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Public Expenditure on Health and Economic Growth in Haryana: An Analysis

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ABSTRACT

The present study makes an attempt to analyze the public expenditure on health and economic growth in Haryana for the period 1991-92 to 2007-08. For this purpose, Granger causality test is applied and Gross State Domestic Product (GSDP) is used as a proxy of economic growth. The empirical results reveal that there is uni-directional causal relationship between public expenditure on health (PEH) and economic growth (GSDP) in the State of Haryana. And the direction of causal relationship is from economic growth to public expenditure on health, but reverse causal relationship is absent.

To make our study reader friendly, we have organized it in five different sections. Section 1 includes introduction. Section 2 is devoted to concentrated review of literature. Section 3 describes the data and methodology. Section 4 includes empirical analysis and its discussion. Section 5 consists of conclusions and policy implications.

Keywords : Health, Economic growth, Public expenditure, Granger causality

Introduction

Health is an essential factor for the human resource development (HRD). The worldwide emphasis on HRD has necessitated particularly the developing countries to pay greater attention to health infrastructure as health and HRD are closely related. Therefore, public expenditure on health infrastructure assumes a greater significance in developing countries like India including Haryana as a most progressive State because of the growing population and ever increasing demand for health services.

Health is a state of complete physical, mental, spiritual and social well-being and not merely an absence of disease and infirmity. It is fundamental to national progress in any sphere. In terms of economic development nothing can be considered of higher importance than the health of the people. Health contributes to the growth of an economy in four ways: firstly, health reduces production losses caused by worker illness; secondly, it permits the use of natural resources that had been totally (or nearly) inaccessible because of disease; thirdly, health can increase the enrollment of children in the school and provides a better learning environment and fourthly, health frees alternative uses of resources that would otherwise have to be spent on treating illness (World Bank, 1993).

The expenditure on health leads to formation of human capital and that provides substantial contribution to economic growth (Duggal, 2007; Mehrotra and Jolly, 1998). The relationship between health expenditure and economic growth attracts the interest of many economists, researchers and policymakers. Over the last three decades, a number of studies found a strong and positive relationship between national income and health care expenditure (Kleiman, 1974; Newhouse, 1977, 1987; Parkin et al, 1987; Hitiris and Posnett, 1992; Pritchett and Summers, 1996; Filmer and Pritchett, 1999). The existing literature on causal relationship between health expenditure and economic growth gives very controversial results. That is, causality between health expenditure and economic growth could be bi-directional (health expenditure and economic growth causes each other), uni-directional (either economic growth causes health expenditure or health expenditure causes economic growth) or none (Devlin and Hansen, 2001).

The present study is an attempt to investigate the relationship between public expenditure on health and economic growth in Haryana during 1991-92 to 2007-08. Haryana is one of the wealthier States of India. After coming into existence as a separate State in 1966, Haryana has made a tremendous progress in the development of health infrastructure. As a result, the health status of people in the State has improved since 1966. The life expectancy of male and female has increased to 65.50 years and 70.00 years respectively in 2007-08. Birth rate has declined from 33.34 to 23.0 per thousand in 2008 and death rate stood at 6.9 per thousand in 2008 in comparison with 9.21 in 1966. Similarly, infant mortality rate has also reduced to 54.0 per thousand in 2008. Public expenditure on health infrastructure in Haryana is increased from ₹ 164.49 crores in 1991-92 to ₹ 1812.62 crores in 2007-08 at compound annual growth rate of 14.0 per cent. The share of public expenditure on health infrastructure in total public expenditure was 6.80 per cent in 1991-92 and 8.53 per cent in 2007-08. The gross state domestic product of Haryana have increased from ₹ 16339.25 crores in 1991-92 to ₹ 153087.03 crores in 2007-08 at the compound annual growth rate of 14.5 per cent.

Literature Review

The relationship between health and economic growth has long been discussed by economists and researchers in both developed as well as developing countries, so there is no dearth of literature on the issue of health-economic growth relationship. To justify the need of the present research study, the reviewed literature is as under:

Hitiris and Posnett (1992) used 560 pooled time series and cross section observations from 20 OECD countries over the period 1960-1987 and found a strong and positive correlation between per capita health spending and GDP. Goel and Ahlawat (1993) analyzed growth of health expenditure, existing infrastructure for health, medical staff and patients treated in hospitals and dispensaries in Haryana and emphasized investment in health sector for creating health culture in country. They concluded that better health and medical care services for the rural and poor people can be provided through proper health planning.

Fogel (1994) concluded that approximately one third of income growth in Britain during 1790-1980 may credited to improvements in health facilities and better nutrition. Study also concluded that public health and medical care must be recognized as labour-enhancing technological change. Sachs and Warner (1997) by using life expectancy as indicator of health, found a quadratic relationship between health human capital and economic growth. Their study concluded that health human capital increases economic growth at a decreasing rate. Gredtham and Lothgren (2000) using country-by-country and panel unit root tests, reached the conclusion that in OECD countries health care expenditure and GDP are non-stationary and cointegrated.

Mayer (2001) applied the Granger causality test on annual time series data from 18 Latin American countries to estimate the causality between health and income. This study concluded that there exists a conditional Granger causality from health to income. Bloom et al. (2001) included health in an aggregate production function as an attempt to test for the existence of an effect on labour productivity. Their main conclusion was that health has a positive and statistically significant effect on economic growth.

Jamison et al. (2003) found that better health accounted for 11 per cent of growth. They concluded that investment in physical capital, education and health plays critical role in boosting the economic growth. Gupta and Mitra (2004) examined the relationship among health, poverty and economic growth in India for the years 1973-74, 1977-78, 1983-84, 1987-88, 1993-94 and 1999-2000 based on data for 15 Indian States along with time series analysis in each of the states. Their findings suggested that per capita public health expenditure positively influences health status that poverty declines with better health and that growth and health have a positive two-way relationship. Duraisamy and Mahal (2005) examined the determinants of economic growth and health using panel data of 14 major Indian States for the period 1970/71-2000/01 and found two-way causation between economic growth and health status.

Weil (2007) suggested that health's positive effect on GDP is strongest among poor countries. For rich countries, the existing empirical evidence on whether health capital formation stimulates GDP growth is mixed. Rao et al. (2008) examined the relationship between quality of life and GDP per capita for ASEAN countries by considering Government per capita health expenditure as a proxy of quality of life. The study found the existence of uni-directional causality from GDP to health expenditure in Malaysia and Singapore, bidirectional causality (both health expenditure and GDP causes each other) in case of Thailand and Indonesia, and no causality in Philippines.

Tang (2009) examined the relationship between health care expenditure and real income by using the annual data from 1960 to 2007 of Malaysia. The results revealed that health care expenditure and real income are not cointegrated. This study also confirmed the existence of two-ways causality between health care expenditure and real income for Malaysia. Amiri and Ventelou (2010) examined the causality between gross domestic product per capita (GDP) and total expenditure of health per capita (HCE) over the period 1965-2004 in United States. They cut the entire period in two periods of 1965-1984 and 1985-2004. The results revealed that for the period 1965-1984, bi-directional causality exists between HCE and GDP, during 1985-2004, uni-directional causality occurs from GDP to HCE and for entire period 1965-2004, uni-directional causal relation from HCE to GDP is significant.

Tang and Ch'ng (2011) investigated the relationship between health care expenditure and income for the ASEAN-5 economies in the cointegration and Granger causality framework. Their study revealed that the health expenditure and income are cointegrated only for Indonesia, Singapore and Thailand. But for Malaysia and Philippines, long run relationship is not found between health expenditure and income. The results of Granger causality test indicate the presence of uni-directional causality running from income to health expenditure for Malaysia, Philippines, Singapore and Thailand. But, for Indonesia, causality does not exist in any direction. Mehrara and Musai (2011) examined the causal relationship between health expenditure and GDP for Iran using annual data over the period 1970-2008. The results suggested that there is a long-run relationship between health expenditure and GDP. And the Granger causality test indicated a strong uni-directional causal link running from GDP to health expenditure, while health spending does not Granger-cause GDP.

Thus, literature reveals the existence of long run relationship between health and economic growth. Any study concerning relationship between health expenditure and economic growth, is not found in Haryana. Therefore, the present study is undertaken to fill the gap in literature.

Data And Methodology

The present study utilizes the secondary data on public expenditure on health (PEH) and Gross State Domestic Product (GSDP) of the State of Haryana during 1991-92 to 2007-08, which are taken from the various issues of Statistical Abstract of Haryana. To investigate the relationship between public expenditure on health and economic growth in Haryana, Granger causality test has been applied. This test is relevant only when the variables under consideration are either stationary or non stationary but cointegrated (Granger, 1988). This means that the stationarity test (Unit root test) and the cointegration test must precede the Granger causality test.

Unit Root Test

The unit root test is used to examine the stationarity of the variables. This test involves estimating Dickey-Fuller (DF) test in three different forms as follows:

Yt is random walk without drift:

$\Delta Yt = \delta Yt\text{-}1 + Ut$ ……. (1)

Yt is random walk with drift:

$\Delta Yt = \beta 1 + \delta Yt\text{-}1 + Ut$ …… (2)

Yt is random walk with drift around a stochastic trend:

$\Delta Yt = \beta 1 + \beta 2\, t + \delta Yt\text{-}1 + Ut$ …….. (3)

Where, $\delta = \rho\text{-}1$ or $\rho = \delta + 1$ and t is the time or trend variable.

The null hypothesis is that H0: $\delta = 0$ ($\rho = 1$) which means the presence of unit root problem i.e. time series is non-stationary and the alternative hypothesis is that HA: $\delta \neq 0$ which indicates the absence of unit root problem, implying time series is stationary.

Equations (1, 2 & 3) have been estimated by Ordinary Least Square and τ (Tau) statistic will be computed. If the computed absolute value of τ statistic exceeds the Dickey-Fuller critical value, then null hypothesis will be rejected which means time

Gross State Domestic Product (GSDP) and Public Expenditure on Health (PEH) in Haryana, (Rs in Crores)

YEAR	GSDP	PEH
1991-92	16339.25	164.49
1992-93	17343.30	209.20
1993-94	22131.30	243.18
1994-95	26244.77	395.15
1995-96	29788.93	330.20
1996-97	35642.38	478.56
1997-98	38649.07	485.83
1998-99	43645.99	594.24
1999-00	51390.58	648.07
2000-01	58169.45	643.62
2001-02	65453.66	753.36
2002-03	72482.86	847.55
2003-04	82885.25	977.69
2004-05	93803.92	956.68
2005-06	106731.60	1198.42
2006-07	130032.79	1444.58
2007-08	153087.03	1812.62

series under consideration is stationary and fit for the application of Granger test. And if the computed absolute value of τ statistic does not exceed the Dickey-Fuller critical value then null hypothesis will be accepted, this implies the time series under consideration is non stationary and is not fit for the application of Granger test.

If a series is found to be stationary at levels, then the series is said to be integrated of order zero, i.e., I (0). When a series becomes stationary after first differencing, then the series is integrated of order 1, i.e., I (1). Similarly, a series is said to be integrated of order d, i.e., I (d) if the series has to be differenced d times to yield a stationary series.

Cointegration

Cointegration is a technique used to study the existence of long run equilibrium relationship between two variables. As Granger (1986) notes, a test for cointegration can be thought of as a pre-test to avoid 'spurious regression' situations. Granger causality test can be directly applied on the level (original) data, if the given time series are cointegrated. To examine whether time series are cointegrated, the following cointegating regression equation is considered:

$$Y_t = \alpha_0 + \alpha_1 X_t + U_t \quad \text{..... (4)}$$

Where, slope α1is cointegrated parameter. A number of methods for testing cointegration have been proposed in the literature. We consider here comparatively simple and quicker method i.e. CRDW (Cointegrating Regression Durbin-Watson) test for examining cointegration. In CRDW test, we have to compute Durbin-Watson (DW) statistic from the cointegrating regression. At 1, 5 and 10 per cent level of significance, the critical values of DW are 0.511, 0.386 and 0.322 respectively. If the calculated value of DW exceeds the critical values then it can be concluded that Y and X are cointegrated and the application of Granger test on level data is possible.

Granger Causality Test

Granger proposed a test to check the causality between variables. This test states that, if past values of a variable X significantly contribute to forecast the value of another variable Y then X is said to Granger cause Y and vice versa. This test involves estimating following regressions:

$$Y_t = \alpha_0 + \sum_{i=1}^{k} \alpha_i X_{t-i} + \sum_{j=1}^{k} \beta_j Y_{t-j} + U_t \quad \text{..... (5)}$$

$$X_t = \alpha_0 + \sum_{i=1}^{k} \alpha_i X_{t-i} + \sum_{j=1}^{k} \beta_j Y_{t-j} + U_t \quad \text{..... (6)}$$

The number of lags 'k' in the above regressions is arbitrary and boils down to a question of judgment. Generally, it is best to run the test for a few different values of 'k' (Pindyek and Rubinfield, 1976). Equation (5) postulates that current Y is related to past values of itself as well as that of X and (6) postulates a similar behavior for X. Meanwhile, the null hypothesis can be tested by using F-statistics which depend on the restricted residual sum of squares (RSSR) and unrestricted residual sum of squares (RSSUR).

$$F = \frac{RSS_R - RSS_{UR}}{RSS_{UR}} \frac{k}{n-2k-1} \quad \text{and } F\ (k, n-2k-1) \text{ ..... (7)}$$

Where k is the number of lags; n is the number of observations involved in the model. If the calculated F-value exceeds the critical F-value at the chosen level of significance, then we reject the null hypothesis and conclude that X causes Y and vice versa. On the other hand, if calculated F-value is less than the critical F-value, then null hypothesis is accepted and it can be concluded that X does not cause Y and vice versa.

Empirical Analysis

The trend of economic growth (GSDP) and public expenditure on health (PEH) in Haryana during 1991-92 to 2007-08 is represented in Figure 1 and Figure 2 respectively. GSDP and PEH are showing an upward trend which implies that both variables may move together. The foremost objective of our study is to investigate relationship between public expenditure on health and economic growth through Granger causality test, for which, firstly, stationarity of the given variables is judged and then, cointegration between variables is tested.

Figure 1: Gsdp's Trend

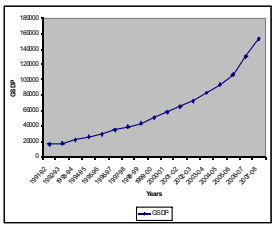
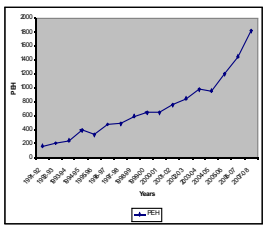


Figure 2: Peh's Trend



In order to examine the stationarity of the variables, Unit root test is applied and its results are presented in Table 1. The results indicate the non stationarity of GSDP and PEH at levels as well as at first difference. But, both the variables become stationary after making second difference it means they are integrated of order two and can be used for causality testing.

Table 1: Unit Root Test

Variables	Without intercept	With intercept	With trend and intercept	Decision Making
Levels				
PEH	5.50	2.93	1.13	Non stationary
GSDP	16.79	9.60	4.57	Non stationary
First-differences				
PEH	-1.04	-2.32	-3.50	Non stationary
GSDP	1.63	0.25	-1.19	Non stationary
Second-differences				
PEH	-7.98*	-8.22*	-8.62*	Stationary
GSDP	-3.62*	-4.17*	-5.29*	Stationary

Note: - PEH: Public Expenditure on Health, GSDP: Gross State Domestic Product.

* indicates at 1% level of significance.

Source: - Researchers' Calculation

As the variables under consideration are found to be non-stationary in their levels, therefore cointegration test is applied. The cointegration test results are shown in Table 2.The results reveal that GSDP and PEH are cointegrated with each other which indicates the existence of long run equilibrium relationship between the two. Therefore, it can be said that the application of Granger causality test by considering GSDP and PEH in their original form will not lead to spurious results. It is better to apply Granger test at original (level) data because our sample size is small and we wish to preserve as many degrees of freedom as possible.

Table 2: Cointegration Test

GSDP is regressed on PEH		PEH is regressed on GSDP	
Slope	DW	Slope	DW
88.71	1.87*	0.01	1.91*

The estimated results of Granger causality test are reported in Table 3. These results explain that the null hypothesis i.e. PEH does not granger cause GSDP, is accepted in each time lag because of insignificant F-statistic. Similarly, for null hypothesis, GSDP does not granger cause PEH, F-statistic is significant for each time lag (1, 2, 3 and 4) at 1%, 5%, 10% and 25% level of significance respectively which indicates the rejection of this null hypothesis. This implies GSDP granger causes PEH. Thus, there exists uni-directional causal relationship between PEH and GSDP running from GSDP to PEH, while the reverse causal relationship from PEH to GSDP is not found in the present analysis.

Table 3: Causality Test

Null Hypothesis	F-Statistic	Conclusion
Direction of Causality at lag 1		
PEH does not Granger Cause GSDP	0.00	Accepted
GSDP does not Granger Cause PEH	13.21*	Rejected
Direction of Causality at lag 2		
PEH does not Granger Cause GSDP	1.52	Accepted
GSDP does not Granger Cause PEH	5.76**	Rejected
Direction of Causality at lag 3		
PEH does not Granger Cause GSDP	0.67	Accepted
GSDP does not Granger Cause PEH	3.34***	Rejected
Direction of Causality at lag 4		
PEH does not Granger Cause GSDP	0.42	Accepted
GSDP does not Granger Cause PEH	2.44****	Rejected

Note: - PEH: Public Expenditure on Health, GSDP: Gross State Domestic Product.

*, **, ***, **** indicate at 1%, 5%, 10% & 25% level of significance respectively.

Source: - Researchers' Calculation

Conclusions And Policy Implications

The major findings of the study are as follows:

- The Unit root test confirmed that public expenditure on health (PEH) and economic growth (GSDP) are found to be non stationary at levels as well as at first difference but become stationary after making second difference. Thus, both variables are integrated of order two.
- The Cointegration test revealed that PEH and GSDP are cointegrated i.e. long run equilibrium relationship exists between these variables in Haryana.
- The Granger causality test clarified that PEH does not cause GSDP while it is GSDP that causes PEH in Haryana State. This implies the presence of uni-directional causal relationship between PEH and GSDP running from GSDP to PEH. But the reverse causal relationship from PEH to GSDP is absent in Haryana.

The absence of connection from public expenditure on health to economic growth, as present analysis reveals, is rather interesting because it contradicts most of the theoretical expectations. This finding is probably reflecting some shortcomings in the available data. Therefore, this finding does not mean to reallocate public expenditure on health away from the health infrastructure. As the study finds that economic growth causes public expenditure on health, so there is need to enhance economic growth in the state of Haryana. This is since an outcome to public expenditure on health that can again indirectly contribute to economic growth also.

Keeping in mind, the presence of long run equilibrium relationship between public expenditure on health and economic growth, the Government should devote a sufficient amount of expenditure on health infrastructure to improve the quality of human resources so that they can contribute more effectively in the economic growth. Public-private partnership (PPP) in health sector in the shape of Vikalp scheme is the need of the day to enhance investment as well as to bring efficiency, sufficiency and equity in health care system in Haryana. It is to be noted that for every ill in an economy including health sector, there are Vedic pills and Bhagavad-Gita is the panacea which is ism neutral religion free treatise on management and welfare economics.

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