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Human Capital Formation and Economic Growth in Emerging Asia: Empirical Evidence Using Panel Data

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ABSTRACT

After the emergence of endogenous growth theory, the role of human capital along with physical capital is considered to be imperative in promoting economic growth. The government social sector spending, mainly on education and health, contributes in forming human capital and promotes economic growth. This study examines the impact of health and education provisions on economic growth of emerging Asian economies, including Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Philippine, and Thailand. Using the data set for 1995-2018, the fixed effects (FE) and the random effect (RE) methods of panel data estimation are employed. Both methods reveal that the health and education support the human capital formation and stimulate economic growth.

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1. Introduction

Social sector spending by a government plays an important role in enhancing economic growth of a country. The higher government spending on providing social provisions fosters economic growth through the better human capital formation and higher labor productivity. Better education and health facilities play an imperative role in building human capital. According to Paul Romer (1986), human capital is an important determinant of economic growth and development. The countries having higher social sector spending usually achieve higher growth rates (Reza Baqir, 2002).

The strategy of social welfare improvement can facilitate the long-run economic growth. The government public sector programs and economic decision making definitely influences the living standards of citizens. The socially vibrant governments invest in social welfare projects prioritizing health and education which provide long term benefits to an economy. The social sector spending by a government assists the human capital formation and raise labor productivity. The size of the government spending on social provision has become a major concern, especially in developing economies. The better utilization of financial resources for the social provisions ensures the availability of social and physical infrastructure to improve economic performance (Chenery & Syrquin, 1975).

Subsidized educational facilities increase enrollment, improve public skills and promote a culture of innovative ideas. The economic theory explains that sufficient expenditure on education leads to human capital formation. Better health facilities increase labor productivity and also cause a reduction in the production losses relating to labor health issues. Khan and Ahmad (1999) are of the view that the quality of labor's work is also improved due to better health facilities and social safety nets. However, some researchers explain that returns to health spending are not properly realized if the population growth rate is higher than the social optimum. This can happen in the situation when the rising birth rate exceeds the following death rate. Baldacci, et.al (2003) suggests that the country-specific conditions should be considered in designing a fiscal policy to achieve higher growth rates. The austerity measures to reduce deficits don't seem to be appropriate for all the sectors of an economy. The transmission mechanism of fiscal policy is different in the developing economies than in the developed ones. The fiscal adjustments altering the composition of fiscal spending can stimulate growth in low-income countries. Similarly, the policy of discouraging unproductive and non-development expenditures is expected to bring sustainable economic growth.

2. Literature Review:

Romer (1986) presents new growth theory by suggesting more investment to form human capital. He also explains that the human capital affects the rate of technological diffusion. Mankiw et al. (1992) incorporate human capital in the Solow growth model by using the data for 21 economies during 1960-1985. The secondary school enrollment is used as proxy for human capital. A Cobb Douglas production function is estimated by using OLS. The empirical findings indicate that the human capital augmented Solow model best explains cross country income differentials.

Baum and Lin (1993) study the impact of government spending on GDP growth per capita for a sample of developed and developing economies during 1975-85. The empirical findings suggest that educational expenditure have a significantly positive impact on economic growth.

Bernanke and Gurkaynak (2001) empirically analyze the Solow model by incorporating human capital. Following Mankiw, Romer and Weil (1992) methodology, OLS is applied on an extended data set for the period 1960-1995. The empirical results conclude that the long-run growth is endogenous and the long-run growth rate is correlated with the human capital formation and savings. The positive impact of social sector spending including health and education is also supported by different studies including Anand and Ravallion (1993), Psacharopoulos (1994), Hojman (1996), Bidani and Ravallion (1997), and Psacharopoulos and Patrinos (2002).

Bloom and Canning (2003) health is a vital sector of an economy government involvement and regulation for the provision of better health facilities prevent market failure and encourages economic growth. Bloom, Canning and Sevilla (2004) explore that better health has major significant impact on aggregate output even after controlling for the work experience of labor force. Gyimah-Brempong and

Wilson (2004) find a significant impact of health expenditure on output. The study suggests that about 22 to 30 percent growth of output is attributed to the health status of the labor and improvements in health status equivalent to one additional year of life expectancy raises GDP growth by 4 percentage points yearly.

Baldacci et al. (2004) examine the linkages between social spending and economic growth in 120 developing economies for the period 1975-2000. The empirical results indicate that the expenditure on health and education positively affect GDP growth in the developing economies under consideration. Ojha and Pradhan (2004) analyze the impact of education provisions on GDP growth and income distribution. By using a multi-sectoral computable general equilibrium (CGE) model for the Indian economy, they conclude that the human capital formation speeds up economic growth and improves income distribution.

Bose, Haque, and Osborn (2007) examine the impact of public spending on economic growth in the 30 developing countries during the 1970s and 1980s. It is found that government spending on education is positively and significantly associated with GDP growth. Li and Liang (2009) use Mankiw, Romer, and Weil framework to examine the sources of economic growth in the East Asian economies for the period 1961-2007. A sub-sample is also considered to take Asian financial crisis into consideration. Human capital is represented by health and education expenditures. The empirical estimates conclude that the health and education spending affect economic growth positively and significantly in both samples. Rup Singh (2009) estimates the effect of human capital formation on economic growth for a sample of 10 Asian economies during 1960-2003. Using an extended Solow growth model, the empirical results suggest a positive impact of human capital on economic growth.

Webber (2002) examines the relationship between human capital formation and economic growth in the 46 economies during 1960-1990. The author suggests increasing government spending on education for the better economic performance.

Huang et al. (2008) studied 23 states including OECD economies and Taiwan to explore the contribution of human capital in economic growth. The authors conclude that better health and education facilities play a pivotal role in promoting GDP growth. Baldacci et al. (2008) empirically examine the relationship between social sector spending, human capital and economic growth in 118 developing economies for the period 1971-2000. The authors empirically found that the government's social spending provides better education and health facilities, accumulates human capital and affects economic growth positively. Colantonio et al. (2010) use a panel data set covering the period 2003-2007 to find a strong correlation between health, education and economic growth in Sub-Saharan Africa. Azam and Ahmed (2010) find a statistically significant and positive impact of health and education on economic growth for Pakistan during 1960-2009. Javed et al. (2013) use co-integration and error correction approaches to find the positive impact of investment in health and education sectors in Pakistan from 1978 to 2008. The authors also believe that Pakistan has high potential to achieve a higher growth rate through investment in human capital. Pelinescu (2015) use a panel data methodology for 28 European countries to show that the low investment in human capital formation is an obstacle in the way of sustainable development in the developing economies.

3. Empirical Model:

A typical Solow model postulates that, in a laissez-faire economy with autarky, output (Y) is produced by utilizing two factors of production capital (K) and labor (L)

$$Y_{it} = K_{it}^{\alpha} (A_{it} L_{it})^{1-\alpha}$$

The main idea about the empirical model comes from the new growth theory by Paul Romer (1986). Mankiw (1992) explains that output growth can be written as a function of the changes in human capital stock. Knowles and Owen (1995) extended the idea of Mankiw et al. (1992) by incorporating health and education as proxies for human capital. The social sector spending by a government on providing health and education facilities leads to human capital formation and stimulates economic growth. So, physical capital and human capital both play a vital role in economic growth. Incorporating the proxies for human capital, the econometric specification can be written in the form given below,

$$Y_{it} = K_{it}^{\alpha} E_{it}^{\beta} H_{it}^{\gamma} (A_{it} L_{it})^{1-\alpha-\beta-\gamma} \dots (1)$$

The small letters indicate the each variable per effective units of labor. After taking the natural log of above equation, we get

$$\ln y_{it} = \alpha \ln k_{it} + \beta \ln e_{it} + \gamma \ln h_{it} \dots (3)$$

Since natural log of e is equal to 1, the above equation turns to be

$$\ln y_{it} = \alpha \ln k_{it} + \gamma \ln h_{it} \dots (4)$$

We can write the above relation in econometric form as

$$\ln y_{it} = \alpha \ln k_{it} + \gamma \ln h_{it} + \varepsilon_{it} \dots (5)$$

Where, y is real GDP per capita and k is gross fixed capital formation as % of GDP representing physical capital. The human capital is denoted by h. The term ε_{it} is the random disturbances which change over time. The subscript i denotes cross section dimension (i = 1.....N) and t indicates time series dimension of the variable (t = 1.....T).

Since, the economies in our sample are in different phases of economic development, there exists significant differences in economic characteristics. So, the assumption of parameter homogeneity doesn't seem to be appropriate. Due to potential country-specific differences among the selected countries, fixed-effect panel estimation method seems to be appropriate. Hence, the fixed-effect technique of panel data estimation is applied. The Random effects method is also employed to check the consistency of our empirical results.

4. Variables Description and Data

Real GDP per capita seems to be a good measure to indicate the overall wellbeing of the citizens of a country. Availability of physical capital stock is represented by gross fixed capital formation as a percentage of GDP. In the human capital formation, education and health are the core variables. The health expenditures as a percentage of GDP are separately used to represent the government focus on human capital formation. The more a government spends on health care, the more human capital formation occurs. The empirical literature has been devoting more attention to education as compared to health although both are equally important. As compared to education, no substantial literature is available which focus on health to form human capital.

The data for eight emerging Asian countries including Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Philippine, and Thailand is collected for the period 1995-2018. In this regard the data is collected from World development indicators (WDI).

4.1 Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Real GDP per capita (log)	152	6.9905	0.7505	6.005	8.4891
Physical capital	152	26.4088	7.7697	12.5206	45.6898
Schooling years (primary)	152	5.5986	0.4917	5	6
Schooling years (secondary)	152	6.1447	0.9018	4	7
Life expectancy	152	70.1406	3.7945	62.505	76.963
Health expenditure	152	1.3060	0.7310	0.4055	3.0223
Enrollment (tertiary level)	147	3.0314	0.6836	0.9935	3.9561

The summary statistics in table 4.1 show the number of observations, the means, standard deviations, maximum and minimum values of the variables.

5. Empirical Results

The estimates after applying FE and RE are presented in tables 5.1 and 5.2 respectively.

Table 5.1: Fixed Effects Estimates

Dependent variable: Real GDP per capita					
Regression	(1)	(2)	(3)	(4)	(5)
Physical capital	0.2227* (0.0769)	0.3093* (0.0987)	0.2684* (0.0874)	0.2579* (0.086)	0.6887* (0.1477)
Life expectancy	8.3192* (0.3383)	8.7668* (0.4252)		4.6740* (0.7222)	
Health expenditure			0.3167* (0.0528)		0.5649* (0.0836)
Years of schooling (primary)	2.7365* (0.2897)				1.8970* (0.6330)
Years of schooling (secondary)		0.3895** (0.1675)			
Tertiary level enrollment			0.5185* (0.0322)	0.3465* (0.0503)	
Constant	-32.998* (1.3575)	-31.1788* (1.7484)	5.3144* (0.2704)	- 13.9626* (2.9031)	2.2216*** (1.1516)
R-squared	0.79	0.61	0.73	0.72	0.71
Number of observations	152	152	147	147	152
Number of groups	8	8	8	8	8

Note: The numbers in parenthesis are t- statistics while *, ** and *** indicate significance at 1%, 5% and 10% level of significance respectively. All variables are in the log form.

Table 5.2: Random Effects-GLS Estimates

Dependent variable: Real GDP per capita					
Regression	(1)	(2)	(3)	(4)	(5)
Physical capital	0.2158* (0.0759)	0.3045* (0.0977)	0.2613* (0.0863)	0.2496* (0.0854)	0.6470* (0.1435)
Life expectancy	8.3325* (0.3352)	8.8139* (0.4223)		4.7145* (0.7173)	
Health expenditure			0.3238* (0.0523)		0.5798*** (0.3249)
Years of schooling (primary)	2.7726* (0.2852)				2.1292* (0.6138)
Years of schooling (secondary)		0.3429** (0.1615)			
Tertiary level enrollment			0.5187* (0.0320)	0.3479* (0.0500)	
Constant	-33.0939* (1.3520)	-31.2793* (1.0758)	5.33166* (0.3227)	-14.1154* (2.8884)	1.9556*** (1.1332)
R-squared	0.79	0.61	0.74	0.73	0.74
Number of observations	152	152	147	147	152
Number of groups	8	8	8	8	8

Note: The numbers in parenthesis are t- statistics while *, ** and *** indicate significance at 1%, 5% and 10% level of significance respectively. All variables are in the log form.

6. Interpretations and Discussion

Five equations are estimated using different proxies of education and health along with physical capital. Table 5.1 shows the empirical results using panel fixed effects to control for the country specific characteristics. Education is denoted by the years of schooling at primary, secondary, and tertiary level respectively while health is proxied by life expectancy and health expenditure by the government. All the equations show that the coefficient of physical capital is positive and statistically significant at 1% level. The life expectancy variable is also strongly significant at 1% level indicating that better health facilities raise average life expectancies of people who play useful role in output growth of the economy. The Health expenditure are included in the equation 3 and 4 as a proxy for health capital and found to be statistically significant at 1% level. It means that the more a government spends on health care, the more human capital formation occurs which leads to higher GDP growth. One percentage point increase in government health spending to GDP ratio brings 31 to 56 percentage points increase in GDP growth. As for as education concerns, the years of schooling at primary and tertiary level are both statistically significant at 1% while the years of schooling at secondary level is found to be significant at 5% level. According to Barro (1991), the education expenditures help in forming quality human capital by providing quality learning and training facilities which promote economic growth. The empirical results also confirm the endogenous growth theory by Paul Romer (1986) which proposes to invest in human capital for the consistent and long-run economic growth. Table 2 shows the random effects-GLS estimates. The random effects estimates are similar to the fixed effects showing the consistency of our estimates. The random effects estimates show that the physical capital is significant and positive at 1% level. The coefficients on life expectancy are positive and significant at one percent level. The coefficient on health expenditure is positive and strongly significant at one percent level in equation 3 but weakly significant at 10 percent level in equation 5. Again, we can observe that the years of schooling at primary and tertiary level are both positive and statistically significant at 1% while the

years of schooling at secondary level is found to be significant at 5 percent level. The random effects-GLS results confirm that the empirical results are not sensitive to the consideration of country specific characteristics. The magnitudes and signs of coefficients are consistent and stable.

The empirical results of this study are in line with the findings of Barro (1991), Baldacci et al. (2003) and many others that the human capital formation through the better education and health provisions can positively contribute to economic growth. Levine and Renelt (1992), Mankiw (1992), Barro and Sala-i-Martin (1995) discover a positive association between school enrollment and the schooling years on economic growth. The empirical findings show that the human capital formation by providing better education and health facilities help accelerating economic growth in the emerging Asian countries.

7. Conclusion and Policy

This study examines the impact of human capital formation including health and education on economic growth of emerging Asian economies. The panel data estimation techniques including fixed and random effects are employed to obtain the empirical results. It is found that the education expenditure, as well as other proxies for human capital formation including years of schooling and school enrollment have a significantly positive impact on GDP growth. An improvement in education and health provisions by the government increases the efficiency of labor which promotes growth in turn.

The empirical findings provide important policy implications for the governments of emerging economies. The investment in human capital by providing better education and health facilities to the masses provides continuously increasing returns to scale. Other policies of monetary management, trade openness and economic liberalization can provide better results if the government provides better education and health facilities to promote human capital in the country. The sound and stable policies regarding social provisions are the prerequisites for the long-run economic growth. Providing education and training to the labor force along with reasonable health facilities can help in achieving sustainable growth in the emerging Asian economies.

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