

*IMPACT OF PUBLIC SPENDING IN HEALTH ON GDP
AND VICE VERSA : A STUDY DONE IN 15 STATES OF
INDIA FROM 1987-2014*

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INTRODUCTION

Health is a primary and more essential input for human resources development of a country. A chronically sick person, in spite of high income and education cannot enjoy life and would contribute very little to the society. The health of population and individual is inextricably bound up with development. Therefore, the expenditure on health is not only a means to the welfare of the society but also an end to the economic development. Investment in the health of people is considered to be a development strategy. A comparison of health indicators with economic indicators at a country level shows that the countries whose inhabitants enjoy the highest life expectancy tend to be those with the highest income per person.

On the other hand, development, like health is equally an exclusive concept. Development is not only the process of increasing per capita income but also a process of improving the quality of all aspects of human life. Growth in national output will tend to increase the health expenditure. Because, irrespective of economic position of the country, it is an important role of the state to develop a good health infrastructure.



GDP is the monetary value of all the finished goods and services produced within a country's borders in a specific time period. GDP includes all private and public consumption, government outlays, investments and exports minus imports that occur within a defined territory.

Put simply, GDP is a broad measurement of a nation's overall economic activity.



- ▶ Total expenditure for health globally in 2011: US\$ 6.9 trillion.
- ▶ According to World Bank, the total expenditure on healthcare in India as a proportion of GDP in 2014 was 4.7%.
- ▶ Country with highest government spending per person: Norway (US\$ 8436)
- ▶ Average Total expenditure for health per person per year: US\$ 1008

Literature Review

- ▶ Adolph Wagner, the renowned German political economist (1835-1913) believed that a functional “Cause and Effect” relationship exists between the growth of an economy and the growth of the public sector. He presented his famous ‘Law of ever increasing state activity’ that indicates that the social progress was the basic cause of the relative growth of state activities.
 - ▶ On the other hand, Keynesian macro economic theories assume that public expenditure causes national income. In “The General Theory of Employment, Interest and Money” (1936) Keynes sounds the death-knell to the classical thoughts. He totally repudiated the concept of laissez faire and argues that economic growth is possible only through the expansion of fiscal activities of the state.
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- ▶ On the above background, many study investigates whether the Keynesian approach is valid on the relationship between health care expenditure and economic growth.
- ▶ The relationship between health care expenditure and economic growth is well studied. However, the direction of causality is still under controversy that is whether health care expenditure leads to economic growth or economic growth leads to health. So this study considering the cases of 15 Indian states combination of top in health performance and the least in performance in India.



PROBLEM FORMULATION

In order to do an empirical analysis of the impact of public spending in health on GDP, 15 states are choose. If there is a fluctuation in GDP seem to affect the health expenditure or vice versa then that indicates that they are inter-linked and mutually affecting each other. This also indicates that either there is an absence or presence of common factors affecting both GDP and health expenditure, therefore the problem for this topic was formulated as follows:

Do changes in health expenditure impact GDP changes in the 15 states of India and vice versa?



Objective

To understand the health expenditure's impact on the GDP in 15 states of India from 1987-2014 and vice versa.



Data source and period

For the purpose of present study, health expenditure data were taken from MOHFW and Planning Commission document from 1987 to 2014. In this way a time series for all states was formed.



Methodology

- ▶ In order to examine the causal relationship between two time series, unit root testing was done by the Phillips Perron (PP) test. Unit root test provide information about the stationarity of data that whether a series is stationary or not. The results of unit root test is given in table below in analysis part.
- ▶ Once it was established that the series was stationary, second derivative Granger causality test was employed to test whether one variable caused a change in another variable.



Testing causality in the Granger sense involves using F-test to test whether lagged information on a variable Y provides any statistically significant information about a variable X in the presence of lagged X . If not, then Y does not cause any impact on X .

(where $X = \text{GDP}$, $Y = \text{Health expenditure}$)



There are many ways in which to implement a test of Granger causality. One particularly simple approach uses the autoregressive specification of a bivariate vector autoregression. Assuming a particular auto-regressive lag length p , and estimating the following unrestricted equation by ordinary least squares (OLS):

$$x_t = c_1 + \sum_{i=1}^p \alpha_i x_{t-i} + \sum_{i=1}^p \beta_i y_{t-i} + u_t$$

$$H_0: \beta_1 = \beta_2 = \dots = \beta_p = 0$$

After that Conducting a F -test of the null hypothesis by estimating the following restricted equation also by OLS:

$$x_t = c_2 + \sum_{i=1}^p \gamma_i x_{t-i} + e_t$$

Comparing their respective sum of squared residuals.

$$RSS_1 = \sum_{t=1}^T \hat{u}_t^2 \quad RSS_0 = \sum_{t=1}^T \hat{e}_t^2$$

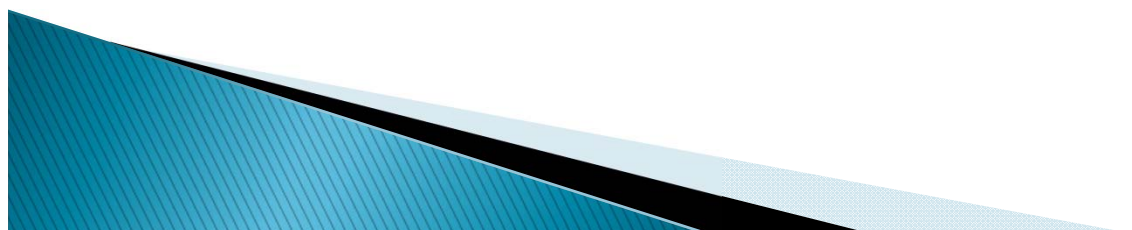
If the test statistic

$$S_1 = \frac{(RSS_0 - RSS_1)/p}{RSS_1/(T - 2p - 1)} \sim F_{p, T-2p-1}$$

is greater than the specified critical value, then reject the null hypothesis that Y does not Granger-cause X .

It is worth noting that with lagged independent variables, as in Granger-causality regressions, the test is valid only asymptotically. An asymptotically equivalent test is given by

$$S_1 = \frac{T(RSS_0 - RSS_1)}{RSS_1} \sim \chi^2(p)$$



Empirical Analysis

As a part of empirical analysis, the unit root result of the variables is reported. In their level form when the time series were tested they were found to be non-stationary. Then these non-stationary time series were transformed into stationary time series by taking a second derivative of log transform. After that the time series were tested for unit root. As a result of testing it was found that for all time series the variable Y is a stationary time series with a non zero mean and the time series is difference stationary. The result of all the time series is given in the table below.



UNIT ROOT TEST (HEALTH EXPENDITURE)



STATES	PP	SIGNIFICANCE
1. ANDHRA PRADESH	-15.52	0.002
2. ASSAM	-20.73	0.002
3. BIHAR	-11.80	0.002
4. GUJARAT	-11.69	0.002
5. HARYANA	-6.50	0.002
6. KARNATAKA	-11.01	0.002
7. KERALA	-8.29	0.002
8. MADHYA PRADESH	-7.50	0.002
9. MAHARASTHRA	-10.07	0.002
10. ORISSA	-19.76	0.002
11. PUNJAB	-20.75	0.002
12. RAJASTHAN	-9.96	0.002
13. TAMIL NADU	-11.42	0.002
14. UTTAR PRADESH	-2.47	0.002
15. WEST BENGAL	-7.66	0.002

UNIT ROOT TEST (GDP)

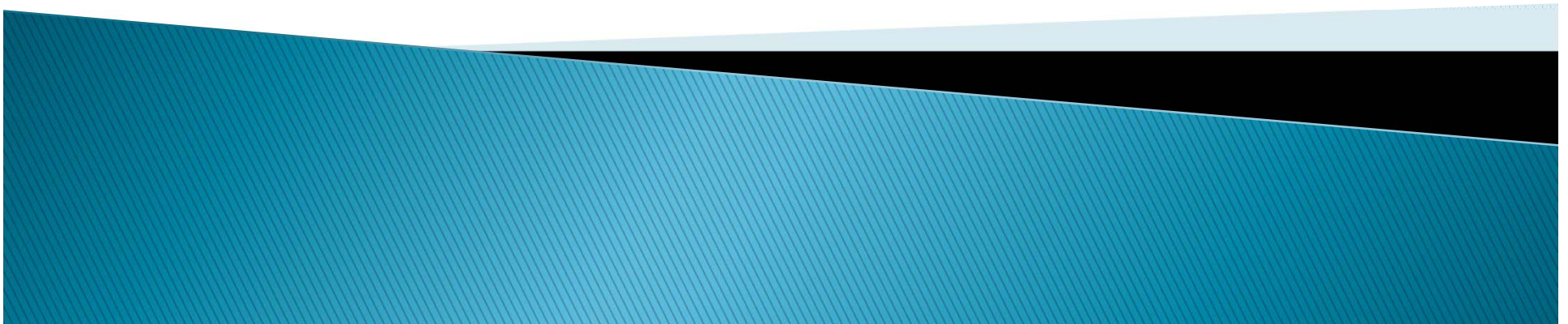


STATES	PP	SIGNIFICANCE
1. ANDHRA PRADESH	-4.60	0.002
2. ASSAM	-25.62	0.002
3. BIHAR	-25.62	0.002
4. GUJARAT	-12.94	0.002
5. HARYANA	-16.68	0.002
6. KARNATAKA	-11.93	0.002
7. KERALA	-6.97	0.002
8. MADHYA PRADESH	-6.46	0.002
9. MAHARASTHRA	-3.43	0.007
10. ORISSA	-16.52	0.002
11. PUNJAB	-3.58	0.0052
12. RAJASTHAN	-11.16	0.002
13. TAMIL NADU	-14.72	0.002
14. UTTAR PRADESH	-7.25	0.002
15. WEST BENGAL	-13.04	0.002

The selection of an optimum lag length is very important in estimation. Akaike Information Criterion and Schwarz Information Criterion were used to determine an appropriate lag length. It was found that as lag length increased (lag length up till 10 was checked) it gave a better estimate. Considering the sample size, the maximum possible lag length that could be taken was four. Therefore lag length was decided as four. A Pairwise Granger Causality Test was first done individually in GDP and health expenditure to understand the causal. The direction of causality has been examined through F values as presented in table.



Pairwise Granger Causality test (Health Expenditure)



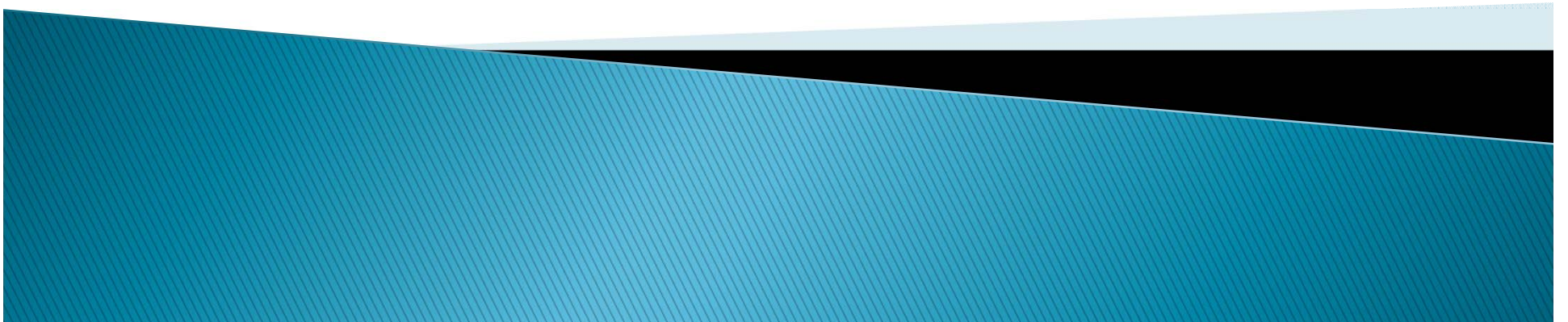
Null hypothesis	F statistics	Probability	Asymptotic equivalent test statistic	Probability	Criterion
In Andhra Pradesh health expenditure does not affect GDP.	6.008	0.0033	36.76	2.017	<Reject
In Assam health expenditure does not affect GDP.	0.2432	0.909	1.488	0.828	>do not reject
In Bihar health expenditure does not affect GDP.	8.3381	0.0006	51.009	2.22E-10	<Reject
In Gujarat health expenditure does not affect GDP.	0.9106	0.4799	5.5711	0.2335	>do not reject
In Haryana health expenditure does not affect GDP.	2.250	0.1064	13.766	0.008	<Reject
In Karnataka health expenditure does not affect GDP.	2.362	0.0094	14.449	0.0059	<Reject
In Kerala health expenditure does not affect GDP.	15.498	0.00001	94.881	0	<Reject

In MP health expenditure does not affect GDP.	0.6786	0.6161	4.1517	0.30	>do no reject
In Maharashtra health expenditure does not affect GDP.	2.2146	0.1106	13.486	0.0083	<Reject
In Orissa health expenditure does not affect GDP.	2.770	0.0061	16.946	0.0019	<Reject
In Punjab health expenditure does not affect GDP.	0.770	0.5589	4.7154	0.3177	>do not reject
In Rajasthan health expenditure does not affect GDP.	2.299	0.100	14.070	0.0070	<Reject

In Tamilnadu health expenditure does not affect GDP.	8.455	0.0006	51.725	1.58E-10	<Reject
In Uttarpradesh health expenditure does not affect GDP.	9.3364	0.0003	57.117	1.17E-10	<Reject
In Westbengal health expenditure does not affect GDP.	1.0788	0.3977	6.6001	0.1585	>do not reject

By this table it is clear that health expenditure affects GDP significantly in 10 out of 15 states. Five states – Assam, Gujarat, MP, Punjab and West Bengal shows that there is no significant impact of health expenditure on GDP.

Pairwise Granger Causality test (GDP)



Null hypothesis	F statistics	Probability	Asymptotic equivalent test statistic	Probability	Criterion
In Andhra Pradesh GDP does not affect health expenditure.	2.535	0.0782	15.511	2.017	>do not reject
In Assam GDP does not affect health expenditure.	24.430	7.3759E-7	149.454	0	<Reject
In Bihar GDP does not affect health expenditure.	27.230	3.3864E-7	149.454	0	<Reject
In Gujarat GDP does not affect health expenditure.	2.6573	0.0687	16.256	0.0026	<Reject
In Haryana GDP does not affect health expenditure.	21.749	1.6718E-6	133.053	0	<Reject
In Karnataka GDP does not affect health	3.8815	0.0203	23.745	0.00008	<Reject

In Kerala GDP does not affect health expenditure.	10.1315	0.0002	61.980	1.112E-12	<Reject
In MP GDP does not affect health expenditure.	6.2788	0.0027	38.411	9.2144E-8	<Reject
In Maharashtra GDP does not affect health expenditure.	0.12841	0.9700	0.7855	0.9403	>do not reject
In Orissa GDP does not affect health expenditure.	9.4515	0.0003	57.821	8.319E-12	<Reject
In Punjab GDP does not affect health expenditure.	1.3673	0.2866	8.3650	0.0790	>do not reject
In Rajasthan GDP does not affect health expenditure.	5.4197	0.0053	33.156	1.11097-6	<Reject

In Tamilnadu GDP does not affect health expenditure.	17.879	6.3799E-6	109.383	0	<Reject
In Uttarpradesh GDP does not affect health expenditure.	4.2096	0.0150	25.753	0.00003	<Reject
In Westbengal GDP does not affect health expenditure.	10.489	0.0001	64.1711	3.846E-13	<Reject

It indicates 12 states have GDP impact on health expenditure. Three states – Andhra Pradesh, Maharashtra and Punjab shows that there are no impact of GDP on health expenditures.



A Pairwise Granger Causality Tests to understand the presence or direction of causality between health expenditure and GDP markets. The value of F was compared against a critical value of F at 99% confidence levels. If the value of F is more than critical value the hypothesis will be rejected. In some cases the value of F is less than critical value but the value of Asymptotic Equivalent Test is highly significant.



Limitation of the study

1. Only 15 states were taken to analyze the impact of health expenditure on GDP.
2. Underutilization of the public healthcare budgeted amount is not the focus area of the study.



CONCLUSION

These results revealed that there exists a bidirectional causality from health expenditure to economic growth. This study indicates an existence of an inter-link between health expenditure and GDP in India. However, while fluctuations in the health expenditure seem to impact GDP, the same is also true for vice versa.

This suggests that the factors affecting health expenditure seem to affect GDP too.

A separate study can be done on individual states to find out common factors that affect both health expenditure and GDP.



Policy Implication

- ▶ Economic growth would contribute both the demand side and supply side factors of health sector. With higher income, people will demand for best health services. Hence, generally they prefer private health care services due to its better services than public hospitals. The increase in demand for better health care leads the private health providers to supply such a good services. This shift will reduce economic growth contribution on public health care expenditure.
 - ▶ The other crucial factor is the leakage of resources. The considerable part of funds allocated to public health sector involves in corruption and mismanagement. Increasing inefficiency and mismanagement may not attract more expenditure in public health care.
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THANK YOU

