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The Effect of Human Assets on Employment in Iran

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ABSTRACT

The paper aims to examine the effects of human assets on employment in Iran from 1990 to 2019, according to the importance of employment in improving economic welfare and the policymakers' emphasis on job-creating. For this purpose and to analyze the relationship between variables, ARDL bounds test of Pesaran et al. (2001) and the simultaneous equations system were used. The results showed that human assets have a positive and significant impact on employment; in this way, the increase in human assets leads to an increase in economic growth, which in turn leads to a rise in the demand for labor and, of course, employment. In fact, human assets are the combination index of the three components of education, health, and nutrition. Investing in human assets enhances levels of skill, expertise, worker productivity and increases the efficiency of the labor force in applying new technology.

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1. Introduction

One of the major goals of the economy of Iran is the increase of employment and achieving growth and stable development. on one hand, employment as one of the most basic variables of the macroeconomy causes self-confidence, happiness, and following mental welfare to increase and, on the other hand as a major source of income and people funding leads to a decrease in poverty and an improvement in income distribution. Considering the stagnating situation of the country and the traditional structure of production employment increase is important and essential because of that recognition of production factors over employment is vital. One of the major variables that influence the employment of the labor force from both quality and quantity aspects is the human assets variable. Human asset is an extended index including education items, health, and nutrition, in which investment in education, health, and nutrition is posed as an investment in human assets. Developed countries that often have good nutrition and health do not pay much attention to human assets in a way that is focused on education's role in economic growth. But in developing and less developed countries people due to nutrition and sanitary problems that they have are not able to have access to quality education and as a result, a healthy individual having appropriate nutrition and education has a higher impact on economic growth in comparison with an individual who does not have access to one or a couple of these features. Good nutrition, health, and education lead to an increase in creativity, efficiency, and a rise in ability and technical and scientific skills and finally, they have an impact on economic growth (Diallo, 2007). Therefore, human assets through a positive impact on economic growth influence employment. The major point is that individuals having poor health conditions have a lower rate of employment in comparison with other people in society. On the contrary, having well health conditions, accumulation of human assets, and sufficient nutrition leads to wage rise and more

job offer opportunities, so such people experience lower unemployment period. So far a variety of research has been carried out regarding the impact of different factors including human assets on Iran employment but to the extent that it has been searched among the different studies in Iran and abroad, no research has been found regarding the impact of human assets on the country's employment. Therefore, considering the importance of the subject, the goal of the current research is the study of human assets in the country's employment.

The rest of the paper proceeds as follows. Section 2 provides the literature review. Section 3 presents the methodology. Section 4 analyses the experimental findings. Finally, section 5 dedicates to results and suggestions.

2. Literature Review

2.1 Human Assets

Human capital refers to the knowledge, experiences, and skills of the labor force which depend principally on the health and education conditions in each country. Furthermore, investment in human capital, in the form of health protection, nutrition status, and quality education, is an efficient instrument for destroying extensive poverty and inequality (Mohamed et al., 2021). Although education is among the essential factors in human assets accumulation, human assets improvement is dependent on other factors including health improvement. According to the 1993 World Development Report, health improvement plays a significant part in increasing efficiency and growth in developing countries (Knowles and Owen, 1995). A labor force with higher health levels as well as being skillful and educated are capable of higher production than those suffering from health issues (Byoun, 2013). Therefore, Becker (1993) believes that human capital entails investment in education, training, skills, health, and other inseparable individual values (Alika and Aibieyi, 2014).

Given that malnutrition, health deprivation, and low educational levels are considered important barriers in the socio-economic growth of developing and developed countries, the United Nations employed a composite indicator made up of literacy rate and the combined ratio of primary and secondary education as well as life expectancy and average calorie intake per capita as two health and nutrition components to measure human capital in 1991. In 1999, average calorie intake per capita replaced calorie supply per capita, and the mortality rate of children under five years old substituted life expectancy at birth. In 2002, the gross enrollment rate in secondary school replaced the combined ratio of enrollment in primary and secondary school enrolment. This indicator was renamed human assets in 2003. In 2005, the percentage of people suffering from malnutrition replaced the average calorie intake per capita. Hence, the human asset index currently incorporates a comprehensive perspective encompassing four indicators of gross secondary school enrollment rate and adult literacy rate as education components and two indicators of children under five years old's mortality rate and the percentage of the population suffering from malnutrition as health and nutrition components (Feidouno and Goujon, 2018). According to the human assets approach, a healthy individual with a high educational level will have better health and nutrition, so the combination of education, nutrition, and health leads a person to be considered an asset in the economy (Diallo, 2017). Equation 1 we used to measure human assets based on three components of education, nutrition, and health.

$$HA_t = \left(U_t + MO_t + LR_t + SE_t\right) \Big/ 4 \quad (1)$$

In the above equation, HAI_t is human assets, while U_t, MQ_t, LR_t, and SE_t show the undernourishment index, under-five mortality rate, the adult literacy rate, and gross secondary school enrollment rate. Each index is expressed as a value ranging between zero and 100

based on the Min-Max technique. Human assets index has an indirect relationship with U_t and MQ_t, which is normalized through the following inverse formula and calculated according to equation 2.

$$U \quad or \quad MO = \begin{cases} 0 & if \quad x \succ Max \\ \left(\dfrac{(Max - x)}{(Max - Min)} \right) \times 100 & if \quad Min \prec x \prec Max \\ 100 & if \quad x \prec Min \end{cases} \tag{2}$$

where x indicates either the percentage of the population undernourished or under-5 mortality rate depending on whether it is U_t or MO_t. The human asset index has a direct relationship with LR_t, and SE_t, which is normalized through the following equation3.

$$LR \quad or \quad SE = \begin{cases} 0 & if \quad x \prec Min \\ \left(\dfrac{(x - Min)}{(Max - Min)} \right) \times 100 & if \quad Min \prec x \prec Max \\ 100 & if \quad x \succ Max \end{cases} \tag{3}$$

In which x represents either the adult literacy rate or gross secondary school enrollment rate. Since each of the indicators ranges between zero and 100, the human asset index also ranges between zero and 100 with higher values indicating increased and improved human assets and vice versa.

2.2 The Effects of Human Assets on Economic Growth

Human assets impact the labor force demand by affecting production. Hence, to explain the impact of human assets on employment, the impact of human assets on economic growth must be first determined and the function of labor demand is then extracted using Shepherd's Lemma. According to Diallo (2017), the endogenous growth pattern is used to examine the impact of human assets on economic growth. According to this pattern, the desirability of the hypothetical consumer is maximized about economic resource limitation, human capital, health asset, and physical asset accumulation. To explain this relationship, $U(0)$ (consumer desirability) is introduced as a function of $C(t)$:

$$Max_{\{c(t),IVK(t),IVH(t),IVS(t)\}} U(0) = \int_0^{\infty} \frac{e^{-pt}\left[c(t)^{1-\sigma}-1\right]}{1-\sigma} dt \quad , \quad \rho \quad and \quad \sigma \succ 0 \tag{4}$$

where ρ denotes a subjective rate of time preference, σ^{-1} represents the constant intertemporal elasticity of substitution in consumption. The production $Y(t)$ is considered as a Cobb-Douglas form in which output is a function of total factor productivity $A(t)$, undernourishment (m), physical capital $K(t)$, human capital $H(t)$, and health capital $S(t)$:

$$Y(t) = A(1-m)^{\varphi} K(t)^{\alpha} H(t)^{\beta} S(t)^{\gamma}, \quad 0 \prec \varphi \prec 1, \quad 0 \prec m \prec 1 \tag{5}$$

$\beta\alpha\gamma$ and indicate the shares of physical capital, human capital, and health capital in production, respectively, while φ contributes proper nutrition's share in production. The economy is assumed to be in long-run equilibrium, and production is assumed to have a constant return on the scale over physical capital, human capital, and health capital $(\alpha + \beta + \gamma)$. The human assets index is defined as the geometric mean of undernourishment, health, and human capital.

$$HAI(t) = (1-m)^{\varphi} H(t)^{\beta} S(t)^{\gamma}, \quad \beta + \gamma + \varphi = 1 \tag{6}$$

where β, γ and φ is the share of variables in the geometric mean. The resource constraint indicates that the income equals the sum of consumption and investment in physical $IVS(t)$, human $IVH(t)$, and health $IVS(t)$ capital.

$$Y(t) = C(t) + IVK(t) + IVH(t) + IVS(t) \tag{7}$$

In equilibrium, the endogenous growth rate of consumption increases at a rate equal to Ψ[1]. According to the characteristics of the Solow model and the features variables in the steady-state, the endogenous variables increase with the same growth rate and fixed rate equal to Ψ:

$$\frac{\frac{d}{dt}C(t)}{C(t)} = \frac{\frac{d}{dt}K(t)}{K(t)} = \frac{\frac{d}{dt}H(t)}{H(t)} = \frac{\frac{d}{dt}S(t)}{S(t)} = \frac{\frac{d}{dt}Y(t)}{Y(t)} = \psi \tag{8}$$

1. See Dialo (2017)

According to function (5) and (6), the growth rate of production and the growth rate of human assets is equal to:

$$\frac{\frac{d}{dt}Y(t)}{Y(t)} = \frac{\alpha\frac{d}{dt}K(t)}{K(t)} + \frac{\beta\frac{d}{dt}H(t)}{H(t)} + \frac{\gamma\frac{d}{dt}S(t)}{S(t)} \quad (9)$$

$$\frac{\frac{d}{dt}HAI(t)}{HAI(t)} = \frac{\beta\frac{d}{dt}H(t)}{H(t)} + \frac{\gamma\frac{d}{dt}S(t)}{S(t)} \quad (10)$$

So, equation 11 is obtained by combining equations 9 and 10 in which economic growth is a function of physical capital growth and human assets growth:

$$\frac{\frac{d}{dt}Y(t)}{Y(t)} = \frac{\alpha\frac{d}{dt}K(t)}{K(t)} + \frac{\frac{d}{dt}HAI(t)}{HAI(t)} \quad (11)$$

Therefore, human assets leave a positive impact on economic growth.

2.3 The Effect of Human Assets on Employment

Theoretically, there is a positive relationship between economic growth and employment, so that increased employment rate results in higher economic growth (Dumitrescu et al., 2009). Therefore, labor force demand (L) is considered a function of production level y, i.e. $L = f(y)$, so it can be calculated how much labor force is required to reach a certain level of production. Hence, human assets affect employment through economic production. Shephard's lemma (1953) and the firm's cost function are used to obtain the labor force demand function. Firm production is a function of the labor force (L) and other production factors (X) including the capital, while the cost of production factors is fixed and the production level is specified. The firm optimization problem would be stated as follows if TC represents the firm cost, y represents production, w represents real wage, r represents the real price of other production factors, and Φ represents fixed costs:

$$Min\,TC(v,w,r) = \phi + wL + rX$$
$$Subject \quad to: f(y) = \bar{v} \quad \left(\bar{y} \quad given\right) = L^{\alpha} X^{\beta} \tag{12}$$

The cost function is a homogenous, linear function that has a linear relationship with independent variables. The labor force demand function is obtained by forming the Lagrange function based on equation 13 and deriving it from wage.

$$\ell(y,w,r,\lambda) = (\phi + wL + rX) + \lambda(f(y) - L^{\alpha} X^{\beta}) \tag{13}$$

$$L^{d} = \frac{\partial \ell(\gamma,w,r,\lambda)}{\partial w} = \Lambda\, w^{\alpha} r^{\beta} y^{\frac{1}{\alpha+\beta}} \tag{14}$$

in the Equation above, $\Lambda = (\alpha/\beta)^{\frac{\beta}{\alpha+\beta}}$ and λ represents the Lagrange coefficient. Labor force demand is obtained by calculating the logarithms of Equation 14, which form Equation 15.

$$L^{d}(AV,w,r) = \ln\Lambda + \alpha \ln w + \beta \ln r + \hbar \ln y, \hbar = 1/\alpha + \beta \tag{15}$$

Theoretically, labor force demand has a direct relationship with production and an inverse relationship with real wage.

2.4 Research Background

Numerous studies have been conducted on the impact of human capital on economic variables. The primary studies suggest only education to be among the important factors affecting human capital accumulation; Barro (1991); Mankiw et al. (1992); Wolbers (1998); Simon (1998); Zhongchng and Yongqiu (2007); Castel et al. (2010); Wambugu (2011); Sharma (2016); Liu and Bi (2019); Rwigema (2020); Jamel et al. (2020); Elmi and Jamshidnezhad (2007); Taghavi and Mohammadi (2006); Barghandan et al. (2011); Aghaei et al. (2013); Gholizadeh and Aghaei (2017) have only considered education as the indicator of human capital. Along with the importance of health being highlighted, some studies used health indicators to measure human capital; for instance, Reza et al. (2013); Onisanwa (2014); Verma and Usmani (2019); Yildirim et al. (2020); Sethi et al. (2020); Odhiambo (2021); Lotfalipour et al. (2011); and

Rabiei et al. (2013) have only examined the impact of health on economic indicators. The combination of the two factors of health and education results in human capital accumulation. In this regard, Ram and Shultz (1997) argue that lower mortality rates and increased motivation for investment are caused by education. Also, the pattern proposed by Ehrlich and Lui (1991) indicates that improved life expectancy is accompanied by lower fertility rates and higher investment in education (Kalemli-Ozcan et al., 2000). According to the pattern proposed by Soares (2005), the reduced mortality rate in children and adults results in higher investment in children's education and reduces fertility rate (Weil, 2014: 37). Hence, given the importance of considering the combination of health and education, recent studies employ the two indicators of health and education to measure human capital. Such studies include the works of Bhat and Siddharthan (2010), Kumar and Chen (2013), Samiullah (2014), Sniukiene and Matuzeviciute (2018), Ezoji et al. (2019), Anvari et al. (2020), Imene and Khemissi (2020), Mohamed (2021), Falahi et al. (2015), and Ghiasi et al. (2018). Through time, it was revealed that nutrition was also among the essential factors influencing one's productivity. Leibenstein (1957) proposes the hypothesis that people with higher calorie intake have higher productivity compared to those suffering from malnutrition. In other words, better nutrition brings about higher productivity at very low levels of nutritional intake (Strauss and Thomas, 1998). Considering the significance of nutrition, it was eventually argued that those with higher education, better health, and healthy nutrition have higher productivity. Hence, the notion of human assets was introduced, encompassing education, health, and nutrition. Diallo (2017) was the first to examine the impact of human assets on economic growth. Using the approach of panel data, Diallo (2017) studied the influence of human assets on the economic growth of 19 developing countries during 1980-2011. In his study, Diallo (2017) measured human assets as the arithmetic means

of four indicators including gross secondary school enrollment rate, adults' literacy rate, percentage of population suffering from malnutrition, and mortality rate of children under five years old. His findings indicated the positive impact of human assets on economic growth. Besides, the impact of human assets on economic growth turned out to be greater than the impact of available capital stock. No study has been conducted so far on the relationship between human assets and employment.

3. Methodological Framework

3.1 Model Specification

The present research seeks to examine the impact of human assets on employment. First, the impact of human assets on the logarithm of GDP will be explored according to Diallo (2017). Then, employment rate will be defined as a function of the logarithms of GDP, logarithms of total factor productivity, and logarithms of minimum wage according to literatures, Siregar (2019), and Yousefy et al. (2019). Hence, Equations 16 and 17 are used to analyze the relationships between research variables.

$$\log y_t = f(\log k_t, ha_t, X_t) \tag{16}$$

$$emp_t = f(\log w_t, \log pro_t, \log y_t) \tag{17}$$

Where $logy_t$ is the logarithm of GDP, ha_t represents human assets, $logk_t$ denotes the logarithm of physical capital, and x_t represents control variables including trade openness $trad_t$, growth of government expenditures gg_t, financial development fin_t, and inflation inf_t. In Equation 17, emp_t represents the employment rate, $logw_t$ indicates the logarithm of minimum wage, and $logpro_t$ shows the logarithm of total factor productivity. The impact of human assets on employment is estimated using the simultaneous equations system. To do so, the simultaneous equations system is introduced as:

$$\begin{cases} \log y_t = \alpha + \psi \log k_t + \gamma trad_t + \varphi gg_t + \tau fin_t + \eta \inf_t + \theta ha_t + \varepsilon_t \\ emp_t = \beta + \rho \log w_t + \delta \log pro_t + \mu \log y_t + \nu_t \end{cases} \tag{18}$$

Where ψ, γ, φ, θ, τ and η are coefficients of the logarithm of physical capital, trade openness, growth of government expenditures, financial development, inflation, and human assets, respectively; also, ρ, δ, and μ show the coefficients of the logarithm of minimum wage, the logarithm of total factor productivity, and the logarithm of GDP, respectively. In the Equation above α and β are the constant terms, ε_t and v_t indicate the error terms that following the white noise process.

3.2 Data

The present research has used time-series data from 1990-2019 to study the impact of human assets on economic growth. Data on human assets were collected from the Ferdi[1] website and data on employment were obtained from the International Labor Organization. Other data were collected from the Central Bank of Iran. We used the ratio of exports to imports for measuring the trade openness and ratio of stock trading value to GDP for measuring the financial development index. For deflating nominal values to real was used the consumer price index of base year 2004. Given that data on human assets in Iran only covered the period of 1990 to 2014, human assets data for the period of 2015-2019 were forecasted by Autoregressive Integrated Moving Average (ARIMA) using the R software. Table 1 reports a summary results of human assets forecast.

Table 1. A Summary Results of Human Assets Forecast

Year	Model	Forecasted	ME	RMSE	MAE	MPE	MAPE	MASE	ACF1
2015	ARIMA(1,0,0)	92.11452	-0.0343	0.46998	0.34174	-0.04469	0.40462	0.34222	-0.0182
2016	ARIMA(1,0,0)	93.11591	-0.0320	0.46085	0.32860	-0.04297	0.38906	0.32902	-0.1785
2017	ARIMA(1,0,0)	94.12733	0.03170	0.45223	0.31643	-0.04134	0.37465	0.31680	-0.1783
2018	ARIMA(1,0,0)	94.9536	-0.0365	0.46804	0.3552	-0.04639	0.4108	0.34615	-0.0189
2019	ARIMA(1,0,0)	95.4091	0.03016	0.45176	0.3241	-0.04063	0.3665	0.31048	-0.1812

Source: Research finding.

In this method, the Box-Jenkins model is first used to select a suitable model from autoregressive (AR) and moving average (MA) models, and a combination of the (Autoregressive Integrated Moving

1. Ferdi.fr

Average) is eventually selected. For this purpose, data stationarity was first examined using the Augmented Dickey-Fuller and the Phillips-Perron tests in the "intercept & trend" case. Accordingly, the variable of human assets is stationary at the 5% level. The optimal lag was determined to be one according to Akaike and Schwartz-Bayesian criteria, and data on human assets were finally predicted for the aforementioned five years. The process of prediction was conducted in a way that 2015 data were first predicted and added to the database. Then, 2016 data was predicted and added to the database; this process kept on going until 2019 data on human assets was obtained. Results indicate that the forecasted values have desired statistical features. As shown in Table 1, the criteria of mean error (ME), root mean squared error (RMSE), mean absolute error (MAE), mean percentage error (MPE), mean absolute percentage error (MAPE), mean absolute scaled error (MASE), and autocorrelation of errors at lag 1 (ACF1) were used to evaluate the predictive accuracy of the model.

3.3 Unit Root Test

The present paper uses the three-stage least squares method to estimate the simultaneous equations. If any of the equations in the system are higher than the specified value, they can be estimated using the method of three-stage least squares. The identifiability of simultaneous equations was examined using the order condition and rank conditions. According to the order condition, the number of exogenous variables that are excluded in the equation $K - K_i$ must not be less than the number of endogenous variables in the model minus one $S - 1$ in a model with n equations. Symbol K is the model's exogenous variables, K_i represents the number of exogenous variables in the equation i, and S represents the model's endogenous variables. If $K - k_i = S - 1$, the equation is completely identifiable and if $K - k_i > S - 1$, the equation is too specific or meta-identifiable.

Table 2. The Investigation of the Order Condition

Equation	$S-1$	$K-k_i$	**Identifiability**
$logy_t$	1-1=0	8-6=2	Meta-identifiable
emp_t	2-1=1	8-2=6	Meta-identifiable

Source: Research finding.

According to the rank condition, an equation is considered meta-identifiable if it has at least one non-zero determinant from the order $(S-1)(S-1)$ upside of the model. Since S equals 2, the equations system will be meta-identifiable if it has at least one non-zero determinant from the order of (1×1).

Table 3. The Rank Condition of Equations

Equation	1	$logy_t$	emp_t	ha_t	$logk_t$	$trad_t$	gg_t	fin_t	inf_t	$logw_t$	$Log\ pro_t$
$logy_t$	$-\alpha$	1	0	$-\beta$	-ψ	$-\gamma$	$-\varphi$	$-\tau$	η	0	0
emp_t	$-\theta$	$-\mu$	1	0	0	0	0	0	0	$-\rho$	$-\delta$

Source: Research finding.

Table 3 indicates that since each of the equations has at least one non-zero determinant, both equation is meta-identifiable.

4. Results

4.1 Unit Root Test

Data stationarity was first examined to avoid pseudo regression and the complications induced by it. For this purpose, was used the Augmented Dickey-Fuller and the Phillips-Perron tests.

Table 4. Unit Root Test Results

Variables	**Phillips-Perron test**		**Augmented Dickey-Fuller test**	
Test Results	**Test statistic**	**Critical statistic**	**Test statistic**	**Critical statistic**
emp_t(first difference)	-5.5798 (0.000)	-4.324	-5.5798 (0.000)	-4.323
Log y_t(first difference)	-3.98 (0.021)	-3.58	-3.985 (0.0213)	-4.323
$Log\ k_t$(first difference)	-5.117 (0.0016)	-4.324	-5.171 (0.001)	-4.3323
$trad_t$(first difference)	-3.707 (0.038)	--3.58	-3.679 (0.041)	-3.58
gg_t(first difference)	-4.83 (0.000)	-3.679	-4.83 (0.000)	-3.679
inf_t(first difference)	-9.011 (0.000)	-4.323	-4.9517 (0.0023)	-4.323
fin_t(first difference)	-2.289 (0.024)	-2.1953	-2.289 (0.023)	-1.953
ha_t(level)	-3.82 (0.0296)	-3.574	-4.281 (0.012)	-3.356
Log v_t(first difference)	-5.19 (0.0013)	-4.323	-5.194 (0.0013)	-4.323
Log pro_t(first difference)	-4.52 (0.006)	-4.323	-4.522 (0.0063)	-4.324

Source: Research finding.

To test the null hypothesis, we examined variables in the case of "intercept & trend" except for the financial development and growth of government expenditures, the former was analyzed in the case of "no intercept & no trend" and the latter in the case of "intercept". Findings indicate that the variable of human assets is stationary, that is, I (0), and other variables are integrated of order one, that is, I (1).

4.2 ARDL Bounds Test

The ARDL bounds test approach introduced by Pesaran et al. (2001) was used to examine the cointegration relationship between variables. To apply the bounds test, the cointegration relationship between variables using the R software was examined in five models including "no intercept and no trend", "restricted intercept and no trend", "unrestricted intercept and no trend", "unrestricted intercept, and restricted trend", and "unrestricted intercept and trend" (Pesaran et al., 2001). Table 5 shows the results of the bounds test for employment and production equations.

Table 5. ARDL Bounds Test Results

Equation												
	$Log\ y_t$						emp_t					
Case	90%		95%		99%		90%		95%		99%	
No Intercept & No Trend	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	1.75	2.78	2.04	3.24	2.66	4.05	2.01	3.10	2.45	3.63	3.42	4.48
	F= 13.167, k=6								F= 6.130, k=3			
Restricted Intercept & No Trend	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	1.99	2.94	2.27	3.28	2.88	3.99	2.37	3.20	2.79	3.67	3.65	4.66
	F= 7.55, k=6								F= 11.317, k=3			
Unrestricted Intercept & No Trend	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.12	3.23	2.45	3.61	3.15	4.43	2.72	3.77	3.23	4.35	4.29	5.61
	F= 5.6592, k=6								F= 14.141, k=3			
Unrestricted Intercept & Restricted Trend	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.33	3.25	2.63	3.62	3.27	4.39	2.97	3.74	3.38	4.23	4.30	5.23
	F= 4.94, k=6								F= 11.436, k=3			
Unrestricted Intercept & Trend	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.53	3.59	2.87	4.0	3.6	4.9	3.47	4.45	4.01	5.07	5.17	6.36
	F= 7.5084, k=6								F= 14.288, k=3			

Source: Research finding.

According to the results, the F statistic is higher than the upper bound of the critical value at confidence levels 99%, 95%, and 90%;

hence, the null hypothesis no cointegration relationship between the variables, in the long run, is rejected. Therefore, there is a long-run equilibrium relationship between research variables in both models.

4.3 Estimation of Research Model

After ensuring the long-term relationship between the variables, the equations in the system are finally estimated using the three-step least squares method, according to the results of the rank condition. In the three-step least squares method, the determinants and statistics of single equations such as R-squared and the Durbin-Watson are not suitable for evaluating the quality of a system of simultaneous equations and examining the goodness of fit.

Table 6. Results Obtained from Model Estimation Using Three-Stage Least Square Method

Dependent Variable: $\log y_t$				**Dependent Variable:** emp_t			
Variable	**Coefficient**	**t- statistic**	**Probability**	**Variable**	**Coefficient**	**t-statistic**	**Probability**
C	7.24	1.028	0.309	C	-2.61	-2.43	0.0189
$\log k_t$	0.77	3.44	0.0012	$\log w_t$	-0.11	-3.58	0.000
$trad_t$	0.24	2.015	0.0496	$\log pro_t$	-0.32	-10.91	0.000
gg_t	0.90	2.18	0.0342	$\log y_t$	0.302	5.86	0.000
fin_t	-1.068	-2.19	0.0334				
$\inf_t$	0.49	2.36	0.0222				
ha_t	1.67	2.03	0.047				
$R^2_{CN} = 0.951$				$R^2_{CN} = 0.871$			

Source: Research finding.

Therefore, the quality of the model is evaluated based on systemic methods (Abbasinejad and Tashkini, 2011: 108). In the present study, to evaluate the goodness of fit, the Carter-Nagar method is used, which is calculated according to the formula $R^2_{CN} = \left[1 - \frac{MSE}{\sigma^2_Y}\right]$, where MSE and σ^2_y are the mean squared error of fitting and variances of the dependent variable, respectively (Gorji and Madani, 2003). Table 6 reports the results of estimating the equations. As can be seen, the Carter-Nagar statistic indicates a goodness of fit of the estimated

equations. According to t-statistic and probability level, the estimated coefficients are statistically significant. Findings show that:

1- The logarithm of physical capital has a positive effect on the logarithm of GDP; So that one percent increase in physical capital leads to a rise of 0.77 percent in the GDP. The production of goods and services in any country requires sufficient physical capital. By increasing the capital stock, firms can increase their production through the purchase of machinery and technology. As a result, the growth of capital stock leads to an increase in GDP. Studies by Lotfalipour et al. (2011), Aghaei et al. (2013), and Rabiei et al. (2013) confirm the positive effect of capital stock on production and economic growth in Iran.

2- The trade openness has a positive effect on the logarithm of GDP; So that by increasing one unit in the degree of trade openness, the logarithm of GDP also increases by 0.24 units. The degree of trade openness promotes economic growth by increasing the mobility of factors of production, access to foreign markets, and the transfer of knowledge, skills, information, and resources from developed to developing countries. In this regard, the studies of Diallo (2017), Emamverdi and Sharifi (2010) confirm the positive effect of the trade openness on economic growth.

3- The growth of government expenditures has a positive effect on the logarithm of GDP. With a one-unit increase in the government expenditures growth, the logarithm of GDP increases by 0.90 units. Rising government expenditures lead to a rise in the social rate of return on investment and an increase in private sector investment through increased construction costs such as the construction of infrastructure and infrastructure. Also, if government expenditures increase on public goods such as security, education, and health, it will have a direct impact on economic growth. In general, government expenditures increase economic growth directly by combining aggregate demand and indirectly by improving investment. The study

of Majdzadeh Tabatabaei and Nematollahi (2010) confirms the positive impact of government spending on the country's economic growth.

4- Financial development leaves a negative effect on logarithm of GDP; an increase of one unit of financial development reduces the logarithm of GDP by 1.068 units. The inefficiency of the financial system and the lack of a cohesive market in the country by increasing financial costs have limited the ability of financial markets to allocate funds to the most efficient economic activities. The results of Moradgholi et al. (2020) confirm the negative impact of financial development on economic growth in Iran.

5- Inflation has a positive effect on the logarithm of GDP; With an increase of one unit of inflation, the logarithm of GDP increases by 0.49 units. In fact, along with rising inflation, the selling price of products of manufacturers and firms increases, which in turn increases the profit margin. Therefore, with the rise of inflation, the activities of firms prosper and lead to an increase in production. The results of Shokravi and Khezri (2018) and Feghhe Majidi et al. (2017) confirm the positive effect of inflation on Iran's economic growth and production.

6- Human assets have a positive effect on the logarithm of GDP; So that with an increase of one unit in human assets, logarithm of GDP increases by 1.67 units. Human resources include the three components of education, health, and nutrition. Increasing human assets means increasing skills and expertise, improving the health status, and improving the nutritional level of the country's manpower, which makes the workforce more capable and capable of accepting, employing, attracting, and promoting innovations and innovations. As a result, improving human assets increases labor productivity and thus economic production. The Diallo study (2017) confirms the direct impact of the human assets variable on economic growth in developing countries.

7- The logarithm of minimum wage has a negative effect on the rate of employment; By increasing one unit in the minimum wage, the employment rate decreases by 0.11 units. Determining the minimum wage affects different levels of wages. Due to the heterogeneity of labor in the market and the high percentage of non-skilled labor, increasing the minimum wage has a significant impact on the wages of non-skilled labor and, consequently, increases the production costs of firms. Because labor productivity is not taken into account in determining the minimum wage, the demand for labor decreases as the minimum wage increases. Studies by Amini and Mansouri (2009), Baseri and Roshani (2014), and Khalili (2017) confirm the negative impact of the minimum wage on employment in Iran.

8- The logarithm of total factor productivity has a negative effect on employment rate; An increase of one unit in productivity leads to a decrease of 0.32 units of employment. Increasing productivity is associated with increasing the capacity to use new technology and improving the ability to produce labor. With the help of a skilled and specialized workforce, companies can use new and advanced technologies. Therefore, with increasing productivity, it is possible to produce a certain level of product with less labor force. As a result, the demand for labor is reduced. Ladu (2012) and Yousefy et al. (1398) confirm the negative impact of total factor productivity on employment.

9- The logarithm of GDP has a positive effect on the employment rate; by increasing one unit in the logarithm of GDP, the employment rate increases by 0.30 units. Increasing economic production means increasing people's income. Consumption and demand must increase as income rises; On the other hand, the savings and, consequently, investment in the country is increasing. As a result, with increasing demand and investment, the need for labor to increase the production of goods and services rises. Thus, given the positive impact of production on labor demand, increased economic growth leads to

raised employment. In Iran, studies by Saadi and Mousavi (2013), Baseri and Roshani (2014), and Khalili (2015) confirm the positive impact of economic growth on employment.

5. Conclusion

According to the research findings, there is a positive relationship between human assets and employment in Iran. In such a way that with the increase of human assets, the amount of economic production of the country increases, which in turn leads to an increase in the demand for labor and, of course, employment. Human assets are a composite index including education, health, and nutrition, which has evolved with the development of methods of measuring human capital. In this context, education increases the efficiency of the workforce in the production of goods and services by increasing the level of skills and expertise. In addition, improving health by reducing mortality rates and increasing life expectancy increases the return on investment in education and, consequently, investment in education. Educated, healthy and well-nourished people have more ability than other people to accept, employ, absorb and promote innovation. Therefore, according to the view of human assets, a healthy person with adequate nutrition can achieve a higher level of education; also, a person with higher education and level of education has better health and nutrition. Thus, the combination of the three factors of education, health, and nutrition makes the labor force an asset in the economy. In a way, investing in human assets enhances the level of skills, expertise, the productivity of the workforce, and increases the efficiency of the labor force in applying new technology. In other words, improving the level of education, improving the state of health along with improving the quality of nutrition of individuals will increase the productivity of the labor force in the production sector; As a result, with the stability of other production inputs, the rate of production and economic growth increases. As the production of

goods and services increases, the economic resources of firms increase and enable firms to increase the production capacity of their goods and services by increasing investment, which in turn leads to an increase in labor demand. Hence, the increase in human assets leaves a positive impact on Iran's employment.

6. Suggestions

Findings showed that promoting human assets leads to increased economic production and employment in the country. Accordingly, by developing a comprehensive program in the form of the country's development plan, it is proposed to the government to achieve sustainable employment, firstly progress the level of skills and expertise of the workforce following the needs of industry and the country; secondly, improve the quality of health and nutrition of individuals for the country to have an efficient labor force. In this process, the government can enhance economic growth and development by investing in human assets in addition to reducing unemployment.

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