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THE IMPACT OF FOREIGN AND NATIVE HUMAN CAPITAL ON TURKEY'S ECONOMIC GROWTH

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ABSTRACT

In this study, the impact of human capital on Turkey's economic growth during 2003-2021 was investigated. For this purpose, the effects of native and foreign labor are examined separately within the framework of the Cobb-Douglas production function. The Johansen cointegration method was used for the analysis. The results of the estimation of the long-run model show that both foreign and native labors have a positive effect on economic growth, with the effect of native labors being larger than the effect of foreign labor. Both native and foreign labor play an essential role in creating the right background for Turkey's economic growth, so native and foreign labor should be used to increase productivity and production.

Keywords: *Human Capital, Economic Growth, Immigrant, Johansen Cointegration.*

JEL Classification: *E24, J24, O40.*

YABANCI VE YERLİ BEŞERİ SERMAYENİN TÜRKİYE EKONOMİK BÜYÜMESİ ÜZERİNE ETKİSİ

ÖZET

Bu çalışmada beşerî sermayenin 2003-2021 döneminde Türkiye ekonomik büyümesi üzerine etkisi incelenmiştir. Bu amaç için yerli işgücü çalışanların ve yabancı işgücü çalışanların etkisi Cobb-Douglas üretim fonksiyonu çerçevesinde ayrı olarak incelenmiştir. Analizlerin yapılması için Johansen Eşbütünleşme yöntemi kullanılmıştır. Uzun dönemli modelin tahmin sonuçları hem yerli hem de yabancı işgücünün ekonomik büyüme üzerinde olumlu bir etkiye sahip olduğunu, yerli işgücünün etkisinin yabancı işgücünün etkisinden daha büyük olduğunu göstermektedir. Hem yerli hem de yabancı işgücü, Türkiye'nin ekonomik büyümesi için doğru zeminin oluşturulmasında önemli bir rol oynamaktadır, bu nedenle yerli ve yabancı işgücü, verimliliği ve üretimi artırmak için kullanılmalıdır.

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1. INTRODUCTION

The importance and role of human capital in economic growth becomes even more apparent when one considers the outstanding and significant achievements of countries such as South Korea, Hong Kong, Japan, Taiwan, and other rapidly growing economies in Southeast Asia. These countries, which often do not have many natural resources, have managed to experience rapid growth because they have a well-educated labor force with sufficient skills and hard work that have fueled the growth of these countries at various stages of development. Of course, this does not mean that physical capital and machinery play an insignificant role in modern economies, but in any case, labor and skilled managers and creative employers in the economy are necessary for the efficient use of this equipment and machinery. Therefore, investing in human resources and improving the quality of the workforce has an impact not only on social benefits but also on economic growth, and the long-term benefits of this issue pave the way for achieving economic growth targets.

Most developing countries face a double problem: They lack the skills and knowledge necessary for industrial growth, while they have a surplus of unskilled labor. The existence of a surplus of labor is largely due to a lack of the necessary skills. Human capital concentration can solve these problems by creating the necessary skills in people. It is like productive resources and creating lucrative jobs for them. The need to invest in human resources in these countries is far greater than that of physical capital.

The training of the human workforce leads to labors acquiring higher skills and abilities. The skills and abilities that result from investment in education can affect the level of savings and capital formation, as well as the wage share. In today's world, countries trying to increase their competitiveness and productivity should invest more in the skills, abilities, and competencies of the workforce.

This study examined the impact of native and foreign human capital on Turkey's economic growth over the period 2003-2021.

A dynamic economy needs efficient human capital, which includes elites, experts, and entrepreneurs, to sustain innovation and competitiveness. All over the world, immigrant labors contribute to the economic growth and development of countries in addition to the native labor force. Studies show that immigrants leave positive economic impacts in most countries around the world. According to the International Organization for Migration's 2020 report, immigrants have a significant impact on the economies of receiving countries. Migrations have been the driving force of growth in countries' structural transformations throughout history. While playing a driving role in urbanization, increased urbanization has begun to affect economic growth in many ways (Bell et al., 2015: 55). Therefore, migration, which meets a significant portion of the labor demand generated by FDI and

urbanization and industrialization, has a positive impact on growth (Noi, 2010: 8). According to TURKSTAT data from 2021, Turkey hosts 1792036 international immigrants. Moreover, Turkey ranks first in the world in hosting the most number of forced migrants.

The difference between this research and previous studies is that in this research, the effect of domestic and foreign human capital on economic growth was investigated separately, while this separation was not done in previous studies. In addition, only a small number of earlier research have looked at the effect of human capital on economic growth in a single country rather than as a collection of countries.

Considering these differences and considering that Turkey ranks first in hosting the largest number of forced immigrants in the world, in this research, the impact of local and foreign labor on Turkey's economic growth is examined using annual data for the period 2003-2021. The econometric method used in this research is co-accumulation using Johansen's co-accumulation method.

The remainder of this article is divided into the following sections. The literature review is presented in Section 2 together with a theoretical framework and empirical data. The methods, tests, and model and data specifications are the main topics of Section 3. The findings and suggestions from the econometric study are highlighted in Section 4.

2. LITERATURE

In most cases, the volume of human capital increases during different years because, in normal conditions, the health and education status of each generation is better than the previous generation. It is expected that the formation of human capital in a country will increase with the passage of time this is the cumulative growth and accumulation of human capital. In countries where the population growth rate is high and facing a labor surplus, the issue of human capital is of particular importance (Oxley et al., 2008). The surplus labor that exists in such countries can be easily converted into specialized and skilled labor at low costs and lead to the improvement of the human capital situation. Also, in the process of producing goods and services, human capital has the potential to perform flexibly (Mubarik et al., 2018). In a planned process, it is possible to improve the condition of surplus labor in countries in terms of skills, knowledge, expertise, and health and turn it into reliable human capital (Tchanturia et al., 2015).

Most economists believe that investing in people and spending on occupational training and workforce health increases the quality of the workforce and has a positive effect on productivity.

The acceptance of human capital as a main focus in economic literature dates back to the early 1961s; That is, when economists tried to provide a convincing explanation for a significant part of economic growth that remained unexplained. In the studies of Lucas (1988) and Barro (1991) it was also proved that human capital and the expansion of knowledge are among the variables influencing

economic growth (Lucas, 1988; Barro, 1991). The main idea of human capital theory is based on the fact that investing in human resources increases the production capacity of people and ultimately improves economic growth. Of course, historically, investing in human resources leads to increased economic growth. Smith and classical economists also emphasized the importance of investing in the skill and expertise of the workforce. However, in modern growth studies, the concept of capital has been expanded from the classic state of investment in equipment and machinery to investment in human resources.

An educated workforce has a positive impact on economic growth through several mechanisms According to the neoclassical view, an educated workforce increases productivity and thus promotes economic growth (Mankiw et al., 1992). Based on endogenous growth theories, an educated workforce can increase the economy's capacity for invention and innovation, leading to the development of new technologies and thus higher economic growth (Romer, 1990). According to Nelson and Fopps (1966), trained labor causes the spillover and transfer of knowledge, and this is also necessary to be aware of new information processes and successful use of new technologies.

According to Shultz, training and improving the quality of the labor force is one of the critical factors for economic growth (Schultz, 1961).

In general, the additional output generated by higher levels of education is estimated using a production function. The argument is that an increase in the level of education raises material productivity, and for each additional dollar invested, GDP increases approximately at the rate of return to education times the labor share of GDP. This is because the results of formal and informal education are hidden in additional skills and potential skills of people who are in the labor market and represent human capital in production. Consequently, the presence of these educated people increases the productive capacity of the whole economy and ultimately contributes to economic growth. One of the prevailing methods to quantitatively estimate such research is to use the production function, and this question is necessary to estimate the benefits of investment in education. However, there is no specific and unambiguous method for using the human capital variables in the production function (Schultz, 1961).

The experience of advanced countries shows that it is not sufficient to explain the economic growth rate by physical capital and labor force alone, but that there is another factor that has strengthened the economic growth of these societies. This factor, which explains an important part of the economic growth of developed countries, depends on better education. The more education the labor force receives and the more useful this education is, the more effective the improvement in the quality of the labor force is in increasing the volume of production.

According to the economic literature and the mentioned materials, it can be stated that human capital can play a special role in the process of economic growth, so it is necessary to evaluate the effect of this component on economic growth.

Table 1 lists the studies that were done. A significant portion of empirical studies reach the favorable conclusion that human capital has on economic growth. There are also results that this effect is not significant (Liu & Stengos (1999); Aşık (2007); Henderson (2010); Delgado et al. (2014); Demir & Yılmaz (2016); Aktekin (2019)) or is negative (Islam (1995)).

Table 1. Empirical Research On Human Capital's Impact On Economic Growth

Author	Country	Period	Result
Group			
Barro (1991)	98 countries	1960–1985	Positive
Mankiw et al. (1992)	98 countries	1960-1985	Positive
Durlauf & Johnson (1995)	121 countries	1960-1985	Positive
Islam (1995)	OECD	1960-1985	Negative
Nonneman & Vanhoudt (1996)	OECD	1960-1986	Positive
Liu & Stengos (1999)	86 countries	1960-1970	Insignificant
Barro (2001)	142 countries	1960-2000	Positive
Sala-I-Martin et al. (2004)	East Asian countries	1960-1980	Positive
Yıldırım (2005)	Turkey and selected countries	1965-1990	Positive
Kar & Ağır (2006)	ASEAN countries	2001-2013	Positive
Aşık (2007)	Emerging market economy	1970-2005	Insignificant
Durlauf et al. (2008)	53 countries, 54 countries, 57 countries	1965-74, 1975-84, 1985-94	Positive
Henderson (2010)	OECD	1965-1995	Insignificant
Hartwig (2012)	18 OECD	1970-2005	Positive
Delgado et al. (2014)	OECD	1950-2005	Insignificant
Parlakyıldız (2015)	OECD	1998-2013	Positive
Demir & Yılmaz (2016)	Turkey and BRICS economies	1995-2014	Insignificant
Cinnirella & Streb (2017)	Prussia	1877-1890	Positive
Gülen (2018)	OECD	1999-2014	Positive
Aktekin (2019)	13 selected countries	1981-2016	Insignificant
Single			
Brempong & Wilson (2003)	Sub-Saharan Africa	1975-1994	Positive
Bozkurt (2009)	Turkey	1992-2001	Positive
Cengiz (2013)	Japan	1980-2011	Positive
Keji (2021)	Nigeria	1981-2017	Positive

3. METHODOLOGY OF THE RESEARCH

In this study, annual data for the years 2003 to 2021 were used to assess the effects of domestic and international labor on Turkey's economic growth. Cointegration utilizing the Johansen cointegration method is the econometric technique used in this study.

3.1. Model and Data

In this experimental study, the Cobb-Douglas production function was used to examine the effects of foriegn and native labor on economic growth.

Q = f(Capital Stock, Labor) (Model 1)

After converting the time series into logarithms, Model 1 was developed as Model 2. The model used in this study is based on the model used by Akbari & Haider (2018).

$GDP = \beta_0 + \beta_1 K + \beta_0 L + \beta_0 NE + \beta_0 IE + \mu_0$ (Model 2)

GDP: Real GDP's natural logarithm (constant 2015 US$)

K: Natural logarithm of gross capital formation (constant 2015 US$)

L: Labor force's natural logarithm

NE: Native labor force's natural logarithm

IE: Foreign labor force natural logarithm. For the foreign labor force, the number of work permits issued to foreigners by year is used. The labor variable is calculated excluding native and foreign labors to avoid collinearity. If there is a problem with collinearity, the coefficients of the model are not valid. The variance of the estimators of the regression coefficients will increase, and the estimation by the regression model will be associated with a large error.

μ_0: Residual term

GDP and gross capital formation data are from the World Bank, labor force and native labor force data are from TURKSTAT, and foreign labor force data are from the Turkish Ministry of Labor and Social Security.

Descriptive statistics for the data set used in the study are given in Table 2.

Table 2. Descriptive Data Analysis

Variables / Statistics	GDP	K	L	NE	IE
Mean	8.749	23.379	13.078	10.156	8.893
Maximum	9.740	25.459	15.709	12.831	10.354
Minimum	6.331	18.799	9.963	6.402	6.251
Std. Dev.	0.586	1.427	1.245	0.735	1.023

3.2. Unit Root Test

In order to assess if a time series is stationary, the unit root test is a frequently used technique in econometrics. Both the Augmented Dickey-Fuller (ADF) devised by Dickey-Fuller (1979) and the Unit Root Tests devised by Phillips-Perron (1988) are employed in this investigation. Statisticians use the ADF test to determine whether a time series variable is stationary. The ADF test takes into account the pertinent context of the wrong phrases. In other words, this test assumes that the error term's distribution is independent. The PP test, which is employed in place of the ADF test, offers many of the same advantages while also accounting for the autocorrelation of the errors. In econometric analysis, both of these tests are frequently applied to determine whether time series data are stationary. This information is crucial for modeling and forecasting because it enables researchers to identify whether a time series is stationary. When the unit root is present, the variables are considered to be non-stationary according

to the null hypothesis test. However, when the unit root is absent, the variables are considered to be stationary (Cai et al., 2022).

The series must be made stationary using sequential differencing if it is found that the variables are not stationary. The ADF test, according to Gujarati & Porter (2009), necessitates computing the following regression:

$$\Delta Y_t = \alpha + \beta_t + \gamma Y_{t-1} + \theta_1 \Delta Y_{t-1} + \theta_2 \Delta Y_{t-2} + \ldots + \theta_p \Delta Y_{t-p} + \mu_t \quad (1)$$

ΔY_t = the time series' initial difference

α = a constant term

β = the time coefficient

γ = the lagged dependent variable's coefficient

$\Delta Y_{t-1}, \ldots \Delta Y_{t-p}$ = the time series' lagged differences

μ_t = the error term

The serial correlation in the error terms was addressed by Phillips & Perron (1988) using non-parametric statistical methods without the addition of a lagged difference term (Gujarati, 2004). In other words, it incorporates a correction for data serial correlation.

The PP test is written like way:

$$\Delta Y_t = \alpha + \beta_t + \gamma Y_{t-1} + \theta_1(\Delta Y_{t-1} - \rho \Delta Y_{t-2}) + \theta_2 \Delta Y_{t-2} + \ldots + \theta_p \Delta Y_{t-p} + \mu_t \quad (2)$$

where ρ is the anticipated autocorrelation coefficient for the residuals resulting from the regression of ΔY_{t-1} on ΔY_{t-2}.

Table 3 displays the outcomes of the Philips-Peron Test and the Augmented Dickey-Fuller Unit Root Test.

Table 3. ADF And PP Test Results At The Variable Level

Test	ADF		PP	
Model / Variables	I	II	I	II
	Statistics	Statistics	Statistics	Statistics
GDP	-2.98 (-3.51)	-2.71 (-2.93)	-3.13 (-3.91)	-2.79 (-2.90)
K	-2.75 (-3.51)	-2.43 (-2.93)	-3.01 (-3.91)	-2.07 (-2.90)
L	-2.14 (-3.51)	-1.38 (-2.93)	-2.76 (-3.91)	-2.14 (-2.90)
NE	-1.90 (-3.51)	-1.67 (-2.93)	-1.36 (-3.91)	-1.68 (-2.90)
IE	-2.04 (-3.51)	-1.92 (-2.93)	-1.94 (-3.91)	-1.59 (-2.90)

Values in parentheses are critical values.

I: including an intercept and a time trend

II: no time trend and an intercept

The findings in Table 3 demonstrate the nonstationarity and unit root of the series in the levels. Because the absolute value of the estimated statistics is smaller than McKinnon's crucial values, the unit root null hypothesis is not rejected at a 95% confidence level. The results are presented in Table 4 after taking the first difference (I) of the series.

Table 4. Results of the ADF And PP Tests For The Variables' First-Order Difference

Test	ADF		PP	
Model / Variables	I	II	I	II
	Statistics	Statistics	Statistics	Statistics
GDP	-4.58 (-3.51)	-4.79 (-2.93)	-5.12 (-3.91)	-5.46 (-2.90)
K	-4.15 (-3.51)	-4.62 (-2.93)	-4.79 (-3.91)	-4.11 (-2.90)
L	-5.01 (-3.51)	-5.31 (-2.93)	-5.02 (-3.91)	-5.48 (-2.90)
NE	-4.21 (-3.51)	-5.37 (-2.93)	-4.42 (-3.91)	-5.71 (-2.90)
IE	-4.19 (-3.51)	-4.83 (-2.93)	-4.36 (-3.91)	-4.65 (-2.90)

Values in parentheses are critical values.

I: including an intercept and a time trend

II: no time trend and an intercept

Table 4's findings show that the null hypothesis of a single root is rejected with a 95% confidence level since the estimated statistics' absolute value is higher than McKinnon's crucial values. All variables are hence integrations of order one, or I(1).

3.3. Optimal Degree of VAR Model

For Johansen's cointegration analysis, the optimal degree in the model VAR should be determined. Henan-Quinn, Akaike, Schwartz-Bayesian, Likelihood Ratio and Adjusted Likelihood Ratio criteria were used to determine the optimal degree. The results are shown in Table 5.

Table 5. Selecting the Order of the VAR Model

Test / Order	HQ	AIC	SBC	LR	Adjusted LR
3	382.3451	274.4664	85.6673	------	------
2	317.2620	225.1616	63.6330	157.3349	65.0470
1	270.4431	226.6668	87.9482	355.8067	288.3862
0	65.7201	46.1798	34.3740	285.5894	254.4901

According to table 4, the optimal degree according to HQ and AIC is 3, and according to SBC, LR, and Adjusted LR is 1. Due to the small sample size, the length of interval 1 was used to estimate the long-term equilibrium relationships so as not to lose the degrees of freedom.

3.4. The Appropriate Model

The maximum eigenvalue statistic was used to select the right model to run the cointegration test on. Table 6 displays the test's outcomes.

Table 6. Determine the Appropriate Model

H_0	H_1	I	II	III	IV	V
r = 0	r = 1	66.65 (47.38)	66.92 (50.64)	58.56 (40.94)	64.11 (54.72)	59.12 (53.78)
r ≤ 1	r = 2	41.06 (30.96)	52.13 (45.50)	38.18 (44.75)	42.48 (48.97)	30.78 (48.18)
r ≤ 2	r = 3	33.91 (34.93)	36.92 (39.38)	35.37 (38.53)	35.93 (42.80)	30.91 (32.00)
r ≤ 3	r = 4	28.85 (28.79)	33.69 (33.15)	29.88 (32.23)	29.94 (36.53)	28.36 (35.46)
r ≤ 4	r = 5	27.40 (22.14)	27.5 (26.98)	9.94 (25.99)	11.88 (20.33)	7.49 (29.44)

Values in parentheses are critical values.

I: with no time trend and no intercept

II: time-limited restricted intercept trend

III: limitless intercept without time trend

IV: unconstrained intercept with a temporal trend that is constrained

V: unrestricted intercept not restricted time trend

From Table 6, the value of the maximum eigenvalue in the third model is 38.18, which is smaller than the critical value (44.75) at the 95% level. Therefore, the cointegration test is performed with model 3, since the null hypothesis is accepted in this model.

3.5. Cointegration Vectors

The cointegration test is most frequently conducted using Johansen's (1988) methodology. The maximum likelihood estimation of the VAR model serves as the foundation for the Johansen test for cointegration, which counts the cointegrating vectors in the study.

The number (r) of cointegrating vectors is calculated using the maximum eigenvalue test and the trace test statistics. The null hypothesis, that there are only r cointegrating vectors, is contrasted with the alternative, that there are r or more cointegrating vectors. While this is going on, the r cointegrating

vectors and the r + 1 cointegrating vectors alternatives are compared using the maximum eigenvalue statistics test.

Trace and maximum eigenvalue are two fundamental test statistics that Johansen & Juselius (1990) devised to assess the quantity of cointegration vectors and their significance. Each test's calculation looks like this:

$$\lambda_{trace} = -T\sum_{i=r+1}^{n} \ln (1 - \hat{\lambda}_i) \quad (3)$$

$$\lambda_{max} = -T\ln (1 - \hat{\lambda}_{r+1}) \quad (4)$$

T = the sample size

$\hat{\lambda}$ = the largest canonical correlation

Enders (2003) states that the trace statistic compares the alternative hypothesis to the null hypothesis, which states that the quantity of cointegrated vectors is equal to or less than r.

The null hypothesis, which states that there are r cointegrating vectors, is compared to the alternative hypothesis, which states that there are r + 1. The asymptotic critical values produced by Johansen & Juselius (1990) are compared to the statistical results from both tests.

The following is the Johansen test's framework (Johansen, 1988):

$$X_t = \delta_1 X_{t-1} + \delta_2 X_{t-2} + \ldots + \delta_k X_{t-k} + \text{deterministic components} + \mu_t \quad (5)$$

X_t = a vector autoregressive (VAR) model of order k is used to represent the Z×1 vector of variables that are not integrated above order one

μ_t = the error term

δ_1, δ_2, and δ_k = coefficients matrices

Using the greatest eigenvalue statistic, the number of cointegration vectors was calculated. Table 7 displays the test's outcomes.

Table 7. Cointegration Test Based on the Maximum Eigenvalue Statistic

H_0	H_1	Statistics
r = 0	r = 1	58.56 (40.94)
r ≤ 1	r = 2	38.18 (44.75)
r ≤ 2	r = 3	35.37 (38.53)
r ≤ 3	r = 4	29.88 (32.23)
r ≤ 4	r = 5	9.94 (25.99)

Table 6 shows that the statistical value for r≤1 is smaller than the critical values at the 95% level. Therefore, there is a single linear combination (covariance vector) of the variables under study. Since the objective is to study the impact of migrant and native labor on Turkey's economic growth, the obtained vector is normalized based on economic growth. The normalized cointegration vectors are shown in Table 8.

Tablo 8. Normalized Cointegration Vectors

Vector / Variables	Normalized Vector
GDP	1
K	-0.5871
L	-0.4623
NE	-0.2214
IE	-0.1564

The normalized vector is presented as follows:

GDP = 0.5871K + 0.4623L + 0.2214NE + 0.1564IE

(0.1331) (0.2301) (0.1047) (0.1011)

The standard deviation, which displays the significance of the variable coefficients at the 95% level, is represented by the figures in parentheses. As a result, the obtained vector is distinctive and can be used to infer long-term economic ties.

The use of both domestic and international workers helps the economy flourish. Although foreigners have a bigger impact, native labor still has a big impact.

Turkey's economic growth increases by 0.5871 percent for every one percent increase in capital stock. Turkey's economic growth improves by 0.4623% for every 1% increase in the labor force. Turkey's economic growth increases by 0.2214 percent for every percent increase in the native work force. Turkish GDP increases by 0.1564% for every 1% increase in the foreign work force.

3.6. The Model for Correcting Errors

Whether or not the error correction model can be implemented depends on the outcome of the cointegration test. The error correction model is used if the variables have cointegration, or a long-term link, between them. When two variables cointegrate, it indicates that the two series are in a long-term equilibrium relationship. Should there not be an equilibrium between the two variables in the short run. The error words in this instance serve as a link between short-term and long-term values. The error correction model can be illustrated as follows in its most basic form:

$$\Delta Y_t = \alpha_0 + \alpha_1 X_t + \alpha_2 u_{t-1} + \mu_t \quad (6)$$

Here it is assumed that the variables Y and X are cointegrated.

ΔY_t = variations in the X_t variable that are momentary

u_{t-1} = adjustments towards long-term equilibrium

α_2 = adjustment or adaptation speed, indicates the deviation. If statistically significant, this coefficient demonstrates how much the short-term imbalance in X_t can be adjusted over time. A departure from equilibrium occurs if α_2 is positive, but a divergence from equilibrium that is nearing the long-term value occurs if α_2 is negative. In this instance, the deviation reduces, indicating that the error correction system is in operation. (Dikmen, 2012).

The error correction model for the long-term relationship has been computed in order to check the short-term departure of the variables from their equilibrium values. The variables' short-term volatility in this model are correlated with their long-term average values. In Table 9, the error correction model is displayed.

Table 9. Correction of Errors Model

Error Correction	d(GDP)	d(K)	d(L)	d(NE)	d(IE)
Error Correction Coefficient	-0.350014	-0.004584	-7.964521	-6.484492	-5.716134
Standard Error	(0.06545)	(3.04610)	(3.46240)	(4.12035)	(5.05349)
t-Value	[-1.35796]	-12.0377]	[-3.94636]	[-3.83535]	[-2.91436]

As seen in Table 8, the error correction coefficient was found to be -0.350014. As a result, approximately 35% of short-term deviations in the relationship between economic growth and stock of capital, labor, local and foreign labor disappear in each period. The error correction coefficient is between -1 and 0 and is statistically significant. This indicates that the error correction mechanism is working.

Based on the formula $1/|ECM|$, it can be calculated how many periods it will take for the data to reach equilibrium. These deviations $1/|-0.350014|$= (2.9) will converge to long-run equilibrium in approximately 3 years. Actually, equilibrium is achieved after about 3 years.

4. RESULTS AND CONCLUSIONS

Most economists agree that the economic growth process of a country is ultimately determined by its human resources and that the importance of human capital is no less than that of physical capital. On this basis, the present study examined the impact of human capital (native and foreign labour) on Turkey's economic growth.

It can be stated that competent foreign labor increases the productivity of other factors of production and increases human capital in Turkey by imparting the knowledge and skills they have learned in their home countries, which is in line with the positive effects of foreign labor on Turkey's economic growth. Moreover, these foreign labors transfer their financial and physical capital to Turkey,

thus creating better conditions for economic growth. In fact, immigration can be seen as complementary to trade and foreign direct investment in Turkey. The formation of trade networks has led to the creation of trade relations, foreign direct investment, the enhancement of benefits derived from trade, and the dissemination of knowledge, thus affecting Turkey's economic growth. Emigration will create trade networks between native and foreign countries and in this way increase trade relations and foreign direct investment.

The findings of the long-run model's estimation reveal that the elasticity of the local labor force is both positive and significant. This result is consistent with the research findings of Brempong and Wilson (2003), Yıldırım (2005), Kar and Ağır (2006), Bozkurt (2009), Hartwig (2012), Cengiz (2013), Parlakyıldız (2015), Gülen (2018), and Keji (2021). Therefore, the government should try to increase investment in this sector and improve the quality of the labor force. With the accumulation of human capital, not only will economic growth be directly affected, but its accumulation and optimal utilization will also increase the productivity of other factors, leading to this indirect and endogenous effect of labor on economic growth.

Both native and foreign labor play a central and essential role in creating the right background for Turkey's economic growth, so native and foreign labor should be used as needed to increase productivity and production.

Investment in labor leads to higher economic growth when it is made in response to the economy's growing need to use the latest scientific achievements in production. Therefore, it is proposed to invest more in indigenous and foreign labor and to further educate the labor force to increase the supply of specialized labor with higher education. This educated and specialized workforce will certainly ensure faster economic growth through innovation and optimal use of Turkey's financial capabilities.

Of course, we must not forget that education will only lead to more economic growth if the educated people are used where they are needed and increase productivity in production. In other words: Investment in human capital leads to more economic growth when it is made in response to the economy's ever-growing need to use the latest scientific advances in production. However, it should be remembered that companies that are not exposed to internal and external competition do not feel the need to make efforts to improve and apply the latest production methods, and they can survive and achieve their goals without such efforts.

Increasing and improving indicators related to human capital, such as increasing literacy levels, improving labors' skills and life expectancy index, increasing per capita income and other related indicators are proposed because they seek economic growth objectives in addition to economic benefits, such as increasing labors' productivity and production. Therefore, economic growth requires attaching importance to the discussion of human capital and efforts to improve related indicators. Therefore, investing in human resources and improving the quality of the labor force not only affect social benefits

but also economic growth, and the long-term benefits of this issue make the path to achieving economic growth goals more even.

REFERENCES

Akbari, A.H. and Haider, A. (2018) "Impact of Immigration On Economic Growth in Canada and in Its Smaller Provinces", Journal of International Migration and Integration, 19(1): 129-142.

Aktekin, E. D. (2019) "The Relationship Between Natural Resource Wealth and Economic Growth: A Multi-Country and Comparative Analysis", Master's Thesis, Niğde Ömer Halis Demir University Institute of Social Sciences, Niğde.

Aşık, B. (2007) "Openness and the Role of Human Capital in Long-Term Growth (A Panel Data Application for Emerging Markets)", Master's Thesis, Yıldız Technical University Institute of Social Sciences, Istanbul

Barro, R.J. (1991) "Economic Growth in a Cross Section of Countries", The Quarterly Journal of Economics, 106(2): 407-443. https://doi.org/10.2307/2937943.

Barro, R.J. and Lee, J.W. (2001) "International Data on Educational Attainment: Updates and Implications", Oxford Economic Papers, 53(3): 541–563. https://www.jstor.org/stable/3488631.

Bell, M., Charles-Edwards, E., Ueffing, P., Stillwell, J., Kupiszewski, M. and Kupiszewska, D. (2015) "Internal Migration and Development: Comparing Migration Intensities around the World", Population and Development Review, 41(1): 33-58.

Bozkurt, S. (2009) "Relationships Between Human Capital and Regional Economic Growth in Turkey", Master Thesis, Ege University Institute of Social Sciences. İzmir.

Cai, J., Ahmad, M., Irfan, M., Khan, I. and Razzaq, A. (2022) "Modeling Wind Energy Development Barriers: Implications for Promoting Green Energy Sector", Energy Sources, Part B: Economics, Planning, and Policy, 17(1): 1-31. https://d oi. o rg/1 0. 1080/ 15567 249. 2022. 21184 03.

Cengiz, O. (2013) "The Impact of the Human Capital on Economic Growth: An Application for Japan", Master's Thesis, Çukurova University Institute of Social Sciences, Adana.

Cinnirella, F. and Streb, J. (2017) "The Role of Human Capital and Innovation in Economic Development: Evidence from Post-Malthusian Prussia", Journal of Economic Growth, 22(2):193-227. DOI 10.1007/s10887-017-9141-3.

Delgado, M.S., Henderson, D.J. and Parmeter, C.F. (2014) "Does Education Matter for Economic Growth?", Oxford Bulletın of Economics and Statistics, 76(3): 334-359. https://doi.org/10.1111/obes.12025.

Demir, G. and Yılmaz, A. D. (2016) "Relationship between Human Capital and Economic Growth in Turkey and BRICS Countries: Panel Granger Causality Analysis", Marmara Journal of Social Research, 9: 1-21.

Dickey, D. and Fuller, W. (1979) "Distribution of the Estimation for Autoregressive Time Series with a Unit Root", Journal of American Statistical Association, 74(366): 427-431. https://doi.org/10.2307/2286348.

Dikmen, N. (2012) "Econometrics Basic Concepts and Applications", Istanbul, Dora Publishing House.

Durlauf, S.N. and Johnson, P.A. (1995) "Multiple Regimes and Cross-Country Growth Behaviour", Journal of Applied Econometrics, 10(4): 365-384. https://doi.org/10.1002/jae.3950100404.

Durlauf, S.N. Kourtellos, A. and Tan, C.M. (2008) "Are Any Growth Theories Robust?", The Economic Journal, 118(527): 329-346. https://doi.org/10.1111/j.1468-0297.2007.02123.x.

Enders, W. (2003) "Applied Econometric Time Series", 2nd Edition, New York, John Wiley & Sons, Inc.

Gujarati, D. (2004) "Basic Econometrics", 4th Edition, New York, The McGraw-Hill Companies.

Gujarati, D. and Porter, D. (2009) "Basic Econometrics", 5th Edition, New York, Palgrave Macmillan.

Gülen, H. (2018) "The Relationship Between Employed Human Capital and Economic Growth: Panel Data Analysis for OECD Countries", Master's Thesis, Eskişehir Osmangazi University Institute of Social Sciences. Eskişehir.

Gyimah-Brempong, K. and Wilson, M. (2004) "Health Human Capital and Economic Growth in Sub-Saharan African and OECD Countries", The Quarterly Review of Economics and Finance, 44(2): 296-320.

Hartwig J. (2012) "Testing the Growth Effects of Structural Change", Structural Change and Economic Dynamics, 23(1): 11-24.

Henderson, D.J. (2010) "A Test for Multimodality of Regression Derivatives with Application to Non-Parametric Growth Regressions", Journal of Applied Econometrics, 25(3): 458-480. https://doi.org/10.1002/jae.1099.

Islam, N. (1995) "Growth Empirics: A Panel Data Approach", The Quarterly Journal of Economics 110(4): 1127-1170. https://doi.org/10.2307/2946651.

in Georgia", Procedia-Social and Behavioral Sciences, 213: 580-585. https://doi.org/10.1016/j.sbspro.2015.11.453.

Johansen, S. (1988) "Statistical Analysis of Cointegration Vectors", Journal of Economic Dynamics and Control, 12(2-3): 231-254. https://doi.org/10.1016/0165-1889(88)90041-3.

Johansen, S. and Juselius, K. (1990) "Maximum Likelihood Estimation and Inference on Cointegration-with Application to the Demand for Money", Oxford Bulletin of Economics and Statistics, 52(2): 169-210. https://doi.org/10.1111/j.1468-0084.1990.mp52002003.x.

Kar, M. and Ağır, H. (2006) "The Relationship between Human Capital and Economic Growth in Turkey: Causality Test with Cointegration Approach, 1926-1994", Journal of Social Economic Research, 6 (11): 50-68.

Keji, S.A. (2021) "Human Capital and Economic Growth in Nigeria", Future Business Journal, 7(49): 1-8.

Liu, Z. and Stengos, T. (1999) "Non-Linearities in Cross-Country Growth Regressions: A Semiparametric Approach", Journal of Applied Econometrics, 14(5): 527–538. https://www.jstor.org/stable/223204

Lucas Jr, R.E. (1988), "On the Mechanics of Economic Development", Journal of Monetary Economics, 22(1): 3-42. https://doi.org/10.1016/0304-3932(88)90168-7.

Mankiw, N. G., Romer, D. and Weil, D.N. (1992) "A Contribution to the Empirics of Economic Growth", The Quarterly Journal of Economics, 107(2): 407-437. https://doi.org/10.2307/2118477.

Mubarik, M.S., Chandran, V.G.R. and Devadason, E.S. (2018) "Measuring Human Capital in Small and Medium Manufacturing Enterprises: What Matters?", Social Indicators Research, 137(2): 605-623.

Nelson, R.R. and Phelps, E.S. (1966) "Investment in Humans, Technological Diffusion, and Economic Growth ", The American Economic Review, 56(1/2): 69-75.

Noi, H. (2010). "Internal Migration Opportunities and Challenges for Socioeconomic Development in Vietnam", United Nation Development Program, Vietnam.

Nonneman, W. and Vanhoudt, P. (1996) "A Further Augmentation of the Solow Model and the Empirics of Economic Growth for OECD Countries", The Quarterly Journal of Economics, 111(3): 943-953. https://doi.org/10.2307/2946677.

Oxley, L., Le, T. and Gibson, J. (2008) "Measuring Human Capital: Alternative Methods and International Evidence", The Korean Economic Review, 24(2): 283-344.

Parlakyıldız, F. M. (2015) "Analysis of The Relationship Between Human Capital and Economic Growth for Selected OECD Countries", Çukurova University Journal of Social Sciences Institute, 24(2): 93-106.

Phillips, P.C. and Perron, P. (1988) "Testing for a Unit Root in Time Series Regression". Biometrika, 75(2), 335-346. https://doi.org/10.2307/2336182.

Romer, P.M. (1990) "Endogenous Technological Change", Journal of Political Economy, 8(5): 71-102.

Sala-I-Martin, X. Doppelhofer, G. and Miller, R.I. (2004) "Determinants of Long-Term Growth: A Bayesian Averaging of Classical Estimates (BACE) Approach", The American Economic Review, 94(4): 813-835. https://www.jstor.org/stable/3592794.

Schultz, T.W. (1961) "Investment in Human Capital", The American Economic Review, 51(1): 1-17.

Tchanturia, N. Beridze, T. and Kurashvili, G. (2015) "Features of Development of the Human Capital

Turkish Ministry of Labor and Social Security. (2023) https://www.csgb.gov.tr/

Turkish Statistical Institute (TURKSTAT). (2023) https://www.tuik.gov.tr/

World Bank. (2023) https://data.worldbank.org/

Yıldırım, S. (2005) "Human Capital Accumulation and Economic Growth: Theory and Practice", Master's Thesis, Erciyes University Institute of Social Sciences. Kayseri.

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