Health Care Expenditure and Inclusive Growth In India: A Cointegration Approach

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Abstract

The agenda of inclusive growth has been interpreted both narrowly and broadly. The narrow definition includes only economic growth. But broad definition emphasizes non-income measures of well being and valuing human capabilities, such as good health and literacy. This study attempts to analyze the issue of inclusive growth in India in terms of public expenditure on healthcare and domestic income, using the test of stationarity and cointegration analysis. The result of cointegrated analysis rejects the hypothesis of existence of long-run relationship between per capita domestic income and per capita planned expenditure in India. The paper concludes that growth of planned health expenditure over time period may have occurred due to other reasons than to increase in per capita income of the country.

KEYWORDS: Health care expenditure, Stationarity, Cointegration

1. Introduction

The agenda of inclusive growth can be interpreted narrowly or broadly. The narrow interpretation implies a focus on economic growth, within which expanding human capabilities is regarded as instrumental to improve economic outcomes. A broad interpretation highlights inclusive development (Rauniyar and Kanbure 2010). This approach emphasizes non-income measures of well being and valuing human capabilities, such as good health and literacy, primarily as human development outcomes, not as instruments to accelerate economic growth. To assess the progress in achieving inclusive growth, a composite inclusive growth index has been constructed. It includes suitable indicators in the area of (1) growth of productive employment, and economic infrastructure,(2) income, poverty and equity including gender equity (3) human capabilities and (4) Social protection. One of the significant aspects of inclusiveness is represented by the employment content of economic growth, that employment should be the decent employment opportunities as a critical aspect of inclusive growth (World Bank 2009 and Ali 2007).

Generally inclusiveness has been addressed in terms of income, poverty income inequality, and productive employment. The attention has primarily been on the demand side of the achievement of equitable access to opportunities. This monitors the demand for labour and the associated generation of income and its distribution – whether equitable or not – among the population. However, even if inclusive growth is defined narrowly, the supply side of such access still needs to be addressed, that is whether the working population possesses the human capabilities necessary to be productively employed to take advantage of available economic opportunities. Such focus leads to consideration of the population's access to public goods and services. The prominent dimensions include access to health and education services, and to other vital infrastructure such as safe water and adequate sanitation. Such dimensions

as health and education can be interpreted in various ways. They are often regarded as human development outcome, but they can also be seen as human capabilities that can generate additional income, accelerate the pace of growth. Within the analytical framework of inclusive growth, health and education can also be utilized as a barometer that a country's population enjoys.

It is well known that health expenditure in India is dominated by private spending. This is a reflection of the inadequate public spending. This shows the unfortunate feature of Indian development. Since we know that there are large positive externalities associated with health spending, which make health spending a clear merit good. The greater reliance on private delivery of health infrastructure and health services is not suitable which in turn deny adequate access to the poor. It adversely affects current social welfare and labour productivity and will harm future growth and development prospects. It is perceived that the government expenditure on health is undermined during the period of economic liberalization since the early 1990s.This is the matter of serious concern. It is generally believed that like the other consumer goods, demand for health services also increases with the increase in income and population of country. This requires the government of the country to allocate an increasing amount of its total expenditure on health sector to meet growing demand. In India since 1980 and more particularly after the economic reforms GDP and Per Capita Income (PCI) has increased rapidly. However conditions of public health services do not look to have improved significantly. It is in this context the study seeks to examine the existence of relationship between growth of income and public health expenditure in the case of India. Though there has been high rate of growth of GDP & PCI during the period, the conditions of the public health services do not seem to be that good. The study seeks to examine whether there is long term relationship between national income and health expenditure. This relationship enables the policy maker to decide on how much aggregate health expenditure will change in the coming years, based on a forecast of the trend in national income. Many of the studies find that there is a strong and positive correlation between the gross domestic product (GDP) of a country and national expenditure on health care (HCE).

The arrangement of the paper is as follows, Second section presents review of the literature. Third section describes the financing of health in India. The data and methodology and empirical analysis are in fourth and fifth sections respectively, the final section draws some preliminary conclusions and suggestions.

2. Review of the Literature

The initial studies have used cross-section data to identify the determinants of health expense. Newhouse (1977) finds that per capita income is an important factor determining health care expenditure in developed countries and concludes that the income elasticity of national HCE is greater than one. Gerdtham et al (2000) estimated the income elasticity of health expenditure as 1.33 which is significantly greater than one of OECD countries. Milane and Monala (1991) also report that health care is a luxury good, but that countries with highest real per capita income health care have relatively expensive health care, implying the large income effect may be offsetting the price effect. Parkin et al (1987) criticize the use of aggregate data and international comparison to estimate income elasticity. They suggested the use of purchasing power parity rather than exchange rate conversion to deflate cross-national series on GDP and health care expenditure and conclude that health care is necessity rather than luxury good. Some studies have used the panel structure data to analyze the statistical relationship between per capita health care expenditure and aggregate

income. Using this method Gerdtham (2000) found that health care expenditure does not appear to be income elastic, contrary to the result of earlier studies. The use of cross-sectional data has been criticized for the smallness of many of the data. Some studies have pointed out that the possible problems with using panel data from different countries due to the presence of trending in variables. Hansen and King (1996) pointed out that panel data estimates of HCE and GDP might be spurious. Some recent studies have found the existence of cointegration between per capita income and health expenditure. Since variables with time series characteristic are not satisfactory. They require different techniques such as unit root tests, cointegration and vector error correction model. Nikolaos Dritsakis investigated the relationship between health expenditure and GDP for 15 member countries of European union, using unit root test and Engel- Granger and Johansen Juselious cointegration test and found long –run relationship between the variables for most of the member countries of European union.

3. Financing of health in India

Finance is the most critical of all determinants of a health system. Health financing has many sources such as the tax-based public sector that comprises local, state and central government, in addition to numerous autonomous public sector bodies, the private sector including not- for –profit sector, directly through insurance households through out of pocket expenditure including user fee paid for public facilities and external financing(through grants and loans). While taxation is considered the most equitable system of financing, out of pocket expenditure by households is considered the most inequitable.

Health spending in India is estimated to be in low range. Therefore, an exercise was undertaken to construct estimate of health spending based on a National Health Account (NHA) framework. Results from the NHA show that the estimated health expenditure in India, for the year 2001-02 was approximately Rs 108732 Crore, accounting for 4.8% of the GDP at current market price. While health as a percentage of the GDP measured at factor cost works out to 5.2%. Out of this, Central, State and Local governments together spend one fourth of the total health expenditure. The share of other Central ministries, which include railways, defense, and post and telegraphs other civil ministries etc., is estimated to be about 2.42% of total health spending in the country. Local governments' resources for health care are through transfers from state governments and their own resources. Public health spending in India has a major role in terms of planning, regulation and shaping the delivery of health services such as public provisioning is considered essential to achieve equity and to address the large positive externalities associated with health. In India, health being a state subject, the sector is financed primarily by the state governments. The per capita total health spending was estimated to be around US$23 during 1997-2000 (World Bank). As compared to the levels of spending by countries such as Sri Lanka (US$ 31) and Thailand (US$71), the spending in India is substantially low. A breakdown of health expenditure reveals that expenditure by the public sector in these countries is twice that of India. Public spending in India gradually accelerated from 0.22% in 1950-51 to 1.05% during the mid -1980, and stagnated at around 0.9% of the GDP during the later years. Of this, recurring expenditure such as Salary and Wages, drugs, consumables, etc account for more than 90% and is on the rise in recent years (Based on National Health Accounts (NHA), 2001-2002). Similarly per capita spending by the government is far below the international aspiration of US$ 12 recommended for an essential health package by the World Development Report1993

(World Bank). As a result of stagnant budgetary allocations, the quality of care suffered substantially and adversely impacted on the utilization of government services by household. As far as public spending on the health sector by the state is concerned, it increased to about 0.9% of GDP as per estimate of 2003-04, from 0.8% in 1975-76. During the decade 1975-85, it registered a substantial increase and reached a high of 1.05%. (Based on State demand for grants for various years). Therefore, it deteriorated steadily due to the general fiscal stress during the late 1980s followed by reform measures initiated in the 1990s. The severity of the fiscal strain during the late 1980s forced the state government to introduce austerity measures and the health sector was targeted for expenditure compressions. Similarly, when reform measures at the Centre during the early 1990, fiscal transfers to states were compressed leading to reductions in health sector allocation at the State level.

4. Data and Methodology

The data consists of annual plan and non plan expenditure of Government of India on health and family welfare in actual as rupee in crore during the period of 1989-90 to 2010-11. Data on expenditure has been obtained from Union Budget of Government of India and data on Net domestic product (NDP) at current prices with base year 1999-2000, has been obtained from Reserve Bank India(RBI) handbook on statistics. Expenditure on health and family welfare are measured in per capita terms. All variables such as plan expenditure per capita (PEPC), non plan expenditure per capita (NPEPC), total expenditure per capita (TEPC) and net domestic per capita (NDPPC) except population growths have been converted into natural logarithms to get economic interpretation.

The cointegration analysis is employed to examine the long-run relationships between total Health expenditure and NDP and population growth in India. According to Engle and Granger, if two variables are cointegrated, there is underlying long-run relationship between them. If the two variables are X_t and Y_t which are non-stationary but stationary in first difference, X_t and Y_t are integrated of order one I (1) and their linear combination would be:

$$Z_t = X_t - \square\, Y_t \qquad (1)$$

If there is a □ such that Z_t is the integrated order of zero I(0), the linear combination of X_t and Y_t is stationary, and the two variables are said to be cointegrated. These variables may drift apart in the short run but they have tendency to move towards long run equilibrium. First of all a test for the presence of unit roots in variable is made. This requires the use of augmented Dickey and Fuller or Phillips and Peron tests. The augmented Dickey and Fuller test uses a regression of the first differences of the series against the series lagged once, X_{t-1} and lagged difference terms. It may include a constant term α and trend term δ_t as follows:

$$\Delta X_t = \beta\, X_{t-1} + \sum_i^p \gamma\, \Delta\, X_{t-1} + \varepsilon_t \qquad (2)$$

$$\Delta\, X_t = \alpha + \beta\, X_{t-1} + \sum_i^p \gamma\, \Delta\, X_{t-1} + \varepsilon_t \qquad (3)$$

$$\Delta\, X_t = \alpha + \beta\, X_{t-1} + \delta_t + \sum_i^p \gamma\, \Delta\, X_{t-1} + \varepsilon_t \qquad (4)$$

The test for a unit root has the null hypothesis that β=0. If the coefficient is statistically different from zero and is negative the hypothesis that X_t contains a unit root is rejected. Phillips and Perron (1988) proposes an alternative (non parametric) method of controlling for serial correlation when testing for a unit root. The PP method estimates the non augmented DF test equation.

The two main approaches used to test the existence of cointegration relationships are the Engle and Granger and Johansen approaches. Both the approaches test the series for the presence of a unit root and determine the order of integration. This study employs Johansen's procedure to test for cointegration between two series. The Johansen approach relies on the relationship between rank of a matrix and its characteristic roots and estimates long-run relationship between nonstationary variables using a maximum likelihood procedure. If it is elaborated further, the Johansen tests are on the rank of the coefficient matrix π of the equation Johansen and Juselius has the following form:

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \text{------} + \Gamma_{k-1} \Delta X_{t-(k-1)} + \pi X_{t-k} + \mu + \varepsilon_t \qquad (6)$$

Where X_t is a K x 1 vector of I(1) variable of Γ_1------ Γ_{k-1}, π is K x k matrix of unknown parameters π, coefficient matrix contains information about long-run relationship. The π can be interpreted as a long-run coefficient matrix. The test for cointegration between the Xs is calculated by looking at the rank of the π matrix via its eigenvalues. The rank of a matrix is equal to the number of its characteristic roots (eigenvalues).

There are three different cases considered regarding the rank of the matrix π

Case-1 when π has a full rank (i.e. there are r = n linearly independent columns) the then variables in X_t are I(0)

Case-2 when the rank of π is zero (i.e there are no linear independent columns) then there are no cointegrating relationships.

Case-3 when π has a reduced rank (i.e there are r ≤ (n-1) linearly independent columns) and therefore there are r ≤(n-1) cointegrating relationships. The reduced rank condition implies that the process ΔX_t is stationary and X_t is non- stationary.

The presence of cointegrating vectors can be obtained by determining the significance of the characteristic roots of π. Both the trace test and the Maximum eigenvalue test determine the significance of the number of characteristic roots that are not different from unity. The test statistics are formulated as

$$\lambda_{trace}(r) = -T\sum_{i=r+1}^{k} \ln(1-\lambda_i)$$

$$\lambda_{\max}(r,r+1) = -T\sum_{i=r+1}^{k} \ln(1-\lambda_{r+1})$$

Where λ_i = the estimated values of the characteristic roots obtained from the estimated π matrix.

r= no. of cointegrating vector.

The critical value for the tests is tabulated in Johansen and Juselius. Π is defined as the product of two matrices, $\propto$ and β' of dimension (K x r) and (r x K) respectively i.e $\pi = \propto \beta'$

The matrix β gives the cointegrating vectors, while $\propto$ gives the amount of each cointegrating vector entering each equation of the VECM, also known as the adjustment parameters or speed of adjustment.

5. Empirical Analysis

During the investigation of long-run relationship among the variables such as net domestic product and health expenditure, first of all the series is tested for stationarity, since the data used in the present study is time series in nature. if there is unit root, the series is non- stationary. The tests of unit roots were performed using Augmented Dickey Fuller Test and Phillips and Perron. The null hypothesis is that the series has unit root against the alternative that they do not have (are negative). The result of unit root test is reported in table-1a and 1b. The result shows that the variables like per capita domestic income and per capita planned expenditure are non stationary at level but are stationary at first difference. But per capita total health

expenditure is not found to be stationary at first difference. Hence, we rule out the application of Johansen test for cointegration to find cointegration between domestic income and total health expenditure as they are integrated of different order. Since domestic income and planned expenditure are integrated of same order, thus ensuring the condition to apply Johansen and Juselius approach to cointegration, we test the existence of cointegartion between these two variables only. Since, the result of VAR analysis is also affected by number of lag period, appropriate lag is selected on the basis of Akaike information criteria (AIC) shown in table-2. Thus, to estimate the long run relationship between per capita domestic income and health expenditure, we have applied the Johansen and Juselius approach to cointegration. The result is summarized in table-3a and 3b. Table 3a provides the result of trace statistics.
Starting with the null hypothesis of no co-integration among the variables, trace statistics is 15.25741 which is less than the 5 percent critical value of 15.49471. Thus we accept the null hypothesis of no co-integration among these variables at 5 percent. We find similar result from Maximum Eigen Statistics table. In this table, we again find that Maximum Eigen value is less than the critical value for no co-integration and accept at no co-integration at 5 percent level of significance. Thus, we may conclude that per capita planned expenditure and per capita domestic income are not cointegrated, and hence, there is no long run equilibrium relationship between per capita planned expenditure and per capita domestic income in the case of India. This implies that increase in health expenditure since 1980 has no relation with increase in income. This may be due to some other socio-economic or political factors.

Conclusion:
Using Johnsen's cointegration relationship, the paper has examined the existence of long run relationship between per capita domestic income and per capita planned expenditure on health or per capita total expenditure on health. The result shows that total expenditure and domestic income are integrated of different order. Hence, these two variables will not have cointegration relationship. The result of cointegartion between per capita domestic income and per capita planned expenditure rejects the hypothesis of existence of long run relationship between these two. Thus we may conclude that growth of planned health expenditure over time period may have occurred due to other reasons than to increase in per capita income of the country.

Table1a: Results of Unit Root Tests for the levels and the first difference of series (Augmented Dicky-Fuller Test)

Variables		Level		First Difference		Order of Integration
		Constant	Constant & Trend	Constant	Constant & Trend	
NDPPC		3.064542	-0.833904	-2.879483	-4.355836	I(1)
PEPC		-0.250551	-2.494778	-3.557100	-3.419016	I(1)
TEPC		-0.397059	-2.756655	-3.306239	-3.245635	I(2)
Critical Value	1%	-3.788030	-4.467895	-3.808546	-4.498307	
	5%	-3.012363	-3.644963	-3.020686	-3.658446	
	10%	-2.646119	-3.261452	-2.650413	-3.268973	

Mackinnon(1996) one-sided critical value. *and** represent significant at 1% and 5% respectively

Table1b: Results of Unit Root Tests for the levels and the first difference of series (Phillips-Perron Unit Root Test)

Variables		Level		First Difference		Order of Integration
		Constant	Constant & Trend	Constant	Constant & Trend	
NDPPC		3.064542	-0.825645	-2.801951	-4.360860	I(1)
PHEPC		-0.255538	-2.215055	-3.458801	-3.295873	I(1)
THEPC		-0.387086	-1.969491	-3.062342	-2.934959	I(2)
Critical Values	1%	-3.788030	-4.467895	-3.808546	-4.498307	
	5%	-3.012363	-3.644963	-3.020686	-3.658446	
	10%	-2.646119	-3.261452	-2.650413	-3.268973	

Mackinnon(1996) one-sided critical value. *and** represent significant at 1% and 5% respectively

Table 2: Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	14.80493	NA	0.000760	-1.506462	-1.408437	-1.496718
1	70.18099	91.20763*	1.82e-06*	-7.550705*	-7.256629*	-7.521473*
2	71.33115	1.623760	2.61e-06	-7.215430	-6.725304	-7.166710
3	75.04500	4.369232	2.89e-06	-7.181765	-6.495589	-7.113558

Johansen's Test of Cointegration

Table 3a: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Values	Prob.*
None	0.451439	15.25741	15.49471	0.0543
At most 1	0.149911	3.248276	3.841466	0.0715

Note: Test was performed using E-views 6

Trace statistics shows no cointegration at 5 percent critical level.

Mackinnon-Haug-Michelis (1999) p-values.

Johansen's Test of Cointegration

Table 3b: Unrestricted Cointegration Rank Test (Maximum Eigen Statistics)

Hypothesized No. of CE(s)	Eigen Value	Maximum Eigen Statistics	0.05 Critical Values	Prob.*
None	0.451439	12.00913	14.26460	0.1103
At most 1	0.149911	3.248276	3.841466	0.0715

Note: Test was performed using E-views 6

Trace statistics shows no cointegration at 5 percent critical level.

Mackinnon-Haug-Michelis (1999) p-values.

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