Indian Journal of Fundamental and Applied Life Sciences ISSN: 2231– 6345 (Online)
An Open Access, Online International Journal Available at www.cibtech.org/sp.ed/jls/2015/01/jls.htm
2015 Vol.5 (S1), pp. 3939-3947/Farzad et al.
Research Article

HEALTH SITUATION AND ECONOMIC GROWTH IN SELECTED ASIA AND PACIFIC COUNTRIES (THESE COUNTRIES INCLUDE AUSTRALIA, BRUNEI DARUSSALAM, CAMBODIA, CHINA, INDONESIA, JAPAN, MALAYSIA, LAO PDR, KOREA REPUBLIC, MONGOLIA, NEW ZEALAND, THAILAND, VIETNAM, SOLOMON ISLANDS, SAMOA, SINGAPORE, PHILIPPINES AND PAPUA NEW GUINEA): EVIDENCE FROM PANEL COINTEGRATION

[*]Farzad Rahimzadeh[1], Mir Naser Mir Bagheri Hir[2], Mohammad Hasannejad[3], Siamak Shokouhi Fard[4] and Abbas Zafarmohammadpour Sarabi[4]
[1]Department of Economics, University of Payame Noor, Ardabil, Iran
[2]Department of Economics, Payame Noor University,
PO BOX 19395-3697 Tehran, I.R of Iran
[3]Department of Financial Management, University of Shahid Beheshti, Tehran, Iran
[4]Department of Art in Economy
**Author for Correspondence*

ABSTRACT
Health situation as a prominent part of human capital has important effects on economic growth. In this paper, effects of health condition on economic growth have been examined by using of several proxies to measure health situation. To this end, data of selected Asia and pacific selected countries from 1995 to 2013 are collected from World Bank database and tested property of data stationary by Fisher-ADF panel data unit root test and cointegration between model variables by Pedroni panel cointegration test. The estimation results show that capital stock, labor force, Trade openness and Liquidity have positive and statistically significant effects on economic growth. Also, health situation has positive and significant effects on economic growth, if health situation measured by per capita health expenditure, life expectancy, Hospital Bed (per 1000 people) and Public health expenditure.

Keywords: *Health Situation, Economic Growth, Panel Data, Asia and Pacific, Panel Cointegration*

INTRODUCTION
Improving health around the world today is an important social objective, which has obvious direct payoffs in terms of longer and better lives for millions. There is also a growing consensus that improving health can have equally large indirect payoffs through accelerating economic growth. Healthier workers are physically and mentally more energetic and robust. They are more productive and earn higher wages. They are also less likely to be absent from work because of illness (or illness in their family). Illness and disability reduce hourly wages substantially, with the effect especially strong in developing countries, where a higher proportion of the work force is engaged in manual labor than in industrial countries.
In traditional growth model that introduced by Solow (1957) only physical capital and labor force considered as production factor.
This model contributes economic growth to growth of labor, physical capital and technology improvement. After him, other economist such as Robert Lucas introduces another type of capital that named "human capital". The human capital theory recognizes people as a type of economic asset and shows that increased investment in health, skills, and knowledge provides future returns to the economy through increases in labor productivity. After these precise works, numerous empirical studies try to explain differences between countries growth rates. In these studies, human capital classified into two major elements, Education and health. In the one hand, education expenditure and school enrollment in secondary, tertiary and primary level considered as human capital. In the other hand, health expenditure (Currais, 1999; Heshmati, 2001; Hartwing, 2009; Baltagi and Moscone, 2010; Wang, 2011) and life

expectancy (Bloom and Sachs, 1998; Gallup *et al.*, 1999; Bloom *et al.*, 2003; Weil, 2007; Ashraf *et al.*, 2008; Lorentzen *et al.,* 2008) considered as human capital index.

In this paper, impact of health on economic growth has been studied in selected Asia and pacific countries. In the contrary to previous empirical works, in this study impacts of external sector (trade openness) and financial sector (stock market and banking sector) are studying on economic growth, too. To this end, data of 18 countries from 1995 to 2013 collected and considered models have been estimated by panel data approach.

Impact of Health on Economic Growth in Theory

Health as human capital affects growth directly through, for example, its impact on labour productivity and the economic burden of illness. Health is so important as both a source of human welfare and a determinant of overall economic growth. In a theoretical basis, Mankiw *et al.*, (1992), Barro (1996) and Grossman (1972) have developed models that include health capital as a significant variable for economic growth. Consider Mankiw, Romer, and Weil (1992) human capital augmented Solow model of economic growth.

$$Y(t) = K(t)^{\alpha} H(t)^{\beta} [A(t)L(t)]^{1-\alpha-\beta} \qquad (1)$$

Where $\alpha, \beta \in [0,1], \alpha + \beta \in [0,1]$ and t denotes time. This implies that the production function exhibits constant returns to scale in its three factors: physical capital (K), human capital (H), and productivity-augmented labor (AL). All markets (both input and output markets) are assumed to be perfectly competitive. All firms are assumed to be identical. The economy can then be described by a representative agent. Physical capital and human capital are assumed to be accumulating factors and the representative agent saves output to have more capital (either physical or human). L and A are assumed to growth exogenously at rates n and g, respectively.

$$L(t) = L(0)e^{nt} \qquad (2)$$

$$A(t) = A(0)e^{gt} \qquad (3)$$

Let S_k be the fraction of income invested in physical capital and S_h the fraction invested in human capital. The evolution of the economy is determined by

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

$$\dot{h}(t) = s_h y(t) - (n + g + \delta)h(t) \qquad (5)$$

Where $y = Y/AL$, $k = K/AL$ *and* $h = H/AL$ are quantities per effective unit of labor. We are assuming that the same production function applies to human capital, physical capital, and consumption. Equations (4) and (5) imply that the economy converges to a steady state defined by

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

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

We can receive to steady-state level of output by mathematical ways. It show that, the rate of human capital accumulation can affect the steady-state level of output per effective worker and higher level of human capital accumulation lead to higher level of output per effective worker. From an empirical perspective, the addition of human capital to the model allows for another dimension to be invoked in explaining differences in output levels across countries. Therefore, Countries who invest in education and health are predicted to have higher income levels than those who don't, for any given investment rate in physical capital

$$Ln(\frac{Y(t)}{L(t)}) = LnA(0) + gt + \frac{\alpha}{1-\alpha} Ln(s_k) - \frac{\alpha}{1-\alpha} Ln(n + g + \delta) + \frac{\beta}{1-\alpha} Ln(h^*) \qquad (8)$$

Research Article

We assume that g and δ are constant across countries and $LnA(t) = a + \varepsilon$, where a is a constant and ε is a country- specific shock. Notice that both physical capital and human capital are assumed to depreciate at the same rate, δ.

Literature Review

The most of empirical studies (based on cross-country or time series regressions) indicate that life expectancy has a positive impact on income per capita (Bloom and Sachs, 1998; Gallup *et al.*, 1999; Bloom *et al.*, 2003). Bloom and Malaney (1998) in a study for 78 countries the time period 1965-1990 perceived that the mortality crisis in the first half of 1990 in Russia was leaded to decrease life expectancy from 70 to 65 which was resulted in reduction of gross domestic product equal to 1.8-2.7 percent with regard to in year 1990 and income per capita growth was reduced to one third.

Rivera and Currais (1999) estimated the relationship between health and growth of OECD member countries in the time period 1960-1990 and showed that countries having more health expenditures had higher economic growth. Heshmati (2001) studied the relation between health expenditures and gross domestic product in a research through generalized Solow model. He inserted health expenditures as the ariable representative of health status in the growth function. Then he concluded that health expenditures have a positive and significant impact on gross domestic product growth.

Chou (2007) investigated the relationship between health care expenditure, income, and other factors that are not related to income for China with pooled cross-section and time series data. An important finding based on the estimated panel cointegrated regressions is that the government budget deficits have a significant long-run impact on China's health care xpenditure. This provided supportive evidence on the differences between rich and poor areas in China's health care financing policy, and the substantial disparities in health service coverage in China**.**

Hartwing (2009) in his article titled ‘is health capital formation good for long-term economic growth? Panel Granger-causality evidence for OECD countries’ revisited the question whether health capital formation stimulates GDP growth in rich countries by applying a new empirical methodology. The results do not lend support to the view that health capital formation fosters long-term economic growth in the OECD area.

Baltagi and moscone (2010) in their article with this title ‘Health care expenditure and income in the OECD reconsidered: Evidence from panel data’ reconsidered the long-run economic relationship between health care expenditure and income using a panel of 20 OECD countries observed over the period 1971–2004. In particular, the paper studied the non-stationarity and cointegration properties between health care spending and income. Their findings suggest that health care is a necessity rather than a luxury, with elasticity much smaller than that estimated in previous studies.

Narayan *et al.*, (2010) investigated the relationship between health and economic growth through including investment, exports, imports, and research and development (R&D), for 5 Asian countries using panel unit root, panel cointegration with structural breaks and panel long-run estimator for the period 1974–2007. They found that in the long-run, while health, investment, exports, EDRD (the interaction term between education and R&D) and R&D have contributed positively to economic growth, imports have had a statistically significant negative effect while education has had an insignificant effect.

Wang (2011) used international total health care expenditure data of 31 countries from 1986 to 2007 for exploring the causality between an increase in health care expenditure and economic growth. The estimation of the panel regression reveals that, health expenditure growth will stimulate economic growth. However, economic growth will reduce health expenditure growth.

Data and Model Specification

We consider the modified bloom, Caning and Sevilla (2004) model by adding the trade openness and liquidity situation to production function as

$$Y(t) = A(t)K(t)^{\alpha} L(t)^{\beta} Liq(t)^{\varphi} TO(t)^{\rho} e^{\phi_1 EDU(t) + \phi_2 H(t)} \quad (9)$$

Where Y is output; A represents TFP; K is physical capital; L is the labor force; Liq is Liquidity; TO is trade openness. In this model, Human capital consists of two components, education (EDU) and health

(H). We express the effect of the human capital terms on output as powers of an exponential. The advantage of this functional form is that it implies that log wages depend on the level of schooling and health status, which is compatible with the relationship usually estimated in microeconomic studies.
Taking natural logs of the aggregate production function, we derive an equation for the log of output in country i at time t as follow

$$LnY_{i,t} = LnA_{i,t} + \alpha LnK_{i,t} + \beta LnL_{i,t} + \varphi LnS_{i,t} + \rho LnTO_{i,t} + \phi_1 EDU_{i,t} + \phi_2 H_{i,t} \qquad (10)$$

We assume that $LnA_{i,t} = a + \varepsilon_{i,t}$, where a is a constant and $\varepsilon_{i,t}$ is a country- specific shock. So one can write this equation as

$$LnY_{i,t} = a + \alpha LnK_{i,t} + \beta LnL_{i,t} + \varphi LnS_{i,t} + \rho LnTO_{i,t} + \phi_1 EDU_{i,t} + \phi_2 H + U_{i,t} \qquad (11)$$

Where i Index denote the number of country ($i = 1-18$) and t is the data set period ($t = 1995-2013$). $U_{i,t}$ Was error term that include the country effects (μ_i), time effects (λ_t) and disturbance term of the equation ($\varepsilon_{i,t}$). That is $U_{i,t} = \varepsilon_{i,t} + \lambda_t + \mu_i$

In this paper, 18 countries from Asia and pacific considered from 1995 to 2013. In this model, variables are defined as below:

$Y(t)$: GDP of country *i* at time *t* (constant 2000 US$)

$K(t)$: Gross capital formation of country *i* at time *t*(constant 2000 US$).
$EDU(t)$: Gross enrollment in secondary in country *i* at time *t*
$L(t)$: labor force in country *i* at time *t*
$Liq(t)$: Liquidity level in country *i* at time *t*

$To(t)$: Trade openness (Sum of export and import volume divided by GDP)

$H(t)$: Health status variable that includes hospital beds (per 1000 people), physician (per 1000 people), per capita health expenditure (PPP, constant 2005 international $), health expenditure (%GDP), private and public health expenditure (%GDP) and life expectancy at birth.All data about these variables collected from World Bank online database (2012).

First, we should be ensuring model variable's stationary by conversional unit root tests. The most widely utilized panel unit root tests are the Im, Pesaran and Shin(IPS) W –test (1997), Levin, Lin and Chu (LLC) t-test (1992) and Fisher type unit root test developed by Maddala and Wu (1999) (Fisher-ADF).

In this section, we use Maddala and Wu (MW, 1999) Panel Unit Root Test or The Fisher-ADF test. The Fisher-ADF panel data unit root test is a much more flexible test and is applicable even to unbalanced panels and it is valid for individual ADF tests with different lag lengths.

The Fisher-ADF test statistic λ, which has a chi-square distribution with 2N degrees of freedom under the null hypothesis, is expressed as

$$\lambda = -2\sum_{i=1}^{N} \log(\pi_i) \qquad (12)$$

Where π_i refers to the probability values from individual ADF unit root tests for each country in the panel. The results of unit root test can summarized as follow in Table 1.

Table 1: Results of variables stationary based on Fisher-ADF test

Situation	Variable	Fisher-ADF test Statistic		Result
		Level	First difference	
Individual intercept and trend	Gross domestic product	11.84 (1.00)	88.67* (0.00)	I(1)
Individual intercept and trend	Gross capital formation	16.12 (0.98)	90.14* (0.00)	I(1)
Individual intercept and trend	Labor force	37.81 (0.38)	86* (0.00)	I(1)
Individual intercept and trend	secondary enrollment(%Gross)	39.34 (0.17)	58.99* (0.00)	I(1)
Individual intercept and trend	Trade(%GDP)	34.2 (0.55)	64.35* (0.00)	I(1)
Individual intercept and trend	Health expenditure(%GDP)	37.35 (0.40)	115.5* (0.00)	I(1)
Individual intercept and trend	Per Capita health expenditure, PPP, (constant 2005 international US $)	20.43 (0.96)	85.69* (0.00)	I(1)
Individual intercept and trend	cilbuP health expenditure(%GDP)	27.55 (0.84)	57.67* (0.00)	I(1)
Individual intercept and trend	cilbuP health expenditure(% Government expenditure)	46.34 (0.11)	89.33* (0.00)	I(1)
Individual intercept and trend	cilbuP health expenditure(%Total health expenditure)	39.93 (0.29)	71.61* (0.00)	I(1)
Individual intercept and trend	Life Expectancy	73.32* (0.00)	-	I(0)
Individual intercept and trend	Hospital Bed(per 1000 people)	29.84* (0.04)	-	I(0)
Individual intercept and trend	Physician(per 1000 people)	39.93 (0.29)	71.61* (0.00)	I(1)
Individual intercept and trend	Money and quasi money(%GDP)	24.94 (0.91)	83.87* (0.00)	I(1)

*A * indicates the rejection of the null hypothesis of unit root at least on the 0.05 level of significance.*

Table 1 results show that GDP, gross capital formation, secondary enrollment(%Gross), Trade(%GDP), Health expenditure(%GDP), Per Capita health expenditure (constant 2005 international US $), cilbuP health expenditure(% Government expenditure), cilbuP health expenditure(%Total health expenditure), Physician(per 1000 people), Money and quasi money(%GDP) and Labor force have not stationary property in variable level. These variables are stationary by getting first differences. In other words mentioned variables have a unit root. Life Expectancy and Hospital Bed (per 1000 people) are stationary. Hence, the model variables should be sure to cointegrated. If the model variables cointegrated, there is a long-run relationship between the dependent variable and independent variables in the model.

So, to ensure cointegraion of variables, Pedroni panel cointegration test (1997, 1999) is used. Pedroni (1997, 1999) developed a number of statistics based on the residuals of the Engle and Granger (1987) cointegration regression. The tests proposed in Pedroni (1997, 1999) allow for heterogeneity among individual members of the panel, including heterogeneity in both the long-run cointegrating vectors and in the dynamics. Assuming a panel of N industries each with m regressors (X_m) and T observations, the long run model is written as:

$$Y_{it} = \alpha_i + \lambda_i t + \beta_{1i} X_{1,it} + \beta_{2i} X_{2,it} + \ldots + \beta_{mi} X_{m,it} + \varepsilon_{it} \qquad t = 1, \ldots, T \qquad i = 1, \ldots, N \qquad (12)$$

Equation (12) implies that all coefficients, and, hence, the cointegrating vector, vary across countries. thus allow full heterogeneity across individual members of the panel. In these tests, the null hypothesis is for each member of the panel the variables involved are not cointegrated, and the alternative that for each member of the panel exists a single cointegrating vector. Pedroni (1997, 1999) also developed seven

Indian Journal of Fundamental and Applied Life Sciences ISSN: 2231– 6345 (Online)
An Open Access, Online International Journal Available at www.cibtech.org/sp.ed/jls/2015/01/jls.htm
2015 Vol.5 (S1), pp. 3939-3947/Farzad et al.
Research Article

panel cointegration statistics. Four of these statistics, called panel cointegration statistics, are *within-dimension* based statistics. The other three statistics, called Group mean panel cointegration statistics, are *between-dimension* panel statistics. Following Pedroni (1995, 1997), the heterogeneous panel and heterogeneous group mean panel of rho (ρ), parametric (ADF) and non-parametric (PP) statistics are calculated as follows.

1. Panel *v*-Statistic

$$Z_v = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{2} \right)^{-1} \qquad (13)$$

2. Panel ρ -Statistic

$$Z_\rho = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{2} \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right) \qquad (14)$$

3. Panel non-parametric (PP) *t*-Statistic

$$Z_{pp} = \left(\sigma^2 \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{2} \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right) \qquad (15)$$

4. Panel parametric (ADF) *t*-Statistic

$$Z_t = \left(\hat{S}^{*2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{*2} \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1_{i,t-1}}^{*} \Delta \hat{e}_{i,t}^{*} \qquad (16)$$

5. Group ρ -Statistic

$$\tilde{Z}_\rho = \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{e}_{i,t-1}^{2} \right)^{-1} \sum_{t=1}^{T} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right) \qquad (17)$$

6. Group non-parametric (PP) *t*-Statistic

$$\tilde{Z}_{pp} = \sum_{i=1}^{N} \left(\hat{\sigma}^2 \sum_{t=1}^{T} \hat{e}_{i,t-1}^{2} \right)^{-1/2} \sum_{t=1}^{T} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right) \qquad (18)$$

7. Group parametric (ADF) *t*-Statistic

$$\tilde{Z}_t = \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{S}_i^{-2} \hat{e}_{i,t-1}^{*2} \right)^{-1/2} \sum_{t=1}^{T} \hat{e}_{i,t-1}^{*} \Delta \hat{e}_{i,t}^{*} \qquad (19)$$

where $\hat{\sigma}^2$ is the pooled long-run variance for the non-parametric model given as $1/N \sum_{i=1}^{N} \hat{L}_{11i}^{-2} \hat{\sigma}_i^2$; $\hat{\lambda}_i = 1/2 \left(\hat{\sigma}_i^2 - \hat{S}_i^2 \right)$, where $\hat{L}_i$ is used to adjust for autocorrelation in panel parametric model, $\hat{\sigma}_i^2$ and $\hat{S}_i^2$ are the log-run and contemporaneous variances for individual *I*, and $\hat{S}^2$ are obtained from individual ADF-test of $e_{i,t} = \rho_i e_{i,t-1} + v_{i,t}$; S^{*2} is the individual contemporaneous variance from the parametric model, $\hat{e}_{i,t}$ the estimated residual from the parametric cointegration, while $\hat{e}_{i,t}^{*}$ the estimated residual from the parametric model and $\hat{L}_{11i}$ the estimated log-run covariance matrix for $\Delta \hat{e}_{i,t}$, and L_i is the *i*th component of the lower-triangular Cholesky decomposition of matrix Ω_i for $\Delta \hat{e}_{i,t}$ with the appropriate lag length determined by the Newey-West method.

In this section, eight models have been estimated with panel data. Pedroni Panel cointegration test results of these models are presented in Table 2. Results from Table 2 indicate that null hypothesis of no cointegration is rejected in all models.

Research Article

Table 2: Pedroni Cointegration test results

	Mod.1	**Mod.2**	**Mod.3**	**Mod.4**	**Mod.5**	**Mod.6**	**Mod.7**	**Mod.8**
Panel v-statistic	-1.75***	-2.35**	3.95*	14.85*	2.94*	12.42*	15.86*	8.88*
	(0.08)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Panel Rho-statistic	7.23*	5.57*	3.35*	5.74*	3.59*	5.47*	5.46*	5.93*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Panel PP-statistic	0.76	-8.88*	0.62	-6.78*	-1.6***	-8.7*	-7.02*	-5.43*
	(0.29)	(0.00)	(0.32)	(0.00)	(0.10)	(0.00)	(0.00)	(0.00)
Panel ADF-statistic	1.69***	-3.38*	1.25	-0.88	0.88	-2.6*	-2.47*	-1.85***
	(0.09)	(0.00)	(0.18)	(0.26)	(0.26)	(0.01)	(0.01)	(0.07)
Panel Rho-statistic	9.07*	6.63*	4.05*	6.91*	4.2*	6.95*	6.62*	7.2*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Panel PP-statistic	-5.11*	-16.8*	0.24	-11.9*	-3.74*	-11.4*	-11.6*	-8.09*
	(0.00)	(0.00)	(0.38)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Panel ADF-statistic	0.43	-4.49*	1.96**	-1.9***	1.01	-1.8***	-2.2**	-4.33*
	(0.36)	(0.00)	(0.05)	(0.06)	(0.23)	(0.06)	(0.03)	(0.00)

*A *, * and *** indicates the rejection of the null hypothesis of no cointegration at least on the 0.01, 0.05 and 0.1 level of significance.*

Table 3: Result of model estimation (dependent variable:LnGDP)

Variables	**Model 1**	**Model 2**	**Model 3**	**Model4**	**Model 5**	**Model 6**	**Model7**	**Model 8**
c	6.34	4.12	5.18	6.17	5.52	5.93	5.92	5.09
	(7.91)*	(4.79)*	(6.34)*	(8.68)*	(4.65)*	(7.69)*	(8.8)*	(6.67)*
Ln(K)	0.451	0. 476	0.636	0.52	0.643	0.542	0.511	0.55
	(13.32)*	(14.01)*	(8.63)*	(10.5)*	(6.83)*	(11.4)*	(12.9)*	(12.5)*
Ln(L)	0.41	0.353	0.20	0.33	0.199	0.316	0.37	0.35
	(9.1)*	(9.62)*	(2.93)**	(8.34)*	(3.23)*	(9.47)*	(11.2)*	(10.5)*
Ln(TRADE)	0.055	0.12	0.041	0.079	0.045	0.05	0.075	0.058
	(0.94)	(2.77)**	(0.65)	(1.7)***	(0.54)	(0.86)	(1.7)***	(0.97)
Ln(M_2)	0.195	0.0458	0.2	0.12	0.176	0.135	0.10	0.08
	(2.34)**	(0.63)	(2.13)**	(1.45)	(1.63)	(1.72)***	(1.37)***	(1.12)
SEC	0.0088	0.0046	0.002	0.007	0.0057	0.0068	0.0066	0.0056
	(5.35)*	(2.85)**	(0.029)	(4.29)*	(2.19)**	(3.72)*	(4.04)*	(3.25)*
PERH	0.00014	-	-	-	-	-	-	-
	(9.27)*							
LE	-	0.054	-	-	-	-	-	-
		(8.55)*						
BED	-	-	0.025	-	-	-	-	-
			(4.25)*					
HGDP	-	-	-	0.051	-	-	-	-
				(2.49)**				
PHYC	-	-	-	-	0.087	-	-	-
					(1.52)			
PUBG	-	-	-	-	-	0.019	-	-
						(3.32)*		
PUBH	-	-	-	-	-	-	0.099	-
							(8.29)*	
PUBT	-	-	-	-	-	-	-	0.0081
								(5.91)*
Adjusted R^2	0.934	0.942	0.918	0.918	0.942	0.918	0.92	0.923
Leamer F test	54.75	68.68	31	66.89	31.02	62.7	68.59	60.7
	(0.00) ©	(0.00) ©	(0.00) ©	(0.00) ©	(0.00) ©	(0.00) ©	(0.00) ©	(0.00)©
Hausman Test	0	0	0	0	0	0	0	0
	(1.00) ®	(1.00) ®	(1.00) ®	(1.00) ®	(1.00) ®	(1.00) ®	(1.00) ®	(1.00)®

Note: figures in parentheses are t-statistics of each coefficient.
*A *, ** and *** indicates the rejection of the null hypothesis on the 0.01, 0.05 and 0.1 level of significance.*
A © indicates the rejection of the null hypothesis of Leamer F test on the 0.01 level of significance.
A® indicates that we can't reject the null hypothesis of Hausman test on the 0.01 level of significance.

Research Article

Final Models can be estimated in form of Pooled data or Panel data. The Leamer F test used to detect it. The null hypothesis of this test supposes that model should be estimated as Pooled data. Results of this test presented in table 3. If panel data approach accepted, in the second step, should be determine which method is suitable (fixed effects or random effects) for estimate the Panel data. To this end, the Housman test (1980) is used. Housman test examine the null hypothesis that random effects is suitable for model estimation. If the null hypothesis rejected, fixed effects methods are used. The results of this test show in the table 3, too.

In all models, the Leamer F test rejects null hypothesis therefore these models can be estimated as the panel data. Also, Housman Test results show that we can't reject null hypothesis and we should estimate all models as random effects. Model estimation results show that capital stock and labor force have positive and statistically significant impacts on production level and have expected signs.

The models results show that the estimated coefficient of capital stock is "0.451 to 0.643". Since the models are in logarithmic form, so we conclude that if capital stock change 1 percent point and all other conditions remain constant, production levels will change "0.451 to 0.643" percent point .Also, the estimated coefficient of the labor force is 0.199 to 0.41. This indicate that the elasticity of labor in these countries, is between 0.199 to 0.41 and by changing labor force as 1 percent, production levels will change 0.199 to 0.41percent point, if other conditions remain constant.

Trade openness has positive and statistically significant effects on production level in some models (2, 4 and 7). If other variables be constant, by increasing trade openness as 1 percent, production level will increase 0.075-0.12. Liquidity has positive and significant effect on production level. Therefore, we can conclude that the trade openness and liquidity have positive impacts on production level.

Finally, health situation has positive and significant effects on economic growth. Based on model 1 results, If per capita health expenditure increases 1000$, economic growth will increase 0.14 percent point. Also, by increasing life expectancy and Hospital Bed (per 1000 people) as 1 unit, the economic growth increases 0.054 and 0.025 percent, respectively. Public health expenditure has expected sign and affects economic growth positively. If other variables be constant, by increasing public health expenditure as 1 unit, the economic growth increases 0.0081-0.099.

Summary and Concluding Remarks

In each country, health situation is important factor in long run economic growth procedure. So, analyzing the impact of health variables on economic growth is one of the policymaker's priorities. In this paper, the relationship between health and economic growth examined in selected pacific countries. To this end, data of these countries collected from World Bank database from 1995 to 2013. Before model estimation, data stationary property tested by Fisher-ADF panel data unit root test. Then, using Pedroni panel cointegration test, existence of cointegration between model variables examined. Results of this test indicate that existence of long-run relationship between model variables strongly supported. Also, Leamer F test and hausman test suggest that model should be estimated by panel data approach and as random effects.

The estimation results show that capital stock, labor force, Trade openness and Liquidity have expected, positive and statistically significant effects on economic growth. Also, health situation has positive and significant effects on economic growth. If health situation measured by per capita health expenditure, life expectancy, Hospital Bed (per 1000 people) and Public health expenditure, the estimated results show that health situation affects economic growth positively.

REFERENCES

Ashraf QH, Lester A and Weil DN (2008). When Does Improving Health Raise GDP?. Brown University.

Baltagi B and Moscone F (2010). Health care expenditure and income in the OECD reconsidered: Evidence from panel data. *Economic Modelling* **27**(4) 804-811.

Bloom D and Canning D (2004). The Effect of Health on Economic Growth: a Production Function Approach. *World Development* **32** 1-13.

Bloom D and Canning D (2003). The health and poverty of nations: from theory to practice. *Journal of Human Development* **4**(1) 47–71.

Bloom D and Malaney P (1998). Macroeconomic Consequences of the Russian mortality crisis. *World Development* **26** 2073-2085.

Bloom DE and Sachs JD (1998). Geography, Demography and Economic Growth in Africa. *Brookings Papers on Economic Activity* **2** 207-273.

Chou W (2007). Explaining China's regional health expenditures using LM-type unit root tests. *Journal of Health Economic* **26**(4) 682-698.

Gallup JL, Sachs JD and Mellinger AD (1999). Geography and Economic Development. *International Regional Science Review* **22**(2) 179-232.

Hartwing J (2009). Is health capital formation good for long-term economic growth? Panel Granger-causality evidence for OECD countries. *Journal of Macroeconomics* **32**(1) 314-325.

Heshmati A (2001). On the causality between GDP and Health Care Expenditure in Augmented Solow Growth Model, Department of Economic Statistics, Stockholm school of Economics.

Lorentzen P, McMillan J and Wacziarg R (2008). Death and Development. *Journal of Economic Growth* **13**(2) 81-124.

Maddala GS and Wu S (1999). Comparative Study of Unit Root Tests with Panel Data and a New Simple Test. *Oxford Bulletin of Economics and Statistics* **61** 631-652.

Mankiw G, Romer D and Weil D (1992). A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics* **107** 407-437.

Narayan S, Narayan K and Mishra S (2010). Investigating the relationship between health and economic growth: Empirical evidence from a panel of 5 Asian countries. *Journal of Asian Economic* **21**(4) 404-411.

Pedroni P (1997). Panel cointegration, asymptotic and finite sample properties of pooled time series tests, with an application to the PPP hypothesis: new Results. Indiana University, Working Paper in Economics.

Pedroni P (1999). Fully modified OLS for heterogeneous cointegrated panels. *Advances in Econometrica* **57** 1361-1401.

Rivera B and Currais L (1999). Economic Growth and Health: Direct Impact or Reverse Causation. *Applied Economics Letters* **6** 761-764.

Wang K (2011). Health care expenditure and economic growth: Quantile panel-type analysis. *Economic Modelling* **28**(4) 1536-1549.

Weil DN (2007). Accounting for the Effect of Health on Economic Growth. *Quarterly Journal of Economics* **122**(3) 1265-1306.

World Bank Database (No Date). [Online]. Available: http://www.Databank.worldbank.org.