# TESTING THE CAUSAL RELATIONSHIP BETWEEN THE VARIABLES OF KNOWLEDGE AND ECONOMIC ACTIVITY IN IRAQ FOR THE PERIOD (2005-2020)

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| A B S T R A C T | K E Y W O R D S |
|---|---|
| Knowledge is a major advantage for achieving human development in any country. Knowledge is achieved through the number of years of schooling. The cognitive variables represented in the number of graduates from high school, graduates from university studies, and graduates from postgraduate studies as independent explanatory variables, and GDP as a dependent variable in Iraq During the period (2005-2020), internal growth theories emphasize the importance of human capital and knowledge in providing a logical explanation for the development achieved in countries that possess natural resources. The researchers relied on the (ARDL) methodology, because the variables are stable in different degrees, based on the Dickey test. Fuller to reveal the unit root in the model, and the results confirmed the existence of a causal relationship between the GDP and the knowledge variables, and the relationship was from one direction of the GDP to the knowledge variables, and the opposite was not achieved, and the study proved that the independent variables are influential and significant in economic activity. | |

## Introduction

We can divide the educational reality in Iraq into the secondary education stage, the institute, the bachelor's degree, and beyond, and education in Iraq is divided into private education and government education. Gross domestic product and knowledge variables that represent human

capital in Iraq during the period (2005-2020). And the human capital in Iraq is limited by the size of the increase in the gross domestic product, and this is due to the nature of the Iraqi economy, which was subjected to the curse of resources resulting from the large increase in financial resources that occurred due to the high prices of crude oil in the global market, and it was reflected in the general budget of the state and was represented by government spending, And the increase in the average per capita income in Iraq, especially public sector employees, and the desire of individuals to improve the level of education and the knowledge index increased, compared to the period of the economic blockade.

**Research Problem:**
One of the problems facing the Iraqi economy is the knowledge crisis and the decline in its indicators at the global and regional levels, and that the reason for the decline in knowledge and human capital is a result of the decline in the level of education, so the following questions arise:
1-What is the contribution of spending on education in raising the level of knowledge-forming education indicators in Iraq?
2-Is there a comprehensive strategy to develop solutions to the problems of knowledge and human capital?

**Research Importance:**
The importance of the research stems from the importance and contribution of knowledge and human capital in influencing economic activity, according to the ideas put forward by the theories of internal growth, which considered that economic growth and development achieved in countries that do not have natural resources were limited to the presence of human capital.

**Research Hypothesis:**
The research is based on the hypothesis that: despite the increase in government spending on the education sector, it did not take the appropriate role for it in improving the special indicators in education that make up knowledge and human capital in Iraq during the period (2005-2020)
Research objective: The research aims to achieve a number of objectives, including:
1-Analyzing the nature of government spending on the education sector
2-Statement of the development in the outputs of the educational system in Iraq during the period (2005-2020)
3-Testing the causal relationship between the gross domestic product and knowledge variables in Iraq during the study period

**The first topic:** human capital in Iraq during the period (2005-2020)
This indicator shows the nature and size of spending on education in Iraq as a percentage of public spending, to show the amount of attention that the government attaches to education in Iraq, through allocations in the general budget, and the importance given to economic sectors and state institutions, particularly higher education institutions and the Ministry of Education.
1-The relationship between spending on education and human capital in Iraq

The increase in the percentage reflects the amount of interest in the education sector and considering it a vital sector that can provide other sectors with knowledge and human capital, which is considered a detriment to the requirements of the productive process, as Table (1) shows that spending on education in Iraq as a percentage of public spending was (5.3%) in (2005) Qom increased to (7.8%) in the year (2008) and continued to rise until the year (2009) by (10.2%), after which it began to fluctuate up and down until the year (2015) by (10.7%) and continued to rise until the year (2018). (15.7%), which is the highest percentage achieved during the study years (2005-2020). **(Al-Shudoud: 2006, 73)**

We notice in Table (1) that the increase in spending on education was accompanied by a horizontal and vertical expansion in educational institutions, as most of the increase in education was a result of the increase in the population and the increase in educational institutions in the Ministry of Education during the school years, in addition to the large increase in State revenues as a result of the rise in crude oil prices in global markets, and it was noticed in the years (2012-2013-2014) a decrease in the volume of spending to (9.8) billion dinars, and (10.5) and (9.9) for the previous years, respectively, after that the volume of spending increased to At the end of the study years, it is clear from Table (1) that the average expenditure specified for education from the general budget during the period is (10.6%) in relation to the total public expenditure, which is less than the global level approved by the international scientific organizations interested in the subject, amounting to (15%). The researchers say that the education sector needs more attention, not only in the amount of spending, but also in the type of spending allocated to educational institutions, to raise the percentage of education's contribution to the gross domestic product, and not to be one of the consumer sectors that burden and burden the state that relies only on the extractive sector. **(Ali: 2004, 84)**

**Table (1) Total expenditure and spending on education in Iraq during the period (2005-2020)**

| YEAR | Public spending on education (million dinars) (2) | Total public spending )Million dinars( (1) | Percentage of spending on education out of total public spending% )3( |
|---|---|---|---|
| 2005 | 1622272 | 30,831,141 | 5.3 |
| 2006 | 2236286 | 37,494,458 | 6 |
| 2007 | 2891256 | 39,308,347 | 7.4 |
| 2008 | 5250308 | 67,277,196 | 7.8 |
| 2009 | 5650972 | 55,589,720 | 10.2 |
| 2010 | 6871577 | 70,134,200 | 9.8 |
| 2011 | 10115959 | 78,757,665 | 12.8 |
| 2012 | 9804496 | 105,139,574 | 9.3 |
| 2013 | 10574820 | 119,127,555 | 8.9 |
| 2014 | 9983244 | 125,321,073 | 8 |
| 2015 | 9089123 | 84,693,523 | 10.7 |
| 2016 | 9695720 | 73,571,001 | 13.2 |
| 2017 | 10239585 | 75,490,114 | 13.6 |
| 2018 | 12689433 | 80,873,187 | 15.7 |
| 2019 | 12687081 | 111,723,521 | 11.4 |
| 2020 | 10396271 | 76,082,442 | 13.7 |

**Source**: Prepared by the researcher based on data

1-Ministry of Finance, Economic Department, unpublished data, column (1)

2- Ministry of Planning, Central Statistical Organization, National Accounts Directorate | Column (2)

3-Ministry of Planning, Department of Government Investment Programs, the actual expenditure of investment projects during the period, column (2)
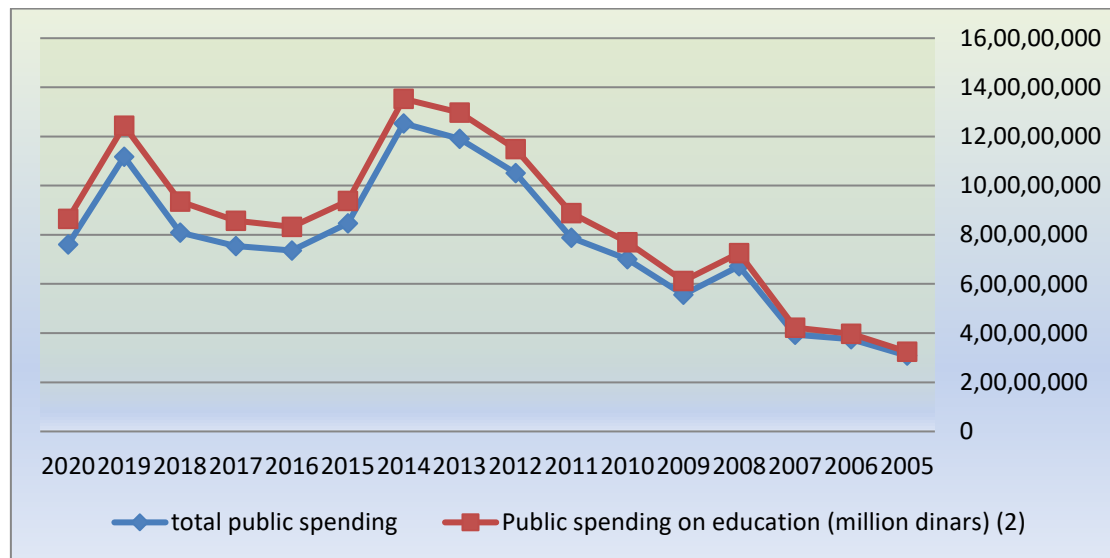
4-Column (3) of the researchers' work



**Figure (1) Public spending and spending on education in Iraq**

Source: Prepared by the researchers based on the data of Table (1)

## 2-The outputs of the education sector:

The outputs of the education sector in Iraq, including legal, university and postgraduate education, may not be consistent with the requirements of the labor market, and may not be consistent with the productive process, as the education outputs represent educated human resources and possess the skill and knowledge that represent the human capital, which he obtained Graduates during the period of schooling in the education and education sector, as standing on the educational reality in Iraq through table (2) during the research period, as follows: **(Mani': 2011, 41)**

a - Secondary education: In secondary education there is an increase in the number of graduates, and the increase was fluctuating from the secondary stage during the years of research, as the number was (97230) graduated in the year (2005), and the number increased to (133734) in the year (2009) and the number continued to increase It is a normal situation where the increase is proportional to the average increase in the population with the growth in the number of graduates, until it reached (183,275) in the year (2017), and the number in the year (2020) was approximately (289,463) and an average compound annual growth (7.3%), The increase in the growth rate by a rate greater than the population growth rate is due to the increase in the average enrollment in the preparatory stage and the increase in the number of students. **(Rasheed: 2008, 76)**

b - Education in institutes and universities: This stage includes graduates from governmental and private institutes and colleges. It also witnessed an increasing increase, starting from the year (2006), so the number of graduates was (70,867), and the number continued to increase until the end of the research period, so the number of graduates increased to (83,451). In the year (2012) and then to (112544) in the year (2016), and the rate of increase decreased in the last four years, so that the number of graduates in the year (2020) was approximately (129658) graduates. It came in response to the expansion of the annual admission plan, and the increase in people's demand for university education in order to obtain a government job, which represents a monthly gain for many graduates who represent a high percentage of disguised unemployment, in addition to the increase in the number of Iraqi universities to more than double what was said. The political system in Iraq changed a year ago (2003).

c - Postgraduate studies: It is noticeable that the number of graduates from postgraduate studies in Iraq has increased significantly, and the number of graduates from international universities has increased significantly, as the number of graduates increased from (5756) graduates in the year (2005) to (8081) in the year (2014). ) and then to (11384) in the year (2017) and the increase in the number of graduates continued after Covid 19, and the study shifted to electronic, so the number of graduates was (15111) in the year (2019), then to (17483) in the year (2020), and this increase came in proportion to The significant increase and expansion of the admission plan for postgraduate studies at all levels (high diploma, master's, doctorate). **(Al-Rikabi: 2012, 94)**

**Table (2) The quantitative development of the outputs of the education sector in Iraq for the period (2005-2020)**

| year | University education | Secondary education | Graduate Studies |
|---|---|---|---|
| | number of graduates | number of graduates | number of graduates |
| 2005 | 96879 | 97230 | 5756 |
| 2006 | 70867 | 111092 | 5328 |
| 2007 | 63065 | 60420 | 4346 |
| 2008 | 63686 | 89053 | 4706 |
| 2009 | 68370 | 133734 | 3827 |
| 2010 | 83669 | 968.2 | 4910 |
| 2011 | 88491 | 153874 | 5849 |
| 2012 | 83451 | 165889 | 6888 |
| 2013 | 83727 | 123558 | 7752 |
| 2014 | 79298 | 114482 | 8081 |
| 2015 | 98802 | 157140 | 7547 |
| 2016 | 112544 | 177543 | 9524 |
| 2017 | 120816 | 183275 | 11384 |
| 2018 | 124324 | 207299 | 13006 |
| 2019 | 126692 | 266670 | 15111 |
| 2020 | 129658 | 289463 | 17483 |
| compound annual growth | 4.4% | 7.5% | 7.1% |

**Source:** Prepared by researchers based on data

1-Republic of Iraq, Ministry of Education, General Directorate of Educational Planning, Department of Statistics, Division of Statistical Reports.

2-Republic of Iraq, Ministry of Planning, Central Statistical Organization, Directorate of Social and Educational Statistics.
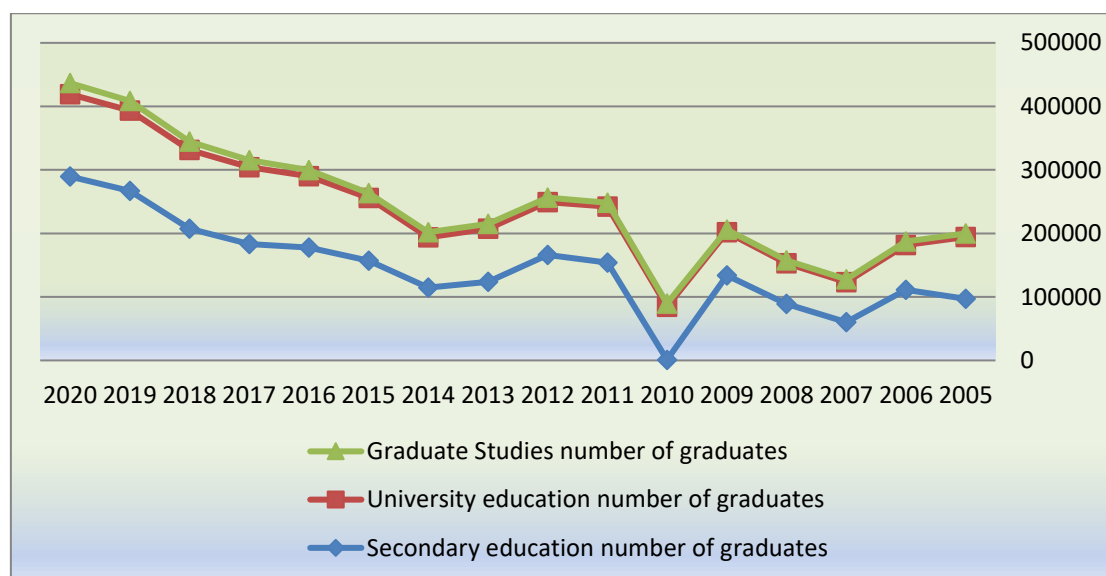


**Figure (2) The number of graduates in Iraq during the years of study in secondary education and above**

**Source:** The figure was prepared by the researchers based on the data of Table (2)

**The second topic: description of the standard model**

The description of the model and the statement of the dependent variable and the independent variables by describing the knowledge variables that represent the explanatory independent variables, represented by secondary education graduates in Iraq (SE), graduates from university education (UE), and graduates from postgraduate studies (GS), while the dependent variable is the output The gross domestic product in Iraq, the mathematical model was built as in the following: **(Al-Arabi: 2007, 174)**

$$GDPt = f(SEt, UEt\ , GSt) \ldots \ldots \ldots \ldots \ldots \ldots \ldots . . \ldots \ldots \ldots \ldots \ldots . (1)$$

The standard form of the study takes the following form:

$$GDP_t = B_0 + B_1 SE_t + B_2 UE_t + + B_3 GS_t + \varepsilon_t \ldots \ldots \ldots \ldots \ldots \ldots (2)$$

By taking all the values in logarithm, the proposed model becomes as follows: **(Abdul Qader: 2012, 295)**

$$LnGDP_t = B_0 + LB_1 SE_t + LnB_2 UEt + + LnB_3 GS_t + \varepsilon_t \ldots . \ldots (3)$$

In order to obtain the model for measuring knowledge and GDP in Iraq, we used a time series of (16) observations that extends from the year (2005) to the year (2020), and below we will analyze the variables according to standard tools.

**1- United Root Tests:**

The unit root test is one of the very important tests to know the stability of the variables or not, and it has a basic scientific importance in estimating the regression equation, as the inference of unstable variables gives false and false results, and it may be misleading to the economic researcher, and it is called (Spurious Regression), and the test is concerned By examining the properties of the variables related to the variables in the study model, during the period (2005-2020).

Avariable is considered stable if it does not have an upward or downward trend in average over time through one of the Unit Root Tests, despite the multiplicity of tests, but we will use (ADF) Test Augmented Dickey - Fuller, and To test the following two hypotheses: **(Amara: 2012, 203)**

**Null hypothesis: the instability of the time series**

**Alternative hypothesis: stability of the time series**

The ADF test, in studying the stability of the X_t series, for example, relies on estimating the models using the following OLS method:     **(Salami and Sheikhi, 124, 2013)**

$$model(i): \Delta yt = \lambda . yt - 1 - 1 \sum_{j=2}^{p} \phi j\, \Delta yt - j + 1 + \varepsilon t \dots\dots\dots\dots\dots\dots\dots (4)$$

$$model(ii): \Delta yt = \lambda . yt - 1 - 1 \sum_{j=2}^{p} \phi j\, \Delta yt - j + 1 + c + \varepsilon t \dots\dots\dots\dots\dots (5)$$

$$model(iii): \Delta yt = \lambda . yt - 1 - 1 \sum_{j=2}^{p} \phi j\, \Delta yt - j + 1 + c + bt + \varepsilon t \dots\dots (6)$$

The difference between the three models is by including the constant term and direction and without the constant and direction, where equation (5) differs from equation (4) in containing a fixed term (C) and equation (6) differs from the previous two equations in including the constant term (C) and direction temporal (bt), and the first difference is calculated as in equation (7).

$$y_{t-1} = \Delta y_{t-1} - \Delta y_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (7)$$

After testing the three equations, the hypothesis (Ho: Ø = 1) is reached against the hypothesis (H1: Ø<1). When the null hypothesis is accepted, it means that the unit root is present in the variable and it is unstable and vice versa. **(Al-Abdali, 2007, 20)**

From Table (3), the results of the test to detect stability can be discussed

a-Gross Domestic Product: GDPt was found to be unstable in the case of a constant or a constant and a general trend or without them, and the variable was stable in the first difference at all levels and integrated of degree I (1).

b-Graduates from secondary education: SEt that the time series is unstable at one level, and stable after taking the first difference of the series at all levels except, that is, the series is integrated of degree I (1).

c-Graduates from university education: UEt after the test turned out to be unstable in the level and in the case of a constant presence, and without a constant and direction, and the variable was stable in a constant state and direction at the level (5%), which means that the variable is integrated of degree I (0).

d-For graduates of GEt graduate studies, the time series of the variable was unstable at the level, and after taking the first difference, it was stable at all levels and it was integrated from degree I (1).

Table (3) Dickie-Fuller test for the stability of the model variables

| UNIT ROOT TEST  RESULTS  TABLE (ADF) | | | | | |
|---|---|---|---|---|---|
| **Null Hypothesis: the variable has a unit root** | | | | | |
| **At Level** | | | | | |
| GE | UE | SE | GDP | | |
| -2.579 | -1.710 | -1.278 | -1.661 | t-Statistic | With Constant |
| 0.118 | 0.409 | 0.615 | 0.430 | *Prob.* | |
| no | no | no | no | | Probabilities and critical values |
| -2.465 | -1.542 | -2.057 | -1.667 | t-Statistic | With Constant & Trend |
| 0.338 | 0.773 | 0.532 | 0.720 | *Prob.* | |
| no | no | no | no | | Probabilities and critical values |
| -0.262 | -0.1835 | 0.563 | 1.040 | t-Statistic | Without Constant & Trend |
| 0.576 | 0.605 | **0.828** | 0.914 | *Prob.* | |
| no | no | ** | no | | Probabilities and critical values |
| **At First Difference** | | | | | |
| d(GE) | d(UE) | d(SE) | d(GDP) | | |
| -3.058 | -3.517 | -3.967 | -3.154 | t-Statistic | With Constant |
| 0.055 | **0.0216** | **0.0092** | **0.0428** | *Prob.* | |
| no | ** | ** | ** | | Probabilities and critical values |
| -3.055 | -3.522 | -3.277 | -3.183 | t-Statistic | With Constant & Trend |
| 0.150 | 0.071 | 0.114 | 0.121 | *Prob.* | |
| no | no | no | no | | Probabilities and critical values |
| -3.124 | -3.540 | -3.815 | -2.848 | t-Statistic | Without Constant & Trend |
| **0.0040** | **0.0015** | **0.0008** | **0.0076** | *Prob.* | |
| *** | *** | *** | ** | | Probabilities and critical values |
| a: (*)Significant at the 10%; (**)Significant at the 5%;(***)Significant at the 1% | | | | | |
| b: Lag Length based on SIC | | | | | |
| c: Probability based on MacKinnon (1996) one-sided p-values. | | | | | |

## 2-Estimating the model in the long term using the (ARDL) methodology:

Depending on the results of the stability test, and because of a difference in the degree of integration of the variables, and the presence of a stable variable at the level, and the variables remained stable in the first difference, a methodology had to be used And it was necessary to estimate the long-term relationship to get the following results:

**(Hassan: 2014, 93)** After estimating the model, it was found that the model is significant and that the independent variables that represent knowledge in Iraq affect the gross domestic product in Iraq. As for the value of ($R^2$), which explains (76%) of the changes that occur in the

dependent variable (GDP), due to the change In the independent variables in the first difference, and the value of (D.W) proves that the model is free from the problem of autocorrelation and is located in the acceptance region and its value is (2) correct. As for the explanatory variables that have a significant effect on the model, they can be explained as in the following: **(Abdul Qader: 2007, 241)**

a- Significant D(GDP(-1)) is affected by the Gross Domestic Product of the previous year and by the amount of the difference, so that every change in D(GDP(-1)) by one time affects (GDP) by (1.5).

b- As for graduates from secondary education, D (SE (-1)) is not influencing or significant in the model, meaning that the increase in the number of graduates from secondary education does not affect the gross domestic product in Iraq even in the long term.

C – The variable represented by graduates from university education D (UE (-1)) is considered influential in the dependent variable in the Iraqi economy during the period (2005-2020), as each change by one time in graduates from university education affects the gross domestic product by an amount (5%)

d – The change in postgraduate studies D (GE (-1)) by one time, it affects the gross domestic product by an effect factor of (15%), and thus the researchers see that the variables of knowledge and human capital are weakly affecting economic activity, except The significance of the model shows that it is possible to raise the level of contribution of knowledge and human capital in economic activity if a special strategy is developed to develop the education sector and make the education outputs commensurate and harmonize with the requirements of the labor market in the Iraqi economy.

### Table (4) Estimating the results of the long-term equation according to ARDL

| Dependent Variable: D(GDP) | | | | |
|---|---|---|---|---|
| Method: Least Squares | | | | |
| Date: 03/13/23   Time: 13:00 | | | | |
| Sample (adjusted): 2005 2020 | | | | |
| Included observations: 16 after adjustments | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| D(GDP(-1)) | 1.53 | 0.335 | 4.55 | 0.003 |
| D(SE(-1)) | -27.03 | 44.105 | -0.61 | 0.5490 |
| D(UE(-1)) | 0. 051 | 0.0138 | 3.67 | 0.0222 |
| D(GE(-1)) | 0.1528 | 0.054 | 2.77 | 0.0142 |
| E1(-2) | -0.5110 | 0.1779 | -2.88 | 0.0328 |
| R-squared | 0.79 | | Mean dependent var | 13937.75 |
| Adjusted R-squared | 0.76 | | S.D. dependent var | 57943743 |
| S.E. of regression | 28.11 | | Akaike info criterion | 37.35016 |
| Sum squared resid | 1.197 | | Schwarz criterion | 37.60501 |
| Log likelihood | -368.58 | | Hannan-Quinn criter. | 37.40497 |
| Durbin-Watson stat | 2.01 | | | |

**Source: The table was prepared by the researchers based on the program EVIWS12**

**3-Testing the causal relationship between inflation and unemployment in the Iraqi economy:**

The significance of the model and the ability of the explanatory variables to influence the dependent variable may be the result of a causal relationship in one or two directions from the independent variable to the dependent or vice versa from the dependent to the independent explanatory variable, and according to the test (Granger) if we have two variables that represent two time series that reflect the development of two phenomena Two different economies during the period of time (t) or more, as in our research, and they are each of the gross domestic product, graduates from secondary education, university education, and graduates from postgraduate studies. **(Al-Shorbaji: 2007, 137)**

The causal relationship between the two variables (GDP) and (UE) can be expressed as follows:

$$lnGDPt = \alpha o + \sum_{i=1}^{p} \rho . lnIGDPt - i + \sum_{i=1}^{p} \psi i . lnUEet - i + \mathcal{E} \dots \dots \dots \dots (8)$$

$$lnUEet = \beta o + \sum_{i=1}^{p} \lambda . lnUEet - i + \sum_{i=1}^{p} \tau i . lnGDPt - i + \Upsilon t \dots \dots \dots \dots (9)$$

Where: Ɛt and Ɣt represent the remainder of the two equations. Table (5) shows the causal relationship between the variables in two directions. The steps of the (Granger) test are as follows: **(Arish, 2011, 82)** Estimating the restricted formula, we mean the following equation:

$$GDPt = \alpha o + \sum_{i=1}^{p} \rho . lnGDPt - i + Ut \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots . \dots \dots . (10)$$

To obtain the sum of squares of the remainder (SSRU) for the equation estimated above, the program (EVIEWS12) directly gives us the result of the causality test as shown in the following table (5): **(Al-Abdali: 2007, 195)**

**Table (5) Testing the causal relationship between knowledge variables and GDP**

| Null Hypothesis | obs | F-tatistic | Prob. |
|---|---|---|---|
| LNGDP does not Granger Cause LNUE | 16 | 12.783 | 0.031 |
| LNUE does not Granger Cause LNGDP | 16 | 1.003 | 0.065 |
| LNGDP does not Granger Cause LNSE | 16 | 6.362 | 0.015 |
| LNSE does not Granger Cause LNGDP | 16 | 0.291 | 0.091 |
| LNGE does not Granger Cause LNGDP | 16 | 5.438 | 0.04 |
| LNGDP does not Granger Cause LNGE | 16 | 26.395 | 0.0001 |

**Source: The table was prepared by the researchers based on the program EVIWS12**

In this part, we try to provide a logical explanation for the causal relationship that the researchers reached. The results of the test were as follows:

a-There is a causal relationship in one direction from the gross domestic product to university graduates.

b-The existence of a causal relationship with one direction of GDP to secondary school graduates.

c-The existence of a causal relationship in two directions, from graduates of postgraduate studies to the gross domestic product.

d-The lack of significant causal relationship between other variables that the researchers did not include with a very limited effect of knowledge and human capital in the Iraqi economy during the period (2005-2020), which may be due to three main reasons:

**The first reason:** the rentier of the Iraqi economy:- The growth in the gross domestic product depends mainly on the production and export of crude oil and the high prices of crude oil in the global market. At a rate that may reach between (92% - 97%) during the period (2005-2020), and the revenues from the oil sector were more than (95%) from the sources of the general budget during the period (2005-2020), so the Iraqi economy was affected by the repercussions of the "disease". Holland, in which the contribution of the extractive sector is high, compared to the low contribution of the commodity sectors, of the gross domestic product, which means that economic growth in Iraq is a function of oil revenues whose prices are determined in the global market. **(Gardner: 2003, 62)**

**The second reason:** the deterioration of the education sector in Iraq: the Iraqi economy is characterized by the dominance of the state over oil revenues, which controls the method of distributing oil revenues to economic sectors and various social services, that revenues have a major role in determining knowledge and human capital in the public sector, and that The state carries out the process of spending on public services that it finances from the extractive sector. The data of Table (1) indicates that financial allocations for education have been affected by military spending and investments to confront terrorist organizations, and problems have accumulated in the education sector.

**The third:** the impact of economic reform policies on educationAfter the change of the political system in the year (2003), the Iraqi interim government adopted an economic philosophy based on the state's control in all aspects of the economic sectors, through applying the recipe of the International Monetary Fund and short-term reforms, and it had an impact on all aspects of the state, including human capital and other variables. Knowledge in Iraq, as the government expenditures allocated to the education sector were low compared to countries that adopt a strategy to build knowledge and have a role in influencing the gross domestic product in Iraq, by increasing government expenditures on this vital and important sector, so the human capital increases and leads to an increase Knowledge, as the rate of spending on education reached (2.6%) as a percentage of (GDP), (5.6%) as a percentage of public spending during the period (2005-20200). **(Al-Hafiz: 2008, 49)**

**Conclusions and Recommendations**

**First: Conclusions**: By examining the relationship between economic growth and knowledge variables in Iraq, the research reached the following conclusions:

1-The stability test showed that the variables are stable after taking their first differences, with the exception of one variable, as well as for a series of estimation residuals that are not stable in the level and are stable after taking their first differences.

2-The causal relationship test indicates that there is a causal relationship in one direction from the GDP to the independent variables, with the exception of the relationship between graduates of postgraduate studies and the GDP during the period (2005-2020)

3-The main factor influencing the economic activity is the specific oil revenues, and therefore the economic growth is volatile and variable and affected by the periodic fluctuations of oil prices in the global market.

4-The decline and decrease in spending on the education sector as a percentage of the gross domestic product or a percentage of public spending affected the significance of the knowledge variables in the Iraqi economy.

**Second: Recommendations**

1-It is necessary to keep pace with developments in developed and developing countries regarding human capital and knowledge variables, and to develop a strategy based on the experiences of successful countries in this regard.

2-Working on diversifying the Iraqi economy through the contribution of knowledge in creating added value in the productive sectors (agricultural, industrial, and service) based on the variables of knowledge generated by the education sector.

3-Coordinating with the Ministry of Finance and Planning in order to raise the percentage of spending on education relative to public spending, in line with the international standard, at a rate of no less than (6%) of GDP, or an average of (15%) of public spending in Iraq.

4-Holding conferences and seminars that are concerned with developing knowledge and raising human capital through a long-term strategy supervised by specialized experts in this field, setting specific goals for them and following up on those achieved, and addressing the problems they face by relying on investing in education and linking it in the labor market to the private sector.

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