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Analysis of the Productivity of Educational Expenditures and Their Impact on Human Development in Iraq

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Abstract:

Purpose : Analysis of the path of public spending on the education sector with an analysis of some human development indicators and the extent to which educational spending contributes to raising the level of human development for the period (2004-2023) in Iraq.

Theoretical Framework: The current research addressed the study of the relationship between government spending in the education sector and the impact of that spending on human development, and the research problem focuses on the inefficiency of educational expenditures in Iraq and their limited impact on human development. Despite significant investments, challenges such as low literacy rates and poor educational outcomes persist. The study seeks to explore the reasons behind this disconnect, examining how funds are allocated and utilized. It aims to identify barriers that prevent these expenditures from effectively enhancing human capital and contributing to broader socio-economic development.

Design/Methodology/Approach: The researcher relied on a mixed approach that combines the descriptive analytical approach to draw the theoretical framework for government spending, the education sector, and human development indicators, in addition to the quantitative standard approach to identify the impact that government spending in the education sector plays on the level of human development. For this purpose, the E-Views10 program was used, and the data extended for the period from 2004-2023.

Findings: The results of the statistical analysis showed that the standard model is free from all statistical problems and gives accuracy to the model.

Research, Practical & Social implications: The current research contributes to clarifying the role of government expenditures on the sector and its reflection in the development of some human development indicators in Iraq.

Originality/Value: The originality of the current research is evident in that it contributes to bridging the research gap between government spending in the education sector and the impact of this spending on human development in developing countries. The research results reached in the standard aspect have shown that education contributes to enhancing human development, so these results add important evidence to the relevant literature.

1. Introduction :

Education is one of the key areas where public resources are allocated (Legenzova et al., 2023). Education has generally been recognized as an important driver of a country's long-term development (Yakubu & Gunu, 2022). It is widely accepted that education is an important source of human capital Development of a country (Rathnasiri, 2020) ; (Khalili et al., 2020) ; (Karaaslan & Tekmanlı, 2022). Education is one of the most important reasons for the progress and development of nations at all levels and attain better social welfare (Mukhtarov et al., 2020) ; (Askarov & Doucouliagos, 2020) ; (Hammadi, 2022). Nowadays, it is known that education is a critical component that accelerates economic, social, and cultural development (Esen et al., 2023) ; (Villela & Paredes, 2022). Owing of significance of human capital, governments and academics focus on the policy implications of human capital investment (Haini, 2020) ; (Özdoğan Özbal, 2021). Expenditure on education plays a special role in driving the development wheel in any country, as it produces outputs, making funding for the educational process very important (Murad & Ahmed, 2023) ; (Mshkal & Nashour, 2023). The topic of government spending on education has gained considerable consensus among researchers (Lawanson & Umar, 2020). As (Al-Zuhairi & Murad, 2023) pointed out, "educational expenditures" are the value of total resources allocated to education relative to the economic system. Despite a surge in global public education expenditure, governments face a financial burden, necessitating a more efficient utilization of resources (Ogunjobi et al., 2024). Public expenditures are largely directed toward defense, education and health (CHEDI, 2022). On the other hand, expenditures in the field of education are generally described as current expenditures (Öksüz, 2023). In the US state educational expenditures comprise the largest proportion expenditures, particularly elementary and secondary educational spending, these educational expenditures are politically popular and are to some degree considered sacred (Park & Kim, 2020). Spending on education reached 6% of national income in 2019 (De Ridder et al., 2020). The US government spent 5.2% of its GDP on education in 2009, compared to other countries, which spent between 3.6% and 5.0% of GDP. (Artige & Cavenaile, 2023). Quality education is the main foundation for promoting knowledge, discoveries, innovation and entrepreneurship that lead to growth and prosperity for both the individual and the nation (Lakshmanasamy, 2021) ; (Atems & Blankenau, 2022). Most researchers agree that there is a strong link between spending on education and building up human capital (Yu et al., 2023). The education sector plays a major role in human development, as human resources are among the most important resources for achieving social welfare for countries (KILIÇARSLAN et al., 2024). Globally, education is seen as one of the most effective tools to combat poverty and unemployment (Al-Ribhawee, 2022) ; (Muzekenyi et al., 2023). Education is also considered one of the important tools in increasing the level of quality of human capital (Çetin, 2023). The research problem focuses on the inefficiency of educational expenditures in Iraq and their limited impact on human development.

Despite significant investments, challenges such as low literacy rates and poor educational outcomes persist. The study seeks to explore the reasons behind this disconnect, examining how funds are allocated and utilized. It aims to identify barriers that prevent these expenditures from effectively enhancing human capital and contributing to broader socio-economic development. The current research is of great importance by shedding light on the role of government spending on the education sector, as educational expenditures are an essential element in achieving human development, as they contribute to improving the level of education and knowledge and developing individual skills and capabilities.

2. Literature Review and Hypothesis Development:

A study conducted by (Essa, 2016) indicated that Iraq ranked lagging globally among the countries that attach importance to spending on education, as spending on education did not expand more than 10% in the periods (1990 - 2014). The study (Naeef Mahmood & Satea Ameen, 2018) provided a clear and detailed analysis of the impact of public spending on higher education on human development in Iraq and determined the impact of spending on higher education in Iraq and whether the amount allocated to this sector is sufficient to enhance human development. A study (Cristobal et al., 2022) examined the values, trends, and variables that determine public education expenditures in the Philippines from 1990 to 2019. The researchers used the following variables: public education, culture, workforce development spending, and tax revenues as a percentage of GDP. A study (Okerekeoti, 2022) examined the impact of government spending on education on economic growth in Nigeria, and the results confirm that there is a positive and significant effect between government spending on education and GDP at the 5% significance level. Spending on education is an important element in ensuring the development of the education sector. The government provides education free of charge, but individuals also bear a huge burden in personal spending on education (Mukherjee & Sengupta, 2023). The study (Ayal, 2023) aimed to clarify the role and importance of Government spending mainly finances the education sector in Iraq. This sector is considered one of the most important sectors that contribute to the preparation and formation of human capital, which is why most economists in various countries seek to find different and appropriate ways to provide government funding for this vital sector. The study reached several conclusions, the most important of which is the weakness of government funding for the education sector in Iraq and the presence of a noticeable deficit. In the amount of funding allocated to the education sector in Iraq. A study (Goldani & Momeni, 2023) indicates that Government expenditure in the education sector constitutes a fundamental drive for the development of human capital in any country and exerts a significant impact on human development indicators. These allocations include various aspects of education, including teachers' salaries, educational resources, the establishment and renovation of schools and universities, educational programs, and scientific research. The study conducted by (Ma et al., 2023) revealed that spending on the education sector has a significant impact on the regional economic growth of any country. The results also indicated that spending on education has a significant impact on human development. The relationship between spending on education and human development is considered one of the most important phenomena that has characterized the international situation. Against this background, we hypothesize:

Increasing Government expenditure on the education sector in Iraq will improve the productivity of this sector, which will reflect positively on human development in the country.

3. Methodology:

A mixed approach was adopted that combines the descriptive analytical approach to draw the theoretical framework for government spending, the education sector, and human development indicators, in addition to the quantitative standard approach to measure the impact of government spending on education and its reflection on human development indicators in the country. To measure the relationship, the E-Views10 program was used, and the data extended from 2004 to 2023. Figure (1) shows the nature of the relationship between the two research variables:
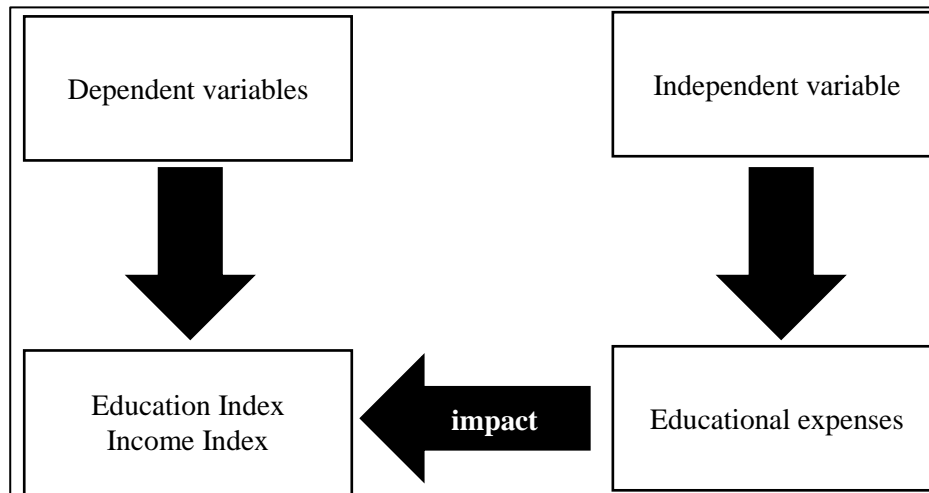

Figure 1: Hypothetical diagram of research

The impact of the independent variable, represented by per capita expenditure on education (PCE), on the dependent variables, namely the education index (EDU) and income index (INC), will be measured and analyzed using the ARDL methodology. Describing the model to be used is a an important step, as it supports the results obtained using econometric methods. These econometric results can determine the direction and nature of the relationships among the variables under study in a mathematical and econometric manner based on economic theory.

The statistical software package E-Views10 was used, and necessary tests were conducted to identify stationarity. The results indicated stationarity in the first difference for the ARDL model. The data covered the period from 2004 to 2022 and were divided into main variables and their dependent variables. The per capita expenditure on education (PCE) served as the independent variable, while the dependent variables were the education index (EDU) and income index (INC), as shown in the following equations:

$$EDU = f(PCH, PCE)$$
$$EDU = B0 - B1x1y1 + B2X2Y2 + ut$$
$$INC = f(PCH, PCE)$$
$$INC = B0 + B1x1y1 + B2X2Y2 + ut$$

Table 1 : Variables of the Econometric Model

Variable symbol	Variable name	Variable type
PCH	Per capita expenditure on education	independent
INC	Income index	Dependent
EDU	Education index (literacy rate, gross enrolment)	Dependent

Source : Derived from the researcher's analysis based on the model description.

4. Results:

Several tests were conducted, the most important being the stationarity test of the time series for the variables in the econometric model used, to determine the degree of stationarity of the time series data in the estimated econometric model. The ADF test and the PP test were also conducted as follows:

The results in the above table indicated that all variables were not stationary at their initial level (Level), suggesting they suffer from the unit root problem. Thus, we accept the null hypothesis, which indicates instability in the series, as evidenced by a (Prob) value greater than the 0.05% threshold. Consequently, the alternative hypothesis is rejected. However, when the first difference is considered, all data become stationary, with (Prob) values less than 0.05%, indicating the absence of a unit root among the research variables. Therefore, this leads to the rejection of the null hypothesis and acceptance of the alternative hypothesis, which states that the time series is stationary among the research variables, implying that the series are in a first-degree integration mode I(1). Table (2) shows that the research variables were not stationary at their original level, which means they had a unit root problem. Consequently, we accept the null hypothesis (H0), which suggests the instability of the series, as indicated by a (Prob) value exceeding 0.05%. This results in rejecting the initial alternative hypothesis. Upon taking the first difference, it is evident that all data become stationary, with (Prob) values falling below 0.05%. This indicates the absence of a unit root among the research variables. Thus, the alternative hypothesis, which posits that the time series among the research variables is stationary, is accepted. This means that the series are integrated.

Table 2: Results of the Augmented Dickey-Fuller test statistics

Variables		Level			First Difference		
		With stability	directional stability	Unstable trend	With stability	directional stability	Unstable trend
PCH	1I	0.4665	0.5747	0.7971	0.0000	0.0001	0.0000
PCE	1I	0.3693	0.8558	0.9138	0.0000	0.0000	0.0000
INC	I1	0.1096	0.4822	0.9637	0.0000	0.0000	0.0000
HEA	I1	0.5683	0.7745	0.8844	0.0000	0.0001	0.0000
EDU	I1	0.7733	0.2309	0.9649	0.0000	0.0000	0.0699

Source: Outputs of (E-Views10).

Table (3) indicates that the (P.P) test results were consistent in both scenarios, showing that all data exhibited a unit root problem. As a result, the null hypothesis (H0) was accepted, and the alternative hypothesis was rejected. However, when considering the first difference, the time series became stable according to the (P.P) test for all variables. Thus, the null hypothesis (H0) was rejected, and the alternative hypothesis (H1) was accepted, indicating that the time series among the research variables is in a first-degree integrated state (I1). This conclusion is supported by the (Prob) value, which was less than 0.05%.

Table 3: P.P test statistics

Variables		At Level			At First Difference		
		With stability	directional stability	Unstable trend	With stability	directional stability	Unstable trend
PCH	1I	0.5119	0.5501	0.8452	0.0000	0.0001	0.0000
PCE	1I	0.2735	0.9130	0.9187	0.0000	0.0000	0.0000
INC	I1	0.1031	0.4986	0.9582	0.0000	0.0000	0.0000
HEA	I1	0.5683	0.7592	0.8869	0.0000	0.0001	0.0000
EDU	I1	0.8421	0.2728	0.9997	0.0000	0.0000	0.0000

Source: Outputs of (E-Views10).

Following the stationarity test on the time series for economic variables, including the per capita share of spending on education and the education index, it was found that all variables were stationary at first difference, I (1). This condition allows us to apply the ARDL model. The test results for this model are shown in the table below:

Table 4: Results of testing the (ARDL) model for the education index (EDU) model

Variable	Coefficient	Std. Error	t-Statistic	Prob	
PCE	4.93E-05	0.000127	0.387252	0.7037	
PCE (-1)	-4.74E-05	0.000150	-0.316518	0.7557	
PCE (-2)	0.000166	0.000148	1.115774	0.2810	
PCE (-3)	-6.49E-05	0.000147	-0.442539	0.6640	
PCE (-4)	-3.85E-05	0.000161	-0.238236	0.8147	
PCE (-5)	-3.77E-06	0.000166	-0.022690	0.9822	
PCE (-6)	0.000317	0.000144	2.197792	0.0430	
C	0.305695	0.082281	3.715267	0.0019	
Adjusted R-squared	0.937448	Durbin-Watson stat	1.990506	Prob (F-statistic)	0.000000

Source: Outputs of (E-Views10).

Table (4) demonstrates that the ARDL model automatically selects the time lags for the variables, with the dependent variable having a lag of five periods and the independent variable, the per capita share of spending on education, having a lag of six periods. The adjusted R-squared test results show that the independent variable accounts for 93% of the variance in the dependent variable, with the remaining 7% due to factors not included in the model. The Durbin-Watson statistic of 1.990506 indicates that the model is free from autocorrelation and has strong explanatory power. The F-statistic value of 31.97259, at a significance level below 0.05%, confirms the model's statistical significance. Additionally, the results from the bounds test, presented in Table (5), verify the presence of a long-term equilibrium relationship between the per capita share of spending on education and the education index, based on the comparison of the F-statistic with critical values for the lower and upper bounds.

Table 5: Results of the bound test between spending on education and the education index as a dependent variable (EDU)

Test Statistic	Value	K
F-statistic	4.066901	2
(Critical Value Bounds)		
Significance	I0 Bound	I1 Bound
%10	2.63	3.35
%5	3.1	3.87
%2.5	3.55	4.38
%1	4.13	5

Source: Outputs of (E-Views10).

Table (5) shows that the F-statistic is 4.066901, which is higher than the upper critical value of 3.87 at a 0.05% significance level. This leads to the rejection of the null hypothesis (H0) and acceptance of the alternative hypothesis (H1), indicating a cointegration relationship between the per capita share of spending on education and the education index. This finding suggests a long-term equilibrium relationship between these variables. The results from the long-term parameter estimation further clarified the independent variable's impact on the dependent variable and detailed the nature of their long-term relationship, as outlined below:

Table 6: Results of estimating the error correction model and the short-run relationship of the education index (EDU) model

Variable	Coefficient	Std. Error	t-Statistic	Prob
PCE	0.000744	0.000118	6.312075	0.0000

Source: Outputs of (E-Views10).

The table reveals a positive long-term relationship between the per capita share of spending on education (independent variable) and the education index (dependent variable). An increase of one unit in per capita education spending leads to an increase of 0.000744 in the education index, with a significant level of (Prob = 0.0000), assuming all other factors are constant. This finding suggests that sustained increases in per capita spending on education are positively impacting the education sector, as evidenced by the expansion in the number of schools and universities and enhancements in education quality. Consequently, there have been improvements in enrollment rates and literacy levels. To verify the validity and accuracy of these results, several critical diagnostic tests will be conducted, as described below:

The LM Test was also used to verify the extent to which the estimated model is free from the problem of autocorrelation of the residuals, as follows:

Table 7: Results of the Autocorrelation Problem (LM) test for the Education Index (EDU) model

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.571185	Prob. F (2,14)	0.5775
Obs-R-squared	2.414144	Prob. Chi-Square (2)	0.2991

Source: Outputs of (E-Views10).

The table shows that the F-statistic has a probability level of 0.5775, which is above the 0.05% threshold, indicating that there is no autocorrelation problem. Therefore, we accept the null hypothesis (H0), which states that there is no autocorrelation among the random residuals, and reject the alternative hypothesis (H1), which suggests the presence of autocorrelation. This finding further confirms the accuracy of the ARDL model's results. Additionally, the ARCH Test was conducted to verify that the estimated model does not suffer from heteroscedasticity in the residuals, as presented in the following table:

Table 8: Results of the test of variance stability and error limits (homogeneity of variance) for the education index model (EDU)

Heteroskedasticity Test: ARCH			
F-statistic	0.845620	Prob. F (1,29)	0.3654
Obs*R-squared	0.878327	Prob. Chi-Square (1)	0.3487

Source: Outputs of (E-Views10).

The table above displays the results of the ARCH test, showing that the F-statistic's probability level is 0.3654, which is higher than 0.05. This indicates that the model does not have an ARCH problem. As a result, we accept the null hypothesis, stating that there is no ARCH problem among the random residuals, and reject the alternative hypothesis, which suggests otherwise. This test supports the accuracy of the ARDL model's results. Additionally, a normality test was conducted to confirm that the residuals of the estimated model are normally distributed, as described below:
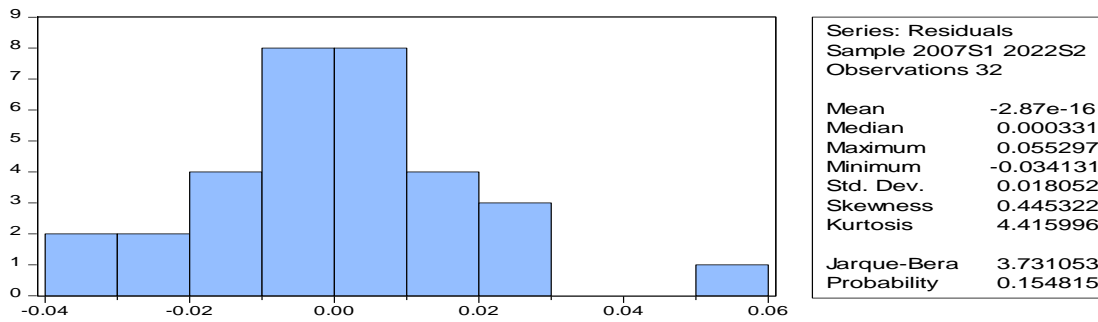
Figure 2: Results of testing the Normal distribution of the education index (EDU) model.
Source: Outputs of (E-Views10).

The figure above shows that the F-statistics have a probability level of 0.154815, which is greater than 0.05. This indicates that the model does not have an issue with the normal distribution of residuals. Consequently, we accept the null hypothesis, which asserts that the residuals are normally distributed, and reject the alternative hypothesis, which suggests a problem with the normality of the residuals. This test affirms the accuracy of the ARDL model's results.

Figure (3) presents the cumulative sum (CUSUM) test of the residuals from the research model. The figure indicates that the model remains stable throughout the research period, as the plotted line stays within the critical boundaries, suggesting consistency in the model's performance over time.
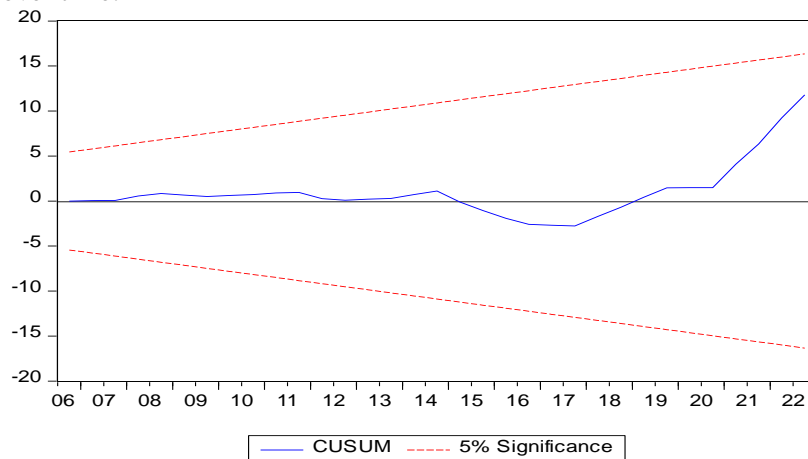

Figure 3: Cumulative sum of residuals test Cusum.
Source: Outputs of (E-Views10).

5. Conclusion:

The standard analysis confirmed the research hypothesis, demonstrating that increased educational expenditures contribute positively to human development indicators in the long term and short-run. The analysis revealed a short-term inverse relationship between the per capita share of education spending (independent variable) and the education index (dependent variable). Specifically, a one-unit increase in per capita education spending led to a decrease in the education index by (0.000376) to a significant level of (Prob = 0.0104), assuming other factors remained constant. This short-term decline may be due to spending being directed towards infrastructure development, which does not immediately impact education indicators such as enrollment or literacy rates. Additionally, the expenditure level may not have been sufficient to significantly improve these indicators.

In contrast, the analysis found a long-term positive relationship between the per capita share of education spending and the education index, with a one-unit increase in spending resulting in a rise of (0.000744) in the index at a significance level of (Prob = 0.0000). This positive effect is attributed to increased numbers of schools and universities and improvements in education quality, leading to higher enrollment and literacy rates.

Furthermore, the analysis showed a positive short-term relationship between the per capita share of education spending and the income index. A one-unit increase in education spending per capita was associated with an increase in the income index of (0.000715) and (0.000454) at significance levels of (Prob = 0.0000) and (Prob = 0.0001), respectively, while other factors remained constant. This positive impact is likely to be due to increased worker awareness and productivity, driven by educational improvements, as well as the introduction of new technologies and equipment that enhance productivity.

The statistical analysis confirmed that the standard model is free from all statistical issues, ensuring the model's accuracy and reliability.

Authors Declaration:

Conflicts of Interest: None

-We Hereby Confirm That All The Figures and Tables In The Manuscript Are Mine and Ours. Besides, The Figures and Images, which are Not Mine, Have Been Permitted Republication and Attached to The Manuscript.

- Ethical Clearance: The Research Was Approved by The Local Ethical Committee in The University.

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