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Health Expenditures, Institutional Quality and Economic Growth

Syeda Anam Fatima Rizvi[1]

Abstract

The study aims to determine the effect of health expenditures on economic growth while taking into account the quality of health institutions, keeping in view the fact that it's not just the level, rather quality of expenditures or institutions that matters. Our hypothesis was where institutions are better health investment in health brings more economic growth as compared to those with low quality institutions. To attain that objective the standard neo-classical Solow Growth Model at steady-state level was taken as theoretical framework and made a production function adding institutional quality proxied by government effectiveness along with other variables like health expenditure, primary education completion rate, population growth etc. For estimation purposes, data for the sample of 20 South, East Asian and Pacific developing countries was used for the period 1995-2017. It was found that if health expenditures adjusted for the quality of government expenditures increase by 100%, then the economic growth will increase by 5%.

Keywords: economic growth, government effectiveness, health expenditures, institutional quality
JEL Classifications: H510, I150, O150

1. Introduction

Health spending and Health outcome linkages have been studied across the world with different lenses. This linkage is very weak for the countries where institutional issues persist such as imperfect research and complicated data to design effective policies, but evidence on the nature of health institution quality in developing countries has begun to emerge. Poor quality institutions caused severe restrictions on improving health with conveyance of health

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care services in case of developing countries. In this paper we will discuss some evidence on this topic and significance of institutional firming to improve health status.

In the last two decades there is a remarkable improvement in access to health care, although in the case of quality of health care services the improvement is very less hence the outcomes are not as desired. Recent evidence proposes that insufficient care and under-performance are due to lack of accountability and unproductive motives (Lewis, 2006). This may feature the weaknesses such as government failure, effectively government interventions that have gone wrong (Jack & Lewis, 2009).

Quality of institution in health sector is understudied despite being very important. Destabilized health investments which lead to unclear relationship between health status and health care services are a result of lack of effective institutions. In middle-income and poorer countries, indicators like utilization statistics, hospital infection incidence and surgery survivals are rarely collected owing to lack of enforcement and regulation (Lewis, 2006).

Some indirect measures like corruption, lack of medical supplies, poor management, and funds leakage and provider absenteeism also undermine effective service supply. Hence to improve health status besides having more investment in health care, the quality of institutions matter more than anything. Thus the linkage between expenditure and outcome will remain feeble until the problem of quality of expenditure is being solved.

A lot of work has been done in health expenditures economic growth literature (some review is provided in the next section) but very few studies focus on the quality of expenditure or institutions alongside the health investments. Since health expenditure is not an exception, therefore only relevant articles are selected. Our contribution in the related research is to capture the effect of institutional quality alongside measuring the effect of health expenditures on the economic growth. Institutional economics literature proposes that it's not the level rather the quality of expenditure or institutions that matters for achieving the economic growth. We have extended the standard neo-classical Solow Growth model at steady-state level by adding institutional quality along with

the health expenditure in the production function to see the health expenditure growth impacts. Our specific hypothesis is that when institutions are better, the investment in health brings more economic growth as compared to other countries with lesser institutional quality.

After the introduction, we have presented some literature review in section 2, followed by the theoretical model in section 3 where we have extended the basic Solow growth model by adding the health expenditures and institutional quality variables, after that section 4 has the data and econometric methodology is described. Section five presents regression outcomes. Section six covers the conclusion and some policy implications.

2. Literature Review

Being healthy is a crucial element of one's well-being. Both at macro and micro economic levels health is found to contribute positively to growth in economy. Health capital impact on economic growth had been explored theoretically (Barro, 1996; Van Zon & Muysken, 2001, 2005) and on the empirical side as well (Bloom, Canning, & Sevilla, 2004; Gyimah-Brempong & Wilson, 2004; Rivera & Currais, 1999). Positive impact of health has been acknowledged by many studies, however it shows strong effect in poor countries than rich (Hartwig, 2010).

Mostly macroeconomists accept the important role in economic growth played by development of human capital. In this regard; Bloom, Canning, and Sevilla (2001) have noted that better health impacts positively, is sizable and have significant impact on the aggregate output through extending production function by two additional variables as the components of the human capital, and these are health status and work experience. Similarly, Akram, Padda, and Khan (2009) explored the relation of health capital with economic growth in case of Pakistan for period 1972 to 2006 and found that health is vital for securing long-term economic growth objective for the reason that health variables significantly impact long-term economic growth.

Similarly, Narayan, Narayan, and Mishra (2010) have investigated the relation in health capital and economic growth for

five Asian countries for the period 1974-2007. In the study it was identified that for the long run investment, health, Research and Development and exports contribute positively in economic growth while import's effect on growth is negative and it was also found that education is showing an insignificant effect on economic growth.

Boachie (2015) examined the health effect on growth in country Ghana for 1982-2012 and found that health, is in fact, the vital factor for economic growth. Improvement in health of work force will raise the output in the economy. Also, Fogel (1994) found that during the period 1790-1980 in Britain, one third of income growth was derived from improvements in health. Similar results regarding positive contribution of health indicators have been identified by Barro and Sala-i-Martin (1995). Also, Sachs and Warner (1997) showed that a quadratic/non-linear relation between health indicators and economic growth exists for 83 countries between the periods 1965-1990.

Healthier work force has an important relationship through the human capital buildup process. For instance, Wheeler (1980) found that improvement in health considerably increases the labor productivity and livelihood. Rivera and Currais (1999) also examined the role of health status in human capital development. The study's results reveal that health investment have contributed meaningfully to explain deviation in output growth due to human capital. Arora (2001) found that 30-40 percent long-term economic growth was due to improvements in health status in 10 industrial countries. Similarly, Bhargava, Jamison, Lau, and Marry (2001) showed positive relation in adult survival rates and the economic growth.

Similarly, Mayer (2001) studied the relationship of growth and health status by focusing on probability of the adult survival as a measure of health status and found that health improvement has caused economic growth in Latin America. Also, the growth effects of up gradation in health status were higher in females than that of males.

2.1. Research Gap

Most of the reviewed studies found that health improvement contributes significantly to growth except a few, which concludes that health status up gradation in the times after World War II had resulted in negative effects on the incomes. These studies approached this idea through the prolonged life expectancy; for instance, Acemoglu and Johnson (2007) argues that health improvement will reduce the per capita income because the improvement in health would cause high population growth than the GDP growth which will result in per capita income or GDP fall.

Now our study takes a third approach where the effectiveness of health expenditures is theoretically considered true, but it will depend on the institutional quality that the increased expenditures would have a significant or a smaller impact. As merely increased spending doesn't reflect improved outcome as well. The question ultimately boils down to the processes involved and the overall governance structure which will help us understand the effectiveness of increase health expenditures.

3. Theoretical Framework

The usual theoretical structure for empirical exploration for factors of the economic growth originates from the Solow's (1956) standard neo-classical growth theory and Romer's (1986) endogenous growth theory, where these both helped to explain the factors of growth of the economy in conventional method.

The neo-classical growth theory explains that output consists of value addition/processing of capital, labor and technical knowledge in the economy. Therefore, output changes are caused primarily through changes in the capital and labor as factor of production. However, in Solow model constant and/or decreasing returns to scale as an assumption is fixed for production function which says that increasing the inputs by two times will double the output. Other inputs like natural resources and human capital are considered unimportant in neoclassical growth theory. However, saving rate, population and technology are measured exogenously in the Solow model.

In this context, Mankiw, Romer, and Weil (1992) in their classical extension to the growth theory modified the work of Solow to explain the effect of human capital accumulation on economic growth. This model in literature is called as Augmented Solow Model (ASM) and it states that human capital is crucial in neoclassical production function as an input.

According to this approach for the human capital e.g. education and health status are considered as separate inputs or complementing labor in the process of production (Barro, 1991; Bloom et al., 2001, 2004; Mankiw et al., 1992). Hence, output growth would be due to excellence in the capital accumulation which had been neglected in neoclassical theory.

On the other hand, endogenous growth theory considers that mainly it is innovation, human capital, and knowledge which determines the growth. It envisages that the depreciation speed of the existing capital stock can be halted by investment in the human capital. Further this expenditures boost economic growth via positive externalities. Therefore, endogenous growth theory postulates a production function with non-decreasing returns to scale, i.e., increasing or constant returns, (Romer, 1986).

Thus, the technology, human knowledge and resources would be the major factors for the country's economic growth if appropriate setup of endogenous growth model is adopted.

Irrespective of the growth theories; economists by and large accept that human capital accumulation i.e. health and education acquisition contribute in the economic development. Many studies (like Bloom et al., 2001, 2004; Mankiw et al., 1992) considered Augmented Solow Model (ASM) for investigating the effect of human capital on the economic growth. Thus, health capital would be taken as a distinct input for the production function as capital and labor. This approach is also followed in this study, where we wish to observe the influence of health expenditures on growth, but we have extended it with institutional quality within this augmented neoclassical framework, i.e., ASM.

3.1. The Model

As per the empirical literature on role of health investment on economic growth, this study is set to evaluate the impact of health expenditures on economic growth in the context of an extended ASM. Considering studies such as those of Mankiw et al. (1992), Knowles and Owen (1997), Boachie (2015) and Bloom et al. (2001, 2004), this study have assumed that the progress in output is a result of input grouping through technology (i.e., the level and variations in technology). For this study the inputs are recyclable physical capital (K), labor (L), human capital (H)[2], and technological progress (A). This study have further decomposed human capital (H) into health expenditures (*h*) and educational outcomes (*e*) to represent the level of Human Capital together. 'A' here represents TFP which in our case would be government effectiveness as a proxy for expenditure efficiency and a control variable trade openness.

We assume that model is static and production will take place using a cobb-Douglas sort production function.

$$Y(t) = K(t)^{\alpha} . H(t)^{\beta} (A(t) . L(t))^{1-\alpha-\beta} \quad \textbf{(1)}$$

L and *A* are supposed to increase exogenously with rates *n* and *g* respectively.

$$L(t) = L(0) . e^{nt} \quad \textbf{(2)}$$

$$A(t) = A(0) . e^{gt} \quad \textbf{(3)}$$

Here number of effective units of labor *A (t) L (t)* grows at a rate of $n+g$

We further assume a fixed amount of output, *s* (savings) is invested therefore attains an equilibrium. Let s_k be the amount invested in physical capital and s_h be the amount invested in human capital. Then

$$\dot{k}(t) = s_k . y(t) - (n+g+\delta) . k(t) \quad \textbf{(4)}$$

$$\dot{h}(t) = s_h . y(t)^{\alpha} - (n+g+\delta) . h(t) \quad \textbf{(5)}$$

[2] An index variable here, as it will be further decomposed in components

Where *k* is the stock of capital per effective unit of labor *k= K/AL*, *y* is the output per unit of effective labor *y=Y/AL* and *h=H/AL* are quantities per effective unit of labor.

δ is the depreciation rate. Equation (4) infers that *k* and *h* converge to steady state value k^*defined by $sk^{*\alpha}= (n+g+\delta)\ k^*$

$$k^* = \left(\frac{s_k^{1-\beta}\, s_h^{\beta}}{n+g+\delta}\right)^{1/(1-\alpha-\beta)} \quad \textbf{(6)}$$

$$h^* = \left(\frac{s_k^{\alpha}\, s_h^{1-\alpha}}{n+g+\delta}\right)^{1/(1-\alpha-\beta)} \quad \textbf{(7)}$$

This equation thus implies that steady-state capital labor ratio is positively linked to rate of saving and negatively to rate of population growth.

Putting equation (6) in production function and using logs, we will have steady-state income per capita equation.

$$\ln\left[\frac{Y(t)}{L(t)}\right] = \ln A(t) + gt - \frac{\alpha+\beta}{1-\alpha-\beta}.\ln(n+g+\delta) + \frac{\alpha}{1-\alpha-\beta}.\ln(s_k) + \frac{\beta}{1-\alpha-\beta}.\ln(s_h) \quad \textbf{(8)}$$

The alternative way to show the human capital role in the model is to collate equation 8 with the equation for steady-state level of human capital in equation 6.

Then we can have equation for income based on rate of investment in physical capital, rate of population growth and human capital.

$$\ln\left[\frac{Y(t)}{L(t)}\right] = \ln A(t) + gt - \frac{\alpha}{1-\alpha}.\ln(\mathrm{n}+\mathrm{g}+\delta) + \frac{\alpha}{1-\alpha}.\ln(s_k) + \frac{\beta}{1-\alpha}.\ln(h^*) \quad \textbf{(9)}$$

As pointed out earlier, A is taken as the measure of total factor productivity which describes output growth and, this is not explained by variations in physical capital or labor. This would be called as Solow residual. In the present model we are taking government effectiveness (GE) and trade openness as the Solow residuals, while H is function of health expenditures (*h*) and primary education completed (*e*).

$$TFP\ or\ A = f\left\{GE, \frac{IMP + XP}{GDP}\right\}$$

$$h^* = f\{h, e\}$$

Whereas g and δ are taken to be fixed across countries because g is the increase in knowledge thus can be taken as constant across the countries, and deprecation δ which are not country specific.

So, our basic empirical specification will be

$$\ln\left[\frac{Y}{L}\right] = \left\{\ln\frac{IMP+XP}{GDP} + \ln(GE)\right\} - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n + g + \delta) + \frac{\alpha}{1-\alpha-\beta}\ln(s_k) + \frac{\beta}{1-\alpha-\beta}.[\ln(h) + \ln(e)] \quad \textbf{(10)}$$

4. Data and Econometric Methodology

For panel data empirical analysis, this study will consider annual data for the period 1995-2017 for 20 South, East Asian and Pacific countries. Data on Real GDP per capita (2010 US$), Population growth (taken in annual percentages), Exports of goods and services (% of GDP), Imports of goods and services (% of GDP), Health expenditure (% of GDP), Gross fixed capital formation (% of GDP) and primary education completion of both sexes as a percentage are taken from World Development Indicator (WDI) database.

While data for government effectiveness is obtained from worldwide governance indicators (WGI). The following table 1 provides the descriptive stats for the variables used in the estimation. While table 2 includes the list of the countries included in the sample

Table 1: Descriptive Statistics of Variables

Variables	Name	Mean	Median	Max	Min	Std. dev	skewness	source	Measuring unit
GDP per capita	GDP	2627.390	1995.470	7365.230	11521.400	2133.520	1.564	WDI	Constant (2010US$)
Population growth	POP	1.515	1.501	4.692	-1.609	0.7260	0.152	WDI	(% annual)
Exports	XP	41.663	36.284	121.310	8.235	24.941	0.918	WDI	% of GDP
Imports	IMP	47.305	48.362	100.597	11.345	20.782	0.237	WDI	% of GDP
Health expenditure	HE	4.486	4.219	13.733	1.8655	1.541	1.403	WDI	% of GDP
Gross fixed capital formation	GFCF	26.400	24.198	68.022	12.1023	9.356	1.596	WDI	% of GDP
Primary education	EDU	89.565	94.157	185.290	17.136	21.054	0.607	WDI	%
Govt. effectiveness	GE	-0.256	-0.294	1.247	-1.2218	0.499	0.821	WGI	index

Table 2: List of Countries in the Sample

Sr. No	Country Name	Sr.no	Country Name
1	Bangladesh	11	Mongolia
2	Bhutan	12	Nepal
3	Cambodia	13	Pakistan
4	China	14	Papua New Guinea
5	Fiji	15	Philippines
6	India	16	Sri Lanka
7	Indonesia	17	Thailand
8	Lao PDR	18	Tonga
9	Malaysia	19	Vanuatu
10	Maldives	20	Vietnam

5. Estimation Results

In this chapter we have explained the estimation results based on the theoretical model derived in the earlier chapter. We have converted equation ten in the section 3 for the empirical estimation as follows:

$$\ln y = a_0 + a_1 \ln he + a_2 \ln(he) \times \ln(ge + 2) + \mathrm{X'b} + \varepsilon \qquad \textbf{(11)}$$

In Equation 11, the study focus on the health expenditures and the interaction of health expenditures with the institutional quality of government expenditures. As the interest of this study is not just on health expenditures rather the quality of health expenditures also. Here X is the vector of other explanatory variables which we have included as control variables for the model completion.

In the first step a simple OLS regression is applied which is based on the assumption that there is no Fixed Effect and Random Effect. Although we will not explain them as consequently from the descriptive analysis of the data, it turns out there is heterogeneity in the countries sampled and Panel Data estimation is more prudent than the simple OLS method. The study further used the Hausman Test for both the countries and the time periods with the following hypothesis:

Ho: Random Effect (RE) model holds

H_1: Fixed Effect (FE) model holds

The probability value turned out to be 0.000 which is less than 5% hence we rejected null hypothesis and concluded that the fixed effect model is appropriate for this estimation. Further no endogeneity is assumed. Also, the data is tested for heteroskedasticity and serial correlation, but no evidence found.

Table 3: Results

Dependent Variable: GDP Per Capita

Variable	OLS	FEM Country: yes Period: yes No of coun:20 Periods included:21 No of obs:219/460	FEM(White) Country: yes Period: yes No of coun:20 Periods included: 21 No of obs:219/460
Constant	1.5150**	5.8036***	5.8036***
	(2.3977)	(21.822)	(25.565)
LOG(EDU)	1.1921***	0.2955***	0.2955***
	(9.3859)	(6.0378)	(7.4753)
LOG(GFCF)	-0.1544	-0.0577	-0.0577
	(-1.5637)	(-1.5376)	(-1.6526)
LOG(IMP+XP)	0.4633***	0.1542***	0.1542***
	(7.1195)	(3.7024)	(4.3324)
LOG(POP)	-0.0224	0.0129	0.0129
	(-0.3130)	(0.5171)	(0.4364)
LOG(HE)	-1.1053***	-0.1549***	-0.1549***
	(-10.981)	(-3.9728)	(-3.9512)
LOG(HE)*LOG (GE+2)	0.8454***	0.0557*	0.0557**
	(11.002)	(1.9453)	(2.5276)
R^2	0.7077	0.9918	0.9918

Figures in parentheses are t-statistics *** shows prob. significance at 1%, ** on 5% and * on 10%

From the results table above, it appears that our model is a good fit, as the R^2 turns out to be reasonably good i.e. 0.99. Further we have applied the var-cov matrix correction to account for heteroscedasticity by applying the White Cross-Section method. This correction does not change estimated coefficients but only the standard errors.

The result of the Variance-Covariance corrected standard errors are reported in the last column of the table 3 above. It appears that the results have become more significant and no sign has been changed. So, we will explain the main results of the fixed effect model reported in the second column.

Since the model is in Log-linear by derivation, so the coefficients reported here are in terms of elasticities and not absolute coefficients. Standard explanation of elasticity applies i.e. any coefficient which is greater than one in absolute value would be explained as that dependent variable is more responsive to that variable.

Constant term in the regression equation takes the maximum value in explaining the change in dependent variable by 5.804. Ideally, we should have an intercept value for each country, but here the result is the average value of the fixed effects across countries. Similarly, the education variable is also highly significant with a value of 0.296. This means with a 100% increase in the primary school pass outs the GDP per capita will increase by 30%.

Gross fixed capital formation variable is negatively linked with the dependent variable as per our results. This result is insignificant before and after correcting for the variance-covariance through white-cross section method. The negative OLS (or FE) sign can be taken as evidence that investment is negatively correlated with the unobserved determinants of income, resulting in underestimating the effect of investment on income.

Next is the trade-openness variable, which has the standard result i.e. the more the country is open in terms of trade integration with the rest of the world, the more the country income will grow. Here the elasticity coefficient is 0.1542 (15%) and it is significant at 1% critical value. Population growth variable is negatively and insignificantly related to the incomes of the sample countries.

Next two results are the major analysis in this paper. The first variable is the health expenditures as a percentage of GDP and second is the interaction of this with the quality of health expenditures. If we look separately at the first result, then the

elasticity coefficient turns out to be negative (-0.1549) and it is significant at 1%.

This is contradictory to the expected sign. One of the possible reasons could be that countries which have higher levels of the income may be spending more as they have better health systems, but the causality is from more income to more health expenditures and not vice versa. Second, in the developing countries since the availability of resources with government is lesser hence, they tend to contribute less in the expenditures on health. Hence the results become ambiguous.

One of the potential reasons of low or opposite returns to investment in health could be the quality of expenditures also. This is the main proposition of our study as well. To see this, we have created an interactive variable of health expenditures and quality of the government expenditures.

We have proposed that along with an increase in the health expenditures, if the quality of the expenditures is good i.e. there are no leakages and funds are allocated optimally considering the economic cost and benefits of government investments, then the health expenditures would bring more economic growth.

This is empirically verified by our results as well. The coefficient of this variable is 0.0557 and it is significant at 10%. This result says that if health expenditures adjusted for the quality of government, the expenditures increase by 100% then the economic growth will increase by 5%. In the developing countries the total health expenditures are around 2% of the GDP. Hence doubling them i.e. 4% will bring a change of 5% in the GDP. This also shows that it has a good multiplier effect.

To summarize our empirical section, it can be asserted that our results have uniquely identified the auxiliary issue to the overall health expenditures i.e. quality of health expenditures to be important. This is to say that health expenditures are important, but it also needs to be seen that how and where these are spent. Our results show that if along with increase in the health expenditures more focus on the quality of expenditure is made then the outcome could also be growth enhancing.

6. Conclusion and Policy Implications

6.1. Conclusion

There is a lot of literature about the effect of health expenditure on economic growth and all of them find strong indication to provision the positive impact of health on economic growth. This exercise however examines the effect of health on economic growth but with a different perspective. The main objective was to capture the effect of quality of health institutions on economic growth because of the fact that it's not just the level, rather the quality of expenditure or institutions that matters.

Our hypothesis was where institutions are better, the investment in health brings more economic growth as compared to others. To attain that objective the standard neo-classical Solow growth model at steady-state level was taken as theoretical framework and made a production function adding institutional quality (proxied by government effectiveness) along with other variables like Health expenditure, primary education completion rate, population growth etc. For estimation purposes we extracted data for the sample of 20 South, East Asian and Pacific developing countries from WDI for the period 1995-2017.

The study used fixed and random effect models for estimation. Our hypothesis was low returns to investment in health could be due to the poor quality of expenditures. For this purpose, we created a variable of health expenditure and government effectiveness and anticipated that if the health expenditure increase is matched with good quality of expenditure then health expenditures would bring additional economic growth.

This is proved by our results also. This variable is significant at 10% and suggested that if health expenditures adjusted for the quality of government expenditures increase by 100%, then the economic growth will increase by 5%. In the developing countries the total health expenditures are around 2% of the GDP.

Hence doubling them i.e. 4% will bring a change of 5% in the GDP. This also shows that it has a good multiplier effect. Hence it shows that quantity of health expenditure matters but more important is to see where and how they are spent because our results

show that focusing on the quality of expenditure will boost economic growth.

6.2. Policy Implications

1. Many studies considered health as an unimportant factor in determining growth and do not include them in the growth equations. So, for research purposes, health being a major human capital component should be encompassed in the production function and in growth equations.

Additionally, a lot of work has been done already on European and SSA countries but there is a lack of research in health and its relationship to growth for developing Asian countries. Consequently, this sector needs extra attention from researchers as it is understudied.

2. Developing countries that aim to have high per capita income, these are approachable by raising and cultivating the health human capital. They should frame and implement the policies that encourage and accelerate quality investment in health sector. Also, the economies need to revise and reformulate the current and future programs in health sector to make them more effective.

Developing nations should increase the total expenditure on health sector need to make the system more progressive. Furthermore, they have to go beyond the Sustainable Development goals and set targets on sub-national levels. They need to focus extra on health sector especially on the quality of the investment and deliverance.

3. Underperformance is due to lack of accountability and unproductive motives regarding the overall expenditures especially the health expenditures. The investment in health sector and especially the quality of investment should be scrutinized and supervised properly because to enhance health status by capitalizing in health care, quality of institutions matters more than anything.

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