



The Significance of Military Expenditure, Tourism, and Exports for Sustainable Economic Growth

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The current empirical study addresses the recent economics of Saudi Arabia such as the uncertainty of economic growth and dependence on oil export. For this purpose, labor, capital, oil price, terrorism, military expenditure, tourism, and exports are added to the analysis. ARDL long-run and short-run analyses are used, and the results of the study have revealed that labor is negatively related to economic growth, which suggests that efforts should be done to reduce dependence on international labor through the installation of production facilities in those countries where labor is cheap. Also, it is noted that capital, tourism, and non-oil exports enhance economic growth, whereas oil price is the main problem for the economic growth of the country. These results suggest that the diversification of exports to non-oil products is a good strategy to boost economic growth. Alongside, domestic tourism should be promoted to enhance its share in economic activities. The current study helps the policy makers to open new earning avenues such as enhanced tourism sectors and modernized industries which help in technology exports.

Keywords: sustainable economic growth, terrorism, tourism, exports, Saudi Arabia

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INTRODUCTION

This article is designed to understand the contribution of key determinants to the economic growth of Saudi Arabia. There is no uniform way to measure the economic growth of a country, but some prime factors have been identified to affect the economic growth in Saudi Arabia. This article reviews the economic trajectories of Saudi Arabia since 2014 considering the issues of labor, capital, terrorism, tourism, oil prices, exports, and military expenditure; however, other macroeconomic factors are determinants of the overall economic performance. The factors are shaped by the prevailing economic scenarios to understand the mechanism between the said factors and economic growth in Saudi Arabia.

The economy of Saudi Arabia highly depends on oil, but the relationship is asymmetrical, which varies across time, macroeconomic conditions, business cycle, military activities etc. Saudi Arabia has introduced Saudi Vision 2030, a national transformation program to test economic boost by inducing more in equity energy and observe a beneficial relationship between the real economy and oil effect (Aina et al., 2019; Jawadi and Ftiti, 2019). The fiscal balances are based on oil price, which is a prime factor in economic growth (Ali Ibrahim and Sonal Devesh, 2019). Moreover the sustainable fiscal policy and budget is concerned with the volatility of oil prices (El Mahmah and Kandil, 2019). A remarkable research has been espied in oil-based economies to understand the liaison between oil prices and economic growth and found that all the sectors of an economy are

interdependent with oil prices. Moreover, it is investigated that increased oil prices boost the revenue from household, and other sectors showed a positive trend in the economic growth. Saudi Arabia is generating positive revenue from changes in oil prices and ultimately recycled in public capital spending (Gonand et al., 2019). On the contrary, the increase in oil prices has a significant positive effect on inflation in the long run; this exerts a challenge to monetary policy. So, the inflationary effect is considered a matter of concern for policy makers as this creates depression in economy (Nusair, 2019), which reduces the demand of oil. In such a scenario, the oil consumption turns downward, and resultantly, the export of oil-exporting countries shrinks (Sarwar et al., 2018).

The critical juncture of the pre- and post-engagement period of military has been discussed along with other colliding factors. Saudi Arabia is passing through a post-cold war period with Yemen along with the terrorism issue. Due to security reasons, the government spent 60 million dollars on the purchase of arms from the United States due to the conflict with Iraq and Yemen (Akcapa, 2019). There has been a strong positive relationship between terrorism and military expenditure having an impact on the economy. Both the instrumental variables show a positive association, and an increase in terrorism leads to a rise in the military expense of the government to induce peace in the country. Consequently, the government allocates more funds to the defense sector, which affects the overall economy. The nexus between a terror-free region and expansion in the tourism industry has been found by empirical investigation; peace promotes tourism by attracting more tourists to the country. Moreover, tourism, terrorism, and military expenditure are considered interlinked factors that influence the economy simultaneously (Kollias and Papadamou, 2019). It has been observed in several empirical investigations that military expenditure has a positive influence on the economic growth, regardless of measurement techniques, growth rate, and government size.

Based on religious values, Saudi Arabia is among the most visited places that attract Islamic tourism which leads to increased economic activity. However, a major portion of tourism income comprises pilgrims and religious visitors and keeps on increasing that boosts economic growth; consequently, the per capita income increases (Liro et al., 2018; Parks et al., 2019). Saudi Arabia has redesigned and modernized the cities by involving skilled labor to attract more tourists. The construction of new buildings, amusement parks, and new style malls attracts people to visit Saudi Arabia. The urbanization along with the religious places allures tourists other than Muslims (Mandeli, 2019). However, Saudi Arabia has started a concept of smart cities to manage increasing population along with attracting tourists to visit these places other than religious activities. The concept of smart cities pertains to Saudi Arabia Vision 2030 to boost economic development and growth (Doheim et al., 2019).

Moreover, the economy of Saudi Arabia is mainly dependent upon exports. Since 2006, Saudi Arabia has been among the top five members of exports with India and a major partner for remittances. The major economic components of Saudi Arabia economic growth are labor force, trade and commerce, and energy supplies. Saudi Arabia exports were 5134.63 million U.S. dollars during 2016–17 (Kumaraswamy and Quamar,

2018). The non-oil exports of Saudi Arabia are around 16 percent to 50 percent of gross domestic product (GDP).

The study has a significant contribution in existing literature; previous studies consider the role of oil and exports in Saudi Arabia's economic growth, whereas we emphasize that military measures and tourism are equally important for sustainable economic growth. The importance of military expenditure cannot be neglected as it shrinks the terrorist activities and safeguards the tourism sector (Waheed et al., 2020). It gives contradicting signals to foreign investors: 1) The country is dealing with terror activities; however, there is a strong evidence of uncertainty in the country, which decreases the investment activities. 2) On the other hand, the significant military measures wipe out the terrorism activities and provide an opportunity for safe havens for foreign investments. However, we combine the economic indicators and military measures to investigate its impact on the economic growth of Saudi Arabia. The findings are important for policy makers to achieve sustainable economic growth. More importantly, the significance of military expenditure and the tourism sector needs to be addressed for shaping the long-term economic plans.

LITERATURE REVIEW

Successful theorization of the Solow growth model presented by Solow (1956) has highlighted the importance of labor and capital in economic growth. Later, the factors have been extended by researchers (Durlauf et al., 2001; Sarwar and Alsaggaf, 2021; Shahbaz et al., 2017; Shahzad et al., 2021a; Shahzad and Qin, 2019; Solow and Wan, 2006; Waheed et al., 2020), which confirms the importance of the exchange rate, foreign direct investment, interest rate, money supply, etc. The model was found with an exponential curve to labor supply. However, a full capital stock is required to employ the labor in the community. The possible growth patterns also include usage of labor and accumulation of capital that is beneficial to fulfill capital requirement for the next period. This capital accumulation spreads on economic and political departments such as military, tourism, extraction of oil, and labor. The human capital is positively correlated with economic growth (Zukime et al., 2004). Thus, the same concept has been applied to Saudi Arabia, focusing on productivity of labor by making demand and supply side compatible as designed by the knowledge-based economic framework (Shahabadi et al., 2017). Moreover the government creates more employment opportunities to engage human capital and is focused on the development of labor to boost the economic growth as well as focus on health-care issues to satisfy the labor and get increased productivity (Malik and Awadallah, 2013; Al-Hanawi et al., 2019; Amirat and Zaidi, 2019).

In the recent decade, shocks have been observed in oil prices due to the global economic crisis. Circumstantial evidence was found to confirm that it has adversely affected the GDP growth rate (Algahtani, 2016). As Saudi Arabia is an oil-rich country, the relationship does exist between revenue from oil and tourism, investing in human resource, smooth running of financial markets, fight against terrorism, and economic stability; there has been a strong causal relationship (Akacem, 2019). Moreover, it is

evident that oil-rich states sponsor more terrorism attacks; mostly, the wars continue for conquering oil. So, there are two types of activities: one is economic and political development, and second, to fight for the protection of oil reserves. A mechanism has been investigated between oil prices and terrorism. The local and foreign investors hesitate to invest their funds in financial markets due to a threat about terrorism, and the economic development is affected by this cycle (Lee, 2018). However, the Saudi economy has decided to be diversified under the regulations set in Vision 2030 to avoid the issues that create depression in financial markets. The financial market of Saudi Arabia shows a positive behavior as rebalancing the portfolios and has become more attractive for foreign as well as local investors. This investment behavior stimulates the economic growth of Saudi Arabia. The diversified portfolios attract capital and increase GDP (Jawadi and Ftiti, 2019), although the global crisis crunch that fluctuates the oil prices in the global market finally hit the bond market of the United States (Balcilar et al., 2019). In 2015, Saudi Arabia had recorded a deficit of the current account with 8.7 percent and in 2016, 4.3 percent, whereas the fiscal deficit was recorded at 14.8 percent of GDP in 2015, and it was 12.9 percent in 2016, 9.3 percent in 2017, and decreased to 4.6 percent of GDP in 2017. However, this deficit did not expose an alarming situation to the Saudi Arabian economy. The year 1999 was considered a blessed year for economy as the debt was 102.9 percent of GDP before a sharp decline in oil prices in 2014, and after that, 1.5 percent of decline was shown. It rose in 2016 to 13.1 percent, in 2016 to 17.2 percent, and in 2018 to 21 percent. Moreover, the structure of the entire regime is a question mark for Saudi Arabia (Faudot, 2019).

The issue of terrorism is negatively correlated to economic growth (Bayar and Gavriletea, 2018). Moreover, military expenditure increased with this issue that reduced the economic activities. Many other factors, indirectly involved, such as bank lending, investments, exchange rate, money supply, inflation, and interest rates are affected due to terrorism in the country. These factors are major contributors to economic growth (Paul and Bagchi, 2019). Terrorism is positively correlated with military expenditure and negatively associated with economic growth (Coutts et al., 2019).

The correlation coefficients of the Benoit theory (Bashir et al., 2021; Battaglino, 2013; Feridun, 2014; Frederiksen and Looney, 1983, 1985; Gottheil, 1974; Grobar and Porter, 2007; Looney and Frederiksen, 1988; Magazzino et al., 2021a; Magazzino et al., 2021b; Magazzino and Mele, 2021; Mele et al., 2021; Shahzad et al., 2021b; Zaman, 2019) give the relationship between military expenditure and GDP growth, rather this theory has become infamous to differentiate between devolved and developing countries but presents comprehensive results as spending more on military declines the economic growth. Meanwhile, it gives a boost by spending more on human capital and stops capital accumulation. The two economic factors, namely, capital and human capital boost the economic growth. Even it was not attractive for the government to invest more on military, increasing terrorism made it foremost. Tourism is positively correlated to per capita income, economic growth, and expansion in economic activities and capital formation but negatively associated with tourist arrival, emission, energy consumption, and military expenditure (Nepal et al., 2019). Moreover, tourism is also associated with increased risk of

terrorism and military expenditure that is negatively correlated to economic growth (Fareed et al., 2018). Azam, 2020 reported a significant and negative relationship between military expenditure and economic growth for non-OECD countries. Nugroho and Purwanti, 2021 reported an insignificant relationship between military expenditure and economic growth.

Moreover, Saudi Arabia is a high-indexed crude oil exporter in the world that boosts the GDP growth (Dike, 2013). A bidirectional relationship has been found between exports and economic growth of Saudi Arabia as exports boost foreign exchange and affect the exchange rate. However, the magnitude is different according to countries and products. Moreover, the local exporters used to enjoy the spillover effect, and also found a bidirectional relationship with exports to India during the post-liberalization period in 2014 (Alkhateeb et al., 2016). The Saudi Arabian economy is taking competitive advantage to dates exports as these are considered best in the world. The economic growth of Saudi Arabia is strongly associated with the exports of dates all over the world (Almodarra and Saghaian, 2016). Moreover, the Saudi Arabian economy is growing along with the increasing population. The generation gap created a difference of magnitude between economic growth and exports. Vision 2030 also covers this difference. Sixty percent of Saudi Arabian population is under 30 years of age the makes the preferences of export different, but still exports make a huge share in GDP growth. Saudi Arabia is included in the 20 largest economies of the modern world mainly due to oil exports, so foreign companies consider the cultural and demographic segments while having business (Aichner and Shaltoni, 2019). The per capita income of Saudi Arabia mainly depends upon oil export share in GDP. Now, it has started exporting solar energy because of huge potential of generating solar energy. There has been found a sharp increase in economic growth due to this advanced activity of Saudi Arabia (Zubair et al., 2019). Rasool et al. (2021) empirically examined the significance between tourism and economic growth in BRICS countries. Naseem (2021) confirmed the significant relationship between tourism and Saudi Arabia's economic growth.

We have noticed that a number of studies investigated the important factors of economic growth, and most of them provided the significant and positive impact of oil and exports. On the contrary, some of the previous research studies concluded the negative association of terrorism and military expenditure, whereas we highlighted that dependence on oil creates uncertainty to achieve sustainable economic growth. However, Saudi Arabia should have to explore more avenues to generate income, such as diversification of exports and boosting the tourism sector. Another important justification, which we believe, is the positive association between military expenditure and economic growth, indicating that higher military expenditure reduce terrorist events and transmit a signal of strong law enforcement within the country. However, through higher military expenditure, a safe environment can be guaranteed to the tourists. Considering the aforementioned arguments, we attempt to investigate these missing gaps and validation of our hypothesis by using a number of econometric estimations.

DATA AND METHODOLOGY

Models

The study attempts to examine the impact of oil price fluctuation and militancy on Saudi economy by introducing some remedy measures (e.g. tourism and exports) to attain sustainable economic growth. For this purpose, we use the growth model by Solow, 1956 which incorporates the role of labor and capital in the economic growth process, which is mentioned in Eq. 1:

$$Y = f(L, K). \quad (1)$$

The reason to use oil price is prominent; Saudi Arabia mainly relies on oil exports to run economic activities. However, the surge in oil price is beneficial for Saudi economy during a demand push scenario which leads toward economic boom. On the contrary, fluctuation in oil prices distracts the oil-exporting economies and makes it harder to attain sustainable economic growth (Waheed et al., 2020). It was evident in the global financial crisis of 2008 and oil price war in 2014 which hit the Saudi economy. In the aforementioned context, it is more than important to analyze the role of oil on oil-exporting economies. Eq. 1 is extended by using the oil price (OP) variable, as shown in Eq. 2:

$$Y = f(L, K, OP). \quad (2)$$

Saudi Arabia is also suffering terror activities and Yemen war; however, we inspect the impacts of such militant activities on Saudi economy. In one view, higher military expenditure is caused by war activities or counter terrorism which transmits negative signals about economic activities; in turn, the inflow of foreign investments turns downward (Manamperi, 2016). In the other view, the increase in military expenditure helps control the terror aggression or war-mongering activities (Ismail, 2017). Considering these theories, we attempt to explore the impacts of terrorism on economic activities, and the role of military expenditure neutralizes the adverse consequences of terrorism on economic activities. In Eq. 2, we incorporate the terrorism (TERROR) and military expenditure (ME). Eq. 3 is given as follows:

$$Y = f(L, K, OP, TERROR, ME). \quad (3)$$

Although Saudi Arabia is an oil-rich country which contains tremendous foreign exchange reserves, it is unable to achieve long-run economic growth. On the one hand, the current study tries to provide the substantial reasons for such failure as well as propose significant measures to achieve sustainable economic growth. Previously, the Saudi Arabian government has focused less on the tourism industry,¹ creating less opportunities for foreigners to visit Saudi Arabia. In the current regime, the

government has been taking aggressive actions to spread the tourist activities and is investing huge amount on infrastructures which adds to the tourism activities. However, we examined that tourism activities are helpful to reach sustainable economic growth. In Eq. 3, we augment the tourism (TOUR) variable. Eq. 4 is given as follows:

$$Y = f(L, K, OP, TERROR, ME, TOUR). \quad (4)$$

Exports are considered the main source of earning for a country which boosts the foreign reserves; however, the emerging economies are more concerned to expand the export net. The previous equation is extended by exports (X), as mentioned in Eq. 5:

$$Y = f(L, K, OP, TERROR, ME, TOUR, X). \quad (5)$$

We transform all the aforementioned equations by using the natural log of variables; the five models of the study are given as follows²:

Model 1

$$\ln Y = \beta_0 + \beta_1 \ln L + \beta_2 \ln K + \varepsilon. \quad (6)$$

Model 2

$$\ln Y = \beta_0 + \beta_1 \ln L + \beta_2 \ln K + \beta_3 \ln OP + \varepsilon. \quad (7)$$

Model 3

$$\ln Y = \beta_0 + \beta_1 \ln L + \beta_2 \ln K + \beta_3 \ln OP + \beta_4 \ln TERROR + \beta_5 \ln ME + \varepsilon. \quad (8)$$

Model 4

$$\ln Y = \beta_0 + \beta_1 \ln L + \beta_2 \ln K + \beta_3 \ln OP + \beta_4 \ln TERROR + \beta_5 \ln ME + \beta_6 \ln TOUR + \varepsilon. \quad (9)$$

Model 5

$$\ln Y = \beta_0 + \beta_1 \ln L + \beta_2 \ln K + \beta_3 \ln OP + \beta_4 \ln TERROR + \beta_5 \ln ME + \beta_6 \ln TOUR + \beta_6 \ln X + \varepsilon, \quad (10)$$

where

$\ln Y$, $\ln L$, $\ln K$, $\ln OP$, $\ln TERROR$, $\ln ME$, $\ln TOUR$, and $\ln X$ are the natural logs of economic growth, proxied by GDP (constant 2010 US\$). Labor and capital are measured by total labor force and gross fixed capital formation (current US\$), respectively. Oil price is calculated as crude oil prices; West Texas Intermediate (WTI), terrorism, and military expenditure are measured as the number of terror attacks and military expenditure (current USD), respectively. Tourism indicated that the international tourism, receipts (current US\$), and exports are proxied by exports of goods and services (current US\$). ε indicates the error term with normal distribution.

¹The focus was limited to religious tourism, which is also very restricted. However, in such environment, the tourism sector has not contributed to the gross domestic product (GDP). Even the country has plenty of tourism spots which can be a point of attraction for local and foreign tourists (e.g., ancient places, mountains, deserts, and coral sea points). Despite all this, the tourism sector contributes only 9.3 percent to GDP (<https://mt.gov.sa/en/TourismInvestment>).

²As followed by Farooq et al. (2019), Sarwar et al. (2021), Sarwar and Alsaggaf (2019), Sarwar and Alsaggaf (2021), Waheed et al. (2018), (2020).

The data use for econometric analysis consists of the period of 1971–2018. The data of GDP (constant 2010 US\$), total labor force, gross fixed capital formation (current US\$), number of attacks, military expenditure (current USD), international tourism, receipts (current US\$), and exports of goods and services (current US\$) are collected from World Development Indicators, whereas crude oil price data are gathered from British Petroleum (BP) statistics. See **Appendix Table A1** for variables, definitions, and sources of data.

ESTIMATION STRATEGY

Stationarity Test

Initially, we applied the classical unit root tests: augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests which are tested on level, as well as on first difference. The main drawback of these traditional unit root tests is the non-accommodating role of structural breaks which needs to be considered while using long period data. To overcome this issue, we used the Clemente–Montanes–Reyes unit root test, proposed by Clemente et al. (1998). The test is based on Perron and Vogelsang (1992), which utilized two structural breaks in the mean of series. The null hypothesis of the test claims that series have a unit root with structural break(s), whereas the alternate hypothesis claims they have stationary with breaks(s). Another advantage of this test is that it is not required to find the prior breaks, which makes it more useable and convenient.

Bayer–Hanck Combined Cointegration Approach

To examine macroeconomic variables' long-run relationships, a variety of cointegration approaches exist in the applied economics literature. Ideally, the unit root properties of the variables must be examined prior to proceeding to the cointegration method. This helps select the suitable cointegration test for the empirical model for a reliable empirical result. A number of approaches to the cointegration exist, such as those in Engle et al. (1987), Johansen (1991), and Phillips and Ouliaris (1990).

Due to the properties of explanatory power, these cointegration approaches can result in ambiguous pragmatic findings. A new cointegration approach known as the combined cointegration approach was developed later by Bayer and Hanck (2009) to increase the power of the cointegration analysis. The outcomes of the previous analysis cointegration are combined by this test (Johansen, Phillips and Ouliaris, Boswijk, and Banerjee) and along with that, Fisher's F-statistics have been provided so that the practical outcomes could be more final, decisive, and consistent. If the Bayer–Hanck approach is to be used, then the order of integration has to meet certain requirements, that is, $I(1)$. By rejecting the null hypothesis that no cointegration exists, if the computed F-statistic exceeds a critical value 4; the reverse applies for the acceptance of the null hypothesis. In order to compute Bayer–Hanck cointegration, Fisher used the following formula, as mentioned in **Eq. 11** and **Eq. 12**:

$$EG - JOH = -2 [\ln(P_{EG}) + \ln(P_{JOH})], \quad (11)$$

$$EG - JOH - BO - BDM = -2 \ln[(P_{EG}) + (P_{JOH}) + (P_{BO}) + (P_{BDM})], \quad (12)$$

where PEG , $PJOH$, PBO , and $PBDM$ denote the p -values of different characters. To determine whether two variables are cointegrated, Fisher's F statistic is used. If Fisher's F statistic is exceeded, the Bayer–Hanck critical bounds; the null hypothesis could be rejected and cointegration between the variables could be favored.

ARDL Bound Testing Approach

In order to test the relationship of long run, among resource abundance, growth of economics, capital, education, and financial development, a model of autoregressive distributed lag (ARDL) has been introduced by Pesaran et al. (2001). There are many benefits of cointegration that are tested by Pesaran et al. (2001) over the models of cointegration that are of a traditional level, for instance, Granger causality of Engle et al. (1987) and Johansen (1991) test of cointegration, relating to the integration order. When the variables are examined to be inactive at $I(1)$, $I(0)$, or $I(1)/I(0)$, then this method is relevant. Based on a general-to-specific modeling framework (Laurenceson and Chai, 2003), the bound testing model developed by ARDL employs enough lags to capture the process of generating data. From the tests of ARDL bounds, a transformation of simple linearity can be used to extract the dynamic correction model of unobstructed error. Empirical results can also be reliably obtained for small samples using this approach. By using the UECM (unrestricted error correction model), the short-run dynamics and long-run equilibrium are combined without sacrificing any long-run information. In this approach, the vectors of cointegration are identified that result from different vectors of cointegration that take place in the empirical model. The ARDL framework permits the use of one of various optimal numbers of lags for different variables in order to calculate the ARDL F-statistic to observe the extent to which the variables are cointegrated. Using an empirical model to accommodate a dummy variable, this cointegration test permits capturing structural break information in a series. Here are the estimated models of cointegration using ARDL bound testing, as in **Eqs 13–17**:

$$\Delta Y_t = \alpha_1 + \alpha_2 Y_{t-1} + \alpha_3 L_{t-1} + \alpha_3 K_{t-1} + \sum_{v=1}^n \beta_{1v} Y_{t-v} + \sum_{v=0}^n \beta_{2v} L_{t-v} + \sum_{v=0}^n \beta_{3v} K_{t-v} + \delta_T, \quad (13)$$

$$\Delta Y_t = \alpha_1 + \alpha_2 Y_{t-1} + \alpha_3 L_{t-1} + \alpha_3 K_{t-1} + \alpha_4 OP_{t-1} + \sum_{v=1}^n \beta_{1v} Y_{t-v} + \sum_{v=0}^n \beta_{2v} L_{t-v} + \sum_{v=0}^n \beta_{3v} K_{t-v} + \sum_{v=0}^n \beta_{4v} OP_{t-v} + \delta_T, \quad (14)$$

$$\Delta Y_t = \alpha_1 + \alpha_2 Y_{t-1} + \alpha_3 L_{t-1} + \alpha_3 K_{t-1} + \alpha_4 OP_{t-1} + \alpha_5 TERROR_{t-1} + \alpha_6 ME_{t-1} + \sum_{v=1}^n \beta_{1v} Y_{t-v} + \sum_{v=0}^n \beta_{2v} L_{t-v} + \sum_{v=0}^n \beta_{3v} K_{t-v} + \sum_{v=0}^n \beta_{4v} OP_{t-v} + \sum_{v=0}^n \beta_{5v} TERROR_{t-v} + \sum_{v=0}^n \beta_{6v} ME_{t-v} + \delta_T, \quad (15)$$

$$\begin{aligned} \Delta Y_t = & \alpha_1 + \alpha_2 Y_{t-1} + \alpha_3 L_{t-1} + \alpha_3 K_{t-1} + \alpha_4 OP_{t-1} + \alpha_5 TERROR_{t-1} \\ & + \alpha_6 ME_{t-1} + \alpha_7 TOUR_{t-1} + \sum_{v=1}^n \beta_{1v} Y_{t-v} + \sum_{v=0}^n \beta_{2v} L_{t-v} \\ & + \sum_{v=0}^n \beta_{3v} K_{t-v} + \sum_{v=0}^n \beta_{4v} OP_{t-v} + \sum_{v=0}^n \beta_{5v} TERROR_{t-v} \\ & + \sum_{v=0}^n \beta_{6v} ME_{t-v} + \sum_{v=0}^n \beta_{7v} TOUR_{t-v} + \delta_T, \end{aligned} \quad (16)$$

$$\begin{aligned} \Delta Y_t = & \alpha_1 + \alpha_2 Y_{t-1} + \alpha_3 L_{t-1} + \alpha_3 K_{t-1} + \alpha_4 OP_{t-1} + \alpha_5 TERROR_{t-1} \\ & + \alpha_6 ME_{t-1} + \alpha_7 TOUR_{t-1} + \alpha_8 X_{t-1} + \sum_{v=1}^n \beta_{1v} Y_{t-v} \\ & + \sum_{v=0}^n \beta_{2v} L_{t-v} + \sum_{v=0}^n \beta_{3v} K_{t-v} + \sum_{v=0}^n \beta_{4v} OP_{t-v} \\ & + \sum_{v=0}^n \beta_{5v} TERROR_{t-v} + \sum_{v=0}^n \beta_{6v} ME_{t-v} \\ & + \sum_{v=0}^n \beta_{7v} TOUR_{t-v} + \sum_{v=0}^n \beta_{8v} X_{t-v} + \delta_T, \end{aligned} \quad (17)$$

where Δ shows the difference operator; δ_T represents the error term; $\alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7,$ and α_8 represent long-run coefficients, and $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7,$ and β_8 are error correction dynamics.

RESULTS AND DISCUSSION

Descriptive Statistics

Results regarding the descriptive statistics of the study variables are presented in **Table 1**. It can be seen that the highest mean value (26.580) corresponds to economic growth, whereas the lowest mean value (0.75) is for terrorism. Alongside, tourism has the highest volatility (10.66) and economic growth proves to be the least volatile with the value of the standard deviation 0.39. Values of skewness show that some variables are negatively skewed whereas some are positively skewed. In this regard, economic growth, capital, oil prices, military expenditure, and exports are skewed negatively whereas labor, terrorism, and tourism are positively skewed. Additionally, the kurtosis value shows that capital, terrorism, military expenditure, and exports series are not distributed normally because the kurtosis value of these variables is more than three. According to the correlation matrix, we found a strong association among sets of variables. We see that the correlation among variables is positive and above 0.5 which shows a significant correlation between variables.

Unit Root Analysis

Table 2 represents unit root analysis which confirms the stationarity of the series. Although there are many different unit root tests; ADF and PP tests of unit root analysis without breaks are used in this study. As we can see that variable military expenditure is stationary at a level according to both ADF and PP, whereas tourism and exports are stationary at a level according to PP only. Labor, capital, oil price, and terrorism are stationary at the first difference.

The Clemente–Montanes–Reyes unit root analysis with breaks is reported in **Table 3**. The innovative outlier (IO) model shows that changes take place rapidly and allow for a break in the slope only, but the additive outlier (AO) model shows that changes take

place gradually and allow for a break both in the slope and intercept, as we can see that t-statistics for all study variables report that the IO model is more significant than the AO model. This shows that the series is more probably to exhibit breaks that take place gradually rather than rapidly. This test suggests different instances with multiple breaks in the observed data. All the variables are significant at a 1 percent level of significance except labor which is significant at 5 percent in both models. All these variables are stationary at the first difference in the IO model as well as in the AO model. This implies that shocks do have a permanent influence on the future development of the series.

The findings of unit root tests validate that the application of ARDL is the best fit for empirical analysis; however, we have to examine the cointegration. We find a mixed order of integration of all studied variables. Overall, it can be concluded that stationary outcomes of all observed variables are a mix of level I (0) and the first difference I (I) which forces us to apply the long-run analysis of integration.

Cointegration Analysis

Table 4 illustrates that all the variables have strong cointegration. According to the results, null hypothesis is rejected which confirms that the long-run relation among dependent and independent variables exists. This test was used to confirm the long-run relation between observed variables, but this test does not give any information regarding breaks occurring in the series. So to solve this, we used the ARDL bound test to investigate structural breaks in the series. According to **Table 5**, the results show that the value of F-statistics are greater than upper bound, so there exist cointegration among all variables in the presence of breaks in the series during the time period from 1960 to 2020. ARDL bound cointegration shows that the results are reliable and consistent because it confirms the robustness of cointegration analysis.

Empirical Estimations

Long-Run Analysis

Empirical findings of long-run analysis are presented in **Table 6**, which illustrate that Model 1 is a slow-growth model, labors positively, and significantly affects economic growth at a 1 percent level. However, the relationship between capital and growth is statistically insignificant and negative. Hence, it can be said that in the slow-growth model, only labor explains the change in the economic growth of Saudi Arabia. In Model 2, the oil price is added to the basic slow-growth model, and it can be seen that both labor and capital have a positive and significant impact on economic growth, whereas the oil price is significantly and negatively related to economic growth at a 5 percent level. This result is consistent with the results of Hathroubi and Aloui,(2021)

Now we turn our attention to Model 3, which is an expansion of Model 2, by adding military expenditure and terrorism. In this model, the effect of labor on economic growth gets insignificant; however, both capital and oil price significantly affect economic growth, but the effect of capital is positive and the oil price effect is negative. The effect of military expenditure as well as terrorism is insignificant in Model 3. In Model 4, tourism is added to Model 3

TABLE 1 | Descriptive statistics and correlation matrix.

Variable	Y	L	K	OP	TERROR	ME	TOUR	X
Obs	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00
Mean	26.58	15.56	24.42	3.84	0.75	23.54	7.11	24.93
Median	26.59	15.52	24.26	3.89	0.00	23.64	0.00	24.79
Maximum	27.26	16.45	26.00	4.71	4.82	25.19	23.42	26.71
Minimum	25.58	14.77	21.73	2.56	0.00	19.97	0.00	21.73
Standard deviation	0.39	0.46	0.96	0.58	1.23	1.12	10.66	1.14
Skewness	-0.17	0.25	-0.38	-0.38	1.97	-1.54	0.81	-0.57
Kurtosis	2.84	2.14	3.55	2.43	6.27	5.80	1.66	3.57
Jarque-Bera	0.29	1.99	1.77	1.80	52.38	34.65	8.85	3.26
Prob	0.87	0.37	0.41	0.41	0.46	0.51	0.31	0.20
Correlation								
Y	1.000							
L	0.912	1.000						
K	0.923	0.804	1.000					
OP	0.549	0.406	0.781	1.000				
TERROR	0.619	0.693	0.527	0.123	1.000			
ME	0.848	0.821	0.892	0.703	0.493	1.000		
TOUR	0.789	0.836	0.747	0.489	0.610	0.589	1.000	
X	0.940	0.862	0.953	0.757	0.476	0.917	0.768	1.000

Notes: Y represents the economic growth, L and K represent labor and capital, OP shows oil price, TERROR and ME are used for terrorism and military expenditure, and TOUR and X are tourism and exports.

TABLE 2 | Unit root analysis without break.

Variable	At level		1st difference	
	ADF	P-P	ADF	P-P
Y	-2.100	-2.037	-5.226***	-5.226***
L	0.802	1.012	-2.215***	-0.962**
K	-2.714	-2.569	-3.856***	-4.822***
OP	-2.602	0.287	-2.249**	-6.598***
TERROR	-0.070	-2.827	-8.932***	-9.085***
ME	-3.867**	-3.828**	-3.412	-3.745**
TOUR	-0.547	-6.605***	-0.547	-6.605***
X	-2.363	-4.172***	-2.791	-4.172***

Notes: Y represents the economic growth, L and K represent labor and capital, OP shows oil price, TERROR and ME are used for terrorism and military expenditure, and TOUR and X are tourism and exports.

***, **, * the level of significance at 1 percent, 5 percent, and 10 percent.

to check if it has any effect on the economic growth of the country. Here, both capital and oil prices affect economic growth significantly at a 1 percent level, and the effect of capital is positive whereas the effect of oil prices is negative again. Alongside, tourism is affects the economic growth positively and significantly at a 5 percent level which is aligned with the findings of Nouri Kouchi et al. (2018); Waheed et al. (2020). However, the effect of capital, terrorism, and military expenditure is insignificant in this model.

Model 5 is the last model where all study variables are incorporated in a single model to check their joint effect on the economic growth of Saudi Arabia. According to this model, labor is significant, but its impact on economic growth is negative, which is similar to Najeb (2014) and Nguyen (2018). The coefficients of capital are significant and positive, which are in line with Sarwar et al. (2017); Shahbaz et al. (2017). Oil prices are significantly and negatively related to the economic growth at 1

percent level, which confirms the results of Waheed et al. (2020). However, the impact of terrorism, military expenditure, and tourism is insignificant. In Model 5, exports show a significant and positive sign at a 1 percent level which suggests that increase in exports increases the economic growth of the country. Waheed et al. (2020) also concluded the same type of association between non-oil exports and economic growth in Saudi Arabia.

Short-Run Analysis

In short-run analysis, the findings of Model 1 report the significance of the labor coefficient. The positive relationship indicates that a significant surge in labor leads to increase in the economic growth, whereas the capital is insignificant, which questions the applicability of the slow-growth model. In the case of Model 2, oil price is included in model 1 and according to the results, the capital has a significant and positive impact on economic growth, at the 1 percent level. The coefficients of labor and oil price are insignificant, which suggests that both of these variables do not explain the variations in economic growth.

In Model 3, two more variables, namely, military expenditure and terrorism are added to Model 3. The effect of labor is insignificant; however, capital and oil price significantly affected GDP, where the effect of capital is positive as well as significant at the 1 percent level whereas oil price has a negative and significant coefficient at the 10 percent level, which reports that the change in oil prices fluctuates the economic indicators negatively. The results of oil prices are similar to those of Sarwar et al. (2017); Shahbaz et al. (2017); Blazquez et al. (2021). Alongside, both terrorism and military expenditure are insignificantly related to economic growth, reporting that terrorism has not affected the economic process of Saudi Arabia. The findings of this study are contradicting those of Bayar and Gavriletea (2018); Shahzad et al. (2019). One of the

TABLE 3 | Clemente–Montanes–Reyes unit root analysis with breaks.

Variable	Innovation outlier (IO)				Additive outlier (AO)			
	At level		1st difference		At level		1st difference	
	t-statistics	Time break	t-statistics	Time break	t-statistics	Time break	t-statistics	Time break
Y	-3.948	2002	-6.311***	1974	-3.835	2003	-6.460***	1974
L	-4.247***	2009	-5.373**	2009	-2.041	1998	-3.199**	1997
K	-4.756**	2003	-6.892***	1999	-4.610**	2003	-6.652***	1974
OP	-3.120	1998	-8.225***	1974	-3.136	1998	-8.378***	1974
TERROR	-4.884**	2014	-9.756***	2005	-4.937**	2013	-9.805***	2012
ME	-6.032	2004	-7.022***	1974	-5.319***	2004	-7.059***	1974
TOUR	-0.591	2002	-30.903***	2003	-1.454	2007	-7.084***	2004
X	-4.705**	2002	-5.012***	1974	-4.263	2002	-5.251***	1974

Notes: Y represents the economic growth, L and K represent labor and capital, OP shows oil price, TERROR and ME are used for terrorism and military expenditure, and TOUR and X are tourism and exports.

***, **, * the level of significance at 1 percent, 5 percent, and 10 percent.

TABLE 4 | Bayer–Hanck combined cointegration.

Estimated model	EG-JOH	EG-JOH-BO-BDM	Lags	Cointegration
Y = f (L, K)	11.13	33.61	5	Yes
Y = f (L, K, OP)	21.06	82.08	5	Yes
Y = f (L, K, OP, TERROR, ME)	57.23	167.76	5	Yes
Y = f (L, K, OP, TERROR, ME, TOUR)	55.59	62.98	5	Yes
Y = f (L, K, OP, TERROR, ME, TOUR, X)	57.05	112.41	5	Yes
Significance Level				
1 percent	15.845	30.774		
5 percent	10.352	19.761		
10 percent	8.301	15.938		

TABLE 5 | ARDL Bound Cointegration.

Estimated model	Optimal lag length	F-statistics
Y = f (L, K)	(1, 0, 3)	3.271
Y = f (L, K, OP)	(1, 0, 2, 0)	3.524
Y = f (L, K, OP, TERROR, ME)	(3, 0, 1, 4, 1, 3)	5.507
Y = f (L, K, OP, TERROR, ME, TOUR)	(3, 0, 1, 4, 1, 4, 0)	6.196
Y = f (L, K, OP, TERROR, ME, TOUR, X)	(4, 3, 2, 4, 4, 3, 4, 4)	2.893
Critical values		
Significance level	Lower bounds I(0)	Upper bounds I(1)
1 percent	2.730	3.900
5 percent	2.170	3.210
10 percent	1.920	2.890

reasons for this insignificance can be the immense increase in military expenditure to counter the terrorism which prevented the negative shocks of terrorism.

Model 3 is expanded to form Model 4 by just adding tourism to examine the role of tourism in the Saudi economy in short-run. The results suggest that labor is significantly and positively related to economic growth at a 5 percent level, whereas capital has a positive and significant impact on economic growth at a 5 percent level. However, the impact of oil prices on economic growth is negative as well as significant at the 5 percent level. In the case of terrorism, the results are again insignificant which proves that terrorism in Saudi Arabia is not an economic issue for the country. Likewise, military expenditure also does not affect the economic growth significantly. However, the effect of

tourism is significantly positive on economic growth at the 5 percent level.

Finally, in Model 5, one more variable, the export of non-petroleum products is added to Model 4 to check the overall impacts of all these variables on the economic growth of Saudi Arabia. According to the results, labor is insignificantly related to economic growth whereas both capital and oil price is significantly related to economic growth at the 1 percent level; however, capital is positively affecting economic growth, whereas the effect of oil price is negative. This result is consistent with the study of Al Mahish, 2016. In the case of terrorism, the coefficient is insignificant which again shows that terrorism is not halting the economic growth of the country in the short run as well. The effect of military expenditure on economic growth is positive and significant at the 5 percent level.

TABLE 6 | ARDL long-run and short-run analyses.

<i>Long-run analysis</i>	Model 1	Model 2	Model 3	Model 4	Model 5
L	0.934***	0.273***	0.191	0.065	-0.691**
K	-0.089	0.338***	0.459***	0.502***	0.137
OP		-0.138**	-0.317***	-0.375***	-0.561***
TERROR			-0.011	-0.007	-0.006
ME			0.032	0.047	0.173
TOUR				0.008**	0.014
X					0.451***
constant	14.048***	14.746***	12.918***	13.699***	20.715***
<i>Short-run analysis</i>	Model 1	Model 2	Model 3	Model 4	Model 5
L	2.272**	0.650	1.352	3.374**	-1.398
K	0.050	0.296***	0.249***	0.288***	0.252***
OP		-0.040	-0.084*	-0.233***	-0.475***
TERROR			0.019	0.069	0.026
ME			0.023	-0.087	0.135**
TOUR				0.028**	0.011***
X					0.409***
ECM	-0.408***	-0.884***	-0.873***	-0.478***	-1.939***
<i>Diagnostic analysis</i>					
Test	F-statistic	F-statistic	F-statistic	F-statistic	F-statistic
χ^2 NORMAL	0.627	0.823	1.008	6.284	0.157
χ^2 SERIAL	5.491	4.408	0.923	1.270	3.086
χ^2 ARCH	0.012	2.666	1.247	1.248	0.195
χ^2 RESAY	3.427	9.648	13.956	9.220	0.338

Notes: Y represents the economic growth, L and K represent labor and capital, OP shows oil price, TERROR and ME are used for terrorism and military expenditure, and TOUR and X are tourism and exports.

*** ** * the level of significance at 1 percent, 5 percent, and 10 percent.

The impact of tourism on economic growth is significant and positive according to short-run analysis supporting tourism-led growth hypothesis. In this regard, the Saudi economy should attract religious tourism by giving better facilities and needs serious reforms in this sector. This result is consistent with result of Fahimi et al., 2018. Exports significantly and positively affect economic growth at a 1 percent level meaning it validates hypotheses which state that export leads to growth.

DISCUSSION

Although the labor force is considered a major factor for the economic growth of any country; however, in the current study, the effect of labor gets negative in both the long run as well as short run in the last model when all variables are added to the equation. This result is contrary to many studies including those by Alodadi and Benhin (2015); Aljebrin (2017). The reason behind this negative effect of labor on economic growth could be the expensive labor force. As it is a known fact that the majority of labor in Saudi Arabia come from other countries which is expensive, as they usually move to other countries in search of better remunerations. However, when companies pay more toward the remunerations, their production cost is increased automatically which adversely affects the economic growth. Hence, it is the high cost of labor that decreases the economic growth of Saudi Arabia.

The relationship between oil price and economic growth is significant as well as negative in both the long run and short

run. One plausible justification for this negative relationship is the fact that the Saudi economy is heavily dependent on oil exports. It is noted that the majority of the revenue comes from oil and petroleum products; however, oil prices are very volatile, which is a negative factor for Saudi Arabia because in recent years, oil prices declined heavily, and being an oil exporter, Saudi Arabia suffered a lot. For example, the oil price in 2014 declined sharply due to low demand by China and other developing countries as well as a decline in the value of the U.S. dollar along with the efforts of the Saudi government to pressurize the United States and Canada to abandon oil extraction due to high costs. This decline reduced the value of exports of the country which are mainly oil and petroleum products, and ultimately, economy suffers. Hence, oil price volatility badly affects the Saudi economy by decreasing the value of its oil exports (Waheed et al., 2020).

The current study witnessed that both terrorism and military expenditure are not an issue for the economy of Saudi Arabia. Although since the formation of the kingdom, terrorism proves to be an issue in one form or another, now the insignificance of terrorism can be attributed to multiple efforts done by the government of the country. Increased military expenditure is one of these efforts as the government has increased its spending toward the security of the country, including the purchase of arms and the establishment of the army. Besides this, a rehabilitation program for prisoners is also put in place to change the overall mindset of terrorists. Also, a legislative system of the country is also revised to combat the illegal activities along with the campaigns and seminars to make people aware of the effects of their activities on the country's security. It is also observed

that military expenditure affects economic growth positively in the short term; however, in the long term, its effect gets insignificant. One important point to explain this relationship is, as in the start, when military expenditure increases, it affects the economic growth positively because security conditions get improved, and the tourism sector flourished due to the building of trust by the tourists. However, it is also a fact that a high level of spending on the military could affect the economy adversely but, in our case, the insignificant effect of military expenditure in the long run can be attributed to oil price volatility. Alongside, American and British companies which are having large military contracts with Saudi Arabia are required to invest a specific percentage in high-tech projects in the country to help the economy combat the negative effects of increased military expenditure. Hence, this way, Saudi Arabia managed the negative impact of terrorism and increased military expenditure on the economy.

The impact of tourism on economic growth is positive in both the long and short term. The fact behind this favorable impact is that Islamic tourism due to Hajj and Umrah pilgrims is one of the major sources of Saudi GDP because every year, almost 2 million people come to visit the Grand mosques as well as the Prophet's mosque. These people spend millions of dollars during their visit which adds to the revenue. Alongside, the employment rate increases in this sector through the creation of direct jobs which is surely a positive factor for any economy. The impact of exports on economic growth is positive in the long as well as the short run which is due to the fact that exports of non-oil products are in favor of the country due to high oil price volatility. The diversification strategy from oil to non-oil exports is beneficial because relying only on oil exports could halt the economy in case of a sudden drop in oil prices. Alongside, non-oil exports help in environmental protection through less emission of greenhouse gases. The results of the study are in favor of environmental protection along with Saudi Vision 2030.

CONCLUSION

The main motive behind the current study is to examine the role of labor, capital, oil prices, terrorism, military expenditure, tourism, and exports in the economic growth of Saudi Arabia. For the purpose of analysis, the ARDL approach is used to check the long-term and short-term associations. The results suggest

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that labor actually decreases the economic growth due to high production costs resulting from costly international labor. It is also noted that capital significant contributors to the Saudi economy however oil prices are resulted in decreased economic growth due to high volatility. Alongside, terrorism and military expenditure did not show any impact on the economic growth, whereas tourism and exports prove to be the beneficial factors for the economy of the country.

The aforementioned findings shed light on important policy implications including advice for the Saudi government to diversify its exports from oil to non-oil products to reduce the negative impacts of price volatility of oil. This will not only enhance the economy but also the environment of the country. Also, as costly labor is increasing the production costs and reducing the revenues, it is recommended that the government should support industries to install their production facilities in countries where local labor can be hired at a low rate. This will reduce the production costs along with the establishment of an international presence of Saudi products. Alongside, prompt measures should be taken to decrease terrorism and military expenditure ahead of time before they become trouble for economic progress. Also, instead of fully depending on international and religious tourism, domestic tourism should also be promoted through advertisement, etc. It is also recommended that the technological sector should be given attention to manufacturing technically advanced products to be exported to diversify the exports to non-oil products.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

GA contributed to data curation, software, formal analysis, and validation. MA helped with reviewing editing the manuscript, and supervision. MK assisted with conceptualization, methodology, investigation, resources, and writing.

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APPENDIX

Table A1 | Definitions and sources of variables

Variable	Definition	Source
Y	GDP (constant 2010 US\$)	https://databank.worldbank.org/
L	Labor force, total	https://databank.worldbank.org/
K	Gross fixed capital formation (current US\$)	https://databank.worldbank.org/
OP	Crude oil prices: West Texas Intermediate (WTI)	https://www.bp.com/en/global
TERROR	Number of attacks	https://databank.worldbank.org/
ME	Military expenditure (current USD)	https://databank.worldbank.org/
TOUR	International tourism, receipts (current US\$)	https://databank.worldbank.org/
X	Exports of goods and services (current US\$)	https://databank.worldbank.org/