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# The Relationship between Government Expenditure and Economic Growth in Saudi Arabia

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**Abstract**. Besides providing national defense and securities and transfer payments to maintain welfare and social harmony, a government can provide economic infrastructure to facilitate economic growth, improve resources allocation and enhance productivity of the economy. These latter activities of the government ignited a considerable debate among economists about the role of the government in the economy and its alleged inefficient use of resources. This study attempts to investigate the role of the government in Saudi Arabia and its impact on the growth and development of the economy. Empirical results show that the government plays important roles in the growth and development of the economy in Saudi Arabia, however, these results also show that the size of the government has increased dramatically, especially after 1973. Based on these results it is important for the government to continue providing infrastructure, social and economic activities. In the mean time it is equally important to encourage the private sector to take an active role in the development and growth of the economy.

## Introduction

There are considerable debates over the effects of the government spending on economic growth. Besides providing national defense and securities and transfer payments to maintain social welfare and harmony, a government can provide economic infrastructure to facilitate economic growth, improve resource allocation and enhance productivity of the private sector. Government expenditures on health and education can improve labor force productivity. In addition governments can provide information, reduce risks, and alter incentives. However, the quantity of public goods provided by the government may be inefficient. There are also possible negative impacts on economic growth induced by a government's revenue raising and transfer mechanism. Thus, government taxation may produce a misallocation of resources as well as disincentives. Many policies contain incentives and disincentives for growth because they increase or reduce rewards to human as well as physical capital. In this regard, many public policies can exert large influence on the growth rates of the economy.

Within the past 25 years, the Saudi Arabian economy has encountered dramatic changes due to increases in oil prices and in turn revenues became available to the government. Revenues accruing from the sales of oil go to the national treasury to finance government expenditures. The government took advantage of these revenues to utilize and build a huge infrastructure where the emphasis was put on developing the basic infrastructure and expanding social services. Thus, the government spent massively on infrastructure during 1973-1982 period. The main objectives of the government, stated repeatedly in the successive development plans, were to increase the participation of the private sector through structural change. Most attention was given to private investment. Thus, the government not only formulated policies designed to encourage investment, but also participated directly in economic activities. It is mainly through government expenditures, among other channels, that oil affects economic growth and development in Saudi Arabia. This gives the government the ability to play a large role and a dominant influence on the performance of the economy.

Given the importance of the government impact on the economy in Saudi Arabia, the main objectives of the paper are to examine the effects of changes in the government expenditures and incentive policies on economic growth and development.

## Government Roles in Macroeconomic Policy

It is widely recognized that government activities may increase total output indirectly through its interaction with the private sector. Thus, the roles of macroeconomic policies in promoting economic growth are generally accepted as significant but could be limited because of the distortions caused by government interventions. Although economic policies may not adequately explain variations in productivity growth and slowdown, these policies are nevertheless considered important in the sense that they can provide the proper incentives conducive to long term output growth . For example, tax credits can encourage certain types of productive investment. Guffey [1] states that, contrary to the widely held belief, money is not neutral in the long run and that monetary policy that contributes to inflation can adversely affect economic growth by creating uncertainty and instability in the economy. More recently, various articles have focused on the contributions of macroeconomic variables, including government expenditures, on growth (e.g., Fischer, [2,3]; Easterly and Rebelo, [4]; Grier and Tullock, [5]; and Kormandi and Meguire, [6] ). Using cross country growth regressions, these studies analyzed the effects of a variety of factors including government size, budget deficit, inflation, money growth, exports, and civil liberty. Although increases in government output can be expected to contribute to total economic growth it is widely recognized that government's activity may increase total output indirectly through its interaction with the private sector. Beyond government most basic activities, private sector productivity may be enhanced by an expanding government output designed to correct for the inadequacies and excesses in the market.

Development of the economic infrastructure and removal or regulation of externalities facilitate economic activity and improve the allocation of resources. Transfer payments may also help to maintain social harmony as well as increasing the productivity of certain sectors of labor force. On the other hand concern has been expressed as to how efficiently the public sector provides goods and services. Though the goods and services provided by the public sector may enhance private sector productivity, the actors in the political arena operate under constraints and an incentive system which permit them to supply the public goods in a manner or to an extent that increases their personal utility and hence limit the contribution their provision makes to economic growth. Thus, Niskanen [7] has argued that utility maximizing bureaucrats receive utility from the size of the budget they manage. Lacking the incentives of the profit maximizing firm and with no clear objectives or instructions, due to the nature of the good, the bureaucrat is likely to seek the budget size which maximizes his utility, which Niskanen shows to be greater than the efficient size. When the government is small, the benefits of its programs are relatively universal and the profits to be earned from forming interest groups are small. As government grows, the public becomes increasingly ignorant of its activities, focusing on issues of immediate and significant concerns and profits to be earned by gaining special advantages for interest group members increase by increasing government output designed to benefit them at the expense of the general public. With increases in government comes greater inefficiency in the provision of public goods. This inefficiency can be expected to lessen the positive influence of the goods themselves. Another concern is the negative impact of the revenue raising burden. As Grossman [8, p.49] noted, "Even if one assumes optimal decision making by government, a concomitant feature of this growth in government is the essentially negative influence of the excess burdens, and disincentive effects more generally, associated with all practical revenue raising and transfer mechanism."

Even though most of researchers used cross sectional data to test their hypotheses, several other studies applied time series to specific developed and less developing countries. among these studies, Afxentiou and Serleties [9], Singh and Sahni[10] and Sahni and Singh [11] for Canada; Mann [12], Nagarjan and Spear [13] and Murthy [14] for Mexico; Chen [15] for China; Krzyzaniak [16] for Turkey; Pulta [17] for Taiwan; Honroyiannis and Papapetrou [18], Cheltsos and Kollias [19] and Karavitis [20] for Greece; Karikari [21] for Ghana; Sinha [22] for Malaysia; Courakis *et al.* [23] for Greece and Portugal; Grossman [24] for Australia; Bird [25], Gupta [26], Ganti and Kolluri [27]; Holms and Hutton [28]; and Vatter and Walker [29] for the United States; Gyles [30] for the United Kingdom; Hsieh and Lai [31] for G7; Park [32] for Korea. Ram [33] used cross section and time series data for 63 developed and less developed countries and Grossman [34] used cross section data for 48 ( 18 developed and 20 less developed ) countries.

Although these studies find empirical support that certain macroeconomic variables affect economic growth, Fischer points out that these variables are not truly exogenous. Moreover, King and Levine [35] argue that use of cross country data dose not account

for country specific characteristics. As Grossman [8] noted, specifications of the models employed allowed for aggregate positive or negative influence; they did not measure the two influences separately. As he suggested we should distinguish between effects that would be associated with increases in the absolute size of the government, and those associated with increases in relative size. Increases in absolute size are expected to have a positive impact on economic growth, though there are potentially negative influences associated with the absolute size. However increases in the relative size of the government are expected to have a predominantly negative impact on growth.

For Saudi Arabia, even though the economic system is based on the principal of free economy where a substantial part of the production and distribution of goods and services is left to individuals and groups enjoying freedom in their dealings and transactions, the government has important influence on the economy through its expenditures financed mostly by revenues generated from oil . Oil revenues are the main sources of national income which is extracted and utilized by the government in the interest of the public. There is no private ownership of oil or oil concessions and revenues accruing from the sale of oil go to the national treasury to finance government expenditures. It is mainly through these expenditures that the government gets the ability to play a large role and dominant influence on the performance of the economy. As El-Mallakh [36, p. 176] noted "It is indeed through government expenditures appropriations that one sees the greatest influence of the government on the levels of economic activities." Thus, the Saudi Arabian economy depends on oil as the main source of income for the government, which uses it for domestic expenditure and the change in this source of income directly and indirectly would affect the output of other sectors of the economy. Because of the drop and fluctuations in oil prices in recent years there is uncertainty about the ability of the government to maintain its level of expenditure and economic policies. This uncertainty could have an adverse impact the decisions of future investment spending and in turn on the growth and stability of the economy. In fact most of the economic growth witnessed in Saudi Arabia was a result of the government's spending from oil revenues. With reduced oil revenues, however, there is increased concern that the government will not be able to assure adequate liquidity to finance a steady expansion in the economic activities. In the 1970's and early 1980's oil revenues accounted for about 95 percent of government expenditures, but lately its share in government expenditure declined to about 75 percent. In the mean time government employment increased dramatically, rising from 137,968 in 1970 to 817,700 in 1995 employees at an annual rate of about 9.7 percent. Government expenditure also increased from less than 8 billion Saudi Rial (SR) in 1970 to about 180 billion SR in 1996. The highest level of spending by the government was the government expenditure of more than 348 billion SR in 1980. This suggests that the size of the government in Saudi Arabia increased in absolute and relative terms which gives the government the ability to influence the performance of the economy. For more information regarding the nature of the Saudi Arabian economy see for example, El Mallakh [36], Al Johany [37], Looney [38] and Askari [39].

## Methodology

The model developed here follows the models presented by Feder [40], Ram [41] and Grossman [24,34]. The economy is assumed to consist of two sectors: the private sector whose output (P) is a function of private labor and capital, Lp and Kp, respectively, and government's output of goods and services (G); and the government sector whose output function of government labor and capital, Lg. and Kg, respectively. The sectors' production functions can be written as:

$$P=P(Lp, Kp, G) \quad (1)$$

$$G=G(Lg, Kg) \quad (2)$$

and gross output (Y) is:

$$Y= P+G \quad (3)$$

Total labor (L) and capital K are the sum of the respective inputs in the two sectors. We also assume that the relative marginal factor productivity's in the two sectors differ in the following way:

$$GL / PL = Gk / Pk = 1+ h \quad (4)$$

Where GL is the partial derivative of G with respect to labor, Gk is the partial derivative of G with respect to capital, and so forth; h is a constant term whose sign shows which sector has the higher marginal productivity.

Taking the total derivatives of equations (1) and (2) and using them and equation (4) in equation (3); assuming that total labor growth equals the sum of labor growth in both sectors; assuming a linear relationship between marginal labor productivity in the private sector and average labor productivity in the economy, i.e., Pl = a ( Y/L ); and assuming that total investment equals the sum of capital formation in both sectors, the following growth equation is derived:

$$dY^* = adL^* + bdI^* + cdGY^* + edG^* \quad (5)$$

Where $dY^*$ is the growth rate of output; $dL^*$ is the growth rate of labor; $dI^*$ is the investment-output ratio; $dGY^*$ equals the product of the growth of G and the ratio of G to Y, and $dG^*$ is the growth rate of government output. According to Ram [41], the parameter c = h/1+h, e measuring the net effect of government sizes on economic growth and indicates the factor productivity difference h/1+h and the externality effect of G on P (e). In her study of 115 countries, Ram found that h/1+h = e, and that equation (5) becomes simply,

$$dY^* = adL^* + bdI^* + edG^* \quad (6)$$

Grossman criticizes Ram's finding that h/1+h = e may be biased on the ground that dGY* and dG* may be highly correlated. He also expanded on Ram's model by arguing that government has both positive and negative effects on growth. The positive effect arises from the government's provision of public goods and services (as measured by dG* and dGY*) while the negative effect comes from the inefficiencies and distortions caused by taxation and government regulations. To capture these negative influences, he adds a tax variable T to equations (5) and (6) as follows:

$$dY^* = adL^* + bdI^* + cdGY^* + edG^* + fdT^* \quad (7)$$

$$dY^* = adL^* + bdI^* + edG^* + fdT^* \quad (8)$$

Using cross sectional data for 48 countries, Grossman found that government had both significant positive and negative effects on economic growth. Although Grossman's reformulation of Ram's equation is innovative, his empirical results are subject to the same criticism Grossman himself pointed out in Ram's study. Grossman's tax rate variable is not represented by actual tax data but instead is proxied by the share of total government spending to GDP and thus is correlated with the G variable in the model. Because the government in Saudi Arabia dose not levy income tax, Grossman tax (T) is used in this study with some modification where financing government expenditure is divided into parts: revenues from oil and other revenues.

Granger causality tests estimated from vector auto-regressions (VARs) are employed in this study to determine the causal relationships between real output growth and changes in real variables and fiscal variable. Since the study uses time series data, it is first necessary to transform the variables into stationary processes so that any estimated effects are not attributed serial correlation. This was accomplished by applying the Augmented Dickey-Fuller (ADF) test for unit roots on each variable [42]. The presence of unit roots indicates non-stationary. The ADF involves regressing a particular variable on a constant, a time trend, the dependent lagged variable, and lags of the differences series. Since transforming the data into first differences can lead to the loss of important long run information, the cointegration test was employed to determine whether the set of variables possesses any long run relationships. This test first runs ordinary least squares (OLS) regression of a variable in level form on the levels of the remaining variables, a constant, and a trend variable. Using the estimated residuals from this cointegrating regression, the next stage involves running OLS of the differences residual on the lagged residual term and lags of the differenced residual. ADF test for unit roots is based on the regression,

$$\Delta Y_t = \alpha + \beta Y_{t-1} + \sum_{t=1}^{n} \delta \Delta Y_{t-1} + \varepsilon \quad (9)$$

The null hypothesis of the test is that Yt is a non-stationary series. The test for cointegration can be estimated as follows:

$$Yt = \dot{\upsilon}\, Xt + ut \tag{10}$$

then retrieving the residuals of regression to estimate,

$$\Delta u_t = a + b u_{t-1} + \sum_{t=1}^{n} bl\, \Delta u_{t-1} + \varepsilon t \tag{11}$$

the t-statistics value is used to test the null hypothesis of no-cointegration in Y and X.

The Granger test in the bivariate system can be written as follows,

$$Y_t = \alpha + \sum_{t=1}^{p} \theta_{11}\, Y_{t-1} + \sum_{t=1}^{q} \theta_{12}\, X_{t-1} + a_{1t} \tag{12}$$

$$X_t = \beta + \sum_{t=1}^{p} \theta_{21}\, Y_{t-1} + \sum_{t=1}^{q} \theta_{22}\, X_{t-1} + a_{12} \tag{13}$$

Where $\alpha$ , $\beta$ and $\delta$ are constants, Y and X are time series , $\varepsilon$ is serially uncorrelated residual, $\theta$'s are vector polynomials of lag operators, and p and q are the optimal lags of series Y and X. In equations (12 and 13 ) it can be said that X does not cause Y if all coefficients of Xt (vector $\theta$12 ) in equation ( 12 ) are insignificantly different from zero. Similarly, Yt dose not cause Xt if all coefficients of Yt (vector of $\theta$21) in equation (13 ) are insignificantly different from zero. Bidirectional causality exists if at least one of the coefficients of lag variables of Y and X ($\theta$21 and $\theta$12 vectors ) in equations (12 and 13 ) respectively, is not zero. The non-causality is observed if all coefficients of Y and X in $\theta$21 and $\theta$12 vectors are zeros. As Ericsson [43] pointed out cointegration implies and implied by the existence of error correction representation of the relevant variables. Thus, Engle and Granger also suggest the use of error correction method to test for causality. They indicate that cointegrated variables because they possess common stochastic trends, must also exhibit Granger causality in at least one direction. Thus, the error correction model introduces an additional channel through which Granger causality can emerge.

Error correction test can be conducted by adding the lagged residual (ut-1) which comes from the corresponding cointegration regressions to equation (12 and 13). The error correction term, when cointegration exist, provides two avenues for statistical causality to emerge, the significance of the lagged differences variables and the significance of the once lagged error correction term. Thus, in contrast to standard Granger causality test, the error correction approach allows for the finding that X

Granger causes Y, even if coefficients on lagged changes in X are not jointly significant. (Engle and Granger, [44]. The error correction approach also allows us to distinguish between short run and long run versions of Granger causality. Assuming cointegration holds, in the short term, deviations from this long run equilibrium will feed back on the changes in the dependent variable in order to force the movement towards the long run equilibrium. If the dependent variable is driven directly by this long run equilibrium error, then it is responding to this feedback, if not, it is responding to only to short run shocks to the stochastic environment. Thus, via error correction models, cointegration brings together short and long run information in modeling the data (Ericsson, [43]).

$$\Delta Y_t = \alpha 0 + \Delta \sum_{t=1}^{p} \theta_{12}\, Y_{t-1} + \Delta \sum_{t=1}^{q} \theta_{12}\, X_{t-1} + u_{t-1} + a_{t1} \tag{14}$$

$$\Delta X_t = \alpha 0 + \Delta \sum_{t=1}^{p} \theta_{21}\, Y_{t-1} + \Delta \sum_{t=1}^{q} \theta_{22}\, X_{t-1} + u_{t-1} + a_{t2} \tag{15}$$

To account for lagged effects as well as for feedback between the variables VAR technique is used, where each variable is regressed on its own past history and on the past history of every other variable in the model. Some studies Glick and Hutchinson [45] and Hafer and Sheehan [46] impose a common lag length structure for all variables in the VAR on the ground that the estimated coefficients are unbiased and as Hafer and Sheehan have shown that using different lag structures in VAR models results in varying policy conclusions. On the other hand the arbitrariness of lag lengths may affect the reliability of the statistical tests of causality and seriously bias implications of the results Hsiao, [47]; Saunders, [48 and 49]; and Thornton and Batten, [50]. Kang [51] suggests that in order to remove arbitrariness, even though when there is no unique criterion for selecting lag length, one may use the Final Prediction Error (FPE) method to determine the optimal lag of the explanatory variables. Minimum FPE Criterion is also suitable for investigating causal relationships which are tested with a relatively short sample of data. Given a small data sample, investigating long lag structures often leads to a serious problem of the loss of degrees of freedom Hsiao [52]. This may lead to a bias toward investigating only short lag specifications even though economic theory may require investigating longer lags. Minimum FPE causality testing method alleviates this problem as it allows a complete investigation of all theoretically relevant lags. Following Hsiao [47 and 52], Thornton and Batten [50], Kang [51] and Saunders [49] among others, considering the variables in the equation in Granger's causality test, the determination of optimal lag length based on the FPE can be done as follows. In the estimating equation, the lag length $p$ is determined from the minimum FPE, defined as,

$$\text{FPE}(p) = n+p+1/\ n-p-1\ .\ \text{SSE}/n \tag{16}$$

where $n$ is the number of observations and SSE is the sum of squared errors. Conditional upon the chosen lag length (p) of Y the optimal lag length of X in the equation can be determined by estimating the following equation,

$$Y_t = \alpha + \sum_{t=1}^{p} \alpha_i Y_{t-1} + \sum_{t=1}^{q} \beta_i X_{t-1} + \delta u_{t-1} + vt \qquad (17)$$

where p is the optimal lag length chosen from the first step and q is the length chosen from the minimum FPE(p,q) where,

$$FPE(p,q) = n + p + q + 1/\, n - p - q - 1 \,.\, SSE/n \qquad (18)$$

by repeating the above method, the optimal lag length of the variables can be determined.

## Empirical Results

Time series for Saudi Arabia are used in this study with annual data for the period 1964-1995. Data on the variables are obtained from Ministry of Planning "Facts and Figures" different issues and from Saudi Arabian Monetary Agency (SAMA) annual reports different issues. Government revenues and expenditures are actual figures and are obtained from SAMA annual reports. Tables 1-5 show the empirical results of the statistical tests conducted to investigate the relationship between government expenditure and economic growth in Saudi Arabia. Growth of real non oil GDP (Y) represents growth of the economy. Independent variables used in this study are in real terms and include: total non oil investment (TI), private investment (PI), labor (L), government expenditures (GE), and the ratio of government expenditures to GDP (GY). Government expenditures are divided into non oil government investment (GI) and government consumption (GC). Grossman tax (T) is divided into two parts: The ratio of government expenditure financed by revenue from oil to GDP (OG) and the ratio of government expenditure financed by other revenues to GDP (OT). All variables are transformed to log terms. To test for structural change especially after 1973 a run for partial data starting in 1974 was conducted and compared to the results from the full sample, and no significant differences were found between the results.

Given the time series natures of the data, a first step was to test for unit roots and the common trend of the variables. Table 1 presents the results of the augmented Dickey-Fuller (ADF) and cointegration test results where the ADF test results reveal that the variables are nonstationary in their level terms. With first differences these variables become stationary at I(1). The results of cointegration tests appear in table 1 reveal that the variables are not co integrated which indicate that we can not reject the null hypothesis of noncointegration of the variables at their level terms, but are cointegrated

when first difference I (1). Because all variables have been proven to be nonstationary at their level terms and integrated of order I(1) as the results show, the difference series are I(0), or stationary. In this case we can perform the Granger causality test with these difference variables, since even when these variables are I(1), their linear combination still be I(0) and the results in Table 1 show that difference variables are stationary and cointegrated at the 1 per cent level. Thus, these results indicate that a long run relationship exists between these variables. Tables 2 and 3 show the results of the causality tests. These tests indicate that GI and GC Granger-cause economic growth. This result is in agreement with Singh and Sahni [10], Ram [41] and Holmes and Hutton [28] who concluded that government expansion has a positive effect on economic growth. On the other hand, it is found that economic growth is a Granger cause government's other revenue and that there is a bi-directional causal linkage between TI and GE and economic growth in Saudi Arabia. In other words, government expenditures and total investment and economic growth are related by a feedback mechanism, which is consistent with macroeconomic theory as well as with Wagnerian hypothesis. These findings support the bivariate study by Ram [33] who tested for 63 developed and less developing countries and found bidirectional causality between government expenditure and national income.

**Table 1. ADF-stationarity and cointegration tests**

| ADF-Stationarity test | | | Cointegration test | | |
|---|---|---|---|---|---|
| **Variables** | **Levels** | **Difference** | **Variables** | **Levels** | **Difference** |
| Y | -1.65 | -6.35* | Y, GE | -3.09 | -6.934* |
| TI | -1.54 | -5.03* | Y,TI | -3.29 | -7.609* |
| PI | -2.05 | -5.13* | Y, GI | -3.84 | -8.515* |
| GI | -1.35 | -5.33* | Y, PI | -2.86 | -6.153* |
| L | -1.65 | -9.07* | Y, L | -2.77 | -6.073* |
| GE | -1.60 | -4.78* | Y, GY | -3.13 | -7.477* |
| GY | -1.60 | -6.38* | Y, GC | -3.11 | -6.746* |
| GC | -0.77 | -6.72* | Y, OG | -3.07 | -6.723* |
| OG | -1.85 | -4.48* | Y, OT | -2.66 | -6.493* |
| OT | -1.94 | -9.69* | Y, GI, PI | -3.32 | -7.207* |
| | | | Y,GI, PI, L | -3.43 | -7.139* |

In all tables: * significant at 1% level
** significant at 5% level
*** significant at 10% level

MacKinnon critical values:
ADF 1% -4.3082
5% - 3.5731
10% -3.2203
Cointegration 1% -4.9247
5% -4.1366
10% -3.7583

All variables are in real terms ( 1984=100)

Y=GDP
TI = Total investment
PI = Private investment
GI = Government investment
L = Labor
GE = Government xxpenditures,
GY = dGE/Y
GC = Government consumption
OG = Ratio of government expenditures financed by oil revenue
OT = Ratio of government expenditures financed by other revenues

**Table 2. Granger causality test ( with arbitrary Lags )**

| Vari.\Lags | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| TI=>Y | 5.03** | 3.58** | 4.57* | 2.86** | 1.55 |
| Y=>TI | 4.21** | 1.90 | 3.61** | 2.42*** | 1.99 |
| PI=>Y | 0.18 | 4.02** | 2.21*** | 2.30*** | 1.46 |
| Y=>PI | 1.52 | 0.65 | 0.43 | 0.47 | 1.46 |
| GI=>Y | 6.65* | 11.59* | 8.996* | 6.62* | 3.18** |
| Y=>GI | 2.03 | 1.00 | 1.62 | 0.80 | 0.66 |
| L=>Y | 0.23 | 0.15 | 0.36 | 1.01 | 0.61 |
| Y=>L | 091 | 0.72 | 0.45 | 0.93 | 0.91 |
| GE=>Y | 0.08 | 2.93** | 3.35** | 4.32* | 1.72 |
| Y=>GE | 0.004 | 6.22* | 6.25* | 5.45* | 5.50* |
| GY=>Y | 3.71** | 4.40** | 4.00** | 2.85*** | 2.15*** |
| Y=>GY | 1.76 | 0.69 | 1.60 | 1.13 | 0.84 |
| GC=>Y | 1.22 | 0.82 | 0.36 | 1.75 | 1.08 |
| Y=>GC | 1.13 | 0.98 | 0.41 | 1.12 | 1.32 |
| OG=>Y | 6.35* | 3.51** | 3.06** | 1.83 | 1.36 |
| Y=>OG | 0.66 | 0.15 | 2.67*** | 1.94 | 2.63*** |
| OT=>Y | 0.17 | 0.46 | 0.32 | 0.32 | 2.22*** |
| Y=>OT | 1.67 | 2.93*** | 1.84 | 1.28 | 1.15 |

**Table 3. Granger causality tests - F-statistics from VAR**

| To\ From | Y | TI | PI | GI | L | GE | DC |
|---|---|---|---|---|---|---|---|
| Y | 14.32* | 20.77* | 0.68 | 21.02* | 0.02 | 1.58 | 5.94** |
| TI | 4.58** | 28.17* | 1.04 | 26.54* | 2.08 | 8.73* | 4.19** |
| PI | 4.51** | 15.59* | 9.66* | 4.97** | 0.08 | 13.10* | 7.79* |
| GI | 1.31 | 83.20* | 0.17 | 13.49* | 2.19 | 1.54 | 0.57 |
| L | 0.501 | 3.78*** | 0.78 | 2.72*** | 5.31** | 0.72 | 1.16 |
| GE | 0.653 | 7.30* | 1.51 | 20.42* | 3.29*** | 0.95 | 2.52 |
| GC | 2.16 | 5.24** | 0.98 | 12.76* | 5.06** | 6.98* | 8.83* |

| Variables | FPE- Based on equations 16 and 18. |
|---|---|
| Y(1) | 0.259 |
| TI(1), Y(1) | 0.249<0.259 |
| GI(3), Y(1) | 0.253<0.259 |
| PI(1), Y(1) | 0.267>0.259 |
| GE(1), Y(1) | 0.268>0.259 |
| GC(1), Y(1) | 0.262>0.259 |
| OG(1), Y(1) | 0.241<0.259 |
| L(1), Y(1) | 0.276>0.259 |
| PI(1),GI(1),Y(1) | 0.235<0.259 |
| PI(1),GI(1),L(1),Y(1) | 0.284>0.259 |

Numbers in parenthesis are lags length.

These results also reaffirm the study by Ahsan, Kwan, and Sahni [53] who conducted tests with both bivariate and trivariate models and found bidirectional causality in France and Italy.

Table 4 presents the results of the error correction test which according to Engle and Granger [44] indicate the directions of causality. These results show that causality runs from government expenditures and its components especially government investment to economic growth. Thus, these results introduced additional channel through which Granger causality has emerged. They also show the speed of adjustment to long run equilibrium and that government expenditure and its components have significant impact on economic growth. On the other hand it seems from these results that there is a bidirectional causality between economic growth and total government expenditure.

**Table 4. Error correction test**

| Dep\ Ind | ΔYt-1 | ΔGEt-1 | ΔTIt-1 | ΔGIt-1 | ΔPIt-1 | ΔGCt-1 | ut-1 |
|---|---|---|---|---|---|---|---|
| ΔYt | -0.867* | 0.147** | | | | | -0.737** |
| | (-3.564) | (2.356) | | | | | (-2.139) |
| | -0.761* | | 0.484*** | | | | -0.911** |
| | (-2.813) | | (1.692) | | | | (-2.127) |
| | -0.636* | | | 0.433* | | | -0.95* |
| | (-4.73) | | | (2.718) | | | (-3.43) |
| | 0.169 | | | | -0.86* | | -1.09* |
| | (0.802) | | | | (-3.48) | | (-3.77) |
| | -0.21 | | | | | -0.11 | -1.13* |
| | (-0.71) | | | | | (-0.91) | (-2.735) |
| ΔGEt | -4.22* | 0.572** | | | | | 2.83** |
| | (-4.47) | (2.365) | | | | | (2.117) |
| ΔTIt | -0.767* | | 0.218 | | | | 0.388 |
| | (-2.727) | | (0.732) | | | | (0.872) |
| ΔGIt | -0.559** | | | -0.141 | | | -0.024 |
| | (-2.385) | | | (-0.507) | | | (-0.05) |
| ΔPIt | 0.014 | | | | -0.463** | | 0.26 |
| | (0.073) | | | | (-2.246) | | (1.036) |
| ΔGCt | -0.359 | | | | | -0.41*** | 0.383 |
| | (-0.587) | | | | | (-1.61) | (0.67) |

Since cointegration clarifies the 'spurious regression' or 'nonsense correlation' problem associated with trending time series data ( Ericsson, [43]), an OLS regression based on the difference variables was conducted. Tables 5A and 5B show the results of regressing the difference economic growth (Y) as a dependent variable on the differences of the other independent variables. The coefficients of dG have the expected signs and are significant. While the coefficients of dGY are significant and negative. All measures of government expenditures (dGE, dGI, dGC) have the expected signs and significance. These results may suggest that inputs are more productive in the public sector than in the private sector and that government expenditure and its components have positive impact on the non oil GDP. The coefficients for both measures of dT (dOG and dOT) have the expected signs and are insignificant.

**Table 5A. OLS regression ( dependent variable = Y )**

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| C | 5.52 | 4.89 | 7.41 | 3.17 | 2.88 | 3.14 | 4.54 |
| | (2.47) | (3.19) | (1.45) | (1.75) | (1.336) | (1.44) | (2.023) |
| dTI* | ----- | 0.77* | ____ | ------ | ------ | ... | - ___ |
| | | (5.36) | | | | | |
| dPI* | 0.75* | ____ | 0.80* | 0.42** | 0.496** | 0.46*** | 0.45** |
| | (3.08) | | (2.60) | (2.05) | (2.061) | (1.850) | (1.97) |
| dGI* | 0.599* | ____ | 0.74* | ____ | ____ | ____ | ____ |
| | (2.98) | | (2.79) | | | | |
| dL* | 1.69 | 5.46 | 2.52 | 15.70** | 19.35** | 18.46** | 7.954 |
| | (0.21) | (0.87) | (0.314) | (2.33) | (2.311) | (2.19) | (0.965) |
| dGE* | 0.24** | 0.27* | ____ | ____ | ____ | ____ | 0.395* |
| | (2.20) | (3.67) | | | | | (4.22) |
| dGY* | -64.87* | -63.01* | -3.49 | 12.13 | 35.088* | 33.82* | -56.64** |
| | (-2.91) | (-3.86) | (-0.25) | (1.15) | (3.21) | (3.62) | (2.54) |
| dGC* | 0.195 | ____ | ____ | 0.298** | ____ | ___ | ____ |
| | (1.45) | | | (2.485) | | | |
| dOG* | 1.46 | ____ | ____ | ____ | -0.45 | ___ | ____ |
| | (0.22) | | | | (-0.069) | | |
| DoT* | -5.34 | ____ | ____ | ____ | ____ | -9.96 | ____ |
| | (-0.37) | | | | | (-0.465) | |
| Ad-R-Sq | 0.739 | 0.736 | 0.596 | 0.700 | 0.517 | 0.504 | 0.677 |
| F | 9.22* | 17.73* | 8.14* | 12.256* | 6.172* | 5.910* | 11.129 |
| D.W. | 2.00 | 2.01 | 1.869 | 1.939 | 2.007 | 2.044 | 1.966 |

In tables 5A and 5B:

Ad-R-Sq. = Adjusted R squared
F = F statistics
D.W.= Durban-Watson statistics.

**Table 5B. OLS regression ( dependent variable= Y )**

| Variables | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| C | 6.934 | 3.0549 | 2.857 | 3.56 | 3.653 | 3.435 |
| | (1.55) | (1.636) | (1.384) | (1.539) | (1.536) | (1.839) |
| dPI* | 0.765* | 0.389*** | 0.497** | 0.503*** | 0.404 | 0.3819*** |
| | (2.725) | (1.783) | (2.145) | (1.850) | (1.45) | (1.815) |
| dGI* | 0.690* | ____ | ____ | ____ | ____ | ____ |
| | (3.725) | | | | | |
| dI* | 3.474 | 15.05** | 19.304** | 17.975** | 19.828** | 15.143** |
| | (0.438) | (2.100) | (2.405) | (1.994) | (2.198) | (2.221) |
| dGE* | ____ | 0.201* | ____ | ____ | ____ | ____ |
| | | (5.409) | | | | |
| dGY* | ____ | ____ | 34.79* | ____ | ____ | ____ |
| | | | (3.97) | | | |
| dGC* | ____ | ____ | ____ | ____ | ____ | 0.340* |
| | | | | | | (3.765) |
| dOG* | | ____ | ____ | 13.114** | ____ | ____ |
| | | | | (2.166) | | |
| dOT* | ____ | ____ | ____ | ____ | -11.308 | ____ |
| | | | | | ( 0.575) | |
| Ad-R-sq | 0.610 | 0.5944 | 0.538 | 0.428 | 0.5093 | 0.6953 |
| F | 10.077* | 9.500* | 7.758* | 5.339* | 7.019* | 14.234* |
| D.W. | 1.909 | 2.03 | 1.7977 | 2.036 | 2.015 | 2.178 |

## Conclusion and Policy Implications

This study has conducted a series of unit root, cointegration, causality, and regression analysis to ascertain the impact and the direction of causality between the growth of government expenditures and the growth of GDP in Saudi Arabia. Final prediction error (FPE) method was employed for determining the optimal lag length of the explanatory variables. Empirical results show that government expenditures exert positive impact on economic growth. On the other hand economic growth is found to Granger cause government expenditures. Several studies as Baghestain and McNown [54] and Singh and Sahni [10] found that GDP causes government expenditure. These findings can be explained by Wagner hypothesis which indicates that increased government activity and the corresponding increase in government expenditure is an inevitable result of economic growth due to: (a) increased friction in society causing greater demand for government services, (b) as the society is growing richer, it requires the government to provide quality goods and services, and (c)the demand for such goods and services is highly income elastic.

This indicates that changes in national income can cause changes in government expenditures. This can be related to the case of Saudi Arabia where the government size has increased in absolute and relative terms. However, the presence of a cointegrating relationship between the variables in the system suggests that a long term relation exists between them. The findings of the study furnish supportive evidence that the government has played an important role in the economic development in Saudi Arabia. In addition to providing infrastructure, establishing a modern education system, and stabilizing the economy, the Saudi Arabian government has played influential roles in establishing large companies and reducing various market distortions that would have worked against economic efficiency. To achieve complementarily and forward and backward linkages of different industries, the government adopted a policy of encouraging large companies- Saudi Arabian Basic Industries (SABIC)- to spearhead the drive of development and by providing leading entrepreneurs with generous financial support and assistance.

The government assisted with investment projects by providing direct and indirect assistance for construction of plants and facilities and helped directly to allocate financial resources by establishing quasi government financial institutions to assist the private sector in diversifying the economy. On the other hand the results show some sings of Wagner's Law which can be noticed by the rapid increase in government size and its influence in the performance of the economy especially after 1973. This might suggests that there is a need to reduce the government size to an optimal size by adopting a policy of privatization to cut its expenditure and in turn budget deficit. Running a large deficit for a long period of time could have an adverse effect on the growth of the economy since financing this deficit by borrowing might crowd out private sector investment. This might imply that government budget deficit reduces the rate of capital formation which implies in turn slower rate growth and productivity of the private sector. Thus, expanded restructuring of public sector expenditure may, therefore, be required to achieve an efficient public sector. Efficiency in resource uses in the public sector is important as the level of expenditure. It is important for policy makers to pay attention not just to the level of government expenditure but also to its composition. Cuts in government expenditures should fall only on those expenditures that are not related to the development of infrastructure. There should be an awareness of the consequences of an inefficient increase in the government size on the long term growth of the economy.

Because of the possibility that government activities enhance future growth of real income, these statistical results support the assertion that public policy has permanent effects on real output. Public expenditure on infrastructure that facilitate economic growth is required to put the economy on higher long term growth path. For Saudi Arabia to maintain its economic growth, it is important to have effective fiscal and monetary polices tools that will allow these policies to be carried out. In this regard, the development of economic institutions including financial and capital markets is crucial for economic development. Developed financial and capital markets can mobilize savings and channel them to productive use.

Finally, since economic growth and development are the main objectives of the government expenditure, especially investment, issues for growth policy should emphasize on investment in infrastructure through technology and human resources. Thus, in short, there should be an effort to maintain adequate levels of investment in social and economic infrastructure. It is also important to pay attention to the composition not just to the level of government expenditure.

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# العلاقة بين الإنفاق الحكومي والنمو الاقتصادي في المملكة العربية السعودية

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**ملخص البحث.** بجانب كون الحكومة تتولى مسئوليات الدفاع الوطني والأمن الداخلي والضمان والرفاه الاجتماعي والتآلف بين المواطنين فإنها كذلك قد تتولى القيام ببعض المهام الاقتصادية التي يكون هدفها تنمية الاقتصاد الوطني وتطوره. لهذا فإن هناك نقاشا مستمرا بين الاقتصاديين عن هذا الدور. ويتركز هذا النقاش في الغالب حول جانب الكفاءة الاقتصادية الذي ربما لا توليه الحكومة أهمية كبيرة عندما تحدد أولوياتها للإنفاق الحكومي. هذه الدراسة تحاول تقصي دور الحكومة ، ومدى تأثير الإنفاق الحكومي في المملكة على النمو والتطور الاقتصادي . تشير النتائج الإحصائية إلى أهمية الإنفاق الحكومي في المملكة وتأثيره المباشر على النمو الاقتصادي ، ومع ذلك فإن النتائج أيضاً تشير إلى تزايد حجم الحكومة بشكل كبير ، خصوصاً بعد عام ١٩٧٣م . لهذا فإنه من المهم القول إن دور الحكومة في التنمية والتطور الاقتصادي ما زال مهماً ، ويساوي ذلك في الأهمية محاولة الحكومة تشجيع القطاع الخاص على المساهمة في التنمية والتطور الاقتصادي في المملكة.