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Education Attainment and Economic Growth of Asian Developing Countries

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Abstract

The purpose of the study is to examine the long-run relationship of economic growth and education in the developing countries of Asia from 1991 to 2015 by following Barro and Lee approach. The econometric strategy indicates long-run relationship between public spending on education and education achievement based on Cobb-Douglas production function with intuition of Solow Augmented Growth Model. In addition, the study attempts to deal with the potential endogeneity by using Generalized Method of Moment (GMM) technique. Findings provide increase economic growth with higher budget allocation in education; however, contradict the assumption of Solow Augmented Mankiw-Romer-Weil for population growth rate. The study finds robust estimates for economic growth determining by life expectancy rate and purchasing power parity as well as by examining heterogeneity among countries classified into subsamples. The findings present valuable recommendations to increase human capital investment in education for policy makers.

Keywords: Economic growth, Human capital, Public spending, Panel data.

JEL Codes: O1, I2, H52, C33

1. Introduction

Economic development emphasizes on productive capacity of long-term expansion of economic growth and social welfare based on the human needs. Education is the most productive medium to increase the economic growth of the country that can maximize the optimum utility of available resources in long run (Todd et al., 2003). The purpose of this study is to develop an analytical framework to determine the impact of education in long run economic growth. It focuses on the developing countries in Asia, to highlight the contribution of knowledge and public investment on human resource by using panel data for the period of 1995 to 2015. Neo classical growth models of Solow (1956) and Swan (1956) for long run economic growth argue about technical progress and population growth and their basic concept focuses on strong policies that can influence the government intervention in population growth rate, saving rates and most significantly, investment in physical and human capital¹.

The share of public spending on education in Asia has remained undermined and ambiguous. At one side, the indebted countries are struggling to cut the public transfer from the social sector to balance of payments and budget deficit, on the other side, some countries improve funding in human resources to achieve Millennium Development Goals (Psacharopoulos, 1994). The United Nation determines threshold of 6 percent of the GDP for the developing countries in education

¹ The policies further change the equilibrium factor ratio and can influence the transition path for the steady growth rate but its impact might be temporary. For example, Chamely (1986) and Judd (1985). Other researchers like Barro and Sala-i-Martin (1992), Easterly (1993), and Stokey (1995) believed on the physical and human capital investment harmonizes the economic growth by public policies.

but unfortunately, most of these countries are below this ratio such as in Asian and Pacific this ratio accounted 2 to 6 percent (2008).

The annual budget allocation for per student is alternative measure of public expenditure that has diminishing effect with the years. In Bhutan, the allocation at primary level recorded 7.2 per student (2009) and 32 percent in secondary level while, India (2006) and Philippines (2007) have less than 10 percent share for primary education. The focus of the prior studies remains the role of government spending on education for long-run growth (Aschauer, 1989; Barro, 1990; Maingi, 2013) mainly on tertiary or primary education. In comparison, some studies specify teacher-pupil ratio for education completion that is also inconvincible for developing countries' perspective. None of the study provides contribution of each level of education as well as public spending at one platform in the context of Asia to my knowledge. The merits of these studies cannot ignore but, data sets of these studies might be under severe heterogeneity as different techniques, time-periods and variable instrumental techniques can produce different results. This creates an urge to investigate and need of empirical analysis to examine the impact and extent of the public spending on education.

The current study sets to investigate the impact of education on economic growth and attempts to reduce the gap in the literature that can stimulate, deter or indeterminate the economic development in poor countries of Asia. The study also deals with the potential endogeneity bias by GMM estimation and establishes economic strategies for policy makers. As a result, following questions have raised:

- What is the impact of education attainment on economic growth in the developing countries?

- Do and at which extent public spending on education can improve economic growth in developing countries?
- Does education attainment and its public spending produce economic growth in long run?

The study has organized into five chapters. In chapter one, I present the background of the study and vague concepts of education. Section 2 with past literature while 3 contains methodology and modelling of the data set. Section 4 concludes empirical results and lastly, section 5 summarizes the study with concluding remarks.

2. Literature Reviews

In 1983, Wagner's Law defined a crucial relationship between public spending and its impact on economic growth. The national income causes public spending that explained by Keynesian approach (1936) for economic progress and stability in the country ([Ansari et al., 1997](#)). In neoclassical economics, exogenous model of [Solow & Swan \(1956-1957\)](#) played a significant role for long run economic growth with production function; labour and capital and increase in the productivity of technology. The standard Solow forecasted that only technological progress would be possible for longer growth that is equivalent to Solow Romer model.

On contrary, [A. M. Nalla Gounden \(1967\)](#) suggest that there is no significance relationship between public expenditure on education and development but the year 1967 was quite early to predict something about it. [Kormendi and Meguire \(1985\)](#) researched on forty-seven countries and they specified unique time series data of 20 years of Post-World War. They found no supporting evidence for public expenditure on human capital and economic growth. According to

[Landau \(1986\)](#), government spending on education sector and the attainment measures for the educational output have found weak effects².

Later on [Robert Lucas \(1988\)](#) developed endogenous growth model, which led the sound ground for further research. He gave more importance to tertiary education but unfortunately, he failed to focus on primary and secondary level of education as he did for higher education. In 1990, he named tertiary education as 'Driving Force' to attract other factor of production in increasing their productivity on researched based knowledge and skilful labour such as, engineers, researchers, administrative and developers.

According to [Barro \(1990-2001\)](#), there are many choices for the government policies like; an increase in public expenditures on development activities in education equally increases the productivity and growth of the economy through saving which might decrease at certain level afterwards. On contrast, non-productive activities by the public spending can curb the savings and economic growth. The key insight about endogenous growth models was to develop perpetual growth; there are factors of combination that can accumulate without diminishing returns to scales that further investigate by [Barro and Sala-i-Martin \(1995\)](#).

In addition, other studies verify that public spending on education and health care sectors boost up economic growth with income equality and reducing the vicious cycle of poverty ([Tanzi et al., 1998](#); [Barro, 1991](#); [Chu et al., 1995](#)). [Becker, Murphy and Tamura \(1994\)](#) found solid results on the significance of education investment and economic growth. For this, they emphasized on the era after 1960. [Psacharopoulos \(1994\)](#) proposed that measuring social returns from the public

² [Mingat and Tan \(1992, 1999\)](#) have conducted similar supporting results.

investment in education are quite difficult. Previously Psacharopoulos and Fiszbien in 1992 conducted a study to see the effects of education investment in Venezuela. They conclude that investment returns from primary education are quite higher than the higher education sector due to high cost of university education that offsets the benefits of university degree. [O'Neill \(1995\)](#) found some estimates regarding convergence of education levels lead to reduce the dispersion of income in the population. He further argued that there is substantial divergence in the education levels but the diverged income is due to the increase return for the developed countries on expense of least developed countries.

In 1992, [Mankiw et al.](#), established the extended version of Solow model and found the significant role of human capital on economic growth. Mankiw has persuasively suggested for defining 'knowledge' as the sum total of technological and scientific discoveries which is in written form found in textbooks, scholarly journals, websites, and the like resources. He also argued 'human capital' as the stock of knowledge that is transferred from these resources into human brains with the help of studying and education. Similarly, the studies of [Azomahou et al., \(2009\)](#) conclude that technology frontier and its place signify the direction of investment in each type of education level such as primary, secondary and higher. They used generalized additive models and described that those countries that are close to technology frontier should invest in higher education and those countries that are away from technology frontier should invest in primary and secondary schooling.

In Pakistan [Aziz, Khan and Aziz \(2008\)](#) conducted the impact of higher education on economic growth, which found significant ([Afzal et al., 2010](#)). Some other researchers like [Jung and Thorbecke \(2001\)](#) in Tanzania, [Adeniyi \(2005\)](#) in Zambia and Nigeria and [Chandra \(2007\)](#) in

India found it significant, but the results were negative found by [Usman and Nurudeen \(2010\)](#). Other studies further established the direct link of economic growth rate and exports of the country ([Chaudhry, Malik and Faridi, 2010](#)). In addition, the study on industrial development states that in Taiwan that one percent increase in the higher education raises 0.35 percent increase in industrial sector and 0.15 percent in agriculture ([Lin, 2004](#)).

The study implies [Mankiw, Romer and Weil \(1992\)](#) model by [Pegkas \(2014\)](#) and run the estimations with cointegration and error-correction models for different educational levels on economic growth rate. The study found unidirectional long-run causality between primary level of education and economic growth and bidirectional with second and third level of education in Greece over the period of 1960-2009. The study of [Krueger and Lindahl \(2001\)](#) based on micro economic framework with the help of cross-country regression analysis using ordinary least square and instrumental variables technique tools examine the impact of schooling on economic growth. However, they oppose others analysis of [Lucas \(1990\)](#); [Murphy et al., \(1991\)](#); [Kumar \(2003\)](#) and [Zeira \(2009\)](#) due to reconciliation of macro and micro backgrounds. There is by product called technology for economic growth progress.

The researchers have strong belief that correlations can establish across the countries between economic growth rate and enrolment rate in higher education. Whereas, [De Meulmester et al., \(1995\)](#), with the help of more accurate econometric techniques analyse that direction of economic growth and education is unnecessary to be always unidirectional. [Yamauchi and Godo \(2001\)](#) found bidirectional relationship between education attainment and economic growth. This study tested causality analysis on Japanese economy. They use time series data to examine the role of education on economic growth and found complex way for education to devise its automatically

productive use. [Chandra \(2010\)](#) conducts study between education investment and economic growth and tested its causality. He finds bidirectional relationship between them in India. The primary focus of the study was to employ Cobb-Douglas production function for the estimation of tertiary level of education.

3. Methodology

3.1 Theoretical Framework

The early work of [Solow \(1956\)](#) showed that economic growth not only captured by the capital and labour increase but also contribution of the factors of production and technological progress to the output as a whole. Thereafter [Mankiw, Romer and Weil \(1992\)](#) known as MRW extended the Solow model by creating human capital augmented version of Solow model. The standard Solow growth model extends the basic production function by adding human capital as an additional input where the economic growth rate has a direct influence from physical capital, labour and human capital augmented by the term Solow residual or Total Factor Productivity (TFP). Education has been included explicitly in the endogenous growth models. MRW made following assumptions:

- a. Investing in human capital is similar to physical capital by devoting the fraction of sh of their income to human capital accumulation.
- b. Human capital depreciate at the same rate as physical capital.
- c. The output can be used either for consumption or for the human or physical investment.

The steady state indicates the level of income is positively related to the rates of investment in human and physical capital and negatively related to the population growth. Lucas formulated

model with production function by introducing human capital in the same way as Solow model did for technology. Educational attainment may have significant influence on people's ability to adapt change and innovation (Nelson and Phelps, 1996).

Basic Framework: The theoretical framework adopted by Mankiw, Romer and Weil (1992) considers a standard neoclassical production function,

$$Y = f(A, K, L) \quad (1)$$

Where Y, K and L are aggregate real output, capital and labour respectively. A denotes to technology or Total Factor Productivity (TFP).

With the intervention of the human capital:

$$Y = A K^\alpha L^\beta H^\gamma \quad (2)$$

Where H is the Human capital, α is capital share, β is labour share and γ is human capital share in education. By differentiating equation with respect to time;

$$\frac{\Delta Y}{Y} = \frac{\Delta A}{A} + F_K \frac{K}{Y} \frac{\Delta K}{K} + F_L \frac{L}{Y} \frac{\Delta L}{L} + F_H \frac{H}{Y} \frac{\Delta H}{H} \quad (3)$$

$\frac{\Delta Y}{Y}$, $\frac{\Delta K}{K}$ and $\frac{\Delta L}{L}$ are the growth rate of output, capital and labour respectively. Whereas, $\frac{\Delta A}{A}$ represents growth rate in TFP.

$$\frac{\Delta Y}{Y} = \frac{\Delta A}{A} + (\alpha) \frac{\Delta K}{K} + (1 - \alpha) \frac{\Delta L}{L} + (1 - \alpha - \beta) \frac{\Delta H}{H} \quad (4)$$

According to [Ayara \(2002\)](#), the rate of change of Total Factor Productivity is due to capital accumulation and human capital due to education. By taking natural logarithm of the above equation and rearranging, $1 - \alpha = \beta$ and $1 - \alpha - \beta = \gamma$, we get following,

$$\ln Y = \ln(A) + \alpha \ln(K) + \beta \ln(L) + \gamma \ln(H) \quad (5)$$

The Solow Growth Model: The empirical analysis of this paper uses methodology of neoclassical theory by following [Mankiw Romer Weil \(1992\)](#) augmented Solow Growth model. Solow-Swan model is set in continuous time-period where output (Y) has produced with two production functions; Labour (L) and Capital (K) and having condition of equal elasticity of substitution.

$$Y(t) = K(t)^\alpha (A(t)L(t))^{1-\alpha} \quad (6)$$

Whereas, t=time and a= elasticity of output w.r.t capital, $0 < a < 1$ and Y(t) represents total production, A represents Knowledge and AL represents Effective Labour. All labour of production are fully employed at initial level, which are given as A(0), K(0) and L(0). L and A grows exogenously at the rate of n and g respectively.

$$L(t) = L(0)e^{nt} \quad (7)$$

$$A(t) = A(0)e^{gt} \quad (8)$$

While the stock of the capital depreciates with the constant rate δ and effective units of labour A(t)L(t) grows with (n+g) rate. Only an output is consumed (cY(t)), leaving a share of saving $s=1-c$ for investment.

$$\dot{K}(t) = s.Y(t) - \delta K(t) \quad (9)$$

While $\dot{K}(t)$ it is change in the capital stock such as output which neither can consumed nor used to replace old goods is net investment. Output per effective unit of labour is,

$$y(t) = \frac{Y(t)}{A(t)L(t)} = k(t)^\alpha \quad (10)$$

The behaviour of capital stock per unit of effective labour change over time

$$\dot{k}(t) = sk(t)^\alpha - (n + g + \delta)k(t) \quad (11)$$

$sk(t)^\alpha = sy(t)$ is actual investment per unit of effective labour and $k(t)$ converges to k^*

$$k^* = \left(\frac{s}{n+g+\delta}\right)^{1-\alpha} \quad (12)$$

Solow-Swan model predicts that economy converged to balanced growth equilibrium, regardless of its starting point. We find that steady state income per capita is,

$$\ln\left(\frac{Y(t)}{L(t)}\right) = \ln A(0) + gt + \frac{\alpha}{1-\alpha} \ln(s) + \frac{\alpha}{1-\alpha} \ln(n + g + \delta) \quad (13)$$

Whereas, $\ln A(0) = a + \epsilon$

The Cobb Douglas Specification: The MRW (Solow Augmented Mankiw-Romer-Weil) model extended for human capital investment for education. The general form of the production function for education is,

$$Y(t) = K(t)^\alpha H(t)^\beta (A(t)L(t))^{1-\alpha-\beta} \quad (14)$$

H is the stock of human capital. The economy is determined as,

$$\dot{k}(t) = s_k y(t) - (n + g + \delta)k(t) \quad (15)$$

$$\dot{h}(t) = s_h y(t) - (n + g + \delta)h(t) \quad (16)$$

In above equation y represents total output per worker, $k(t)$ represents stock of physical capital per worker and $h(t)$ is the stock of human capital per worker. For all capital we assume $\alpha + \beta < 1$ there is decreasing rate of returns. Above equation, explain that the economy converges to steady state.

$$k^* = \left(\frac{s_k^{1-\beta} s_h^\beta}{n+g+\delta} \right)^{\frac{1}{1-\alpha-\beta}} \quad (17)$$

$$h^* = \left(\frac{s_k^\alpha s_h^{1-\alpha}}{n+g+\delta} \right)^{\frac{1}{1-\alpha-\beta}} \quad (18)$$

Substituting into production function and taking its log we have,

$$\ln \left(\frac{Y(t)}{L(t)} \right) = \ln A(0) + gt - \frac{\alpha+\beta}{1-\alpha-\beta} \ln(n+g+\delta) + \frac{\alpha}{1-\alpha-\beta} \ln s_k + \frac{\alpha}{1-\alpha-\beta} \ln s_h \quad (19)$$

It is assumed that the labour force grows exogenously at a rate n and $A(t)$ grows exogenously at a rate g . The rate of depreciation of the capital stock is denoted by δ . As in the MRW model, g and δ are assumed to be the same across countries. If gross investment in physical capital is denoted by s_k and gross investment in human capital by s_h the steady state level of per capita output can be expressed as:

$$y^* = \left(\frac{A s_k^\alpha s_h^\beta}{n+g+\delta^{\alpha+\beta}} \right)^{\frac{1}{1-\alpha-\beta}} \quad (20)$$

3.2 Model Specification

The technology advancement that remains constant in Solow Growth Model does not remain constant in our model as it varies between countries and it is proxy of trade openness. The investment has divided into physical investment in terms of gross capital formation and human capital investment in terms of education and health; such as, public spending on education and health, gross enrolment rates, and fertility rate that are used as explanatory variables. One of the important factors for determining the public spending on output is population growth rate that captures the heterogeneity in the models. I examine seven models based on three different outcome variable for the measurements of growth.

The first five models use per capita income (real) as dependent variable. The other growth measurement variables are GDP per capita in PPP terms using International US \$ 2011 in model 6 and, life expectancy rate in model 7. Fixed and Random Effect models specifically control omitted variables biasness by measuring the changes within the group across time. The main difference between two models is that; in fixed effect model, inference can be drawn within the group but in Random effect model, it allows to infer something about the population from which the group has been selected. Nevertheless, Random effect allows the time-invariant variables to play a role as explanatory variables (LaMotte, 1983). The selection between Fixed and Random effect models has made by the Hausman Test (Green, 2008, Chapter 9). Additionally, I apply Bresuch & Pagan Test for the detection of heteroscedasticity.

*Bresuch – Pagan Test = $n * R^2 \sim X^2(k \text{ degree of freedom})$*

$\varepsilon^2 = \alpha + \beta_1(\text{explanatory variables}) + \beta_2(\text{Square of explanatory variables})$

Alternative Specification: In addition, this study uses Generalized Method of Moment (GMM) estimation for any endogeneity bias in each model (Greene, 2003). The potential instruments are

lagged explanatory variables and periods, as each period consists of five years, in each set of models. However, estimation strategies in Model 5 and Model 7 differ that calculate with explanatory lag variables and external instrument of export rate. The J statistics of Hansen examine to test the validity of overidentifying restrictions and test suggests that the respective models are specifically correct by validating instruments. Furthermore, goodness of fit also estimated by the coefficient of determination.

Beside this, to observe the spatial and geographical heterogeneity within the developing countries of Asia, the impact of human resource capital and education attainment further investigate in two sample groups (Idress et al., 2013). These estimations also provide robustness check of our results. The dataset categorizes into following groups, first consist of South, Central and Middle East Asia, while second composed of East Asia and Pacific.

From Equation (I) to (VII), provide seven econometric models with μ_i = Stochastic disturbance term and, e = Base of natural logarithm. All acronyms in detail are provided in Table 3.1.

Cobb-Douglas production function in stochastic form,

$$y = \beta_1 g s^{\beta_2} h^{\beta_3} c f d^{\beta_4} p o p g^{\beta_5} T r a d e^{\beta_6} e^{\mu_i} \quad Eq (a)$$

$$\log(y p c 5) = \log(\beta_1) + \beta_2 \log(g s) + \beta_3 \log(h) + \beta_4 \log(c f d) + \beta_5 \log(p o p g) + \dots + \mu_i \quad Eq(b)$$

$$\log(y p c 5) = \beta_0 + \beta_2 \log(g s) + \beta_3 \log(h) + \beta_4 \log(c f d) + \beta_5 \log(p o p g) + \beta_6 \log(t r a d e) + \mu_i \quad Eq (I)$$

$$\log(y p c 5) = \beta_0 + \beta_2 \log(g t) + \beta_3 \log(h) + \beta_4 \log(c f d) + \beta_5 \log(p o p g) + \beta_6 \log(t r a d e) + \mu_i \quad Eq(II)$$

$$\log(y p c 5) = \beta_0 + \beta_2 \log(g s) * \log(g t) + \beta_3 \log(h) + \beta_4 \log(c f d) + \beta_5 \log(p o p g) + \dots + \mu_i \quad Eq(III)$$

$$\log(ypc5) = \beta_0 + \beta_2 \log(edu) + \beta_3 \log(gp) * \log(gs) + \beta_4 \log(cfd) + \dots + \beta_6 \log(fert) + \mu_i \quad Eq(IV)$$

$$\log(ypc5) = \beta_0 + \beta_2 \log(edu) + \beta_3 \log(cfd) + \beta_4 \log(popg) + \dots + \beta_6 \log(hg) + \mu_i \quad Eq (V)$$

$$\log(gdpcppp) = \beta_0 + \beta_2 \log(gs) + \beta_3 \log(h) + \beta_4 \log(cfd) + \beta_5 \log(popg) + \dots + \mu_i \quad Eq(VI)$$

$$\log(life) = \beta_0 + \beta_2 \log(gs) + \beta_3 \log(h) + \beta_4 \log(cfd) + \beta_5 \log(popg) + \dots + \mu_i \quad Eq (VII)$$

3.3 Variables and Data

Data: The panel data from 1991 to 2015 have sorted for nineteen countries selected from Asia and listed in the Table 3.2. In addition, deliberate efforts put to ensure consistency in the source for all the series.

Dependent Variable: The *per capita income in real term* considers as proxy for growth rate in first five models. If the education is a normal good then with the higher level of growth, there will be higher level of education in the country and this can capture in second dependent variable of *GDP per capita in purchasing power parity* in Model 6, besides, *life expectancy at birth* used as third dependent variable in Model 7.

Explanatory Variables: Education indicators use to gauge the impact of education on growth rate. Education attainment is proxy by the public spending on education as percentage of GDP and gross enrolment ratios in primary, secondary and higher education levels. All these indicators use for both of the sexes. Public education expenditure includes spending by municipal, regional and national governments on educational institutions, administration and subsidies for private entities.

Gross enrolment ratio at primary, secondary and tertiary level are total enrolment rates regardless of age expressed as percentage.

[Table 3.1 here]

Population Growth defines as increase in the population raises the need of technological improvements in order to meet the demands of the basic goods and services. Gross Capital Formation consists of outlays on additions to the fixed assets of the country with inclusion of net changes in the level of inventories. It emphasizes on the fixed assets such as plants, machinery, construction of roads, schools, hospitals and residential dwellings etc. The gross capital formation is the key source of the development of the economy (Lee 1995). Trade openness in goods and services is a core channel for international exchange of ideas and myths in the diffusion of technology. Public spending on health as percentage of GDP and total expenditures, fertility and life expectancy rates use as proxy for health indicator.

[Table 3.2 here]

4. Results

4.1 Descriptive Statistics

The total number of observations for income per capita, Public spending on education, trade, population growth and public health expenditure are 95 for each. Because of some missing values, number of observations for capital formation and higher education are 91 and 93 respectively. The mean value for per capita income is 1799.99 representing central tendency and accurate estimation of dispersion is 1724.34. The gross enrolment ratio in secondary level shows

the central tendency equals to 65.55 with median 69.23 and standard deviation equals to 22.32. The mean of health, trade, population growth and fertility rate are 1.98, 80.77, 1.48 and 2.29 respectively. The probability of capital formation, public health expenditure as percentage of total expenditure or GDP and population growth is 0.0000.

[Table 4.1.1 here]

4.2 Regression Results

4.2.1 Panel OLS Regression: Table 4.2.1 consists of five models with Panel OLS estimation results. In Model 1, enrolment ratio for secondary level of education is highly significant and unit percent increase in secondary gross enrolment raises 62 percent income per capita.

[Table 4.2.1 here]

The public spending on health as percentage of GDP shows positive and significant effect of 79 percent on the economic growth. Similarly, unit increase in the physical capital investment can increase per capita income by 28 percent. The reported level of t-statistics is 8.44 at 1 percent significance level. While, trade increases the income per capita by 63 percent that is higher than secondary enrolment rates and it might be the reason that Asian countries are associated with agriculture sector in majority for textile, food and fishery industries and away from technology frontier. The population growth rate positively increases 56 percent income per capita.

In Model 2, it is unexpected to observe that the higher enrolment rate is insignificant but positive; however, Model 3 sustains the increase in the income per capita by the interaction term between secondary and higher enrolment rates with significant estimates of 8 percent. The Model 4

describes with the additional externalities in terms of health that focuses on the fertility rate. It states that decreasing the fertility rate by one percent can increase the income per capita by 193 percent. By observing the R squared for each model, the highest score for Model 3 provides most appropriate manifestation for determining the economic growth rate.

4.2.2 Random Effects Regressions: The Table 4.2.2 uses two specifications simultaneously in five models. The first column in each model explains estimates for Random Effect (RE) regression while second column provides estimates after controlling the heteroscedasticity. Results from Hausman Section model with null hypothesis has accepted for Random Effect model with probability $0.0893 > 0.05$. In Model 1, coefficient estimates have positive and significant effect with 52 percent level of income per capita. At the same time unit increase in the log of gross capital formation in constant US \$ 2005 makes 29 percent increase in the growth rate.

[Table 4.2.2 here]

The population growth rate is also strongly significant but having positive effect on the income per capita with 18 percent increase, which is opposite to the MRW model assumptions. The reason might be the possibility of three Asian countries cover most of the world's population; China, India and Pakistan. In Model 2, the enrolment rate in higher education is significant and increases the economic growth by 28 percent. On the other side, the share of the health in the GDP with unit increase can affect positively with 37 percent increase in the output level of income. The interaction term in Model 3 between secondary and higher education illustrate positive increase in the income per capita by 7 percent.

Model 4 describes gross enrolment ratios of primary and secondary level in interaction is also significant at 1 percent level to raise the output by 11 percent, however the public spending on education remains insignificant that is similar to the fertility rate. Lastly, in Model 5 public spending on education becomes highly significant and increases the output level with 25 percent. The unit decrease in the fertility rate can raise the output by 107 percent and one percent increase in investment can raise 33 percent income per capita of the country.

4.3 Estimation Regressions Results for GDP per capita PPP and Life Expectancy Rate:

Model 6 with dependent variable as GDP per capita in PPP having International constant US \$ 2011 estimated in Table 4.3. The gross enrolment ratio in secondary education is highly significant at 1 percent level. Unit percent increase can raise GDP per capita with 66 percent increase in panel OLS and 54 percent in RE model. The estimates are robust and similar effects are validated for health variables. In Model 7, life expectancy as proxy for economic growth use to analyse the monetary and non-monetary effects on the development of the country. The model suggests that level of education can increase the life expectancy rate with 7 percent points in both specifications. The rate of population growth has negative effect that supports prior research of MRW assumption.

[Table 4.3 here]

4.4 Endogeneity Bias

The effect of education on economic growth with the help of GMM estimator have presented in Table 4.4 below. All models are with their respective explanatory variables are estimated that are already calculated in panel OLS equations. Most of the results are consistent with the base

models of the OLS estimations except in Model 4 for interaction terms and Model 6 for gross enrolment rates.

[Table 4.4 here]

4.5 Economic Outlook among Asian Countries:

Our large dataset allows us to make comparison of the economic growth rate of the Asian countries and measuring the fastest growth rate in the particular region of the continent. Group (I) consist of Asian regions of South, Central and Middle East Asia, and Group (II) includes East Asia and Pacific regions.

[Table 4.5.1 here]

The Table 4.5.4 illustrate difference between two groups of Asian countries in which dependent variable is per capita income (real) and gross secondary enrolment is used as proxy of public spending in education sector. Meanwhile, the model strategy is similar to the base models previously defined³. The education variable is highly significant at 1 percent level. It states that unit percent increase in education increases the output by 156 percent. Similarly, for one percent increase in gross enrolment ratio there is increase of 92 percent in the per capita income of South, Central and Middle East Asian countries. While, 72 percent increase in the output is possible due to one percent increase in the public spending on health. On the other side, OLS estimations explain the significant role of public spending on education on East Asia and Pacific. The one percent increase in public spending on education can raise 50 per cent increase in the output.

³ Descriptive Statistics and correlation statistics are in Table 4.5.2a and 4.5.2b for Group I, and 4.5.3a and 4.5.3b for Group II.

Although this coefficient is not as larger as compared to the Group (I) which has, 156 per cent increase in the output yet it makes significant share at 1 percent level. The highly significant variables are public spending on education, health and physical investment. One of the biggest difference one can see in the trade openness share as the variable has become insignificant under RE specification that is quite better in panel OLS as one per cent increase in the trade openness boosts up the economic growth by the 113 percent.

[Table 4.5.4]

5. Discussion and Conclusion

The main objective of the study was to investigate the impact of education and its public spending on economic growth in the developing countries of Asia. For this purpose, panel data for the period 1991 to 2015 has used for various macroeconomic characteristics for 25 countries in which 6 countries have been dropped due to unavailability of data. Data used in this study design in periods and each period is the average of five years of annual data. Panel Least square regression has estimated to examine different levels of productivity with multiple macroeconomic indicators (Islam, 1995). Hausman Test between Fixed effect and Random effect use to specify model in our study. The test suggests that Random Effect Model is more appropriate for further estimations. Moreover, this study attempts to deal with the potential endogeneity in persisting results with the GMM techniques. In addition, the dataset divided into two sub-groups to investigate the heterogeneity among Asian countries to examine the effect of human capital investment that consist of; firstly, South, Central Asia and Middle East which include 11 countries and secondly, East Asia and Pacific regions with 8 developing countries. The study finds robust estimates with alternative specifications.

The findings concretely explain that education attainment is highly significant for the economic growth. Specifically, gross enrolment rate for secondary level increases economic growth fifty times higher than gross enrolment rate for tertiary level. As a whole, education performs substantially better to stimulate economic growth at each level of education. Similarly, public spending in education has significant and positive impact on the economic growth (Lindahl et al., 2001). Investment in education is equally increasing the growth level as fixed capital formation in Asian economies. Nevertheless, the study determines the positive and significant impact on the economic growth by investing in public health, yet education investment gives higher estimates. The findings are also forecasting about the physical investment opportunities to develop better economies with strong infrastructure and maintenance that increase the per capita income. Asia needs to focus more on the international trade that can be useful tool for the developing economies with having largest populated countries (Judson, 1998). However, the estimates highlights that trade become ineffective when public health expenditures are accounted. These needs to be focus as there must economic balance between health and international trade.

The estimates are consistent with real strength of Asia, which is its population (Becker et al., 1999). Almost, population growth rate presents positive and highly significant coefficients in each model. It explores the labour force opportunities that are limited. On the other side, countries with lower enrolment rates in both level have opportunities to invest in these areas to reduce education gap and increase the number of students in formal education (Blankenau et al., 2004). While, examining the interaction of secondary and higher education enrolment rates also proves significant increase in education but these estimates are slightly lower than the above mentioned interaction term that could be possible due to the huge gender gap in tertiary education in the developing countries.

The findings reveals that per capita income (real) and GDP per capita are more appropriate measurement tools for economic growth as compared to life expectancy rate. However, the estimates support significant relationship between life expectancy and economic growth (Azomahou et al., 2009). It is important to consider that education attainment at lower levels can lead the developing countries in the initial track of growth for long run progress. In addition, the study investigates two subsamples of the dataset for looking over the impact of education spending by the government on economic growth in Central, South and Middle East and East Asia and Pacific. The results show that education investment in both group is beneficial to policy makers with significance. However, the effect of public spending on education for Central, Middle East and South Asian countries is 92 percent on economic growth than the East Asia and Pacific that is 42 per cent. Lastly, results are quite robust to enhance the economic growth with the education investment at individual and group levels. It emphasizes the trade openness in Asia that definitely boost up and support local businesses, venture capitals and small industries by the help of transition countries.

Summing up, my analysis conclusively present that education attainment and public spending on education are the strongest and productive channels for the consistent economic growth in long run. However, the budget distribution in education must reconsider and revise for long run perspective. However, other important determinants are not covered in this research such as foreign direct investment, government effectiveness, foreign aid, financial development, employment, inflation rate, law and order, private investment etc. There can be possibilities for the proxies of said determinants in further research.

The study suggest following policy recommendations. Firstly, education policies should be reform to cover supply and demand according to the population growth, so that, equal distribution of resources in schools and universities regardless of location can be maintained. Additionally, education sector should focus on improving gross enrolment rates in tertiary education and Universal Primary Enrolment achievement. Secondly, it is necessary to adopt policies to combat pandemic diseases and climate change by assuring resource allocation on different sectors without political influence. Economic policies are highly needed for free trade zone in observance of trade openness and mobility of labour force among Asian countries.

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Data and Results Tables

Table 3.1 Variables and Description

Dependent variable is Per capita income (Real)				
Variables	Abbreviation		Units	Sources
	Eviews	Results		
Income per capita(Real)	Ypc5	Real GDP	Real GDP in Constant US \$ 2005 divided by population	World Bank
Gross Enrolment Ratio Primary Level (both sexes)	gp	Primary	Percentage	World Bank
Gross Enrolment Ratio Secondary Level (both sexes)	gs	Secondary	Percentage	World Bank
Gross Enrolment Ratio Higher Level (both sexes)	gt	Higher	Percentage	World Bank
Health Expenditure	h	H Exp. (% GDP)	Percentage of GDP	World Bank
Gross Capital Formation	cf	Capital Form.	US \$2005	World Bank
Trade	trade	Trade (% GDP)	Percentage of GDP	World Bank
Population Growth	popg	Population	Annual percentage	World Bank
Fertility Rate	fert	Fertility Rate	Total (births per woman)	World Bank
Public Expenditure on Education	edu	P Exp. Edu. (% GDP)	Percentage of GDP	World Bank
Expenditure on Health	hg	Exp. H (% T Exp.)	Percentage of govt. Exp.	World Bank

Table 3.2: List of Selected Countries

East Asia and Pacific		Central Asia & Middle East		South Asia	
Countries	GDP (US \$2005)	Countries	GDP (US \$2005)	Countries	GDP (US \$2005)
Cambodia	11489216205.6843	Azerbaijan	31243183063.8401	Bangladesh	118889894713.575
China	5270061138617.21	Kazakhstan	96488665229.0179	Bhutan	1573073201.75673
Indonesia	471710182292.671	Tajikistan	4209222099.72851	India	1598324149794.9
Malaysia	220235367117.611	Iran	276740113715.673	Pakistan	150571721707.155
Mongolia	5477482142.71821	Lebanon	32993712534.4715	Nepal	12014068656.3475
Thailand	255244833669.891			Sri Lanka	42494660670.4684
Vietnam	97798691646.3751				
Philippines	164775851239.328				

Table 4.1.1: Data Descriptive Statistics

Variable	Mean	Median	Max	Min	S.D.	Skew.	Prob.	Obs.
Income per capita	1799.994	1061.778	7291.004	219.0863	1724.348	1.497495	0.0000	95
secondary	65.55927	69.23412	102.882	14.81846	22.32258	-0.39192	0.13135	90
higher	20.37142	18.01202	60.23526	0.74877	14.71323	0.850314	0.00366	93
P Exp. Edu. (% GDP)	3.393612	3.207027	7.14229	1.00145	1.335029	0.480049	0.11372	95
H Exp. (% GDP)	1.982678	1.712584	5.278476	0.62113	1.059243	1.221582	0.0000	95
H Exp. (% T Exp.)	8.458372	7.904743	22.07639	3.553855	3.596142	1.204437	0.0000	90
Capital Form⁴.	91500	16600	2270000	142	29600	5.655777	0.0000	91
Trade	80.77982	77.13138	202.9801	19.26573	40.3639	0.855311	0.00181	95
Population growth	1.481953	1.43988	4.177176	-1.214735	0.785465	-0.29118	0.0000	95
Fertility Rate	2.792985	2.534	5.6204	1.485	0.963253	0.815244	0.00518	95

Table 4.1.2: Correlation between the variables

Variable	Income Per Capita	Secondary Rate	Higher Rate	P Edu. % GDP	Health % GDP	Health % T Exp.	Capital Form.	Trade	Pop. Growth	Fertility Rate
Income	1.0000	0.4221	0.6553	0.1719	0.428	0.1564	0.07668	0.4585	-0.011	-0.488
Secondary	0.4221	1.0000	0.7564	0.1885	0.192	0.0605	0.1230	0.2836	-0.2691	-0.509
Higher	0.6553	0.7564	1.0000	0.2424	0.4065	0.2527	0.00902	0.4133	-0.1948	-0.497
P Edu.	0.1719	0.1885	0.2424	1.0000	0.4336	0.1110	-0.1930	0.5166	-0.0991	-0.098
Health	0.4289	0.1926	0.4065	0.4336	1.0000	0.7629	0.03800	0.3159	-0.1646	-0.345
Health	0.1564	0.0605	0.2527	0.111	0.7629	1.0000	0.06953	0.1188	-0.2790	-0.342
Capital	0.0766	0.1230	0.0090	-0.1930	0.0380	0.0695	1.0000	-0.2206	-0.2437	-0.298
Trade	0.4585	0.2836	0.4133	0.5166	0.3159	0.1188	-0.2206	1.0000	-0.0259	-0.200
Pop.	-0.011	-0.2691	-0.194	-0.099	-0.164	-0.2790	-0.2437	-0.0259	1.0000	0.463
Fertility	-0.488	-0.5092	-0.497	-0.098	-0.345	-0.3424	-0.2981	-0.2004	0.4636	1.0000

Source: World Bank

⁴ Capital formation for mean, median, maximum and minimum are in (000000)

Table 4.2.1 Estimation Results of Panel Ordinary Least Square

Dependent Variable : Income per capita (Real)					
Variables	Estimates	Estimates	Estimates	Estimates	Estimates
	(1)	(2)	(3)	(4)	(5)
Secondary	0.6258*** (3.520)	---	---	---	---
Higher	---	0.4557 (5.3996)	---	---	---
Secondary* Higher	---	---	0.0833*** (4.8705)	---	---
Primary* Secondary	---	---	---	0.0878** (2.090)	---
Fertility Rate	---	---	---	-1.930*** (-5.8488)	---
P Exp. Edu. (% GDP)	---	---	---	0.4186** (2.370)	0.0045 (0.0215)
Exp. H (% T Exp.)	---	---	---	---	0.2534
H Exp. (%GDP)	0.7911*** (5.8143)	0.7015** (5.1014)	0.7371*** (5.6025)	---	---
Capital Form.	0.2874*** (8.4418)	0.2211*** (6.2414)	0.2516*** (7.4627)	0.1131*** (3.125)	0.2509*** (5.6095)
Trade (% of GDP)	0.6330*** (4.486)	0.3286** (2.2911)	0.4856*** (3.4276)	---	0.9884*** (5.469)
Population	0.5689*** (3.573)	0.5481** (3.5141)	0.5432*** (3.671)	0.8544*** (4.06)	0.15736 (0.7768)
Constant	-5.446*** (-4.471)	-1.279 (-1.09)	-2.35** (-2.068)	3.92*** (2.786)	-3.592** (-2.216)
Observation	83	86	82	83	83
R-Square	0.68	0.68	0.72	0.58	0.43
Adj. R-Square	0.66	0.66	0.70	0.55	0.40
F-Statistics	32.8183	33.4301	38.642	21.080	11.7957

All variables are taken in logarithm. Data has arranged by taken averages of 5 years. The t-statistics are presented in parenthesis with significance level reported as, *** p<0.01, ** p<0.05, * p<0.10

Table 4.2.2 Estimation Results of Random Effect Model. Dependent Variable: Per Capita Income (Real)

	(1)		(2)		(3)		(4)		(5)	
Variables	(i) Estimates	(ii) Estimates	(iii) Estimates	(iv) Estimates	(v) Estimates	(vi) Estimates	(vii) Estimates	(viii) Estimates	(ix) Estimates	(x) Estimates
Secondary	0.5281*** (4.965)	0.528*** (3.966)	---	---	---	---	---	---	---	---
Higher	---	---	0.277*** (4.928)	0.277*** (5.083)	---	---	---	---	---	---
Secondary* Higher	---	---	---	---	0.0700*** (5.883)	0.0700*** (6.419)	---	---	---	---
Primary* Secondary	---	---	---	---	---	---	0.111*** (5.046)	0.111*** (5.046)	---	---
Fertility Rate	---	---	---	---	---	---	-0.1573 (-1.003)	-0.1573 (-0.725)	---	---
Pub. Exp. Edu. (% GDP)	---	---	---	---	---	---	0.01927 (0.1930)	0.01927 (0.1588)	0.2555** (2.3218)	0.2555*** (2.9690)
Exp. H (% T Exp.)	---	---	---	---	---	---	---	---	-0.2208 (-1.6307)	-0.2208 (-1.2024)
H Exp.(% GDP)	0.3747*** (3.4639)	0.3747*** (3.3468)	0.285*** (2.7635)	0.285*** (2.606)	0.22566** (2.3143)	0.22566** (2.2693)	---	---	---	---
Capital Form.	0.292*** (8.2541)	0.2915*** (9.3172)	0.245*** (6.3968)	0.245*** (4.836)	0.2341*** (6.1946)	0.2341*** (4.6190)	0.247*** (6.4918)	0.247*** (7.6518)	0.337*** (8.7021)	0.337*** (12.6943)
Trade (% of GDP)	0.24230** (2.4221)	0.24230 (2.2682)	0.0773 (0.7456)	0.0773 (0.618)	0.1114 (1.0972)	0.1114 (1.0604)	---	---	0.2722** (2.363)	0.2722** (2.397)
Population	0.1819** (2.2277)	0.1819 (0.1480)	0.1539* (1.9251)	0.1539 (1.137)	0.1724** (2.197)	0.1724 (1.2763)	0.0484 (0.594)	0.0484 (0.358)	-0.0016 (-0.0193)	-0.0016 (-0.0154)
Constant	-3.125*** (-3.629)	-3.12*** (-3.509)	0.1285 (0.129)	0.1285 (0.100)	0.2034 (0.263)	0.2034 (0.162)	-0.631 (-0.63)	-0.631 (-0.47)	-1.0744 (-1.5984)	-1.0744** (-2.4781)
Observations	83	83	86	86	82	82	83	83	83	83
R-Square	0.74	0.74	0.74	0.74	0.76	0.76	0.66	0.66	0.64	0.64
Adj. R-Square	0.72	0.72	0.73	0.73	0.74	0.74	0.64	0.64	0.62	0.62
F-Statistics	43.5689	43.5689	46.5077	46.5077	47.8157	47.8157	30.0224	30.0224	27.7204	27.7204

All variables are estimated in logarithm. Data has arranged by taken averages of 5 years. The t-statistics are presented in parenthesis with significance level reported as, *** p<0.01, ** p<0.05, * p<0.10. Second column of the coefficient estimates for each model provides results with White Test.

Table 4.3 Estimation Results of Panel OLS and Random Effect Models

Dependent Variable	GDP Per Capita (PPP)			Life Expectancy Rate		
	(6)			(7)		
	OLS	Random Effect		OLS	Random Effect	
Variables	(i)	(ii)	(iii)	(i)	(ii)	(iii)
Secondary Level	0.6604*** (3.7841)	0.5417*** (5.0960)	0.5417*** (3.8606)	0.0698*** (4.8458)	0.0795*** (5.3687)	0.0795*** (5.7308)
P Exp. Health (% GDP)	0.5095*** (3.8150)	0.3353*** (3.1015)	0.3353*** (2.9538)	0.0355*** (3.2270)	0.0197 (1.3976)	0.0197 (1.2239)
Capital Fix Form. (\$2005)	0.5520*** (6.8068)	0.2835*** (8.0333)	0.2835*** (9.2439)	0.0189*** (6.8763)	0.0256*** (6.2948)	0.0256*** (5.5342)
Population Growth Rate	0.3439** (2.2007)	0.1486* (1.8210)	0.1486 (1.1826)	0.0016 (0.1308)	-0.0023 (-0.2050)	-0.0023 (-0.1802)
Trade (% of GDP)	0.5520*** (3.9854)	0.2296** (2.2967)	0.2296** (2.1313)	0.0350** (3.0623)	0.0498*** (3.7700)	0.0498*** (4.1431)
Constant	-2.1798* (-1.8227)	-1.4568* (-1.6928)	-1.4568 (-1.6580)	3.3173*** (33.593)	3.0730*** (26.8719)	3.0730*** (24.8033)
No. of obs.	83	83	83	83	83	83
R-Squared	0.61	0.74	0.74	0.66	0.69	0.69
Adjusted R-Squared	0.58	0.73	0.73	0.64	0.67	0.67
F-Statistics	24.0347	44.74	44.74	30.1663	34.7989	34.7989

All variables are taken in logarithm. Data has arranged by taken averages of 5 years. The t-statistics are presented in parenthesis with significance level reported as, *** p<0.01, ** p<0.05, * p<0.10. Second column of the coefficient estimates provide results with White Test.

Table 4.4 Generalized Method of Moment regression results for economic growth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Estimates	Estimates	Estimates	Estimates	Estimates	Estimates	Estimates
Secondary	0.7736*** 1.547251	---	---	---	---	0.7405 1.48295	0.077*** 2.90611
Higher	---	0.582*** 3.043438	---	---	---	---	---
Secondary* Higher	---	---	0.0982*** 2.688443	---	---	---	---
Primary* Secondary	---	---	---	0.072509 0.907466	---	---	---
Fertility Rate	---	---	---	-3.599*** -5.876196	---	---	---
Pub. Exp. Edu. (% GDP)	---	---	---	0.4468* 1.78302	-0.079987 -0.135327	---	---
Exp. H (% T Exp.)	---	---	---	---	0.412877 0.601915	---	---
H Exp.(% GDP)	0.808*** 2.06803	0.8176*** 1.967546	0.8142*** 2.0659	---	---	0.471 1.410188	0.044*** 2.033655
Capital Form.	0.3230*** 3.794647	0.251*** 2.44473	0.278*** 2.965456	0.1604*** 3.250808	0.293*** 3.236926	0.2479*** 3.410034	0.0175*** 3.296152
Trade (% of GDP)	0.7167*** 4.917946	0.3395* 1.580307	0.539*** 3.837124	---	1.201*** 3.935588	0.6463*** 3.769553	0.0235 1.450583
Population	1.7829*** 1.809036	1.858*** 1.823484	1.629*** 1.713778	4.2877*** 4.738891	0.623308 0.473369	0.946 1.315108	0.0618 0.760299
Constant	-8.667*** -2.915898	-3.987** -1.179019	-4.741*** -1.549785	0.988406 0.461594	-6.239** -1.33813	-4.1003* 1.669969	3.319*** 13.47428
Observations	64	66	62	64	65	64	64
R-Square	0.65	0.62	0.69	0.47	0.37	0.59	0.63
Adj. R-Square	0.62	0.59	0.66	0.42	0.32	0.56	0.60
Prob(J-statistic)	0.47	0.75	0.53	0.64	0.92	0.32	0.88

The variables are transformed into logarithm. Data has arranged by taken averages of 5 years. The t-statistics are presented in parenthesis with significance level reported as, *** p<0.01, ** p<0.05, * p<0.10. The coefficient estimates provide results with White Test.

Table 4.5.1 Economic Outlook Among Developing Countries of Asia. Groups List

Group(I)	Group(II)
Middle East, South & Central Asia	East Asia & Pacific
Azerbaijan	Cambodia
Bangladesh	China
Bhutan	Indonesia
Lebanon	Malaysia
India	Mongolia
Iran, Islamic Rep.	Philippines
Kazakhstan	Thailand
Nepal	Vietnam
Pakistan	
Sri Lanka	
Tajikistan	

Table 4.5.2a Descriptive Statistics for Group I

Table 4.5.2a: Data Descriptive Statistics Group I Central, South & Middle East Asia

Variable	Mean	Median	Maxim	Minimum	S.D	Skew.	Prob.	Obs.
Income per capita	2331.25	1461.30	7291.00	263.710	2009.19	0.9599	0.0143	54
secondary	64.1834	64.8159	102.8820	14.81846	21.6876	-0.2440	0.5801	54
Health Exp.(% of GDP)	2.0002	1.7262	5.2637	0.7089	1.1146	1.1460	0.0015	54
Capital formation	1.43E+11	2.68E+10	2.27E+12	1.42E+08	3.77E+11	4.26569	0.0000	54
Trade	76.6828	69.0412	202.9801	19.2657	43.7046	1.20015	0.0003	54
Population growth	1.4910	1.4768	4.1771	-1.2147	0.8914	-0.3845	0.0000	54

Table 4.5.2b Correlation Group I

Table 4.5.2b: Correlation among variables in Group I (South, Middle East & Central Asia)

Variables	Income	Secondary	Health	Capital	Population	Trade
Income	1.0000	0.5708	0.4319	-0.0055	0.0947	0.4832
Secondary	0.5708	1.0000	0.1215	0.1676	-0.2632	0.0647
Health	0.4319	0.1215	1.0000	0.0356	0.0668	0.1941
Capital	-0.0055	0.1676	0.0356	1.0000	-0.2648	-0.2313
Population	0.0947	-0.2632	0.0668	-0.2648	1.0000	0.1308
Trade	0.4832	0.0647	0.1941	-0.2313	0.1308	1.0000

Table 4.5.3a Descriptive Statistics Group II

Table 4.5.3a: Data Descriptive Statistics Group II East Asia & Pacific

Variable	Mean	Median	Maximum	Minimum	S.D	Skew.	Prob.	Obs.
Income	1970.25	1277.57	7067.27	263.710	1700.66	1.4644	0.0003	36
secondary	64.5836	66.4690	93.0465	17.2413	18.9935	-0.6398	0.2920	36
Health	2.0038	1.75837	5.2784	0.7089	0.9878	1.4274	0.0000	36
Capital	1.72E+11	3.28E+10	2.27E+12	2.27E+12	2.73E+12	4.50E+11	0.0000	36
Trade	98.8820	99.7922	202.9801	34.3623	44.5311	0.6326	0.2936	36
Population	1.4910	1.4768	4.1771	-1.2147	0.8914	-0.3845	0.3277	36

Table 4.5.3b Correlation among Variables in Group II

Table 4.5.3b Correlation among Variables in Group II (East Asia & Pacific)

Variables	Income	Secondary	Health	Capital	Population	Trade
Income	1.0000	0.2890	0.3089	0.1324	-0.0716	0.6173
Secondary	0.2890	1.0000	0.3911	0.2418	-0.3982	0.0546
Health	0.3089	0.3911	1.0000	0.1379	-0.5729	0.3150
Capital	0.1324	0.2418	0.1379	1.0000	-0.4286	-0.3847
Population	-0.0716	-0.3982	-0.5729	-0.4286	1.0000	0.2377
Trade	0.6173	0.0546	0.3150	-0.3847	0.2377	1.0000

Table 4.5.4 Economic Outlook Among Developing Countries of Asia. Dependent Variable Income per capita (Real)

Variables	Group I			Group II		
	Estimates	Estimates	Estimates	Estimates	Estimates	Estimates
	OLS	Random	Random	OLS	Random	Random
	(i)	(ii)	(iii)	(i)	(ii)	(iii)
Secondary Level	1.561*** (10.919)	0.9323*** (9.1220)	0.9323*** (6.3961)	0.5057*** (2.9036)	0.4239*** (3.8664)	0.4239*** (3.5155)
P Exp. Health (% GDP)	0.7239*** (8.6083)	0.7122*** (7.5083)	0.7122*** (7.628)	0.3156 (1.4778)	0.3370** (2.7063)	0.3370*** (3.1819)
Capital Fix Form.(\$2005)	0.2748*** (3.7293)	0.1811*** (6.4635)	0.1811*** (2.8803)	0.3050*** (9.147)	0.3757*** (8.9022)	0.3757*** (9.1118)
Population Growth Rate	0.1567*** (7.7300)	0.2180*** (2.3370)	0.2180 (1.0952)	0.2332 (1.2967)	0.0262 (0.3013)	0.0262 (0.5309)
Trade (% of GDP)	0.6827*** (7.3034)	0.5479*** (6.5351)	0.5479*** (5.2120)	1.1337** (6.871)**	0.1080 (0.9308)	0.1080 (0.6996)
Constant	-6.204*** (-6.7458)	-3.494*** (-4.4304)	-3.494** (-1.986)	-7.405*** (-6.295)	-4.1714*** (-4.306)	-4.1714*** (-2.9485)
No. of obs.	51	51	51	36	36	36
R-Squared	0.89	0.80	0.80	0.8593	0.8684	0.8684
Adjusted R-Squared	0.88	0.78	0.78	0.8358	0.8465	0.8465
F-Statistics	80.392	37.37	37.37	36.6565	39.60	39.60

All variables are taken in logarithm. Data has arranged by taken averages of 5 years. The t-statistics are presented in parenthesis with significance level reported as, *** p<0.01, ** p<0.05, * p<0.10. Second column of the coefficient estimates provide results with White Test.