

Relationship between human capital and foreign trade on the economic growth of the countries by panel method

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Abstract: After 1950's, gradually the variable of human capital was included in the economic growth analysis. Foreign trade has also provided economic growth. Among other variables, which can be effective on the economic growth, are the country's economic and political structure and history of the oil or socialist system. The aim of this study was to analyze the effect of human capital, foreign trade, having a history of having some oil and the socialist system on economic growth. Using the model of Soderbom and teal (2003), this paper aims to investigate the role of the mentioned factors on economic growth for 89 countries during 1996 -2008. The data of the study are panel or calculated from different years of data from the World Bank. The results showed that variables of human capital, foreign trade and oil-producing countries had significant positive effect, and variables of socialist countries had significant negative effects on the economy's growth.

Keywords: Human capital, foreign trade, economic growth, panel data Classification JEL: I20, F10, O40, C23.

Introduction

Economic growth rate has always been regarded by economists and policy makers. Early studies have attributed the main cause of differences in economic growth rates to physical factors of production and technology. However, theoretical and experimental studies since 1950s have shown that the main source of the country's growth rate, in addition to physical capital, is human capital difference [4].

In addition to physical capital and human capital factors, such as foreign trade, oil and having a history of socialism system (i.e. having different economic and political structure) affect the economic growth of the country. Also, the countries that have the capability of empowered human resources are able to produce more goods with better quality and have a greater share of world trade [12]. The effect of human capital on economic growth returns to Adam Smith. He believed that education of people is a kind of investment on them. Later, economists such as David Ricardo and Robert Malthus and John Stuart Mill and Schultz explained the effect of human capital on economic growth. Schultz considered the acquired ability of humans as the most important source of productivity growth and economic development [9]. Ranis analyzed the interaction of human capital and economic growth [6].

The effect of foreign trade on economic growth started from mercantilist era at the beginning of the sixteenth century and continued into the eighteenth century. Merchants would support the idea that the government should encourage exports and restrict imports if [11].

In the book *The Wealth of Nations*, Adam Smith argued that each country can specialize in producing goods in which they have an absolute advantage [8]. Ricardo added that there seems to be no trade advantage in having absolute advantage but Comparative advantage suffices. Heckscher and Ohlin, enumerate the difference in the relative prices of inputs and their relative price as the main factor of trade. Presupposition of this theory is that each country will export the commodity in its production, an input is used which due to relative abundance has the relative cheapness.

A socialist system, which is a political, social and economic system, could affect the economic performance of socialist countries. In this study it is assumed that countries that have experienced the socialist system; are still influenced by the previous socialist system in terms of economic growth. The aim of this study is to analyze the impact of such effect. The system of the socialist economy has been based on state ownership and central planning. The leaders of the socialist countries believe the system is based on Karl Marx's ideas. For example, Russian government became Socialist under the leadership of Lenin in October 1917. And subsequently in WWII, Russia propagated ideological foundation of the socialist economic system of communist parties in other countries, including China, Germany and Eastern Europe [11].

One characteristic of development strategies that all socialist countries have followed includes the emphasis on shared services. Emphasis on social and shared services to all the people has enabled many of socialist countries to get a high score in the indicators of quality of life. One of the shared services is education. Its record in education indicate that it's average performance is much higher than similar average of the non- socialist Third World countries [2]. To modernize socialist economy in the socialist countries, there are considered two points: first, to prevent the employment of minors, providing their continuing studies in order to increase efficiency. Second, distinguishing between the wages of skilled and unskilled provides an incentive to acquire expertise [1].

Foreign trade of countries with centrally planned programs (socialist economies), are in many ways distinct from the market-based system countries, whose idea is an anti-utilitarianism in international trade. That means they believe import is a tool to eliminate bottlenecks in the economy. Exports in the economy, is not considered as an aim but rather a means of financing essential imports. The economy of these states is monopoly of foreign trade and operations related to it, are completely controlled by the government [11].

The following are a number of studies on the subject of the present research Manikiw, Romer and Weil (1992) The Solow model is first examined and then the human capital as one of production factor was added to the model, and for this purpose used cross-sectional data. They used the enrollment rates in secondary education as a surrogate for human capital variables and concluded that human capital has a significant effect on economic growth. Soderbom and Teal (2003), added effects of human capital and foreign trade using panel data simultaneously, to the model of economic growth. Their results showed that an increase in exports had a significant positive effect on economic growth. But indicators of human capital could not create a significant impact on the economic development.

Osipian (2007) in his study, he analyzed the role of human capital on economic growth in the former Soviet Union and the socialist bloc and achieved Positive and statistically significant relationship between economic growth. Sadeghi (1996) in a study set out to estimate the relationship between enrollment rates and GDP growth per capita for 98 countries using cross-sectional data, with emphasis on oil-producing countries and East Asian countries. The results of this study indicate that the relationship between primary and secondary enrollment rates and per capita GDP growth is significantly positive. Also, East Asia and variable had positive effect on economic growth but variable of oil-producing countries had a negative impact on economic growth. Tayebi et.al (2008), in a study, using pooled data investigated the effect of human capital and foreign trade on economic growth of OIC member states. The results of this study show a significant positive effect of the growth of human capital on economic growth in the members of the organization. The aim of this study was to analyze the effect of variables of human capital, foreign trade and socialist history on the economic growth of the countries, where the variable of the oil-producing is also used as a control variable.

Data and Methodology

A. Data

Different parameters were used in the analysis of the impact of human capital on economic growth, the most common of which are the enrollment rate, literacy rate, the number of scientists, engineers and technicians, training costs, and the average years of schooling. Various indicators have been used for the impact of foreign trade on economic growth such as the level of exports, imports and net trade of foreign trade in GDP. In this study, secondary school enrollment rate is used to measure the impact of human capital on economic growth and indicator of foreign trade percentage of GDP for the impact of foreign trade on economic growth in selected countries during 2008-1996. In this study, dummy variables have been applied for the countries with the socialist system so that, for countries which are socialist system and for other countries, the numbers one and zero, respectively, have been selected. For the effectiveness of this system on the GDP per capita to be determined. The dummy variable is included in equation (5) consisting of 19 countries. In this study, a dummy variable is also included for oil-producing countries. The countries in equation (5) are enumerated as 32.

Analysis method

The purpose of this section is to develop an appropriate model to assess the impact of human capital and foreign trade on the economic growth in selected countries, and also take into account the history of the socialist system and the oil-rich countries as the dummy variable on economic growth. The model used in this study to investigate the factors affecting economic growth is Soderbom and Teal model. This proposed model based on the Cobb-Douglas function and as equation (1), can be specified:

$$Y_{it} = A_{it} K_{it}^{\alpha} L_{it}^{\beta} \quad 1)$$

Where: Y is GDP, A is total factors productivity, K is capital stock, and L is labor. In this model, the logarithmic form of this function is used in equation (2) as:

$$\ln Y_{it} = \ln A_{it} + \alpha \ln K_{it} + \beta \ln L_{it} \quad (2)$$

In the model of Soderbom and Teal, human capital and foreign trade are also effective in the economic growth. Therefore, in equation (2), the level of TFP ($\ln A_{it}$) is considered as in equation (3):

$$\ln A_{it} = C + \gamma_1 \ln T_{it} + \gamma_2 \ln H_{it} + \varepsilon_{it} \quad (3)$$

Where: A is total factors productivity, T is indicator of foreign trade, H is human capital index, ε is disturbing term, and C is the intercept. Then, the equation (3) substituted in equation (2) and as the result equation (4) is obtained:

$$\ln Y_{it} = C + \gamma_1 \ln T_{it} + \gamma_2 \ln H_{it} + \alpha \ln K_{it} + \beta \ln L_{it} + u_{it} \quad (4)$$

To show the influence of the socialist economic system and the oil-rich countries on economic growth, two variables as dummy variable are added to the relationship (4) as shown in equation (5):

$$\ln Y_{it} = C + \gamma_1 \ln T_{it} + \gamma_2 \ln H_{it} + \alpha \ln K_{it} + \beta \ln L_{it} + a_0 D_{SC} + b_0 D_{OC} + \vartheta_{it} \quad (5)$$

Where: $\ln Y$ is logarithm of GDP per capita, $\ln T$ is logarithm of foreign trade (% of GDP), $\ln H$ is logarithm of gross secondary school enrollment, $\ln K$ is logarithm of physical capital stock, $\ln L$ is logarithm of labor, D_{SC} is dummy variable of countries that have a history of socialist system ($D_{SC}=1$ for countries that have a history of socialist and $D_{SC}=0$ otherwise), D_{OC} is dummy variable for oil-producing countries ($D_{OC}=1$ for the countries that are oil-rich and $D_{OC}=0$ otherwise), i is countries under study, including 89, and t is time of the study (2008-1996).

The results of the estimation of model

In this section, descriptive information about the samples of the study and variables used, including mean, standard deviation, maximum and minimum in this model are presented in Table 1.

Table 1: Descriptive information on the variables used in the model (5) for 89 countries in the years 2008-1996

variables	mean	Std.	min	max
GDP per capita In us dollars	9100/77	10860/23	118	42133
% Enrollment rate In secondary	78/20	30/72	10	162
% Foreign trade percentage from GDP	84/29	48/69	15	438
Total labor force	27,239,461	89,442,403	271,544	776,880,961
Physical capita In us dollars	2,004,357,880	69,192,651,622	139,110,863	58,596,349,188

As data of 89 countries in the years 2008-1996 in Table 1 show the mean rate of secondary school enrollment is 20/78 %, the average GDP per capita is 77/9100, and the average percentage of foreign trade from GDP is 29/84. The maximum amount of per capita GDP in 2008 is 42,133 belonging to Norway. The minimum amount of per capita GDP in 1998 is 118 belonging to Ethiopia. The maximum gross secondary school enrollment rate is 162 percent related to Australia in 2000 and its minimum is equal to 10% belonging to Uganda in 1998 and 1999. The maximum amount of foreign trade percentage from GDP is 439 belonging to Singapore in 2006 and its minimum is 15 percent for Brazil, in 1996. Maximum amount of physical capital is related to Japan in 1996 and minimum in 2007 is related to the Central African country. The maximum number of labor force is in China in 2008 and the minimum is related to Bahrain in 1996.

Before estimating the results, it is necessary to test the inertia of all variables used in the model. For this, we must use Levin, Lin & Chu (LLC) test. The null hypothesis of this test indicates non-inertia of variables. Therefore, if the calculated statistics is larger than the current value of the confidence level, the null hypothesis will be rejected based on non-inertia. The results of this test indicate that the null hypothesis, based on the data of non-inertia of variables is rejected all the variables are inertia. To specify the data type, F-tests of Hausman and Limer are used. To determine whether data are the panel or pooled, the F -test of limer is used and to determine the fixed or random effects, Hausman test is used .Hausman and Limer F-test results indicate the type of panel data of the fixed effects. The results of estimating coefficients of the variables for the model (5) with the interaction effects of variables are shown in Table 2.

Table 2: The results of estimating equation 5 along with the mutual effects of variables for 89 countries through tabular data in 1996-2008, dependent variable is GDP per capita

variables	Estimated coefficients
Logarithm of gross enrollment rate in secondary education	0/163 *** (5/09) ^a
Logarithm of foreign trade	0/212 *** (7/92)
Logarithm of physical capital	0/088 *** (3/37)
Logarithm of labor force	0/241 *** (8/55)
Dummy variable: Socialist countries	-3/66 *** (-10/69)
Oil-producing countries	0/001 *** (6/58)
Interaction effects among variables:	
Dummy variable of socialist countries * Logarithm of gross enrollment rate in secondary education	0/185 *** (3/42)
Dummy variable of socialist countries * Logarithm of foreign trade	0/511 *** (9/49)
Dummy variable of Oil-producing countries * Logarithm of gross enrollment rate in secondary education	-0/0001 *** (-3/18)
Dummy variable of Oil-producing countries * Logarithm of foreign trade	-0/0001 *** (-4/02)
	0/52
F -statistic	763/35 ***
Hausman test	165/47
Number of observations	1157
Intercept	0/418 (0/53)

***At 1% level, ** at 5% level and * at the 10% level is statistically significant.

a- Numbers in parentheses indicate t -statistic values.

Source: Calculated from survey data using STATA software

As shown in Table 2, estimated results of this study are as follows: The human capital which is shown in this model for the study of secondary school enrollment rate has created a statistically significant positive effect on economic growth. So that a 1% increase in gross enrollment of secondary school, assuming all other conditions remain constant, causes 0.16 % increase in economic growth. In fact increasing knowledge and training in communities has served to increase production capacity in the production cycle, dynamics and technological developments and to achieve higher economic growth. There is a statistically significant positive effect of foreign trade on economic growth. So that a 1% increase in foreign trade, assuming all other conditions remain constant, caused 0.21 % increase in economic growth. The degree of increase in the volume of foreign trade and trade openness increases the capacity of countries to achieve higher economic growth.

There is a statistically significant positive effect of physical capital on economic growth so that a 1% increase in physical capital, assuming all other conditions remain constant, causes 0.08 % increase in economic growth. It is evident that equipping human capital with physical capital is an important factor for the development of increased domestic production and production growth. Thus, economic security and a safe environment for investment, and diversifying and expanding markets need greater efforts to be made. There is a significant positive effect on economic growth by the labor force has so that a 1% increase in the labor force, assuming all other conditions remain constant, causes 0.24 % increase in economic growth. In fact, one of the factors of using production capacities and technology optimally in economic growth is sought the increase of the labor force.

In this study, two dummy variables for the socialist countries and the oil-producing countries are used. Dummy variable coefficient is negative and statistically significant at the 1% level, calculated as -3.66. Open economies operate more efficiently in economic growth. Dummy variable coefficient of oil-producing countries is 0.001 which is positive and statistically significant at the 1% level. It is observed that dummy variable of countries with a history of socialist reduces the intercept of model estimates decreased and that of oil-producing countries increases the intercept of the model estimated.

Multiplicative coefficient (interaction) of dummy variable of the countries of the socialist system and the secondary school gross enrollment rate ($D_{SC} * \ln H$) is 0.185, which is positive and significant at the 1% level. The interaction coefficient of the dummy variable of the socialist countries and foreign trade ($D_{SC} * \ln T$) is 0.511, which is positive and significant at the 1% level.

These results could be due to specific policies of the countries with the socialist economic system after the fall of this regime. Interactive coefficient of dummy variable of oil-producing countries and gross secondary school enrollment rates ($D_{OC} * \ln H$) is -0.0001 which is negative and significant at the 1% level. Interaction coefficient of dummy variable of oil-producing countries and foreign trade ($D_{OC} * \ln T$) is -0.0001 which is negative and significant at the 1% level, but the amount is very small. This result could be due to various reasons such as the possibility of Dutch disease in oil-producing countries, economic mismanagement, flawed trade policies, exports of raw materials, dependence on a single export product, lack of systematic and coordinated strategies and ignoring other variables of enhancing economic growth.

The results of this study, has been confirmed by studies of Mankiw and Romer and Weil (1992), Soderbom and Teal (2003), Osipian (2007), Tayebi and others (2008) and Mir Mohammad Sadeghi (1996).

Conclusions and Recommendations

In this paper, the effects of human capital and foreign trade on economic growth of selected countries have been examined during 2008 - 1996. The results show that human capital, foreign trade, physical capital, labor, and the dummy variable of oil-producing countries had positive and significant impact on economic growth. But dummy variable of the socialist countries had negative and significant effect on economic growth. Because of the role of human capital variable is considered as a factor contributing to the promotion of economic growth, it is recommended that in the countries the education system is systematically directed so that the possibility of in-service learning is provided for adults and workers participate in educational courses, in order to increase their training related skills and familiarity with new technologies. Therefore, the cooperation of countries in the training labor force and transfer of technical knowledge is considered as an appropriate policy.

Based on the estimates in this study, the influence of human capital and foreign trade is evident in economic growth, so countries should promote human capital formation provide local knowledge and technology imported from other countries through import of industrial and capital goods.

Moreover, the adaptation of imported technology to local conditions and design of new models must be considered to transform raw materials into exportable goods and replace goods to goods export on export of raw

materials. Experimental results of the present study show the fact that control economic systems such as socialism act against the growth rate in the long-term delay economic continued and rapid economic growth. Thus, the economic transition to market -based pricing system is regarded for the realization of economic growth these countries which must be accompanied by liberalization policies.

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