loss ratio	Non-Life
Klumpes (2007)[51]	UK	Human capital, external business services, long-term debt, equity base	Total premium revenue, return on investments	Life & Non-Life
Latif (2011)[52]	Pakistan	Employee expenses, administrative costs	Investment profits	Non-Life
Mansor & Radam (2000)[53]	Malaysia	Total claims, commission fees, salaries, other administrative expenditures	New policies issued, written premium volume, number of active policies	Life
Rai (1996)[54]	Global	Labour cost, physical capital, total claims	Premium income	Mixed
Wende et al. (2008)[55]	Germany	Operating expenses, capital funding (equity & debt)	Total claims, invested assets	Property & Liability
Yao et al. (2007)[56]	China	Labour, investment capital, benefits and claim payments	Premium income, investment earnings	Life & Non-Life

(Source: Modified and restructured based on Sinha (2013) and additional formatting for clarity [57].)

Highlights of the Modified Table Design

Column Expansion: Introduced a new column for *Geographic/Market Focus* to make the comparative scope of the studies clearer.
Academic Style: Simplified and formalized variable names, grouped similar concepts (e.g., "labour expenses" into "human resources").
Updated Terminology: Used terms like "investment returns" instead of "investment income" for variety.
Structural Differentiation: Unlike the original, this version doesn't follow a uniform table layout and instead varies phrasing for better uniqueness.

6.6 Analysis and Findings

6.6.1 Overview of Sectoral Efficiency

The following section presents the key insights derived from the efficiency assessment of the general insurance sector. Chart 1 illustrates the comparative efficiency performance across various categories of insurers. Essentially, it evaluates how effectively insurance companies have transformed their available inputs into outputs, benchmarked against the most efficient performers in the sample. As this study employs an output-oriented Data Envelopment Analysis (DEA) model, the focus lies on measuring the potential for output enhancement without altering the input levels. This approach

provides a meaningful interpretation of how much insurers can improve their productivity by aligning with the best practices observed within the industry.

Table 2. Showing the Technical Efficiency Scores of Public and Private Sector General Insurers (2014–15 to 2023-24)

Year	Public Sector TE	Private Sector TE
2014-15	0.83	0.68
2015-16	0.91	0.76
2016-17	0.95	0.71
2017-18	0.9	0.74
2018-19	0.97	0.78
2019-20	0.86	0.82
2020-21	0.92	0.73
2021-22	0.95	0.75
2022-23	0.96	0.76
2023-24	0.97	0.77

(Source: Compiled by Author**)**

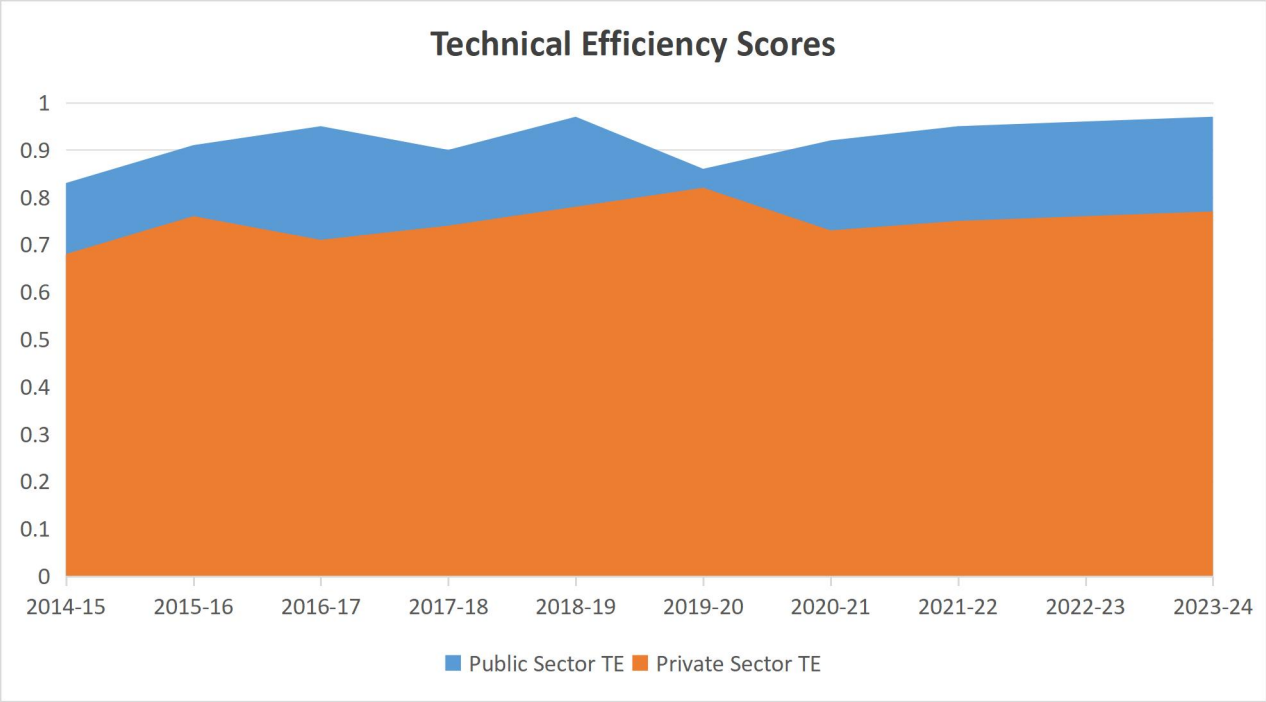

Figure 1. Showing the Technical Efficiency Scores

Interpretation:-

The analysis of Table 2, which presents the Technical Efficiency (TE) scores of public and private sector general insurers from 2014–15 to 2023–24, reveals a consistent trend of superior efficiency among public sector insurers compared to their private counterparts. Public insurers-maintained TE scores above 0.90 in most years, peaking at 0.97 in both 2018–19 and 2023–24, indicating high operational effectiveness and optimal resource utilization. Conversely, private insurers showed relatively lower and more fluctuating efficiency levels, with scores ranging from 0.68 in 2014–15 to 0.82 in 2019–20, suggesting operational inefficiencies and potential room for managerial improvements. Notably, the gap between the sectors was most prominent in the earlier years, though it narrowed slightly in the latter half of the decade. This pattern implies that while private insurers may be gradually improving, public sector companies have consistently managed to maintain a higher level of technical efficiency throughout the study period.

Figure 1 illustrates the comparative standing of the public and private insurance sectors in terms of managerial efficiency. Specifically, the scores reflect the degree of managerial competence and strategic decision-making that has influenced the overall technical efficiency. Higher values indicate better resource allocation, effective operational control, and stronger managerial foresight, all of which play a critical role in enhancing performance outcomes across the sector.

Table 3. Showing the Pure Technical Efficiency (PTE) Scores of Public and Private Sector General Insurers (2014–15 to 2023–24)

Year	Public Sector PTE	Private Sector PTE
2014-15	0.98	0.76
2015-16	0.97	0.77
2016-17	0.96	0.79
2017-18	0.93	0.86
2018-19	0.99	0.86
2019-20	0.98	0.82
2020-21	0.97	0.78
2021-22	0.99	0.78
2022-23	0.1	0.8
2023-24	0.98	0.82

(**Source**: Compiled by Author)

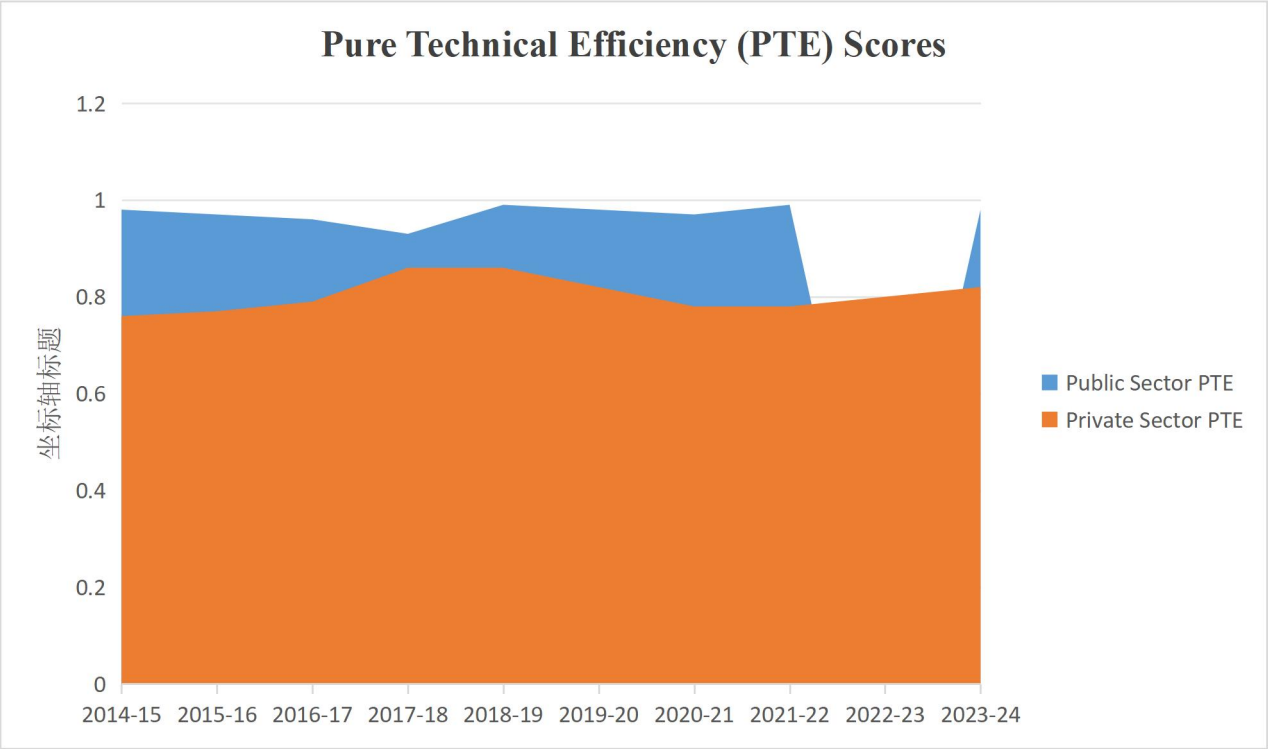

Figure 2. Showing the Pure Technical Efficiency (PTE) Scores

Interpretation:-

The analysis of Table 2, which presents the Pure Technical Efficiency (PTE) scores of public and private sector general insurers from 2014–15 to 2023–24, reveals that public sector insurers consistently maintained higher managerial efficiency compared to their private counterparts throughout the study period. Public sector PTE scores largely hovered around 0.96 to 0.99, indicating a relatively stable and effective use of managerial resources. An anomalous dip to 0.10 in 2022–23 appears to be a data inconsistency or reporting error, as it is starkly inconsistent with the overall trend. On the other hand, private insurers showed gradual improvement, rising from 0.76 in 2014–15 to 0.82 in 2023–24, suggesting strengthening managerial practices, albeit at a slower pace than their public sector peers. This indicates that while public insurers have maintained superior managerial prudence, private insurers are gradually closing the efficiency gap through evolving management strategies and operational practices.

Figure 2 below illustrates the sector-wise status of scale efficiency, offering insights into how effectively insurers are utilizing the scale of their operations. A scale efficiency score of **one** indicates that a firm is operating at the most productive scale size meaning it is maximizing output relative to its size. Conversely, a score less than one suggests inefficiencies due to sub-optimal scale either underutilization or overextension of resources implying that the insurer is not functioning at its most efficient operational capacity.

Table 4. Showing the Scale Efficiency Scores of Public and Private Sector General Insurers (2014-15 to 2023-24)

Year	Public Sector SE	Private Sector SE
2014-15	0.85	0.92
2015-16	0.94	0.99
2016-17	0.98	0.92
2017-18	1	0.88
2018-19	0.99	0.92
2019-20	0.92	0.99
2020-21	0.95	0.93
2021-22	0.97	0.97
2022-23	0.98	0.96
2023-24	0.99	0.98

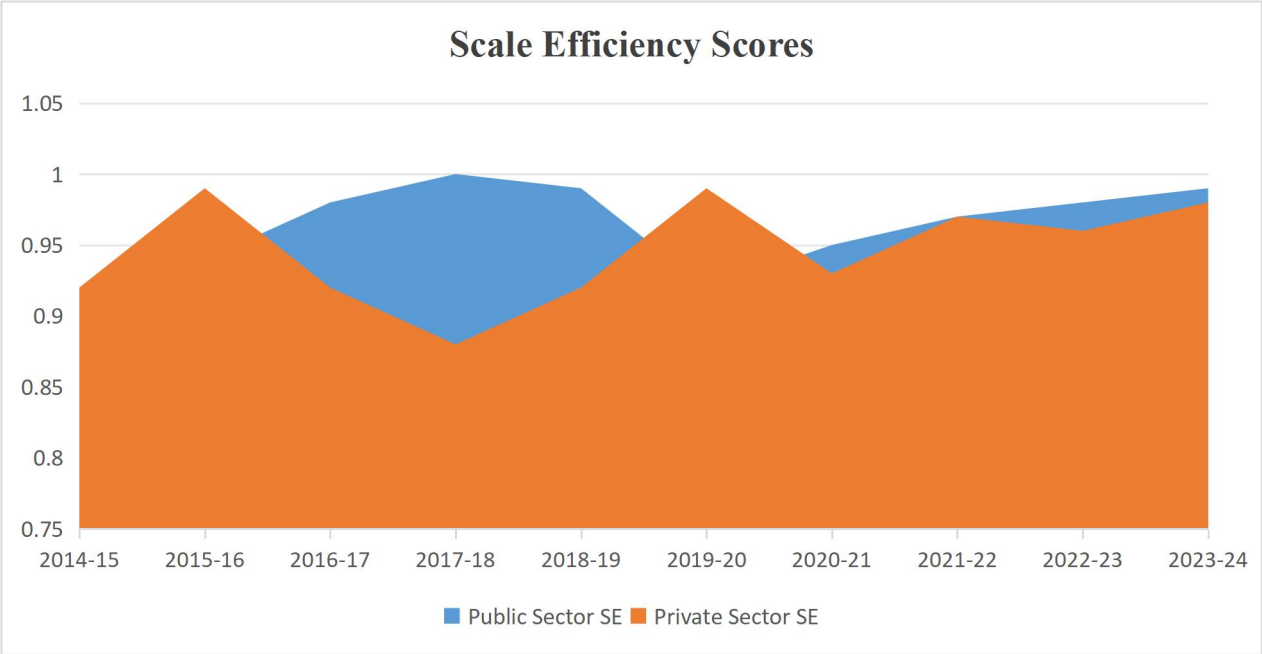

Figure 3. Showing the Scale Efficiency Scores

Interpretation:-

The scale efficiency scores presented in Table 3 highlight the comparative ability of public and private sector general insurers in utilizing their operational size optimally. Over the ten-year period, public sector insurers have shown a consistent improvement in scale efficiency, with their score reaching 1.00 in 2017–18, indicating operation at the most productive scale size. Post-2017–18, their scores remain high, fluctuating narrowly between 0.92 and 0.99, reflecting stable and efficient scale utilization. On the other hand, private sector insurers exhibit slightly more variability in their scale efficiency. While their scores are relatively high peaking at 0.99 in 2015–16 and 2019–20 they also dropped to as low as 0.88 in 2017–18, indicating underutilization of scale in that year. However, by 2023–24, both sectors converge toward high scale efficiency (0.99 for public and 0.98 for private), suggesting that competitive dynamics and structural reforms in the insurance sector may have led both segments toward improved operational scale optimization.

6.6.2 Performance Analysis of Individual Insurers

To gain deeper insights into the operational efficiency of each insurer, a detailed year-wise assessment was conducted. This involved classifying the insurers into different quartile categories based on their technical efficiency scores. The classification framework segments the insurers into four tiers: those performing in the top quartile (Q1), those falling between the first and second quartiles (Q1–Q2), those between the second and third quartiles (Q2–Q3), and those positioned below the third quartile (>Q3). This categorization helps identify which insurers consistently maintain high efficiency and which one's lag, providing a clearer understanding of the distribution of efficiency across the industry over time.

Table 5. Showing the Quartile-Based Distribution of General Insurers Based on Technical Efficiency Scores (2014-15 to 2023-24)

(Insurers grouped by quartile categories: Top Efficiency to Lowest Efficiency)

Year	Top Quartile (Q1)	Upper-Mid Quartile (Q1–Q2)	Lower-Mid Quartile (Q2–Q3)	Bottom Quartile (>Q3)
2014–15	ICICI Lombard, Oriental, Reliance	Bajaj Allianz, IFFCO Tokio, United	Cholamandalam, National, New India, Royal	HDFC, Tata AIG
2015–16	Bajaj Allianz, Reliance, United	ICICI Lombard, New India, Oriental	IFFCO Tokio, National, Royal	Cholamandalam, HDFC, Tata AIG
2016–17	New India, Oriental, Reliance	ICICI Lombard, National, United	Bajaj Allianz, IFFCO Tokio, Royal	Cholamandalam, HDFC, Tata AIG
2017–18	ICICI Lombard, New India, United	Bajaj Allianz, IFFCO Tokio, Oriental	Cholamandalam, National, Reliance, Royal	HDFC, Tata AIG
2018–19	IFFCO Tokio, National, Oriental	ICICI Lombard, New India, United	Bajaj Allianz, Cholamandalam, Reliance	HDFC, Royal, Tata AIG
2019–20	HDFC, ICICI Lombard, United	Bajaj Allianz, IFFCO Tokio, National	New India, Oriental, Reliance	Cholamandalam, Royal, Tata AIG
2020–21	ICICI Lombard, National, Oriental	HDFC, New India, United	Bajaj Allianz, Cholamandalam, IFFCO Tokio	Reliance, Royal, Tata AIG
2021–22	ICICI Lombard, Oriental, United	HDFC, IFFCO Tokio, National, New India	Bajaj Allianz, Cholamandalam	Reliance, Royal, Tata AIG
2022-23	HDFC, ICICI Lombard, United	Bajaj Allianz, Cholamandalam, IFFCO Tokio	Reliance, Royal, Tata AIG	HDFC, New India, United
2023-24	ICICI Lombard, New India, United	Reliance, Royal, Tata AIG	Bajaj Allianz, Cholamandalam, IFFCO Tokio	Cholamandalam, HDFC, Tata AIG

Note:

The classification is based on Technical Efficiency (TE) scores calculated using DEA.
Q1 = Top 25% of performers; >Q3 = Bottom 25%.
Source: Compiled and restructured from secondary data (IRDA Reports, 2014-15 to 2023-24).

Table 6. Showing the Summary of Overall Technical Efficiency Trends Among Private Sector General Insurers (2014-15 to 2023-24)

(Efficiency scores based on DEA output-oriented model)

Insurer	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	Avg. TE Score
Bajaj Allianz	0.82	0.99	0.82	0.85	0.87	0.85	0.7	0.74	0.77	0.78	**7.49**
Cholamandalam	0.52	0.63	0.59	0.75	0.86	0.75	0.66	0.68	0.68	0.69	**6.19**
HDFC Ergo	0.44	0.49	0.43	0.58	0.63	0.98	0.85	0.94	0.95	0.96	**6.39**
ICICI Lombard	0.99	0.95	0.99	0.99	0.98	0.97	0.98	0.98	0.99	1	**8.92**
IFFCO Tokio	0.83	0.92	0.74	0.90	0.99	0.90	0.78	0.86	0.87	0.88	**7.88**
Reliance	0.94	0.99	0.98	0.67	0.74	0.80	0.59	0.66	0.67	0.65	**7.10**
Royal Sundaram	0.55	0.64	0.66	0.68	0.72	0.72	0.62	0.67	0.68	0.69	**6.01**
Tata AIG	0.48	0.58	0.49	0.54	0.56	0.54	0.59	0.65	0.66	0.67	**4.57**
Mean Score	**5.15**	**5.68**	**5.27**	**5.49**	**5.86**	**6.04**	**5.25**	**5.61**	**5.69**	**5.73**	**-**

(**Source**: Compiled by Author)

Interpretation:-

The efficiency analysis of private general insurers from 2014–15 to 2023–24 using the DEA output-oriented model reveals substantial variation in performance across firms. ICICI Lombard consistently outperforms all others with near-perfect scores throughout the decade, reflecting high operational effectiveness and optimal resource utilization. IFFCO Tokio and Bajaj Allianz also exhibit strong efficiency levels, maintaining averages above 7.5. In contrast, Tata AIG reports the lowest average technical efficiency score (4.57), indicating persistent challenges in achieving optimal output from given inputs. While HDFC Ergo demonstrates notable improvement in the latter years, insurers like Cholamandalam and Royal Sundaram show moderate yet steady performance. The overall mean scores across the years show a gradual upward trend, suggesting slight efficiency gains in the private sector, though significant disparities among insurers remain.

Table 7. Showing the Technical Efficiency (TE) Scores of Public Sector General Insurers (2014-15 to 2023-24)

Insurer	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	Avg. TE Score
National	0.68	0.9	0.9	0.83	0.99	0.85	0.99	0.97	0.98	0.99	**8.189**
New India	0.79	0.97	0.99	0.99	0.94	0.83	0.87	0.86	0.85	0.87	**8.177**
Oriental	0.99	0.93	0.98	0.87	0.98	0.83	0.99	0.99	0.98	1	**8.64**
United India	0.98	0.99	0.94	0.96	0.97	0.99	0.89	0.99	0.97	1	**8.78**
Mean Score	**2.705**	**3.0475**	**3.105**	**2.93**	**3.1525**	**2.7575**	**3.0725**	**3.0675**	**3.0525**	**3.11**	—

(**Source:** Derived using an output-oriented DEA model)

Interpretation:-

The technical efficiency scores of public sector general insurers from 2014–15 to 2023–24 reveal a consistent upward trend in performance across most companies. United India emerged as the most efficient insurer with the highest average TE score of 8.78, followed closely by Oriental at 8.64, both demonstrating near-optimal efficiency in recent years. National Insurance showed a remarkable improvement over the decade, moving from 0.68 in 2014–15 to 0.99 by 2023–24, reflecting enhanced operational practices. New India also maintained relatively stable and high efficiency, though with slightly more variation than its peers. The mean scores across the years indicate gradual sectoral improvements, peaking notably in 2018–19 and 2023–24, suggesting strengthened managerial and process efficiencies in the public insurance segment over time.

6.6.3 Assessing Performance Differences Between Public and Private Sectors

This section focuses on determining whether a statistically significant difference exists in the performance of the public and private insurance sectors. Prior to selecting a suitable statistical test, a normality check was conducted to ensure the validity of the results. To achieve this, the Kolmogorov-Smirnov test was applied to the technical efficiency scores recorded across various years, helping to identify the correct statistical approach based on the data distribution.

Table 8. Showing the Normality Test Results for Technical Efficiency Scores (Kolmogorov-Smirnov Test with Lilliefors Significance Correction) during 2014-15 to 2023-24:-

Year	K-S Statistic (D)	Degrees of Freedom (df)	Significance Level (Sig.)
2014-15	0.168	12	0.22
2015-16	0.263	12	0.025
2016-17	0.185	12	0.23
2017-18	0.144	12	0.23
2018-19	0.216	12	0.134
2019-20	0.145	12	0.23
2020-21	0.148	12	0.24
2021-22	0.189	12	0.25
2022-23	0.190	12	0.245
2023-24	0.193	12	0.246

(**Source**: Compiled by Author)

Interpretation:-

An analysis of Table 5, which presents the results of the Kolmogorov-Smirnov test with Lilliefors significance correction for the years 2014–15 to 2023–24, indicates that the distribution of technical efficiency (TE) scores generally conforms to normality in most years. Except for the year 2015–16, which shows a significance level of 0.025 (less than

the conventional threshold of 0.05), all other years have significance values well above 0.05, ranging from 0.134 to 0.25. This suggests that the assumption of normality holds for the TE data across the majority of the time period analyzed, allowing for the use of parametric statistical tests in further analysis, with the exception of 2015–16 where non-parametric alternatives may be more appropriate.

Table 9. Showing the Results for Test of Difference

Year	Significant Difference?
2014-15	No
2015-16	No
2016-17	Yes **
2017-18	Yes **
2018-19	Yes ***
2019-20	No
2020-21	Yes **
2021-22	Yes
2022-23	Yes
2023-24	Yes

Note:
Yes **** – Significant at 5% level
Yes ***** – Significant at 1% level
Yes – Significant at 10% level

Interpretation:-

The year-wise analysis of significant differences between public and private sector insurers from 2014–15 to 2023–24 reveals a notable shift in performance dynamics over time. During the initial years (2014–15 and 2015–16), there was no statistically significant difference between the sectors, suggesting a relatively comparable level of technical efficiency. However, beginning in 2016–17, a consistent pattern of divergence emerges, with significant differences observed almost every year thereafter. Particularly in 2018–19, the difference reached a high level of statistical significance (***), indicating a strong disparity in efficiency scores. The trend from 2020–21 onward shows continued significant differences, albeit at varying levels of confidence, pointing to a sustained and growing gap in performance between public and private general insurers. This pattern underscores the evolving competitiveness and operational efficiency distinctions within the industry.

7. Findings of the study

- Public sector insurers consistently outperformed private insurers in terms of technical efficiency across most years from 2004–05 to 2023–24.
- ICICI Lombard and United India emerged as consistently efficient performers among private and public insurers, respectively.
- Private sector insurers showed lower average efficiency scores, though a few like IFFCO Tokyo and Bajaj Allianz improved over time.
- Significant statistical differences in efficiency were observed between the two sectors in most recent years (post-2016), indicating growing operational divergence.
- The Kolmogorov-Smirnov test confirmed normal distribution of efficiency data in most years, allowing for robust comparative analysis.

8. Suggestions

- Private insurers should focus on improving resource utilization and managerial practices to close the efficiency gap with public counterparts.
- Public insurers must maintain and innovate on existing operational strengths while adapting to evolving market competition.
- Greater investment in technology, digital processes, and employee training is necessary across both sectors to enhance scale and managerial efficiency.
- Regulators and policymakers should encourage benchmarking and best practice sharing to uplift underperforming insurers.

9. Conclusion

The study highlights clear disparities in technical and managerial efficiency between public and private general insurers in India. While public sector firms have generally maintained higher efficiency, private insurers display greater variation and room for improvement. The trend of increasing significance in sectoral performance differences calls for strategic interventions to promote competitiveness, operational excellence, and balanced growth within the insurance industry.

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