Examining the efficiency of public spending within the Indian states

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INTRODUCTION

- This study evaluates the effectiveness of government spending in the education, health sectors across 23 Indian states in 2013-14,2014-15,2015-16 employing a combination of input and output measures.
- As expenditures on health and education have direct impact on welfare and growth of the economy, we focus on these expenditures.
- The issue of assessing expenditure efficiency is the need of the hour to know whether some regions lag behind others due to lack of resources, or due to efficiency issues in using existing resources.
- Therefore, it has become more critical than ever to assess about the efficiency of public spending among Indian states

❑ Overview:

- Examination of government expenditure efficiency in Indian states, focusing on crucial sectors: health and education.

❑ OBJECTIVES:

- Measure Efficiency: The primary objective is to measure the efficiency of government expenditures in the social sector, particularly focusing on health and education, across various Indian states. The study employs DEA (Data Envelopment Analysis) approaches to quantify how effectively states are utilizing their resources in these crucial sectors.

- Compare Sectoral Efficiency: By focusing on the social sector, especially health and education, the paper intends to compare the efficiency across these sectors within the states. This comparison helps to identify where the states are performing better and where there is a need for improvement.

- Provide Policy Insights : The ultimate objective of the study is to offer actionable insights for policymakers. By understanding the efficiency levels and their determinants, the study aims to guide resource allocation and policy formulation to enhance the effectiveness of public expenditure, thereby improving the overall welfare and development outcomes in the states.

Data Envelopment Analysis Methodology:

- For measuring the efficiency of public spending, Data Envelopment Analysis (DEA) is applied

Education:

- The calculation of efficiency scores for education is intended to be undertaken using two outputs, i.e., Gross enrolment ratio for school education, Gross enrolment ratio for higher education, and two inputs such as education expenditure to GDP ratio and Non-education expenditure to GDP ratio.

Health:

- In the realm of Health, the DEA setup considers two outputs and two inputs. Two conventional indicators of health achievement, namely Infant Mortality Rate (IMR) and life expectancy, are intended to be utilized as outputs.

- Government Health expenditure to GDP ratio and personal health expenditure to GDP ratio are considered as inputs for evaluating health efficiency.

- The DEA methodologies employed in this study operate under the premise that higher values for outputs are preferable.

- In this context, IMR represents the ratio of the number of children who died before 12 months to the number of births, multiplied by 1000. Thus, an "Infant Survival Rate" (ISR) is calculated as follows: ISR = (1000 - IMR) / IMR. Finally, ISR and life expectancy serve as the ultimate outputs in the DEA framework.

VARIABLES(DATA)	SOURCE
Gross Enrollment Ratio (Primary)	Department of school,Education and literacy statistics division,GOI
Gross Enrollment Ratio(Higher Education)	Department of school,Education and literacy statistics division,GOI
IMR	RBI
Life Expectancy	RBI
Education expenditure to GDP ratio	Department of Higher education (GOI)Report
Non education revenue expenditure to GDP ratio	Department of Higher education (GOI)Report
Government health expenditure to GDP Ratio	National Health Accounts estimate report
Personal health expenditure to GDP ratio	National Health Accounts estimate report

INPUT ORIENTED DEA MODEL SETUP (Education)

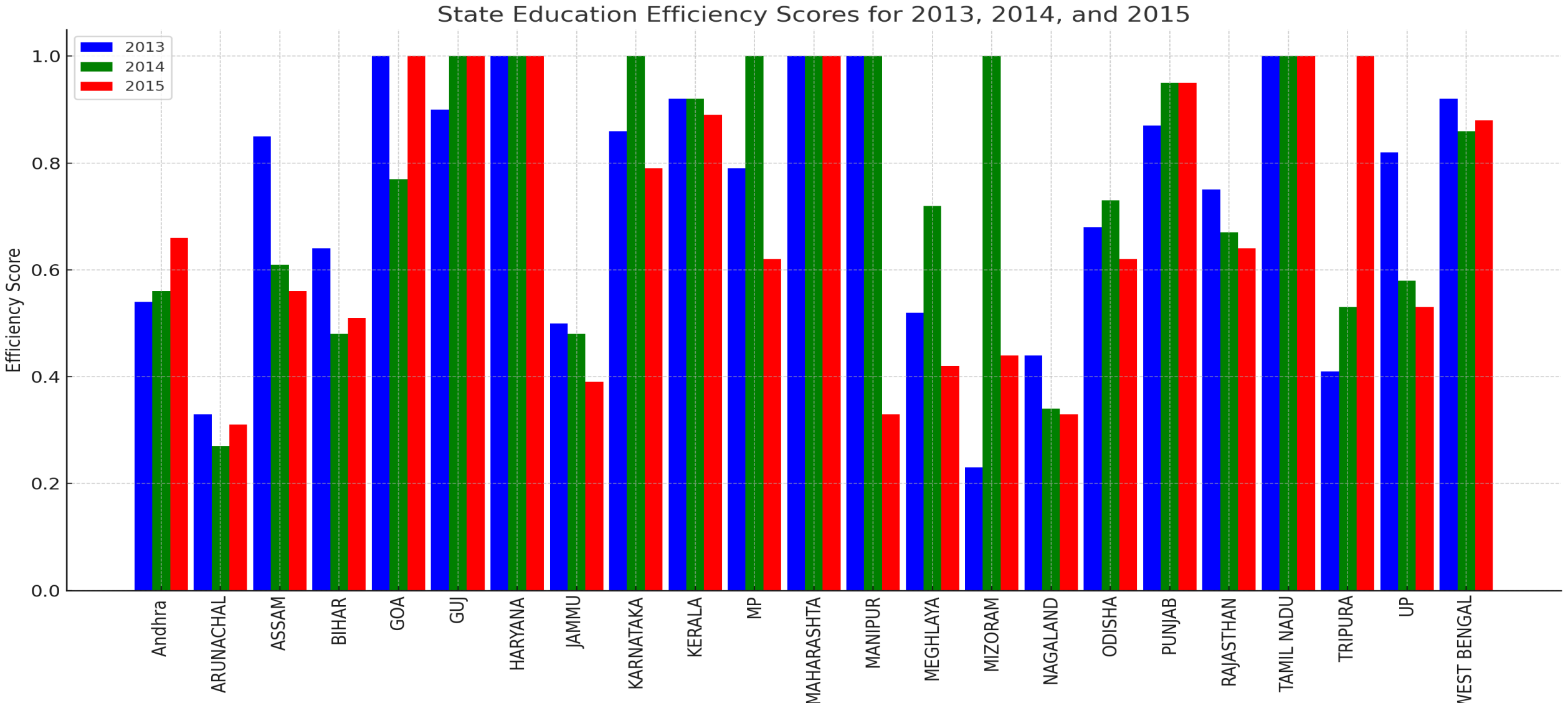
- *Inputs for State 'j'*

  - $x_1 j$: Education Expenditure to GDP ratio
  - x_{2j}: Non-education expenditure to GDP ratio

- Outputs for State 'j':
  - y_{1j}: $Gross$ enrolment ratio for school education
  - y_{2j}: $Gross$ enrolment ration for Higher Education

- Objective: Minimize θ_j $(Efficiency\ score\ for\ State\ 'j')$
  - Constraints: $\sum_{j=1}^{n} \lambda_j x1\, j \leq \theta_j x_1 j$ $(Education\ expendicture\ constraint)$
  - $\sum_{j=1}^{n} \lambda_j x2\, j \leq \theta_j x_2 j$ (Non-education expenditure constraint)
  - $\sum_{j=1}^{n} \lambda_j y1j \geq y1j$ $(School\ enrolment\ output\ constraint)$
  - $\sum_{j=1}^{n} \lambda_j y2j \geq y2j$ $(Higher\ Education\ enrolment\ output\ constraint)$
  - $\sum_{j=1}^{n} \lambda_j = 1, \lambda_j \geq 0 (Convexity\ and\ positivity\ constraints)$

DEAP software was used to compute input oriented technical efficiency
RESULTS



Analysis of Input oriented technical efficiency (EDUCATION)

- In 2016, the input efficiency score of all states is 0.75 (0.81 in 2013 and 0.89 in 2014) meaning that, on average, they should be able to attain the same level of output.

- The least efficient state from an input perspective is Arunachal Pradesh (0.31). It means it can achieve the current outcome by using only 31 per cent of the current spending. Rest resources are used inefficiently.

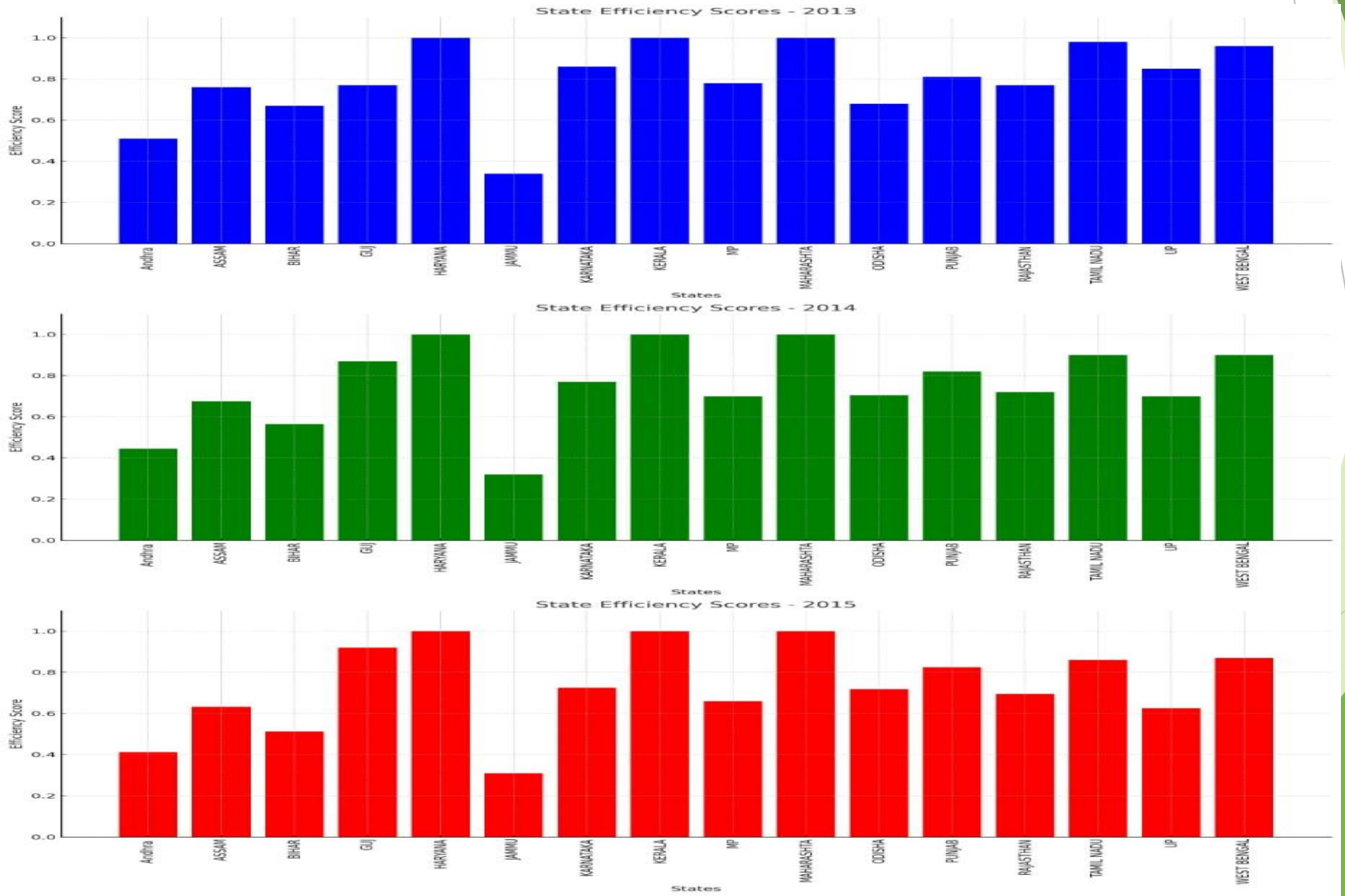
- The results of input efficiency score (table 1) show that in 2016, Six states are labeled as efficient, Goa, Gujarat, Haryana, , Maharashtra, Tamil Nadu and Tripura. Among these states, only Haryana, Maharashtra and Tamil Nadu are consistently efficient from 2013. These efficient states have achieved higher enrolment ratio using a smaller proportion of resources than the national average.

- Most of the North-East-ern states (except Tripura) are the poor performers in 2016 as these states are using ahigh share of public spending to achieve the given outcome.

INPUT ORIENTED DEA MODEL SETUP (HEALTH)

- X1j is the health expenditure to GDP ratio for state ‘j’
- x2j is the personal health expenditure to the GDP ratio for state ‘j’
- y1j is the infant survival rate (ISR) for state ‘j’
- Y2j is the life expectancy for state ‘j’
- Objective: Minimize θ_j $(Efficiency\ score\ for\ State\ 'j')$
  - $\sum_{j=1}^{n} \lambda_j x1j \leq \theta_j x_1 j\ (Health\ expendicture\ constraint\ for\ state\ 'j')$
  - $\sum_{j=1}^{n} \lambda_j x2j \leq \theta_j x_2 j$ (Non-health expenditure constraint for state ‘j’)
  - $\sum_{j=1}^{n} \lambda_j y1j \geq y1j\ (ISR\ output\ constraint\ for\ state\ 'j')$
  - $\sum_{j=1}^{n} \lambda_j y2j \geq y2j\ (Life\ Expectancy\ output\ constraint\ for\ state\ 'j)$
  - $\sum_{j=1}^{n} \lambda_j = 1, \lambda_j \geq 0 (Convexity\ and\ positivity\ constraint)$

DEAP software was used to compute input oriented technical efficiency
RESULTS (HEALTH)



Analysis of Input oriented technical efficiency(HEALTH)

- It is possible to observe from table 2 that three states would be labeled as the most efficient ones in the input-oriented approach: Kerala , Maharashtra, and Haryana.
- The lowest IMR (12) and highest life expectancy (more than 75) is found in Kerala, while Maharashtra and Haryana are among the lowest share of health spending to GDP with a better health outcome.
- Another set of five states are located at the bottom - Jammu & Kashmir, Uttar Pradesh, Himachal Pradesh, Bihar and Andhra Pradesh.
- In 2016, the input efficiency score of all states implies that on average the same level of output could be achieved by using about 71 per cent of the current inputs. Over the time the efficiency of health has declined from 0.90 to 0.71 from 2013 to 2016.
- Jammu and Kashmir is the least efficient state from an input perspective, which can maintain its current outcome using only 31 per cent of the current spending.

LIMITATIONS

- Data Constraints: Reliance on secondary data might impact the accuracy of efficiency scores due to potential issues with data quality and granularity.
- Sectoral Focus: Concentrating solely on education and health sectors excludes other significant areas of public expenditure, which might provide a more comprehensive understanding of overall efficiency.
- Causal Relationships : The study establishes correlations but not causal relationships between public expenditure and outcomes in education and health, which requires a deeper investigation to understand underlying mechanisms.
- Regional Diversities: Efficiency variations across states are highlighted without an in-depth exploration of local or regional factors that could influence these efficiencies, such as governance quality or socioeconomic conditions.

Policy Implications

- Benchmarking Best Practices: Efficient states serve as benchmarks. Other states can adopt their best practices in public expenditure management, focusing on strategies that enhance the quality and accessibility of education and healthcare services.

- Inter-State Collaboration: Encourage collaboration among states to share knowledge, innovations, and practices that have led to improved efficiency in public spending.

- Customized Approaches: Recognize the diversity among states and tailor policies to reflect the unique socio-economic contexts and challenges of each state, avoiding one-size-fits-all solutions

By addressing these policy implications, states can enhance the efficiency of public expenditure, leading to better education and health outcomes. This, in turn, contributes to overall development and the achievement of broader socio-economic goals.

CONCLUSION

- Significant variations in efficiency across states.
- Overall, it shows that western states are more efficient in public spending than the other regions.
- Most of the north-east regions and the eastern Indian states are inefficient states in public spending.
- South Indian states are relatively better compared to Central Indian states
- Education spending is more efficient than health spending.