Role & Status of Educated Human Resources (Human Capital) on Economic Growth of Iran

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Abstract

Human capital is the prerequisite of development, because the speed of growth and rate of development depend on the quality and quantity of efficient workforce. In fact, human capital provides potentials for change and improvement, optimizes the use of physical and tangible capital, increases the efficiency of production and finally accelerates the rate of economic growth. In this study, the importance of human capital in economic growth is illustrated through endogenous economic growth models, using Romer`s endogenous economic growth model. We will estimate the model for Iran`s economic growth and discuss and test the effect of human capital, physical capital and export of manufactured goods on national gross output. The resultant findings suggest that a positive correlation between human capital and economic growth emerges when the economic structure of the country has the capacity of attracting skillful and expert workforce in different fields of activity. Otherwise, given the growth in educational indices among the active population, and lack of growth in production-based economic indices the gap between educated expert workforce and employment, with respect to absorbing job opportunities, will appear as unemployment of educated and expert workforce.

Keywords: education, human capital, educated human resources, economic growth

Introduction

The most important factor for growth and development of each country is the educated and well-trained labor force and utilizing this force according to the needs of each country and world community. In today's world the wealth of each nation does not consist of underground sources, mining or financial investment but each nation's share of knowledge that has become currency and thus developing countries. Then, applying the talents of labor force for optimum use and development of technology that has been obtained form the knowledge. Both of these steps namely research and investigation for scientific development of skilled labor force is in the hands of high educational system of each country.

Today science and technology and educated labor force based on the needs of society has a major role in the development of each country to the point that it can be claimed as the basic factor of production. What distinguishes one country from another is the acquisition of science and knowledge and its application by the skilled labor force. In such circumstances little attention to the scientific potentials and exploitation of new technology is the main factor in widening the gap between developed countries and less developed countries, therefore it is essential to exercise fundamental policies to reduce the scientist gap. To achieve this objective it is important to produce new knowledge and technology or transfer it from developed countries and to learn how to use the new technology in different areas.

Labor force can reduce the technological gap and decrease the role of comparative costs. In other words, it is a key factor in economical growth.

Therefore, the developing countries devote a considerable share of resources on educating the labor force, just as Jean- Jacques Servan put it," not the armed forces nor raw materials, nor capital is the sign of power any longer.

Today power lies in invention and transforming those inventions to goods and work equipments. Mines are no longer in the underground nor in the machine.

Today, mines should be searched in the thought of mankind or to be specific in the ability to think and create. In the contemporary world the source of power is the nourishing and expanding intelligence.

Statement of Problem

In most of the newly- industrialized countries the reason for economic growth is the increase in the education and skill of labor force and all the developing countries are trying to accelerate their economic growth by investing on the education of labor force. By educating the labor force the potentials of labor force will expand and investing on the education of labor force will enhance the power of labor force. This will result in the augmentation of the income of the producers and convenience of the consumer and will also raise gross national product and economic growth. On the other hand, the more a community invests in education the more educational opportunities will be created and this leads to increased production power and income. Moreover, since the transfer of technology exacerbate the growth rate of industrial development more investment in education leads to more rapid economic growth. Determining the role of education in economic development can be useful for the decisions of policy makers and this will provide a suitable guide for planners in the proper allocation of costs. Another thing is that the type of education based on its impact on economic development can be important, for example, if production becomes complex only the trained workforce who can coordinate to the technology will be employed and will not remain unemployed like the field of cell phone and computers that has the provided a lot of occupational opportunities.

Importance of Research

In most countries, investment in training human resources is one of the important issues that have occupied the mind of those responsible for communities and the role of labor force in the comprehensive development of society is so significant that some believe trained labor force is main asset of a community. Therefore, education should be regarded as a national capital. In most countries investment in labor force training is one of the major factors for consistent development. Developed countries consider their power due to management, creativity, innovation and skilled labor force and they try, in order to gain consistent development, have established wide policies and programs to attract skilled labor force. Nobel Prize winner, Simon Kuzentes in 1971 stated that ninety percent of the development of developed countries is because of improving human capacities. World Bank studies have shown that in the field of growth, in 192 countries, 64 percent of their growth comes from labor force, 16 percent from physical capital and 20 from natural sources.

Thus, it can be stated that the development of today's developed countries is the result of great consideration upon human capital. In contrast, there are less developed countries with lagging economics and have less prosperity. Considering the numerous deficiencies in economic infrastructure, developing nations like developed countries spend high costs on human resources development. Iran is among the developing countries which has started their activities in this field a decade ago and is rapidly growing. Training educational and medical investment indicates this fact and has definitely achieved some progression in these fields. The existence of many highly educated people in society is the main reason of progression, however; their mere existence will not achieve this goal. Human capital like other facilities in a society must be used for the development of a country. Iran in the process of transition from underdeveloped to developing country has critically needed the human capital. In the process of growth and development any attempt is doomed to fail without the necessary creativity, innovation and skilled specialists.

Iran and other developing countries to achieve development standards in the world require additional use of facilities and resources. The necessity to move towards comprehensive development is possible with the combination of skilled human resources and the cost that is spent on the development of human capital.

Research Objective (expressing hypotheses and questions)

Considering that Iran is one of the developing countries and has always attempted to achieve stable economic growth, discussing about achieving economic growth is noteworthy. On the other hands, considering the countries mostly young population and the importance of human capital in economic growth, investment in educating the young force and establishing human capital in the economic growth of the country is highly important.

The aim of this study is to show the role of human capital in the economic growth of the country and presenting the following hypothesis:

- Human capital and investment on it through increased investment on the productivity of the producers has a positive role in economic growth of the country.
- Does the formation of physical capital have an acceptable role in the economic growth of the country?
- Does the growth of non- oil exports specially factory exports through increased productivity and optimal allocation of resources have a positive effect on the country's economic growth?

Specified time and place considered for this research

This research studies the importance of human capital in economic growth, therefore it is a national macro- level study and is aimed at Iran through national letters issued by competent organization for required variables that has been mentioned in the model. The period of study is from 1342 up to 1382.

Method of collecting statistics and information

Statistics used in this study use a series of economic statistics for different years that has been provided by internal resources. The use of internet and library resources have also been other attempts for collecting updated information. Finally, it has been tried to test the hypothesis by related software and existing macro economic information.

Estimation of the model in Iran's economy

Introduction

Given the importance of endogenous economic growth models in recent decades and due to considering the role of human capital in growth and endogenous technological changes in economics, the current study has focused on the role of human capital on the economic growth of Iran and building and testing a model to explain the fact in question.

In previous models, specially neoclassical growth models the rate of growth has been considered equal to technological progress and due to the fact that the rate of the growth of technology is exogenous and the hypothesis of decreasing yield of capital, the rate of economic growth is considered stable and exogenous.

In the new economic growth models meaning the endogenous models of growth which uses human capital and its accumulation as a factor of endogenous growth, the significant points are:

1. Attention to the key role of human capital and its accumulation in the long- term economic growth so that the presence of human capital neutralizes the limitation of decreased yields of capital and leads to economic development.
2. The lack of hypothesis of decreased yields of capital and instead paying attention to increased yields of capital or stable yields in relation to scale in production function due to regarding investment as physical investment and human capital.
3. In the indigenous economic models homogeneity is not foreseen but it is expected that the country's per capita income is in level with its stability.

In the present study, given the importance of indigenous economic growth models first these models are introduced, then the role of human capital in the economic growth is estimated from a theoretical perspective and finally the appropriate model for Iran's economy is presented. Afterwards with the introduction of variables used in models of economic growth along with indicators the statistics and information will be provided by Eviews software. And at the end estimation of the experimental results will be done and recommended policy will be presented.

Theoretical Basics of the Model

The main indigenous economic models are of two types. First, one- part models including Model AK 1987, one-part model based on Ero's model, and Romero's model with regard to the activities of the government. Second, two- part models including Rebelo's model with the difference for technology for production of goods and education, two- part model of uzawa- lucas and Romero's model based on the indigenous changes of technology. Human capital in these models is used according to two concepts.

In the limited concept human capital means change in the quality of the labor force for changes in the level of education and experience and therefore human capital is considered as the factor of production in the function of production and leads to increased yields in regard to the scale. In the broad concept, human capital means knowledge and its existence in economics and leads to foreign savings in production and increase in the productivity of production factors.

Accordingly, considering the human capital in the indigenous economic growth models causes increase in the productivity if production factors and will have a positive effect on the economic growth.

In this one- part indigenous model, with regard to Kop Douglas production function which shows constant return to scale and limitation of resource in economics and household utility function is presented as follows:

$$Y = AK^{\alpha} H^{\mathbf{1}-\alpha} \qquad \mathbf{0} < \alpha < \mathbf{1}$$

$$y = AK^{\alpha} H^{\mathbf{1}-\alpha} = C + I_K + I_H \quad , \quad K = I_K - \delta_K \quad , \quad KH = I_H - \delta_H$$

$U(C)=(C^{1/\theta}-1)/(1-\Theta)$

In this function of production K is physical investment and H is human capital and with the hypothesis of stability of labor force H is only in proved through the improvement of labor force. lK and lH are investment in the human capital and physical investment and if we suppose that the house holds are producers of goods.

$J = U(C).e^{-\rho t} + V(I_K - \delta_K) + \mu(I_H - \delta_H) + W(AK^{\alpha} H^{\mathbf{1}-\alpha} - C - I_K - I_H)$ V respectively to the shadow price of K and H and W are coefficient Lagrange related to the limited sources. Assuming getting derivative of j related to C and lK the initial condition is obtained and summarizing it the rate of growth is:

$$\gamma C = \frac{\mathbf{1}}{\theta}\left[A\alpha\left(\frac{K}{H}\right)^{-(\mathbf{1}-\alpha)} - \delta - \rho \right]$$

The second condition is that the final production of physical investment should be equal with the final production of human capital which means:

$$A^{\alpha}\left(\frac{K}{H}\right)^{-(\mathbf{1}-\alpha)} - \delta = A(\mathbf{1}-\alpha)\left(\frac{K}{H}\right)^{\alpha} - \delta = \left(\frac{K}{H}\right) = \left(\frac{\alpha}{\mathbf{1}-\alpha}\right)$$

The above result states for that the rate of yields of physical investment and human capital is and according to the function of production its amount is stable. Therefore when is fixed decreasing yields does not exist and K and H are both increased based on one rate and their rate is estimated by replacing the equation of 6 with 5:

$$\gamma^{*} = \left(\frac{\mathbf{1}}{\theta}\right)\left[A.\alpha^{\alpha}\right](\mathbf{1}-\alpha)^{(\mathbf{1}-\alpha)} - \delta - \rho$$

Therefore by observing human capital in the assumed model the descending efficiency of production factors is eliminated. Inner growth models are divided into 2 sections including: producing product and producing education or human capital by having their specific production function. It is assumed that education have higher requirement to human capital and product production sector requires higher physical capital.

$$Y = C + \dot{K} + \delta K = A(VK)^{\alpha}(UH)^{\mathbf{1}-\alpha}$$

$$\dot{H} + \delta H = B[(1-V)K]^{\beta}.[(1-U)H]^{1-\beta}$$

In this function, Y indicates production of product, A and B indicate technology parameters and $0 \le U \le 1$, $0 \le V \le 1$ are K and H coefficients used for producing product and (1-V) (1-U) indicate K and H coefficients in the section of education. These models have proved that efficient toward scale is fixed; therefore, it increased diversity and quality of products that prefer to reveal neutral descending efficient. 3 logical theorems of this research are including:

First: Technologic changes means improving method of using raw materials in economic growth

Second: Great section of technologic changes is happened due to willful performance of people and economic brokers based on market motivation and obtaining profit which is endogenous

Third: Scientific knowledge and training has fundamental difference with other economic product; since, a new set of training requires spending cost and this training is offered for several times without repeated cost.

When person discovers something his success is accidental; therefore, it is endogenousissue i.e. force out of control of person determines his success. When large number of people discover and invent, certainly some valuable discoveries are created; consequently, some inventions are intrinsic. Economy deals with accumulating physical asset, collecting human capita through training and technologic change due to investment on human capital i.e. the same motivation encouraging institute to collect physical capital. This model deals with 3 sections of economy including:

First Section: research applying from human capital and economy to produce new knowledge; therefore, this section offer some plans for new long lasting products

Second Section: producing broker product by using research section designs for long lasting product

Third Section: Final product using from workforce, human capital and long lasting products for producing final product and the product of this sector is saved as consumption or new asset. Production function of final product is:

$$Y(H,L,X) = H^{\alpha}{}_{y} L^{\beta} \sum_{i=1}^{\infty} X_i^{1-\alpha-\beta}$$

In this function L is workforce, Hy is human capital allocated to final production section and X is physical capital and first degree homogenous function. Production technology applies from physical capital and its capital is consisting of unlimited long lasting products; however, limited number of such products is used for producing final product. By assuming Y as unit of product for making investment, a unit of any long lasting product is written as:

$$K = \gamma \sum_{i=1}^{\infty} X_i = \gamma \sum_{i=1}^{A} X_i$$

H and L are fixed and K is based on consumption and process of collecting new plans is toward growth of A (t). Having research about this model depends on level of allocated human capital to this section and accessible stock for economy i.e. growth rate of stock is:

$$A^{\bullet} = \delta H_A . A$$

Where HA is total human capital, A is accessible knowledge of economy and δ is efficiency parameter. Function 12 reveals both topics the one is higher application of human capital that increased production of new plans and the other one is knowledge that increases efficiency of persons employed in research; therefore, efficiency of human capital in the research section is ascending. Another discussion is that function 12 is linear toward HA and A and is able to produce new product and also a new plan by using R & D increases efficiency of human capital. Generally HA and Hy are related through H=Hy+HA. If PA is price of new plan and WA is lease for each human capital unit, with respect to this fact that each person is free to use knowledge and assuming equal human capital for both section and whereas Hy=H-HA andfixed rate of physical capital efficiency (r) we have:

$$W_H = P_A . \delta . A = \alpha H^{\alpha-1}{}_{y} L^{\beta} A X^{-1-\alpha-\beta}$$

By assuming produced plans by research in order to produce final product, this formula is revised as:

$$Y = H_y^{\alpha} L^{\beta} A X^{-1-\alpha-\beta}$$

When HA is fixed it is equal to H-Hy, potential growth rate of A is δH_A and therefore fixed level of L and HY and $\overline{X}$ is equal to growth rate of A. thus, growth rate model at this equilibrium is:

$$g = \frac{\dot{C}}{C} = \frac{\dot{Y}}{Y} = \frac{\dot{K}}{K} = \frac{\dot{A}}{A} = \delta H_A = \delta H \frac{\alpha}{(1-\alpha-\beta)(\alpha+\beta)} . r$$

Results of aforesaid growth rate are including:

1) Holders of human capital make decision for research and production based on A (price) and PA (salary rate at production) i.e. WA
2) Cost of human capital is equivalent to income obtained from production. Investment efficient of human capital in research section is equivalent to net income of plan in future. Therefore, is interest rate is higher, financial value of net income of plan is less; therefore, less human capital is allocated to research and there is less amount of growth i.e.:

$\downarrow \Rightarrow$ Gross income of human capital in research section $r \uparrow \Rightarrow$

$\downarrow \Rightarrow g \downarrow$ Allocating human capital to research section

3) Any change in preference parameter i.e. α, β changes productivity rate and therefore growth rate is changed
4) L is measured by human capital; therefore, one unit increase in human capital means H growth rate
5) Efficiency of human capital in this research is ascending; therefore, upon H and A increase, final production of human capital in research section is increased and then final production of physical capital is also increased. Therefore, economy benefiting human capital and knowledge experiences higher and quicker growth production rate. Lokas a theoretician of endogenouseconomic growth model believes that 2 issues influence on human capital, the first issue is accumulating human capital increase their final production ability and the second issue is outer effect of medium level of human capital that increases total efficiency of person and production factors; therefore, obtains minimum efficiency in comparison to fixed scale.

3-2 Introducing Model

Whereas Iran is a developing country and attempts to develop its long term economic stability the issue of obtaining economic growth has great importance. On the other hand, according to this fact that population of Iran is young the importance of human capital on economic growth and investment on educating young people and establishing human capital, plays key role at economic growth of Iran. Therefore, goal of this study is determining role of human capital on economic growth of Iran, hypothesis test and answering to the following questions:
1) Investment on human capital through increasing productivity of production factors, plays positive role in economic growth
2) Is establishing physical capital plays acceptable role in economic growth of Iran?
3) If growth in non-oil exports through increasing productivity and allocating optimum resources, has positive significant effect on economic growth?

1-3-2 Desired Model for Economy of Iran

According to some key properties of Iran's economy including: important role of government in economic activities, economic dependency of Iran to oil, failure of productivity, efficiency of human workforce due to lack of investment on human capital, lack of safety of investment, inflation and based on some endogenous economic growth models including: key role of human capital and its accumulation on long term economic growth, eliminating descending efficiency of capital, effect of knowledge and economy on developing knowledge, role of government in creation of grounds for endogenous growth and advancement of endogenous technology, the following model is offered for describing economic growth of Iran:

$$\ln y_t = LnA + \alpha Ln(K) + \beta Ln(H_3) + u_t$$

Independent variables of growth equation are including:
1) Physical capital so that Kt is net capital in t year, K0 is value of initial capital at beginning of period, IG is gross investment on t period and DE is value of depreciation at t period. Although it decided to divide capital into governmental and private section, due to separated information and statistics, it was impossible to do so
2) Human capital by using HC (university graduates). There is strong belief that university capital is real variable for defining human capital and on the other hand, their employment has more realistic effects on variable. This statistics reveal 2 important issues including: firstly, annually 250,000 persons are added to university graduates; therefore, ratio of university graduates to active population is increased. Secondly, since 1994 and over the gap between university graduates and employed university graduates is increased which show increasing unemployment rate of university gradates

3) Non-oil export by using XNOILR and theoretical and empirical study for effect of this export on factories and industries reveal 2 important points including: institutes in order to increase quality and export of their products at global competitive level, attempt to improve their management, technology and comparing them with greater institutes; therefore, to increase economy and efficiency. Whereas export is among national productions, based on duplication coefficient rule, increasing export has double influence on production. Statistics of non-oil export reveals 2 important issues including: ratio of non-oil export toward GDP is very trivial (best ratio was 6.4% in year 1994) and great part of non-oil export consists of non-industrial products

4) Workforce by using active young index (L) means part of population exposed to age of being able to work (10 to 65 years) and therefore offer their workforce to market. Statistical study of active young workforce reveals 2 issues: firstly, ratio of young population of Iran toward total population of other countries is less; therefore, rate of activity or partnership is low (Iran 44.3%, Malaysia 60.6%, Swiss 67.6%, Canada 65.6%, Indonesia 67.9% and Turkey 51.8). Unemployment rate in Iran is due to quick population increase and low rate of economic growth, so that unemployment rate is year 2000 was estimated 15% (Komeijani 2004, p.14).

2-3-2 Estimating Model of Economy in Iran:

Variables of domestic growth production, price and price of last year 1990(GDP), independent variable, volume of physical capital (K), university employed graduates (HC), non-oil export (XNOILR) are observed. In order to use previously mentioned variables it is used from lasting test. Table 1 show summary of lasting status of each variable

Table 1-4: Studying lasting test for variables of Equation

Variable	L, T, C, N	ADF	90%	95%	99%	Result at 95%
GDP69	ICT	-2.85	-3.19	-3.52	-4.20	Non-lasting
HC	ICT	0.35	-3.19	-3.52	-4.20	Non-lasting
K	ICT	1.18	-1.62	-1.94	-2.62	Non-lasting
XNOICR	IN	-2.08	-2.60	-2.93	-3.60	Non-lasting

T is process, C is width from origin, L is optimum stop and N is width from origin
According to non-lasting results of variables, the following model is estimated as:

$$\text{Log GDP}_{69} = 3/35 + 0/38 \log k + 0/29 \log HC + 0/17 \log x \quad)=0/56 \ ]$$
$$\text{NoiLR} +[\ AR_{(1}$$

(9/6) (7/2) (8/07) (7/39) (4/7)

$R^2 = 0/99$ $R^{-2} = 0/99$ F = 2034/25 (P = 0/000)

LM = 1/50 (P = 0/27)

White F = 2/39 (P = 0/049)
ARCH F = 0/915 (P == 0/3448)
Ramsey F = 0/628 (P = 0/4334)

As it is observed all variables are significant and $R^2 = 0/99$ indicates appropriate value of equation and $\bar{R}^2 = 0.99$ indicate that all models are correctly descried. Results of F test show that total regression is significant and zero hypothesis is rejected. P=0.000 and since it is less than 5%, zero hypothesis of all coefficients is rejected. According to White test there is no heterogeneous variance in this model and correlation of LM test is one of the most complete self-correlation tests; which show that there is no self-correlation. According to ARCH test, there is not self-correlation and variance in this model and it used from Romsey test which show this model is dependable.

Table 2-4: Studying lasting test on equation error component

Result at %95	Macnon critical amounts			ADF	(L . T . C , N)	Variable
	%99	%95	%90			
مانا	-4/21	-3/53	-3/19	-4/59	(1,N)	U1

T is process, C is width from origin, L is optimum stop without process and N is width from origin

As it is observed, the error component is مانا; therefore, according to Angle- Konecher study it is concluded that this model has accumulation and there is false regression problem; consequently, results of estimating parameters of evaluation model are dependable. By studying all of the aforesaid tests it is concluded that estimated regression has no problem from technical point of view; therefore, classic hypothesis (heterogeneous variance and self-correlation…) is not rejected and model has co-integration and it is possible to analyze results of model.

3-3-4 Analyzing Estimation Model

1) Logarithm coefficient of physical capital logk is 0.38, which reveals in case of one unit increase at human capital, GDP of Iran is 0.38% increased. T statistics of this variable is 9.6, which show significant effect of this variable on Log GDP [69].
2) Coefficient of human capital i.e. Log HC is 0.29 which reveals in case of one percentage increase in university employed graduates, GDP of Iran is 0.29% increased and whereas t statistics is 7.2, it has positive effect on Log GDP
3) Coefficient of non-oil export Log XNOILR is 0.17, which reveals in case of one percent increase at non-oil export, GDP is 0.17 increased. T statistics of this variable is 7.39 that show positive significant effect on Log GDP [69].

3) Suggestion & Conclusion

1-3: Introduction

Reality is that in the present age, human resources, is regarded as infrastructure of all evolutions and permanent development of all countries. Political system of all societies attempt to educate their required human workforce to supply their requirements. Scientific and industrial advancement of each country depends on creating suitable framework and mechanism to improve human infrastructures and this goal is obtain through applying scientific approaches, identifying talents of researchers to meet fundamental requirements of society and reaching to permanent economic growth.

2-3: Suggestions & Conclusion

1-2-3: Human capital is one of the most effective factors on economic growth; since, coefficient of this variable is positive and significant and in case of one percent increase in human capital, GDP increases 0.29%. This result is compatible with economic growth theory and insists on importance and role of human capital on economic growth.

* Improving educational quality through having creative education, improving complementary courses and holding technical and vocational educational courses compatible with requirements of economic sector, to increase skill and specialties of workforce
* Developing university education and compatibility of admitting student with different field of studies and academic courses, developing knowledge, preventing from unemployment of university graduates, leaving genius students from Iran to increase human capital of economy
* Compatibility of education with research to meet research requirements, applied university teaching and more compatibility of university courses with requirements of society, industry and other sectors. Having positive relationship with human capital and economic growth emerges when economic structure of Iran is able to attract skilful workforces in different fields; otherwise, growth of education indices among active population, not growth of economic indices based on production, gap between skilful workforce increases unemployment of educated persons

2-2-3: Physical capital (K) is one of the effective factors on economic growth and having positive physical capital reveals this fact that in case of one percent increase in physical capital, GDP increases 0.38%.

This result is compatible with theories of economic growth and insists on importance and role of physical capitals on economic growth. Therefore, upon increases economic safety for investment, developing and diversifying market and financial organizations (stock exchange, investment companies, activities of private retirement fund and other financial organizations) movement toward open economy and using foreign investment and clarifying regulations of capital market and increasing stability of increasing investment is developed.

3-2-3: XNOILR is another effective factor on economic growth. Coefficient of this variable is 0.17 that reveals in case of one percent non-oil export, DGP increases 0.17. theories based on export is formed based on development policies of global bank. The following factors have positive effect on economic growth: developing factories through dividing work, using benefits, more indices of efficiency, increasing size of market, higher productivity capacity, amending management policies for increasing productivity and efficiency, allocating optimum resources.