Relationship between Public Health Expenditure and Economic Growth

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Abstract—*The paper empirically examines the relationship between public health expenditure and economic growth for a panel of 12 selected developing countries for a data from 1995-2013. The techniques of Unit Root Test and Co-integration are used to test the stationarity and short run and long run relationship between them. It also studies a growth model with variables including public health expenditure, employment rate, gross capital formation and expenditure on renewable sources as inputs. The results are two-fold. First, we establish a short run and long run relationship between public health expenditure and growth rate for the data. Second, the growth model delivers a negative relationship between public health expenditure and growth rate in developing countries.*

1. INTRODUCTION

Human capital formation has been identified as a yardstick to measure economic growth. Health – the state of being physically, mentally and socially sound in addition to the absence of illness – is one of the key features of human resource. Good health plays a catalytic role in the economic development of countries. This is because a good health status is reflected in a more productive and efficient labour force which does not take frequent leaves due to illness, resulting in human resource development. It also saves the resources in terms of time and income which would have been used in the treatment of ill-health and thus permits their employment in other fruitful purposes. Health is also a latent determinant of education as only a robust individual can attain higher levels of education with regularity and competency. Thus health is a significant and positive instrument of the economic welfare of any individual and country.

Government intervention in health aims to ensure equal access of healthcare to everyone in the society and comes to rescue in times of market failures in health sector due to positive externalities and asymmetric information. Thus, public health expenditure finds space in our study as a proxy of health welfare.

On the other hand, a higher GDP and hence a higher income implies more resources available to the government to be spent on public health, thus implying a direct relationship between them. Hence, income has acquired an integral role as a determinant in the level of public health expenditure across countries. This role is evident in the wide variation in the GDP share of public health expenditure across developed and developing countries. While countries like USA spend as high as 8.1% of their GDP on health, developing countries like India are barely able to shell out even 1% of their income for this purpose. Thus, any study on public health expenditure calls out for a division of developed and developing regions.

There is another possible case where a higher income can result in people opting for better quality services offered usually by private sector, decreasing the public health expenditure. Hence, we may expect a unidirectional relationship from economic growth to public health expenditure or vice-versa or both between the two variables.

Thus, this paper aims to examine the long term and short term relationship between economic growth (measured as growth rates) and public health expenditure (measured as a percentage of GDP) for a panel data of 12 developing countries – Russia & Chile, belonging to high income group; China, South Africa, Turkey & Argentina belonging to upper income group; India, Pakistan, Sri Lanka, Vietnam & Ukraine belonging to lower middle income; and Bangladesh belonging to low income group from 1995-2013.

For these purposes, we use the instruments of unit root test and co-integration test. The findings of this paper establish a long term and short term relationship between them and the stationarity of the two variables across developing countries.

The study also examines a growth model using public health expenditure, employment rate, gross capital formation and renewable energy expenditure as inputs. A negative relationship emerges between public health expenditure and growth rate in developing countries which can be explained by the high degree of trade off faced by them due to limited resources and subsequent pressure to raise debt for the same.

The remaining study is structured as follows: Section 2 examines the existing literature on the subject, Section 3 describes the methodology used and the data sources, Section 4 explains the results and their discussion, and Section 5 is the concluding remark along with the limitations of this study.

2. LITERATURE REVIEW

The theoretical background of relationship between growth rate and public health expenditure was first postulated by Wagner (1883). He states that when the per capita income of a country increases, the government would raise public spending. This law is referred as Wagner's law which implies that growth of GDP causes a rise in public expenditure. In this case there exists a unidirectional causality from GDP growth to public expenditure.

Fuchs (1996) empirically tested aggregate income as an important variable of health care expenditure, but this study did not test the causality, that is, whether rise in health expenditure can give rise to aggregate income. Hansen and King (1996) carried out a country wise ADF test for unit root before they conducted co-integration tests and found that use of panel data results in a spurious relationship between GDP estimates and health spending.

Bloom and Canning (2000) concluded that healthy individuals tend to live longer and get motivated to invest in their abilities therefore increase their human capital value which in turn will positively affect income. This study further connected the findings of Smith life cycle model (1999) establishing the relationship between health status, future income, welfare and consumption.

WHO's Commission on Macroeconomics and Health (2001) considers health as one of the crucial indicators of human health therefore investment in health is considered as an important source for economic growth. Devlin and Hansen (2001) tested the Granger causality between health expenditure and GDP by using annual OECD data from 1960-87 and concluded a bi-directional relationship between health expenditure and GDP.

Jaunky , V.C and Khadaroo, A.J . (2008) investigated income elasticity of health care expenditure for 28 African countries over the decade 1991 – 2000 . The paper used the separate models for both public and private health expenditure .In both the short-run and long - run, public health expenditure is found to be a luxury while private health expenditure a necessity.

Zahra Mila Elmi and Somaye Sadeghi concluded a bilateral causality in relationship between economic growth and spending on health in long run for developing countries . They emphasized health is an important factor in developing countries and also confirms the hypothesis of health – led growth in the developing countries .

Chlestsos Michael Dimou Spiridoula (work in progress) investigated the impact of health care spending on economic growth for 28 OECD countries for 1990 – 2008 . According to the findings, an increase in health expenditure may cause a slight but significant decrease in growth .

Mohsen Mehrara, Ali Akbar Fazaeli and Amir Abbas Fazaeli, Reza Fazaeli (2012) examine the stationary and co integration between the health expenditure and GDP based on the panel co integration analysis for a panel of 13 MENA countries using data for the period 1995-2005. Panel unit root tests results indicate that both health expenditure and GDP are non-stationary. Even though, the findings indicate that health expenditure and GDP are co integrated they concluded that the share of health expenditures to GDP decreases with GDP. This implies that health care is not a luxury good in MENA countries.

3. OBJECTIVES OF THE STUDY

1) To examine stationarity of growth rates and public health expenditure for the period 1995 – 2013 for 12 selected developing nations, chosen from the different
2) To identify the short- run and long – run relationship between growth rates and public health expenditure .
3) To visualize a growth model emphasizing certain inputs like public health expenditure, employment rate, gross capital formation and expenditure on renewable source .
4) To identify and evaluate the significance of health expenditure in determining growth rates in developing countries.

4. METHODOLOGY

In order to achieve the above mentioned objectives, a set of 12 developing countries is considered for analysis. Among all the developing countries, we have selected countries from each group of income as per UN Classification : High Income (Russia and Chile), Upper income (China, Turkey, South Africa & Argentina) &, Low and middle income (India, Sri Lanka, Pakistan, Vietnam & Ukraine) and Low income (Bangladesh).

To explore the relationship between growth rates (grth rate) and public health expenditure as percentage of GDP (Phe) the study considers the time period from 1995 – 2013 .

Data source for the two variable are taken from World Bank Database.

To identify the existence of stationarity in growth rates (grth rate) and public health expenditure as percentage of GDP (Phe), Unit Root test is conducted .

Unit Root Test :

Most of the time –series are often found to be non–stationary and have uinit root . The presence of a unit– root in any time series implies that the mean and the variance are not independent of time. In such cases conventional regression techniques produce spurious results .

Thus, Dickey – Fuller test is used to test whether a unit – root is present in autoregressive model.

Co-integration :

The possible presence of co-integration must be taken into account while choosing a technique to test hypothesis concerning the relationship between two variables having unit roots (integrated of at least order one). Non– stationary series with the same order of integraton could be co-integrated if there exists some linear combination of series that can be tested for stationarity. Co-integration is a test for long– run equilibrium of non – stationary series that do not have equilibrium relationship in the short – run. Further the existence of Co-integration between two time series indicates the existence of causality relationship at least in one direction .

Growth Model :

The growth model specification for this study is given as

Y = f (Human capital , capital , energy , labor)

grth rate = f (gcf , emp , phe , ren engy)

grth rate : GDP growth (annual %) as an indicator of Output or Income .

gcf : Gross capital formation (% of GDP) as indicator of capital inevestment

emp : Employment to population ratio, 15+, total (%) (national estimate) as an indicator of labor input

phe : Health expenditure, public (% of GDP) as indicator of investment in human capital

ren engy : Renewable energy consumption (% of total final energy consumption) as indicator of energy input

5. RESULTS & DISCUSSION

Unit Root Test for growth rate

H0:All panels contain unit roots

Ha : Some Panels are stationary

Number of panels=13 Number of periods=20

Table 1

Statistic p-value
W-t-bar -2.8544 0.0022

The Augmented-Dickey Fuller test reveals stationarity of growth rate.

Unit Root Test for Public health expenditure

H0:All panels contain unit roots

Ha : Some Panels are stationary

Number of panels=13 Number of periods=19.85

Table 2

Statistic p-value
W-t-bar -19.0056 0.000

The Augmented-Dickey Fuller test reveals stationarity of public health expenditure with 2 lag time period.

Co-integration Test

Results for H0 : No co-integration

Table 3

Statistic	Value	Z-value	P-value
Gt	-2.460	-0.414	0.340
Ga	-8.918	1.640	0.950
Pt	-9.029	-1.615	0.053
Ps	-8.143	0.464	0.679

Regression Results for Growth Model

Table 4

Source	SS	Df	MS
Model	1119.25816	4	279.814541
Residual	2337.82204	176	13.2830798
Total	3457.0802	180	19.2060011

Table 5

Growth	Coeff	Std. Err.	t	p>|t|	[95% Conf Int
GCF	.2360198	.0537784	4.39	.ooo	.129886 .342153 -
Emp	.0012213	.0326187	.04	.970	.063152 .065595
PHE	-1.337572	.3887604	-3.44	.001	-2.10480 -.570339
RE	-.0378875	.020708	-1.83	.069	-.078755 .0029804
Cons	3.838328	2.385929	1.61	.109	-.870383 8.54704

Table 6

Number of Observations	181
F (4,176)	21.07
Prob>F	.000
R-Squared	.3238
Adj R—Squared	.3084
Root MSE	3.6446

The Unit root test for stationarity of growth rate for the time period 1995–2013 reveals stationarity of growth rates (Table 1). Public health expenditure variable is non – stationary without lag but it becomes stationary with one – lag period (Table 2). This can reflect the impact of structural change or change in political set up which affects the public spending on health.

The Co-integration test yields a short – run relationship between growth rate and public health expenditure for the selected countries which is observed to be significant . The long - run relationship between growth rate and public health spending is also significant, thus implying that there exists both short – run and long – run significant relationship between growth rates and public health expenditure in developing nations. (Table 3)

While analysing the intuitive growth model (Tables 4-6), we conclude that Gross fixed capital formation has a positive impact on growth rate and the impact is significant, public health expenditure holds a negative impact on growth rates and this negative impact is significant, employment has a positive but insignificant effect.

Investment plays a crucial role in determining growth rates in the developing countries which conforms to our result. Similarly a rise in public health expenditure reduces the amount that could be invested in more productive activities which affect growth rates positively in developing nations and the resource constraint faced by developing nations compels to finance their expenditure through borrowing. Employment rate does not contribute substantially to the growth of developing countries because of the lack of skilled labour in developing countries and the infrastructural bottlenecks added to a diversion of funds to renewable sources which does not yield results immediately, gives a negative relationship between renewable energy consumption, though insignificant.

Therefore a rise in public spending on health services would hold a negative impact on growth rates.

By running the Cobb-Douglas Production growth model, elasticity of public health expenditure with respect to growth rate is -0.256 which implies that 1% increase increase in rate of public health of expenditure, growth rate will decrease by 0.25%

There are mixed trends of spending in public expenditure across various countries as depicted in Figure !

6. CONCLUSION

The purpose of this study is to primarily explain the relationship between economic growth and public expenditures in 12 selected developing countries from 1995-2013. Using Unit Root Test and Co-integration tests, the stationarity and long run and short run relationship are established. The growth model explains a negative relationship between public health expenditure and growth rates indicating three things. First, it takes time to witness the growth effects of public health expenditure, that is there is a time lag between the expenditure and its effects on human capital and hence growth. Second, there exists infrastructural deficiencies in terms of non-availability of hospitals, pharmaceuticals, equipments and a poor doctor to patient ratio in developing countries. Thus, they need to heavily invest in these domains in addition to provision of healthcare services to an extent much larger than developed countries, increasing the former's public health expenditure. Third, developing countries are capital-scarce and hence they have to switch to borrowing, widening their budget deficit.

Yet, health remains an indispensable ingredient in human capital formation and thus, developing countries must invest in it despite the slow process of the returns. In the long run, a skilled and healthy labour force more than compensates for the deficit in government budget.

However; this study is plagued with limitations. It fails to incorporate the role of private expenditure on health and out of pocket expenditure. Secondly, the growth model generated by the paper, crucial indicators such as gross enrolment ratio, life expectancy and infant mortality rate have been ignored.

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