

The Impact of Investment in Human Capital on Economic Growth in Saudi Arabia: A Panel Data Study for the Period 2000-2022

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Abstract:

This study aims to measure the impact of investment in Saudi human capital on economic growth in the Kingdom of Saudi Arabia during the period 2000-2022. This is thanks to learning the determinants of investment in the human capital that lives on economic growth in the Kingdom of Saudi Arabia, taking money into account and knowing which elements suffer from deficiencies, using both descriptive and measurement applications. This was revealed through the use of government spending on education, unemployment rate, and inflation rate as independent variables, and economic growth represented by GDP as a dependent variable. The researcher tested two models, and found that the best model includes the following independent variables: government spending on education and inflation rate. The results of the model indicate that all variables are statistically significant. The model also suggests that there is a positive relationship between government spending on education, inflation, and GDP.

Keywords: *Inflation, unemployment rate, domestic product, government spending.*

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1.0- Introduction

Preface:

The human element is one of the most important pillars of the development and advancement of nations. Therefore, investment in human capital is considered one of the most valuable and important types of investment for achieving real and sustainable economic growth. Thus, human resources are considered a fundamental measure of the wealth of nations. We find that the most economically advanced countries are those that have made investment in human capital a top priority by providing healthy food, healthcare, good education, jobs, and skills, which contributes to the development of human capital from abroad (2017).

For human capital to be productive, it requires the presence of a stable economy with sound management. If all these steps are achieved, then human capital can achieve high productivity, leading to economic growth for the country concerned (2017).

Government spending on education, research, and development also has direct effects on the progress and sustainability of the economy. However, this evidence is not prevalent in rentier economies and third-world economies (Lui & Abu Hatab, 2022)

From this perspective, the research measures the impact of investing in citizens through education, in addition to building fixed capital, on economic growth in the

Kingdom of Saudi Arabia, through a comprehensive study spanning from the year 2000 to 2022.

1.1- Problem Statement

The vision of Saudi Arabia 2030 aspired to change the policy of sole reliance on natural resources and diversify sources of income. It did not overlook the importance of human capital, placing it among the priorities. This focus is attributed to sustainable and real economic growth, where efforts aim to develop human skills, direct their energies, and optimize their employment. Since the launch of Vision 2030, spending rates on education and health have increased. However, the productivity of the Saudi human element and its contribution to economic growth still fall below the required level and do not meet aspirations (Alamri & Algamdi, 2020)

Understanding the determinants or components of investment in human capital that affect economic growth in the Kingdom of Saudi Arabia, while considering identifying any deficiencies in it, the study's inquiries are as follows:

What are the determinants of investment in human capital?

To what extent does investment in human capital affect economic growth?

What are the most impactful elements of investment in human capital on economic growth in the Kingdom?

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2.1- Assumptions and Study Variables:

The research hypothesis suggests the existence of a significant relationship between the preceding independent variables and economic growth represented by the Gross Domestic Product (GDP) in the Kingdom of Saudi Arabia. Additionally, the study aims to verify the validity of the following hypotheses:

1. There is a positive relationship between government spending on education and economic growth in the Kingdom of Saudi Arabia.
2. There is an inverse relationship between the unemployment rate and economic growth in the Kingdom of Saudi Arabia.
3. There is an inverse relationship between the inflation rate and economic growth in the Kingdom of Saudi Arabia.

3.1- Research objectives

It divides into a main objective, representing the focal point of the study, which is to measure the impact of investment in human capital on economic growth in the Kingdom of Saudi Arabia.

Subsidiary objectives stemming from this main objective are:

- Determining the determinants of investment in human capital.
- Understanding the extent of the impact of investment in human capital on economic growth.

4.1- The importance of the research:

The significance of the study lies in the following:

The research project holds utmost importance in light of the traditional economic perspective that the Kingdom of Saudi Arabia has relied on for many years, primarily dependent on oil. In order to shift this perspective and achieve a productive and sustainable economy, it is essential to explore new investment channels to ensure continuous economic growth and sustainable economic development. It is evident that investing in the capabilities and skills of the human element plays a vital role in transforming the economic model of the Kingdom of Saudi Arabia. This renders the vision of the Kingdom

for the year 2030 unattainable except through the availability of efficient human resources capable of performing their roles efficiently and effectively. Consequently, the study highlights the positive and vital role of investing in human capital and its impact on economic growth and development, based on modern growth and economic models that emphasize human capital as one of the main drivers of achieving comprehensive economic development.

5.1- Research Methodology:

The study relies on a descriptive and quantitative methodology. It utilizes the descriptive analytical approach to review the concept of investment in human capital and the current state of investment in human capital in the Kingdom of Saudi Arabia. Meanwhile, it employs the quantitative approach to measure the impact of the relationship between the dependent variable represented by economic growth and the other independent variables using the statistical analysis software EVIEWS.

After investigating and researching numerous previous studies and research, a set of variables has been selected to measure investment in human capital and its expected impact on economic growth, as follows:

Dependent Variable:

- Economic growth, represented by Gross Domestic Product at current prices.

Independent Variables:

- Government spending on education at current prices.
- Unemployment rate.
- General price level represented by the inflation rate.

Based on this, the proposed standard model for the regression function is as follows:

- Proposed Standard Model for Regression Function:

$$Y = \beta_0 + \beta_1X_1 - \beta_2X_2 - \beta_3X_3 + U$$

Description of the Economic Model:

Y: Gross Domestic Product at current prices

X1: Government spending on education at current prices

X2: Unemployment rate

X3: General price level represented by the inflation rate

U: Random error of the regression function in the study

6.1- Research Scope

Time:

The time frame of the study spans from the year 2000 to the year 2022.

Data analysis will cover a period of 22 years.

Location:

The study focuses on the Kingdom of Saudi Arabia.

Data analysis will be conducted at the national level.

Topic:

The research examines the impact of investment in human capital on economic growth.

It emphasizes the relationship between the following variables:

Investment in Human Capital:

Indicators such as expenditure on education, healthcare, and training.

Other indicators may include literacy rates and enrollment rates in education.

Economic Growth:

Indicators such as Gross Domestic Product (GDP) and annual growth rate.

Other indicators may include unemployment rate and standard of living.

7.1- Research Plan:

The research project is divided into four main parts as follows:

Introduction followed by the general framework of the study, previous studies, then the theoretical framework which includes the most important concepts and definitions related to the study, then the applied and

quantitative framework, and finally, the main results of the study.

8.1- Previous Studies

Researchers have been interested in studying the impact of investment in human capital on economic growth since the inception of the field of economics. Adam Smith, Marshall, Malthus, and others have pointed out the importance of education in economic development, but these were merely indications and did not take on a serious and practical character until the 1950s. Studies by Schultz and Denison showed that education directly contributes to increasing the national income of countries by enhancing the productivity of the workforce. These studies also demonstrated the relationship between growth in education spending and growth in GDP, as well as the positive correlation between spending and economic development (IMF, 1999). One of the most prominent of these studies is Robert Solow's study in 1958, which revealed that education, knowledge, and technological progress multiplied individual productivity by 87.5%, with a greater impact than physical capital contribution, which contributed by 12.5% (Solow, 2003)

Moving to more recent studies, here are several sequential studies listed by date as follows:

1. The results of a study by (Benhabib & Spiegel, 1994) indicate a positive role of capital in economic growth.
2. (Burnett, Marbler, & Patrinos, 1995) clarified that the concept of human capital formation refers to a conscious and continuous process of acquiring and increasing the number of individuals with the required knowledge, education, skills, and experience necessary for economic and political development of the country.
3. (Lopez, Thomas, & Wang, 1998) argue that human capital investment may have a minimal impact on economic growth if individuals cannot utilize education in open competitive markets.
4. (Qadri & Abdul-Waheed, 2013) affirmed that human capital investments yield higher returns in low-income countries compared to middle and high-income countries.
5. (Musai & Mehrara, 2013) found that education has no significant effects on GDP and investment in the short and long term due to formal education systems not being

oriented towards the labor market and an increase in enrollment accompanying a decrease in the quality of education.

6. (Glewwe, Maiga, & Zheng, 2014) indicated that the impact of education on economic growth in Sub-Saharan Africa is lower compared to other countries, likely due to lower education quality.

7. (Jaiyeoba, 2015) found a long-term relationship between government spending on education and health and economic growth in Niger, as well as a negative relationship between total fixed capital formation and economic growth.

8. (Maitra, 2016) showed that human capital leads to a permanent increase in economic growth.

9. (Garza-Rodriguez, Almeida-Velasco, Gonzalez-Morales, & Leal-Ornelas, 2016) concluded that the impact of human capital on economic growth is much greater than that of physical capital.

10. (Khan & Chaudhry, 2019) demonstrated through experimental results that human capital variables (life expectancy and education expenditure) are significant and thus contribute as drivers of growth and employment opportunities in developing countries.

Relationship to Other Studies:

Was similar in:

The study aligned with previous studies in measuring the impact of investment in human capital on economic growth by using the same dependent variable, which is the individual's share of GDP as the dependent variable. It also shared similarities with them in utilizing economic analysis methodology, as both this study and previous ones employed the ARDL (Autoregressive Distributed Lag) model for cointegration analysis. This study benefited from existing literature in various aspects, such as analytical frameworks and variations in perspectives.

Was different in:

The study diverged from previous studies in using different time periods, geographical locations, and diverse economic and cultural environments. It highlighted the need for studies in the Gulf region to bridge the gap in this field.

0.2- The theoretical framework

1.2- The fundamental concepts

The concept of investment in human capital:

The concepts and definitions related to human capital have varied. Here's a brief overview of some of them:

- The concept of human capital refers to the fact that individuals invest in themselves through education, training, or other activities, increasing their future income by enhancing their earnings throughout their lives. This interpretation suggests that education or training leads to increased worker productivity (Woodhall, 1987).

- Human capital also refers to knowledge, education, and work efficiency (Namasivayam & Guillet, 2006).

- The concept of human capital has evolved in economics, particularly as an estimate of an individual's production capacity (Di Bartolo, 1999)

- Human capital has been defined as knowledge, skill, creativity, and individual health (Becker, 2002).

- UNICEF defines human capital as "the stock of competencies, knowledge, social and personality attributes embodied in the ability to perform labor so as to produce economic value" (UNICEF, 2023), which is considered the most comprehensive definition due to its inclusiveness and agreement with other definitions reviewed.

From these various concepts and definitions, we can conclude that human capital refers to investment in individuals' capabilities, knowledge, and skills, enhancing their productivity and contributing to economic growth and social development. It is considered a vital resource for societies, encompassing components such as education, health, and skills.

The concept of economic growth:

Economic growth is defined as the sustained increase in productivity over the long term, and the ability to produce a diverse range of economic goods for the population of a country during this growing period, relying on technological advancement and the institutional and ideological organizations required for growth (Kuznets, 1973)

"Economic growth is the sustainable increase in labor and resource productivity, leading to an increase in the total output of the state over the long term." - (Romer, 1986)

"Economic growth is the continuous and sustainable increase in the total productivity of workers and natural resources in the economy." - (Mankiv, 2014)

"Economic growth is the process of increasing the productive capacity of society as a whole, which includes expanding the resource base, improving its efficiency of use, and increasing technology and innovation in productivity." - (Barro, 1996)

"Economic growth means a continuous increase in the total output of goods and services in the economy over a certain period of time, and it is considered an indicator of the economic welfare improvement of society." - (Moomin, 2009)

"Economic growth refers to a permanent increase in the gross domestic product (GDP) of the country over a certain period of time, and it is considered an indicator of achieving economic prosperity and social progress." - (Barro, Human Capital and Growth, 2001)

These definitions reflect the diversity of concepts and foundations upon which studies of economic growth in economic literature are based, highlighting the importance of continuous and sustainable productivity increase as a fundamental element in economic growth.

2.2- The reality of investment in human capital in the Kingdom of Saudi Arabia:

A. Government Spending on Education and Training

Positive economic growth can lead to poverty reduction, improved health, increased life expectancy, enhanced living standards, more job creation, reduced unemployment, and political stability (Sekwati & Dagume, 2023). Therefore, the Kingdom has worked on providing education for all citizens, as evidenced by the allocations dedicated to the public education sector in the state's general budget and the Ministry of Education (Saudi Ministry of Education, 2022).

Financial Enterprises in Bangladesh, 17 (2): 178-189.

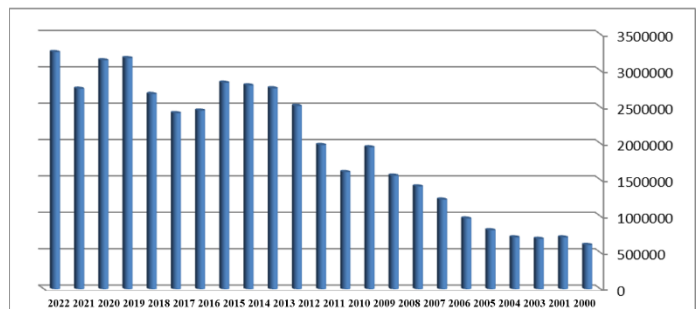


Figure 1: Rate of Change in Gross Domestic Product during the Study Period - Years 2000-2022 CE.

Figure prepared by the researcher (2023).

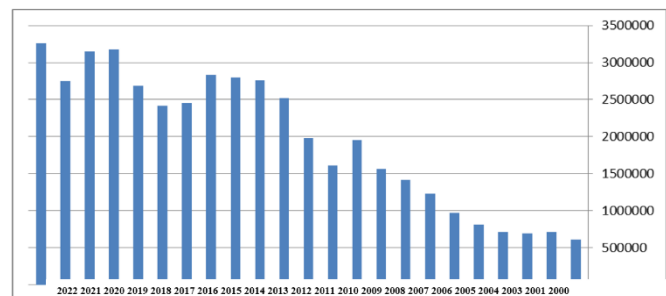


Figure (2): Rate of Change in Government Spending on Education during the Study Period - Years 2000-2022 CE.

Figure prepared by the researcher (2023).

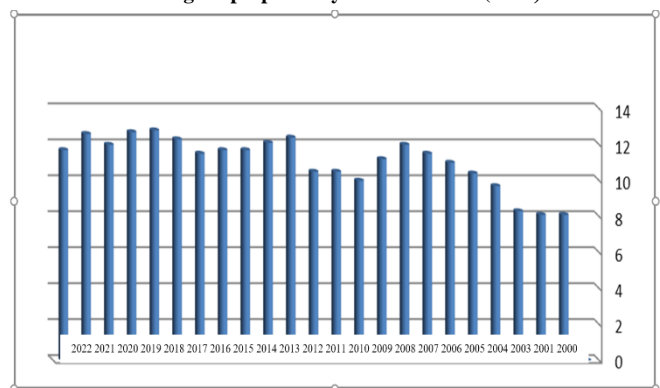


Figure (3): Rate of Change in Unemployment Rate during the Study Period - Years 2000-2022 CE.

Figure prepared by the researcher (2023).

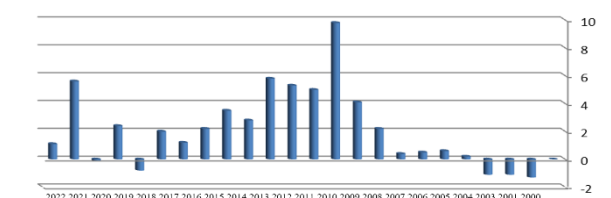


Figure (4): Rate of Change in Inflation Rate during the Study Period - Years 2000-2022 CE.

Figure prepared by the researcher (2023)

0.3- Application of Methodology and Evidence:

In this part of the research, the standard model of the study is reviewed, aiming to determine the impact of investment in human capital on economic growth. This is achieved through using independent variables such as government spending on education at current prices as indicators of investment in human capital, in addition to the unemployment rate and inflation rate. The dependent variable is represented by the Gross Domestic Product (GDP) at current prices as an indicator of economic growth. This is done using modern measurement methods to analyze the time series of the study, in order to reach more realistic results with logical and sound analysis that aligns with economic theories.

The methodology employed is the Autoregressive Distributed Lag (ARDL) approach, known for its ability to be applied when variables exhibit different levels of stationarity, with some variables being stationary at levels and others at first differences. The application of the methodology involves conducting Unit Root tests and Bounds Testing to Cointegration, followed by presenting the standard models and final results, along with explaining the reasons for accepting or rejecting the research hypotheses.

The data for the model variables were obtained from several official sources, including the World Bank, the International Monetary Fund, the General Authority for Statistics, and the Saudi Arabian Monetary Authority. The study period spans from 2000 to 2022, totaling 23 observations.

Expected Signs:

Economic theories suggest the nature and form of the relationship between the independent variables and the dependent variable, represented by the value added to the economy, as shown in the following table:

Table (1): Independent Variables and Their Measurement Units

Variable Code	Independent Variable	Measurement Unit	Expected Sign
x1	Government Spending on Education (Current Prices)	Riyals	Positive
x2	Unemployment Rate	Riyals	Negative
x3	Inflation Rate	Riyals	Negative

Source: Table prepared by the researcher (2023)

1.3- Unit Root Test:

The Unit Root Test is used to determine whether variables are stationary in their original form or after taking their first and second differences. It also ensures that there are no variables stationary at the second difference level before applying the ARDL test, using the Augmented Dickey-Fuller (ADF) test, and relying on the Schwartz criterion to determine the appropriate lag length for the study variables (Maddala & Kim, 1998).

Through conducting the test, the following results were obtained:

Table (2): Unit Root Test Results

The variable	Level		First difference	
	"Augmented Dickey-Fuller (ADF) statistic"	Result	"Augmented Dickey-Fuller (ADF) statistic"	Result
Y	1.557090	Changing	-4.351440	Constant
X1	0.224611	Changing	-4.317212	Constant
X2	0.754224	Changing	-3.939312	Constant
X3	-1.849588	Constant	-	-

Source: Table prepared by the researcher based on EViews application data (2023)

From the results in the above table, it is evident that both Gross Domestic Product (GDP) and expenditure on education, as well as the unemployment rate, are not stationary at the 5% significance level in their original form (at level). However, stationarity is achieved for these variables after taking the first difference at the 5% significance level. Additionally, there are no variables stationary at the second difference, which supports the application of ARDL. As for the inflation rate variable, its stationarity is evident in its original form (at the 5% significance level).

2.3- Bounds Testing to Cointegration

The purpose of the cointegration test is to detect the long-term equilibrium relationship between the independent variables and the dependent variable by comparing the statistical (F) value with critical values. If the (F) value is lower than the minimum critical value, then the null hypothesis is accepted, indicating the absence of a long-term equilibrium relationship. However, if the value exceeds the upper critical value, the alternative hypothesis is accepted, indicating the presence of a long-term equilibrium relationship between the variables (Maddala & Kim, 1998).

By conducting the test for the variables under study, the following results were obtained:

Table (3): Bounds Test for Cointegration

Statistic		Value			
F-statistic		18.71552			
Significance Level	1%	2.5%	5%	10%	
Lower Bound	3.65	3.15	2.79	2.37	
Upper Bound	4.66	4.08	3.67	3.2	

Source: The table is prepared by the researcher based on the data of the application of EViews (2023)

Based on the results, the alternative hypothesis was accepted, indicating the presence of cointegration in the long term. This means that there is a long-term equilibrium relationship between the independent and dependent variables, as evidenced by the F-value of 18.71552, which exceeds the upper critical values at various significance levels.

3.3- The main standard model:

$$Y = 1086521.6338 + 9.4028X_1 - 32344.1780X_2 + 130382.2720X_3$$

Prob : (0.0651) (0.0001) (0.495) (0.0003)

$R^2 = 0.99 \cong 99\%$; $\overline{R^2} = 0.987 \cong 99\%$

Statistical analyses:

- 1086521.6338 = C: represents the Gross Domestic Product (GDP) when the total government expenditure on education, along with the unemployment rate and the inflation rate, are equal to zero.
- 9.4028 = β_1 : represents the coefficient of government spending on education, indicating the positive relationship between government spending on education and Gross Domestic Product (GDP). This means that for every 10% increase in government spending, GDP increases by approximately 6%, consistent with

economic theory. The coefficient's level is lower than the 5% significance level, so we reject the null hypothesis and accept the alternative hypothesis stating that the coefficient is significant.

- 32344.1780 = 2β : represents the coefficient of the unemployment rate, indicating the inverse relationship between it and Gross Domestic Product (GDP). This means that for every 10% decrease in the unemployment rate, there is an increase in GDP by the value of 32344 million. This aligns with economic theory. The function's level is higher than the 10% significance level; therefore, we accept the null hypothesis, stating that the coefficient is not significant, and reject the alternative hypothesis. There are reasons why unemployment may increase despite the rise in government spending on education. Despite the increase in the number of university and institute graduates in recent years due to increased government spending, the quality of outputs may affect the impact of education on the labor market. Additionally, economic recession in recent years may contribute to the rise in the unemployment rate. Furthermore, the structural nature of the Saudi economy, characterized by a shortage of skills for some jobs and the presence of alternative foreign labor, may perform the required work at a lower cost. (Ministry of Economy, 2022)
- 130382.2720 = β_3 : represents the coefficient of the inflation rate, indicating the positive relationship between it and Gross Domestic Product (GDP). This means that for every 10% increase in the inflation rate, there is an increase in GDP by the value of 130382 million. This contradicts economic theory. However, the

function's level is lower than the 5% significance level; therefore, we reject the null hypothesis and accept the alternative hypothesis, stating that the coefficient is significant.

4.3- unit root test:

Table (5) Unit Root Test Results

The variable	Level		First difference	
	"Augmented Dickey-Fuller (ADF) statistic"	Result	"Augmented Dickey-Fuller (ADF) statistic"	Result
Y	-4.208823	Changing	-	Constant
X1	-4.527351	Changing	-	Constant
X3	-1.849588	Changing	-	Constant

Source: Table prepared by the researcher based on EViews application data (2023)

Based on the results in the table above, it is evident that the Gross Domestic Product (GDP) remains stationary at a 5% significance level in its original form (level). Similarly, the variable of expenditure on education also shows stationarity in its original form (level) at a 5% significance level. As for the inflation variable, it also exhibits stationarity in its original form (level) at a 5% significance level in the first test. Additionally, there are no variables stationary at the second difference level, which supports the application of the Autoregressive Distributed Lag (ARDL) model.

5.3- Bounds Testing to Cointegration

(Bounds Test 6)

Statistic		Value			
F-statistic		4.519359			
Significance Level	1%	2.5%	5%	10%	
Lower Bound	4.13	3.55	3.1	2.63	
Upper Bound	5	4.38	3.87	3.35	

Source: The table is prepared by the researcher based on the data of the application of EViews (2023)

Based on the results, the alternative hypothesis indicating the presence of cointegration in the long term between the independent and dependent variables was accepted.

This suggests a long-term equilibrium relationship between the variables, as evidenced by an F-value of 4.519359, which exceeds the critical upper bounds at a 5% significance level.

$$Y = 282238.2186 + 12.0376 + 113474.4544$$

$$Prob : (0.0754) \quad (0.002) \quad (0.0059)$$

$$R^2 = 0.99 \cong \%99 ; \overline{R^2} = 0.979 \cong 98 \%$$

6.3- Statistical analysis

- $282238.2186 = C$: represents the value of Gross Domestic Product (GDP) when the values of total government spending on education, unemployment rate, and inflation rate are all equal to zero.
- $12.0376 = \beta_1$: represents the coefficient of government spending on education, indicating the positive relationship between government spending on education and Gross Domestic Product (GDP). This means that for every 10% increase in government spending on education, there is approximately a 7% increase in GDP, which aligns with economic theory. The coefficient is statistically significant at the 5% level, leading us to reject the null hypothesis and accept the alternative hypothesis that the coefficient is significant.
- $113474.4544 = \beta_3$: represents the coefficient of inflation rate, indicating the positive relationship between it and Gross Domestic Product (GDP). This means that for every 10% increase in the inflation rate, there is an increase in GDP by 113474 million, which contradicts economic theory. However, the coefficient is statistically insignificant at the 5% level, leading us to reject the null hypothesis and accept the alternative hypothesis that the coefficient is not significant.

These results further reinforce the accumulating evidence highlighting the importance of investing in human capital as a key driver of economic growth. The study indicates that every 10% increase in government spending on education leads to a 6% increase in Gross Domestic Product (GDP) in the long term. This means that investing in education is a high-return investment, as it enhances productivity, fosters innovation, and improves workforce skills, thereby contributing to long-term economic growth.

Results and Recommendations:

Results:

Based on the analysis of the time series characteristics of the study using the Autoregressive Distributed Lag (ARDL) approach, the following conclusions were reached:

- The time series is stable after taking the first differences of all study variables at a significance level of 5% or 10%.
- The presence of cointegration in the long run among the study variables is indicated by comparing the value of $4.519359 = F$ at the upper critical bounds at the 5% and 10% significance levels.
- Based on the model, a significant and positive impact of government spending on education was found, which is consistent with the hypotheses of the study. This aligns with the findings of (Altiner & Toktaş, 2017), who demonstrated that an increase in the level of education has a positive effect on GDP. It also agrees with the study by (Khan, Chaudhry, & Farooq, Impact of Human Capital on Employment and Economic Growth in Developing Countries., 2019), which highlighted that investment in human capital is a fundamental element for growth in the Saudi

economy. On the other hand, inflation shows a positive relationship with economic growth, contradicting the results of (Ilyasu & Muhammed, 2023). However, it is consistent with the study by (Musai & Mehrara, 2013), which concluded that education has no significant effects on GDP and investment in both the short and long terms. This may be attributed to the researcher's use of GDP at current prices rather than constant prices, which has a positive impact on the size of GDP at current prices.

- The model has a high explanatory power, as indicated by the coefficient of determination (R-squared), which reached a value of 98%. This indicates that the explanatory variables of the model, represented by government spending on education and the inflation rate, explain 99% of the variation in GDP. The remaining percentage is attributed to other variables not included in the model.
- The research objectives were achieved by establishing the optimal model through evaluating the components of investment in human capital and identifying the most impactful elements on economic growth, namely government spending on education and the inflation rate.
- The study results indicate that gross domestic product (GDP) positively correlates with government spending on education, consistent with previous studies we reviewed earlier. This finding aligns with the study by (Diebolt & Hippe, 2019), which emphasized that human capital is one of the key determinants affecting long-term growth and productivity increases. Many empirical models have demonstrated this relationship, highlighting that achieving long-

term economic growth as a goal for any country requires sufficient human and natural resources. The formation of these resources fundamentally relies on the progress of the national economy.

Recommendations:

- Relying on human resources, particularly university graduates who are experts, researchers, and specialists, to support economic growth in the Kingdom could serve as an alternative to the semi-rentier economy currently adopted by Saudi Arabia, which heavily relies on fossil fuels.
- Dependence on qualified human resources allows for the rational management of various natural resources, making them effective and beneficial in the process of growth and development.
- Establishing production zones to accommodate successive generations of degree holders.
- Building partnerships with higher education institutions in advanced countries to benefit from their expertise.
- Developing human capital in the fields of technology and artificial intelligence.

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