

The Relationship Between the Human Capital and Economic Growth: A Case of Vietnam

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Abstract

Human capital are not only the engine of economic growth but also increase the global competitiveness for countries. Improving labor quality helps countries improve long-term economic efficiency. This article uses annual data in the period 1990 - 2017 in Vietnam, which attempts to explore the relationship between total capital formation, the labor quantity, education levels and life expectancy with economic growth. By using OLS regression, the analysis results shown that the gross capital formation, the labor quantity, education levels and life expectancy are positive and have a significant impact on GDP in Vietnam. Furthermore, the Granger causality test indicates that there is a two-way causal relationship between labor and economic growth (GDP) in Vietnam.

Keywords: Human capital, Economic growth, Education levels, Granger causality

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1. Introduction

Labor is the growth motivation for the economic development of countries in the world, including Vietnam. In the era of knowledge economy, the world economy moved to the stage of industrial revolution 4.0, the role of the labor force became increasingly important. Human capital have a direct relationship with labor productivity, thereby contributing positively to economic growth (Becker, 1994; Schultz, 1961; Mincer, 1958; Solow, 1956; Romer, 1987 and Barro, 1991). Modern growth theory has demonstrated the factors contributing to economic development not only in terms of material but also human capital and arguing that the main driving force of economic growth is the accumulation of human capital and the main difference in living standards among countries is the difference in education and skill level (Amjad, 2005). Therefore, improving the quality of labor is an urgent requirement, requiring governments to make significant reforms in all key areas of the economy, to increase productivity, skills and quality of labor to maintain competitiveness.

There are many studies in the world that have focused on the role of human resources in explaining the level and change in production and growth. The results have shown that the long-term growth and sustainable development of countries is driven to a great extent by productivity growth (Easterly and Levine, 2001). There is also growing evidence that the education and skills of the workforce are important determinants for economic growth and productivity. Romer (1990) and Lucas (1988) in their endogenous growth models have played a central role in education in the course of economic growth. Renelt and Levine (1992) found that education seems to have a high positive impact on economic growth. Therefore, in the last century, the focus of researchers is still the impact of human capital on economic growth by increasing educational and health facilities. Several empirical studies have noted a strong and positive relationship between human capital (education and health) and economic growth (Akram et al., 2008, Kakar et al., 2011). Education and health are two important aspects in improving the quality of human capital (Becker, 1964; Schultz, 1961). High quality labor increases labor productivity. Improving productivity when workers have high skills and knowledge, along with their physical and mental health can perform their tasks with higher efficiency (Bong, 2009). Workers with higher education levels can also adapt to new technology faster than workers with low education levels.

In Vietnam, there are also a number of studies on the above topic. However, most are qualitative studies that explore factors affecting employment in Vietnam (Dang 2002) or use econometric models to test the elasticity of employment growth (Pham H.M & Nguyen V.N, 2014). The observed labor market conditions in Vietnam pose an appropriate question: does the quality of human capital affect labor productivity and economic growth in Vietnam? This study has the main objective of estimating the contribution of human capital quality to economic growth in Vietnam. We consider labor with education levels and life expectancy representing the quality of human resources. While most of the previous studies based on Vietnam, the aspect of education is considered a measure of the quality of human capital.

The following section provides an overview of the quality and productivity of human capital. Part 3 presents research methods based on model specifications related to productivity with capital, number of employees and labor quality, and discusses data and methodological approaches. use. Part 4 analyzes the results, while part 5 draws conclusions and some policy recommendations. This study is unique because of the measure of human capital quality taking into account both education and health components and it is also based on Vietnam's updated data set.

2. Literature review

Human capital are the driving force for economic growth for countries, especially developing countries. If countries do not improve the quality of labor, they will find it difficult to improve long-term economic efficiency (Hnushkek, 2009). Global competitiveness depends on the ownership of innovation and knowledge of a country. That is one reason why technology education, research and development has brought a new meaning and importance (Dyba, 2012). Many empirical studies have examined the impact of human capital quality, labor productivity and economic growth. Overall, the results from these studies are positive despite differences in model specifications, time frames, sample selection, measurement problems and variables used. Developing countries have made significant progress in bridging the gap with developed countries in the quality of human capital.

In Solow's neoclassical growth model (1956), two variables that determine growth are physical capital and labor quantity. However, the empirical results of this model indicate that physical capital and labor inputs cannot fully explain the growth of output (Schultz 1961, Denison 1962). The findings suggest that output growth in excess of relevant inputs suggests that human capital is the main explanation for the difference (Lucas, 1988). Studies on the effect of human capital quality on economic growth can be divided into two groups: macro level (national or transnational) and micro level (enterprise or industry).

Cross country research conducted by Belorgey, Lecat and Maury (2006) investigated the labor productivity determinant used in 2000 with two samples of countries. The first sample consists of 77 countries and the second sample includes 49 countries most developed. They showed that human capital (measured by the total number of students enrolled in primary and tertiary education) has a positive meaning as a determinant of labor productivity in both samples. Chansarn (2010), using panel data of 30 Western countries over a period of 24 years, by multivariate regression proved that education has a positive impact on labor productivity and is statistically significant. According to Forbes et al. (2010) there exists a positive relationship between education level and labor productivity because education leads to the accumulation of knowledge and formation of skills that make workers think systematically. and be more active in carrying out their work, thus leading to higher productivity. Skills that may be specific skills or general skills are involved in improving productivity. Theoretically, when using labor effectively, output growth is enhanced and will be achieved at a higher rate than the growth of the labor force. The difference in productivity between efficient workers and simple workers is expressed by the quality of labor by education level, participation in training courses or acquired skills. Easterly and Levine (2001) research on global growth processes have shown three differences between economies of countries. The first is total factors productivity (TFP), not capital accumulation. Secondly, the gap in GDP per capita between the richest countries and the poorest countries is increasing. Third, intermittent growth over time, some countries "take off", others are weakened and recession some are less developed, and others have never grown. Empirical research by Collins and Bosworth (2003) analyzes data from 84 countries for the 1960-2000 period. Research results shown that the growth performance between Asian countries and industrialized countries is different. China outperforms industrialized countries in all three growth components: physical per capita accumulation, human capital accumulation and total factor productivity (TFP); In East Asia countries (except China) not only have better per capita physical capital accumulation but also have better human capital accumulation. Meanwhile TFP growth is equivalent but South Asian countries have poor performance in increasing TFP. Besides, East Asia and South Asia countries show TFP growth is better than Latin American and African countries. Islam (2010) used a panel data form of 87 countries in the period 1970-2004. The result shown that the efficiency of skilled human resources for growth increases as the distance to the technological border is narrowed, but this is only true for small and medium businesses. They also pointed out that a large number of college-educated workers create higher growth for high-income and middle-income countries, while young workers have secondary education working for low-income countries. Ha, Kim, and Lee (2009) also provided empirical evidence, using panel data from 1989-2000 from Japan; South Korea; and Taipei. When technology gap is narrowed, highly qualified workers show higher growth efficiency than skilled workers. They also provide evidence that the quality of higher education has a significant positive effect on productivity of R&D. The results of these studies show a positive relationship between human capital and economic growth, consistent with the studies of Denison (1967), Barro (1990), Mankiw et al. (1992), De Gregario (1992), Otani and Villanueva (1990), Hansen and Knowles (1998), Murthy et al. (1997), Barro and Lee (1996), Afroz et al. (2010), Jajri and Ismail (2010). A good education system is the foundation to equip workers with the necessary skills. Modern education systems should aim to provide quality education with policies such as: prioritizing budgets to provide quality basic education before training for higher levels; provide incentives and appropriate regimes for teachers; allow schools to be self-reliant and accountable for the results they train; investment in preschool education development; and consider implementing funding programs to expand higher education for human capital.

Most studies have shown that education and health contribute positively to labor productivity (Ismail and Jajri 2007, Jajri and Ismail, 2010). Bloom, Canning and Sevilla (2003) analyzed the effects of both education and health on labor productivity with panel data of 104 countries from 1960 to 1990 with Cobb-Douglas production function. They found that education and health variables are highly correlated and significant positive effects of

health on labor productivity (Umoru and Yaqub, 2013). In macro-level analysis, both educational and health variables are often included as representative of the quality of human capital. The variables used to represent education are the average number of years of schooling, education level, enrollment rate, government spending on education and literacy. Health variables are measured by life expectancy, government spending on health and adult survival. Several studies combining other variables can enhance human capital such as capital market improvement, foreign policy and trade policy (Lee and Barro, 1998; Sacerdoti et al., 1998).

Studies using company data (micro level) to examine the impact of human capital quality on labor productivity based on a single national case made using the company data or industry data. Jajri and Ismail (2007) investigated the effects of educational attainment of human capital on productivity and labor productivity of Malaysian companies based on the Cobb-Douglas function. Data were collected from 574 Malaysian companies surveyed in 2001 and 2002. They analyzed the effects of education (average school year) on labor productivity. Their findings suggest that education has a significant positive impact on labor productivity in only a few sectors. Secondary education has contributed positively to labor productivity only in the textile industry. They also found that in metal products, electricity and the electronics and food industries, the development of labor productivity is marginal due to the major contribution from the development of capital intensive production. Their research also found that in the service industry, variables such as the average school year and workers with primary, secondary and tertiary education are statistically significant in explaining labor productivity. In another sectorial study, Afrooz et al. (2010) estimated the effect of human capital on labor productivity in Iran's food industry based on the Cobb Douglas production function. The authors used panel data of 22 food production companies between 1995 and 2006. By fixed effects method, workers have skill and qualified was found to have a significant impact on labor productivity. The coefficients indicate that when the percentage of workers with education and skilled labor increases by 1%, the value added per worker in the Iranian food industry will increase by 0.14 and 0.41%, respectively (Afrooz et al., 2010; Qu and Cai, 2011, Fleisher et al., 2011).

Some empirical results from studies in this area show unconvincing relationships between human capital and economic growth. While some studies show positive relationships, other studies conclude the opposite. Among the empirical results shows the negative relationship between human capital and economic growth, including studies by Sacerdoti et al. (1998), Knowles and Owen (1997). There are also studies showing that the unstable relationship between these two variables indicates a positive relationship in the early stages of development but negative relationships in the later stages (Iyigun and Owen, 1996).

3. Methodology and data

In order to estimate human capital effects on labor productivity, we employ a Cobb-Douglas production function in this study. This functional form is flexible and results obtained can be interpreted in a straightforward manner. The functional form also has commonly been employed in many previous studies such as Afrooz et al. (2010), Jajri and Ismail (2010) and Bloom, Canning and Sevilla (2003). A simple Cobb-Douglas production function can be expressed as:

$$Y_t = AK_t^\alpha L_t^\beta \quad (1)$$

where Y refers to the output, K is physical capital stock, L is quantity of labor assumed to be homogeneous, $\alpha + \beta = 1$ for constant return to scale assumption, A is the efficiency parameter and t is time trend. Lucas (1988) however, argues that labor is different based on his accumulated human capital. A production function that takes into account the quality of labor, therefore, can be written as:

$$Y_t = AK_t^\alpha (uhL)_t^\beta \quad (2)$$

where u is time allocated for producing output, $(1 - u)$ denotes time allocated for human capital investment, h is human capital stock.

The term $uhL = L^*$, constitutes effective labor. Production function based on effective labor can thus be written as:

$$Y_t = AK_t^\alpha (L_t^*)^\beta \quad (3)$$

In order to analyze how accumulated human capital is related to the production function, effective labor, L^* refers to the labor with three levels of education and healthy mental and physical conditions, or simply expressed as:

$$L_t^* = L_t^{\theta_i} L_t^{\gamma_j}, \quad i=1,2, \text{ and } 3 \quad (4)$$

where $L_t^{\theta_i}$ is the proportion of labor with different i th level of education ($i = 1, 2$ and 3), where $1 =$ primary, $2 =$ secondary, and $3 =$ tertiary level at t time and $L_t^{\gamma_j}$ is the proportion of labor with good health status at t time period. By substituting (4) into (2), we obtain:

$$\ln\left(\frac{GDP_t}{L_t}\right) = \alpha_0 + \alpha_1 \ln\left(\frac{K_t}{L_t}\right) + \alpha_2 \ln L_t + \alpha_3 \ln PE_t + \alpha_4 \ln SE_t + \alpha_5 \ln TE_t + \alpha_6 \ln LE_t + \varepsilon_t \quad (5)$$

where GDP/L is Gross Domestic Product (GDP) per worker; K/L is gross capital formation per worker; L is

number of employed workers; PE is number of workers with primary education; SE is number of workers with secondary education; TE is number of workers with tertiary education; LE is life expectancy and ε is the error term.

This article uses OLS multivariable regression to determine the effect of independent variables on dependent variables. The choice of the OLS method gives the least squares the least squares and has some advantages such as zero deviation, consistency, minimal variance and minimum efficiency; It is widely used based on BLUE (Best, Linear, Unbias, Estimate) rules, simple and straightforward (Gujarati 2004). The Stata econometric software 14.0 was used for this analysis. Statistical testing of parametric estimators was conducted using standard errors, t-test, F-test, R, and R^2 . Economic criteria show that the coefficients of the variable are consistent with predicted economic expectations, while the statistical criteria test is used to assess the magnitude of the overall regression. This study using annual data for the period 1990 - 2017. The data were obtained from World Development Indicators published by the World Bank for Vietnam.

4. Results and Discussion

4.1. Ordinary Least Square Regression

The key idea of the Ordinary Least Square regression is that employing this model in order to estimate the coefficients and intercept through minimizing the sum of squared estimate errors in the multiple regression models.

Table 1. OLS regression

Variable	Coefficient	Std. Error	t-Statistic	p-value
LnGCF/L	0.3735296	0.0338704	11.03	0.000
LnL	4.153785	0.9538317	4.35	0.000
LnPE	0.9599227	0.1339039	7.17	0.000
LnSE	2.203762	0.1662808	13.25	0.000
LnTE	-0.1335156	0.031969	-4.18	0.000
LnLE	-19.30229	6.547015	-2.95	0.008
Constant	0.9624027	14.13571	0.07	0.946
R-squared	0.9985	F-statistic		865.15
Adjusted R-squared	0.9981	Prob(F-statistic)		0.0000
Durbin-Watson stat	2.405306	Observations		28

Source: Author's Computation

Estimated function:

$$\ln(GDP_t/L_t) = 0.9624 + 0.3735 \ln(GCF_t/L_t) + 4.1538 \ln L_t + 0.9599 \ln PE_t + 2.2038 \ln SE_t - 0.1335 \ln TE_t - 19.30229 \ln LE_t$$

In the estimated regression line above, the value of α_0 (the constant term) is 0.9624027, which means that holding the value of all other variables used in this regression constant, the value of GDP will be about 0.9624027. The regression coefficient of GCF/L in the estimated regression line is 0.3735296 which implies that which shows that 1% rise in GCF/L would result in 0.3735% increase in GDP of Vietnam. The calculated t-statistics for the parameter estimates of foreign direct investment is 11.03 which is greater than the value of the tabulated t-statistics illustrates that the relationship between GDP and GCF/L is positive and statistically significant for the period under review.

Additionally, the regression coefficient of L in the estimate regression lines is 4.153785, which means that a 1% rise in $GFCF$ would result 4.153785% increase in GDP within the period under study was accounted for by changes in labor. The calculated t-statistics for L is 4.35 which is greater than the value of the tabulated t-statistics indicates that the relationship between GDP and labor is positive and statistically significant.

In the estimated regression line above, the regression coefficient of SE is 2.203762 which implies that a 1% rise in SE may result 2.203762% of the increase in GDP within the period under study was accounted for by the SE . The calculated t-statistics for SE is 13.25 which is greater than the value of the tabulated t-statistics implies that the relationship between GDP and SE is positive and statistically significant. The regression coefficient of PE is 0.9599227 which implies that a 1% rise in PE may result 0.9599227% of the increase in GDP within the period under study was accounted for by the SE . The calculated t-statistics for PE is 7.17 which is greater than the value of the tabulated t-statistics implies that the relationship between GDP and PE is positive and statistically significant.

Similar, The regression coefficient of TE is -0.1335156 which implies that a 1% rise in TE may result -0.1335156% of the decrease in GDP within the period under study was accounted for by the TE . The calculated t-statistics for TE is -4.18 which is smaller than the value of the tabulated t-statistics implies that the relationship between GDP and TE is negative and statistically significant. The quality of highly qualified workers is based on a number of "pillars" such as civil servants, scientific and technological officials, university lecturers, high-level businessmen, technical workers still has not been able to fulfill the mission of "the pull of development".

On the contrary, the LE has a negative and statistically significant influence on the economic growth. Particularly, a 1% increase in the rate of LE will lead to around -19.30229 decreases in GDP. Life expectancy has

an immediate impact on economic growth. However, life expectancy has the opposite effect on GDP growth, indicating that if the economic development is not commensurate with the amount of labor, the advanced life expectancy will also be a pressure on the economy when the dependency ratio also from that increase.

4.2. Unit Root Test

Since most of the economic time series data are unstable, the prerequisite of conducting regression approach is to ensure that the objective time series data is stabilized; otherwise, the obtained regression results would be susceptible. ADF test and PP test are used in order to test non-stationary and stationary for all variables, which are gross domestic product per labor (GDP/L), gross capital formation per labor (K/L), PE, SE, TE and LE, and to examine the variables stationary at I(0) or I(1).

Table 2. ADF and PP Test Results

Variable	ADF T-statistic		PP T -statistic	
	At level	1 st difference	At level	1 st difference
GDP/L	-3.130	-4.050**	-3.166**	-3.988**
K/L	-2.333	-4.398**	-2.455	-4.398*
PE	-9.466*	-15.241*	-10.780*	-12.206*
SE	-2.238	-4.389**	-2.460	-4.411*
TE	-2.585	-4.665**	-2.667	-4.687*
LE	-1.548	-4.201**	-10.551*	-7.709*

Source: Author's calculation

Note: ** shows significant at 5% level; and * shows significant at 1% level

The results given in Table 2 show the results with intercept and trend, and no lag for each of the four variables included in this study. The test is based on the null hypothesis that the variable contains a unit root, and the alternative is that the variable was generated by a stationary process. If the calculated test statistics are less than the critical value of the test statistics, then the null hypothesis will be rejected. The unit root tests using intercept and trend suggests that all series are non-stationary in level and becomes stationary after differencing. Thus the variables becomes integrated of order one, I(1).

4.3. The Granger Causality Test

The Granger causality test is conducted to check the existence of causality between explanatory variables and dependent variable. This model is in line with Engle and Granger (1987), Khan (2007) and Egbo (2010).

The Granger causality test was used to explore the existence of a bi-directional causality between GDP and labor for Vietnam for the proposed study period. If labor can help to forecast GDP, then we can say that labor Granger-causes GDP. However, if labor causes GDP and not versa vice, then we say there is unidirectional causality exists from labor and GDP. The Granger approach answers the question whether GDP causes labor by finding how much of the current value of GDP can be explained by past values of GDP and values of labor. Thus, to test for causality between GDP and FDI, we shall estimate the following regression equations:

$$\ln GDP_t = \gamma + \sum_{i=1}^k \alpha_i \ln GDP_{t-i} + \sum_{i=1}^k \beta_i d(2) \ln L_{t-i} + \mu_t \quad (2)$$

$$\ln L_t = \phi + \sum_{i=1}^k \delta_i \ln GDP_{t-i} + \sum_{i=1}^k \theta_i \ln L_{t-i} + \eta_t \quad (3)$$

Where GDP_t and $\ln L_t$ are stationary time series sequences, μ_t and η_t are the respective intercepts, and are white noise error terms, and k is the maximum lag length used in each time series (decided by Akaike Information Criterion (AIC) or Bayesian Information Criterion (BIC)). Labor is said to Granger cause GDP if the β_i coefficients are jointly significantly different from zero. Similarly, GDP is said to Granger cause L_t if the δ_i coefficients are jointly significantly different from zero.

Table 3. Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
LnGDP/L	LnGCF/L	8.6147	2	0.013
LnGDP/L	LnL	9.4497	2	0.009
LnGDP/L	LnPE	8.0773	2	0.018
LnGDP/L	LnSE	5.881	2	0.053
LnGDP/L	LnTE	6.1506	2	0.046
LnGDP/L	LnLE	9.9597	1	0.002
LnGDP/L	ALL	4505	11	0.000
lnL	LnGDP/L	7.2658	2	0.026
lnL	lnLnGCF/L	27.56	2	0.000
lnL	LnPE	3.8549	2	0.146
lnL	LnSE	3.8549	2	0.000
lnL	LnTE	7.5465	2	0.023
lnL	LnLE	3874.8	1	0.000
lnL	ALL	73542	11	0.000

Source: Author's Computation

According to our results we reject the null hypothesis and accept the alternative hypothesis is that GDP can cause L, GCF, PE, TE and LE. In the case of L, we reject the null hypothesis that means L can cause GDP, GCF, SE, TE and LE. In contrast, GDP and L do not have a causal relationship with SE and PE, respectively.

5. Conclusion and Policy implications

This paper has attempted to explore a relationship between gross capital formation, labor quantity, labor with different level of education and life expectancy with economic growth (GDP). It has employed annual data over the period of 1990 - 2017. By using OLS regression in terms of level form of series variables, the result of the analysis shows that gross capital formation, labor quantity, labor with different level of education and life expectancy positively and significantly impact on GDP in Vietnam for the period under review. Besides that, the test result shown that all variable in this paper has a unit root problem in terms of level by using Augmented Dickey Fuller (ADF) test. But, when the first difference is considered, all the series become stationary at 5 percent confidence levels. Furthermore, Granger causality testing indicates that there is a two-way causal relationship between the amount of labor and economic growth (GDP) in Vietnam. Current research results show the fact that Granger labor is caused by GDP because it can reject the hypothesis at 5% significance level and vice versa. Based on the results of empirical research, we conclude that the labor quality, education and health contributed to speed up the GDP growth into the Viet Nam economy for the period under consideration.

Improving the quality of high-quality labor in Vietnam must become the most important factor in competition and development. How to have a highly qualified workforce sufficient in size, reasonable in structure and improved in quality; how do they become "development tractors" and to connect training with use.

Policy implications:

- Improving the quality of high-qualified labor in terms of scale, rational structure and quality improvement; Create an environment and position for high-level workers to work so that they become "development tractors" and to connect training with use.
- Innovating education and training in the direction of standardization and modernization to meet the needs of the labor market and link training with enterprises;
- Life expectancy is a factor representing the quality of life as well as the health care system of the society, so it is necessary to implement well the pension regime, the health care system needs to be further enhanced. in order to bring good health to the people to work in the most optimal way for the country. Promote jobs for people after retirement but still need to contribute to society to help reduce the burden of social insurance fund.

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