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Fiscal Expenditure Policy and Non-Oil Economic Growth: Evidence from GCC Countries

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Fiscal Expenditure Policy and Non-Oil Economic Growth: Evidence from GCC Countries

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Abstract

Through the use of a multivariate cointegration and error-correction model, this study investigates the short- and long-run relationship over the past two decades between fiscal expenditure policy and non-oil real GDP growth in member countries of the Gulf Cooperation Council (GCC). Despite the important role of the government, the empirical results do not strongly support that increases in fiscal expenditures tend to slow or accelerate non-oil real growth in these countries. However, the breakdown into current and capital expenditures is useful for assessing the effects of each spending category on short- and long-run non-oil real GDP growth.

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I. Introduction

The role of government spending in promoting economic growth remains a debatable issue in both industrialized and developing countries. Empirical studies have yielded mixed results, with some finding a negligible role (Landau, 1986; Anwar, Davies, and Sampath, 1996; and Alesina and Perotti, 1995), and others a strong role (Ahsan, 1989; and Aschauer, 1990). Some studies have determined that both the composition of public expenditure and the size of the government may also have an important influence on growth (Diamond, 1989; Tanzi, 2000; and Alesina, Perotti, and Tavares, 1998). Endogenous growth models have also shown that an increase in capital spending will either raise or lower economic growth depending on the size of the government and how this increase in financed, while an increase in government consumption will lower growth independently of the government size, because it might lead to higher taxation without enhancing the productivity of the private sector (Barro, 1990).

The debate arises because government expenditure can influence growth through several channels with ambiguous results. The most obvious influence is the direct contribution of government development spending to physical capital—assuming that productive private capital expenditure is not being crowded out and government spending is not less efficient. An increase in government expenditure on human capital formation could positively impact growth, even though this may not show up immediately because of longer gestation periods, while a similar increase in government spending on research and development could also enhance economic growth over the long run. Moreover, current expenditures could be positively associated with growth if they are, for instance, largely directed at maintaining the physical and capital stock, influencing technological change, and investing in law and order.

Despite diversification efforts, the government in the oil-dependent countries of the Gulf Cooperation Council (GCC) has continued to play an important role in sustaining and promoting non-oil economic activities.[2] Thus, the authorities in the region have usually been reluctant to cut spending—primarily current outlays—because of the possible adverse effects on non-oil real growth. The main objective of this paper is to shed some light on the importance of fiscal expenditure policy in determining non-oil real growth in GCC countries. This is a relevant issue because policy makers in the region aim at achieving adequate non-oil growth to generate jobs for the increasing number of GCC nationals entering the labor force.

To assess the relationship between expenditure—broken down in current and capital spending—and non-oil real GDP growth, a multivariate cointegration and error-correction

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[2] The GCC member countries are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (U.A.E.).

model was used.[3,4] The study covered the period 1980–99 primarily to gain a common denominator in the database for the empirical analysis. The paper is organized as follows. It begins by reviewing the role of the government spending in the process of non-oil economic development in these countries. It then summarizes previous empirical studies on the relationship between government and economic growth in GCC countries. The following section describes the econometric methodology used and presents the empirical results. Lastly, it summarizes the main conclusions.

II. Background

Over the past two decades, important changes in economic policy took place in the GCC countries that might have affected the relationship between fiscal expenditure policy and non-oil real growth. Following the sharp increase in global oil prices in the 1970s and early 1980s, the authorities in these countries recycled the windfall oil gains through a generous welfare system, and a massive public investment program in infrastructure, utilities, and basic industries, leading to an initial rapid growth in non-oil activities.[5,6] They also encouraged the development of these activities through fiscal incentives, including subsidized provision of electricity and water, soft loans, and low taxation.[7] The instability in non-oil economic growth has been therefore associated with swings in government spending (Figure 1).[8]

This instability was until recently compounded by the authorities' response to oil price shocks. During periods of declining oil prices, cuts in capital outlays were typically the first line of defense because these outlays are generally import-intensive, and because eliminating investment projects can be politically and socially easier to implement than

[3] An attempt was also made to find information on private non-oil activities to determine the relationship between government spending and these activities, but only partial data were available for a few GCC countries.

[4] The focus was on non-oil real GDP growth because oil activity is mostly influenced by quota agreements within OPEC, of which most GCC countries are members, except Bahrain and Oman.

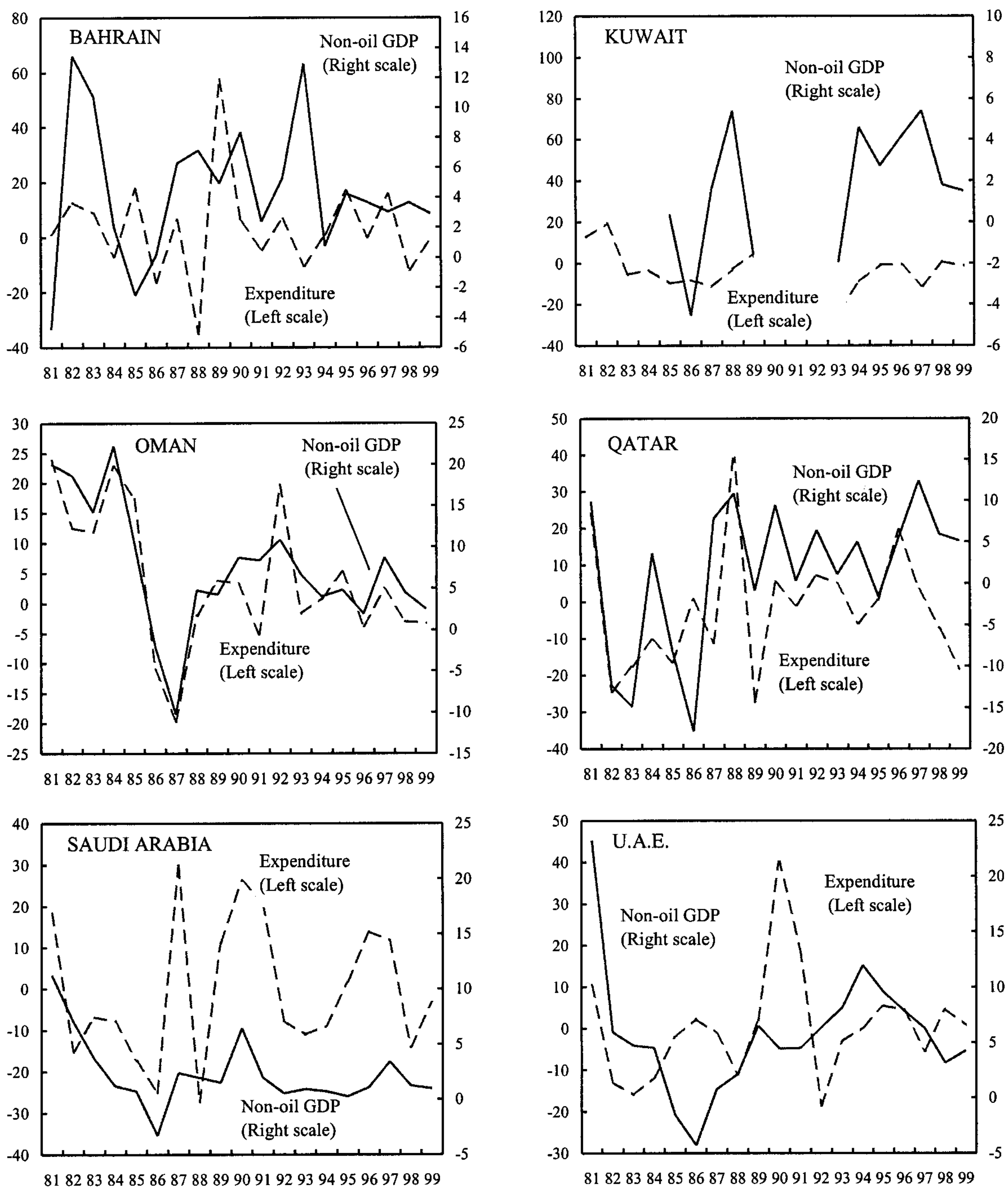
[5] In other resource-rich countries, commodity booms have usually resulted in slower economic growth over the medium term because revenues from booms were mostly consumed rather than invested (see Sachs and Warner, 1995).

[6] The most important non-oil activities include trade, government services, construction, utilities, finance, natural gas, and petroleum-processing industries.

[7] In 1999, non-oil revenue (excluding government investment income) stood at less than 10 percent of non-oil GDP in the GCC region as a whole.

[8] Despite diversification efforts and restraint in government expenditure growth, particularly in the past few years, the government still accounts for about 40 percent of aggregate demand in most GCC countries, one of the highest shares in the world.

Figure 1. GCC Countries: Real Expenditure and Non-Oil GDP Growth, 1981–99 /1



Sources: National authorities; and IMF staff estimates.

1/ Total expenditure, including net lending.

reducing current outlays, such as the wage bill or subsidies. In fact, despite the declining trend in oil revenue during much of the past two decades, the wage bill has grown continuously—reflecting the role of the government as the main provider of jobs for nationals. Conversely, during periods of rising oil prices, current expenditure rather than capital spending has tended to increase.

Since the mid-1990s, however, GCC governments have attempted to contain the impact of abrupt shifts in government spending on non-oil activities by expanding the role of the private sector in the economy and maintaining prudent fiscal policies. In this context, most GCC countries have made important progress in privatizing primarily telecommunications and utilities, easing rules on foreign investment, and setting up one-stop investment centers to reduce bureaucratic red tape, as well as strengthening the financial system and capital market.[9] These countries have also experienced a rapid increase in non-oil export volumes—such as petrochemicals, fertilizers, natural gas, and aluminum. More recently, during the favorable oil market conditions that developed in mid-1999 and continued into 2000, GCC governments used the windfall oil gains mainly to build up official assets and/or to pay off outstanding debt instead of expanding expenditure substantially. Also, a safety margin was built into government budgets in recent years by using conservative oil price assumptions—rather than the prevailing relatively higher price at the time of the budget preparation.

Overall, government policies have demonstrated a greater awareness of the need to insulate fiscal policy, and particularly non-oil activity from the volatility in oil prices. This has most likely contributed to weakening the structural dependence of non-oil real GDP growth on government expenditure. Thus, it is not surprising that the non-oil growth has not been significantly affected in most GCC countries by the restrained government spending policy of recent years. It is also important to note that despite the declining trend in government capital outlays over the past decade, the non-oil sector has grown rapidly, particularly in those GCC countries—such as Bahrain, Oman, Qatar, and the United Arab Emirates (U.A.E.)—that have actively pursued a diversification strategy based on the development of natural gas, tourism, and/or financial services.

III. Studies of Government Spending and Economic Growth in GCC Countries

The literature includes a few empirical studies on the influence of government spending on economic growth in GCC countries. In general, some of these studies presented evidence of a positive, strong relationship between these variables. This relationship, however, has weakened since the mid-1980s, while causality tests run from government spending to non-oil growth.

[9] An open-door policy to foreign labor has also continued to provide the skills at internationally competitive wages to help develop non-oil activities.

Using a vector autoregressive (VAR) analysis, Khalifa (1997) studied the relationship between the growth rate of per capita real GDP and the change in the share of government spending—broken into investment and consumption—in GDP in Saudi Arabia from 1960–96. He found a positive but insignificant impact of changes in either government investment or consumption on real per capita GDP growth, while the causality run from output growth to total government spending.[10] Another study on Saudi Arabia by Kireyev (1998) tested the relationship between the change in real government expenditure and growth in the non-oil private sector, using a pair wise Granger causality test from 1969–97. His results showed that real non-oil private GDP was strongly and positively correlated with government expenditure—contending that an increase of 1 percent in total government expenditure generates about a 0.5 percent increase in private sector GDP growth. However, when the time period was subdivided through a Chow breakpoint test into two sub-periods, 1969–82 and 1983–97, the results from the cointegration test showed no clear statistical evidence of a relationship between the two variables during the second sub-period, suggesting increasing autonomy of the non-oil economy.

In Oman, using cointegration analysis, Treichel (1999) studied the link between the growth rate of total real expenditure—also broken into current and capital spending—and non-oil real GDP growth from 1981–97. He found that non-oil growth could be explained to a large extent by both government current and capital expenditure (an increase of 1 percent in current or capital government expenditure may generate about a 0.6 percent increase in non-oil GDP growth, or 0.2 percent, respectively). However, this relationship seemed to have weakened over the past decade.

In the U.A.E., using a cointegration and error-correction framework, Ghali and Al-Shamsi (1997) tested the causal relationship between government current and capital spending and total GDP growth from 1973–1995. The evidence supported a long-run equilibrium relationship between these variables. In the short run, government investment has a positive and significant effect on economic growth, while government consumption has a negative and insignificant one. Also, causality tests showed that the causation runs from a change in government spending to output growth.

IV. Econometric Methodology and Empirical Results

The econometric approaches used in the studies reviewed in the previous section presented some shortcomings. In Khalifa (1997) and Kireyev (1998), the methodology used did not make the distinction between short- and long-run causality, and thus risked the possibility of attributing the detected causality entirely to short-run interactions between government spending and non-oil growth. Treichel (1999) assumed that the causal direction

[10] This supports Wagner's law, which over a century ago proposed that there is a positive correlation between the level of economic development and the scope of government.

ran from expenditure to non-oil GDP growth, without testing this relationship. Ghali and Al-Shamsi (1997) used the same econometric techniques as appear in this paper, but they only focused on the issue of short-run intertemporal causality.

The econometric methodology used in this paper—a multivariate cointegration and error-correction model—addresses these shortcomings. Thus, to avoid the potential problem of estimating spurious relationships, the time series properties of the variables under investigation were tested for unit roots. We also tested the variables for cointigration to determine whether a long-term equilibrating relationship exists between government expenditures and non-oil real growth in the GCC countries in the sample (meaning that the variables are subject to the same long-run influences), and causality tests were then conducted.

Although this econometric methodology presents an incomplete picture of the non-oil growth process in GCC countries, it discerns the dynamic causal relationship—in the Granger intertemporal rather than in the structural sense—between government expenditures and non-oil real growth.[11] It helps in fact distinguish between short-run dynamics among the variables (or short-run causality), and each varible's gradual correction from the long-run equilibrium through a series of partial short-run adjustments (or long-run causality). The sample covers five of the six GCC countries—Bahrain, Oman, Qatar, Saudi Arabia, the U.A.E.[12] For each country, we have official data on non-oil gross domestic product at constant prices (GDP), and government capital (CAP) and current expenditures (CUR) deflated by the consumer price index. However, because of data limitations (notably, a relatively short period under investigation, i.e., 1980–99), considerable caution should be exercised in interpreting the statistical results.

A. Test Results for Unit Roots

GDP, CAP, and CUR were tested for their orders of integration by using Augmented Dickey-Fuller (ADF) tests (Table 1).[13] The tests showed that ln(GDP), ln(CAP), and ln(CUR) are integrated of order one for all the GCC countries in the sample.

[11] Eken, Helbling, and Mazarei (1997) presented a model to explain per capita non-oil GDP as a function of investment, inflation rate, and a number of fiscal variables, such as the share of current and capital expenditures in total expenditures. The inclusion of fiscal variables did not improve the fit of the equations significantly.

[12] Kuwait was excluded because of lack of statistical information for the early 1990s as a result of the regional conflict.

[13] Detailed test statistics are presented in Table 4 in Appendix I.

Table 1. Augmented Dickey-Fuller Test Results for Unit Roots

Variables	Bahrain	Oman	Qatar	Saudi Arabia	U.A.E.
ln(GDP)	I(1) $^{c, t***}$	I(1) ^{c***}	I(1) $^{c, t***}$	I(1) ^{c**}	I(1) $^{c, t***}$
ln(CAP)	I(1) ***	I(1) ^{c*}	I(1) $^{c, t***}$	I(1) $^{c, t***}$	I(1) ^{c***}
ln(CUR)	I(1) ***	I(1) $^{c, t***}$	I(1) ^{c*}	I(1) ^{c*}	I(1) ***

Note: *, **, and *** denotes significance at 10 percent, 5 percent, and 1 percent, respectively; "c" indicates the constant term is significant; t, indicates that the trend is significant; I(1), indicates unit root in levels and stationary after first differencing.

B. Test Results for Cointegration

Since the time series of ln(GDP), ln(CAP), and ln(CUR) were found to be integrated of the same order (i.e, order one), a cointegration test could be conducted to determine whether a long-run equilibriating relationship existed among the three variables. A Johanson conintegration test was performed, assuming a cointegrating relationship as specified by equation (1):

$$\ln(GDP_t) + a*\ln(CAP_t) + b*\ln(CUR_t) + c = \varepsilon_t \tag{1}$$

Cointegration relationships were found for all GCC countries in the sample (Table 2).[14] Moreover, the empirical results indicated that over the long run, non-oil real GDP was negatively related to government capital expenditure but positively related to current expenditure for all these countries, except Saudi Arabia where non-oil real GDP was negatively related to both type of spending.[15,16] Although these results may seem counterintuitive, they likely reflected the changing structure in government spending over the past two decades at a time when non-oil activities have continued to expand. In fact, overall, government capital expenditures experienced a downward trend during the past two decades,

[14] For all the GCC countries in the sample, except Qatar and the U.A.E., the tests supported the existence of a unique cointegration relationship. For Qatar and the U.A.E., tests weakly pointed to the existence of two congregating vectors. Nevertheless, economic theory made clear the choice of the long-run relationship as presented in Table 2.

[15] Note that from the perspective of a typical structural equation, such as equation (1), the signs of the constant, ln(CAP) and ln(CUR) are reversed because they are on the left side of the equation.

[16] In a separate test, which is not presented in the paper, we found that the times series of non-oil GDP and total government expenditure (current plus capital) were tested to be cointegrated for all countries in the sample (except Saudi Arabia). The results showed that over the long run non-oil GDP was positively related to total government expenditure.

Table 2. Johanson Cointegration Test: Estimated Cointegration Vectors

Variables	Bahrain	Oman	Qatar	Saudi	U.A.E.
ln(GDP)	1	1	1	1	1
ln(CAP)	1.59 (2.07)	1.44 (0.53)	4.94 (0.50)	0.21 (13.99)	2.03 (2.24)
ln(CUR)	-1.23 (-2.52)	-2.15 (-0.87)	-21.10 (-0.53)	0.06 (1.89)	-4.71 (-2.97)
Constant	-3.51	-0.16	65.06	-5.17	8.49
Likelihood Ratio	30.02	34.34	35.53	43.43	52.12
Eigenvalue	0.61	0.66	0.65	0.82	0.83
Lag length	1	1	1	1	1
No. of CE(s)	1 *	1 *	1** , 2*	1**	1**, 2*

Note:

1. The cointegration coefficients are normalized on ln(GDP).
2. T-ratios are in parentheses.
3. *(**) indicates the significance level at which the number of cointegration equation(s) (CE) is identified is 5 percent (1 percent).
4. The length of the lag is chosen with an view to balancing between ensuring approximately white-noise errors and allowing for enough degrees of freedom in estimation.

partially owing to the completion of major infrastructure projects, while current expenditures increased on account of a higher demand for public services (such as education, health, and subsidies on electricity and water) by a rapidly growing population; rising military expenditure; and, in some GCC countries, higher interest payments.[17]

[17] According to official sources, military expenditures account for about one-third of current outlays in most GCC countries.

C. Test Results for Causality

Since the series for all the GCC countries in the sample were found to be cointegrated, the Granger causality test was conducted in the context of an error correction model (ECM) by estimating a vector auto regressive (VAR) model as follows:

$$\Delta \ln(GDP_t) = \vartheta_0 + \alpha_0 \Delta \ln(GDP_{t-1}) + \beta_0 \Delta \ln(CAP_{t-1}) + \gamma_0 \Delta \ln(CUR_{t-1}) + \lambda_0 ECT_{t-1} + \mu_t \quad (2)$$

$$\Delta \ln(CAP_t) = \vartheta_1 + \alpha_1 \Delta \ln(GDP_{t-1}) + \beta_1 \Delta \ln(CAP_{t-1}) + \gamma_1 \Delta \ln(CUR_{t-1}) + \lambda_1 ECT_{t-1} + \nu_t \quad (3)$$

$$\Delta \ln(CUR_t) = \vartheta_2 + \alpha_2 \Delta \ln(GDP_{t-1}) + \beta_2 \Delta \ln(CAP_{t-1}) + \gamma_2 \Delta \ln(CUR_{t-1}) + \lambda_2 ECT_{t-1} + \pi_t \quad (4)$$

where, υ, α, β, γ, and λ are the coefficients, and μ, ν, and π are the error terms. ECT_t is equivalenct to ε_t in equation (1), representing the disequilibrium residuals of the cointegration equation identified above. In an error correction model, a variable reacts both to short-run movements in other variables individually and to changes in the long-run cointegrating relationship (captured by the ECT_{t-1} term).

As regards short-run causality, the empirical results did not strongly support the proposition that changes in government expenditure tend to accelerate or slow non-oil real growth in the short-run in the GCC countries in the sample. Also, the results did not show a strong unidirectional causal relationship running from government spending to growth, as was expected given the important role of the government in these economies (Table 3). The results, however, showed that non-oil real GDP growth in the current period reacted negatively to current spending growth in the previous period in all these countries, except Oman, and positively to capital expenditure growth, but this causal effect was statistically significant only for Saudi Arabia.[18]

The cointegrating relationship found among non-oil real GDP and capital and currenct expenditures for the GCC countries, indicates that part of these variables' intertemporal variations can be attributed to their gradual correction to a deviation from the long-run equilibrium. We thus examined the sign of the coefficient for the error correction term in the model to determine whether a variable's long-run and short-run movements are consistent. Given that the long-run stable equilibrium showed that, for all the GCC countries in the sample, non-oil real GDP was positively related to current expenditure, and for all these countries, except Saudi Arabia, non-oil real GDP was negatively related to capital

[18] The empirical results also showed that for all the GCC countries in our sample, except Saudi Arbia, the growth of capital expenditure in the current period reacted positively to changes in non-oil real GDP in the previous period; but this causal effect was statistically significant only for Saudi Arabia and Qatar. In addition, for all the GCC countries in our sample, except the U.A.E., the growth of current expenditure in the current period reacted positively to non-oil real GDP growth in previous year; but, this causal effect was found to be statistically insignificant for all the countries in the sample.

Table 3. Causality Test Based on Error-Correction Model

	Bahrain			Oman		
	$\Delta\ln(GDP_t)$	$\Delta\ln(CAP_t)$	$\Delta\ln(CUR_t)$	$\Delta\ln(GDP_t)$	$\Delta\ln(CAP_t)$	$\Delta\ln(CUR_t)$
ECT_{t-1}	-0.055 (-1.172)	**-1.318** **(-2.682)**	-0.923 (-1.602)	-0.024 (-0.674)	**-0.079** **(-2.310)**	-0.051 (-1.039)
$\Delta\ln(GDP_{t-1})$	-0.046 (-0.187)	4.052 (1.600)	2.500 (0.841)	0.373 (1.120)	0.520 (1.620)	0.796 (1.732)
$\Delta\ln(CAP_{t-1})$	0.110 (1.499)	0.998 (1.307)	0.999 (1.115)	-0.402 (-0.868)	-0.465 (-1.042)	0.051 (0.080)
$\Delta\ln(CUR_{t-1})$	-0.093 (-1.363)	-1.106 (-1.430)	-1.606 (-1.278)	0.350 (0.840)	0.076 (0.189)	-0.470 (-0.815)
Constant	0.023 (3.490)	-0.009 (-0.134)	0.048 (0.592)	0.024 (1.467)	0.029 (1.878)	-0.005 (-0.239)

	Qatar			Saudi Arabia		
	$\Delta\ln(GDP_t)$	$\Delta\ln(CAP_t)$	$\Delta\ln(CUR_t)$	$\Delta\ln(GDP_t)$	$\Delta\ln(CAP_t)$	$\Delta\ln(CUR_t)$
ECT_{t-1}	-0.019 (-0.928)	0.085 (1.640)	**0.060** **(2.436)**	**-0.334** **(-2.847)**	**-4.425** **(-3.265)**	0.568 (0.537)
$\Delta\ln(GDP_{t-1})$	-0.010 (-0.027)	**1.996** (2.071)	0.755 (1.642)	0.191 (1.116)	**-4.191** (-2.124)	2.168 (1.409)
$\Delta\ln(CAP_{t-1})$	0.080 (0.654)	-0.243 (-0.794)	-0.017 (-0.119)	**0.046** **(2.204)**	-0.004 (-0.173)	-0.017 (-0.092)
$\Delta\ln(CUR_{t-1})$	-0.203 (-0.810)	-0.009 (-0.014)	-0.172 (-0.574)	-0.002 (-0.047)	0.774 (1.854)	-0.298 (-0.914)
Constant	0.005 (0.463)	-0.047 (-1.730)	-0.011 (-0.873)	0.007 (2.791)	-0.010 (-0.363)	0.010 (-0.363)

	U.A.E.		
	$\Delta\ln(GDP_t)$	$\Delta\ln(CAP_t)$	$\Delta\ln(CUR_t)$
ECT_{t-1}	**-0.201** **(-2.104)**	**-0.140** **(-3.939)**	0.046 (0.840)
$\Delta\ln(GDP_{t-1})$	0.438 (3.012)	0.861 (1.644)	-0.421 (-0.521)
$\Delta\ln(CAP_{t-1})$	0.011 (0.228)	0.127 (0.694)	0.152 (0.539)
$\Delta\ln(CUR_{t-1})$	-0.106 (-1.812)	-0.286 (-1.355)	0.203 (0.625)
Constant	0.010 (2.236)	-0.025 (-1.536)	0.015 (0.610)

Note: T-statistics are in parenthesis.

expenditure, a positive value of ECT_{t-1} implies that either ln(GDP), or ln(CAP), or both are too high, or ln(CUR) is too low; hence adjustment back to equilibrium in later periods would require either ln(GDP), ln(CAP) or both to fall, or ln(CUR) to rise. Therefore, in equations (2), (3), and (4), Δln(GDP) and Δln(CAP) should respond negatively to positive values of ECT_{t-1}, and the λ's should be negative for Δln(GDP) and Δln(CAP), while the opposite is true for Δln(CUR).

Our empirical results of the long-run analysis indicated that most signs of the coefficient of the error correction term (λ) were correct, namely, in the face of a positive (negative) value of ECT_{t-1}, maintaining a long-run equilibrium required, for instance, capital expenditure to decline (increase) and current expenditure to increase (decline). It was also important to determine by examining the significance level of the λ's which of these variables did adjust to maintain the long-run equilibrium. We found that for all the countries, except Qatar, the λs for capital expenditure were statistically significant, while, in constrast, those for current expenditure were statistically insignificant. Therefore, the estimation results indicated that in the GCC countries in the sample, the long-run equilibrium among non-oil real GDP, current expenditure, and capital expenditure was mainly maintained by adjustments in the latter.

V. Conclusion and Policy Implications

The authorities in GCC countries have usually been reluctant to cut spending because of their concerns regarding the potential adverse effects on non-oil growth. However, when confronted with the need to cut spending, like in periods of declining oil revenues, they have often chosen to reduce first capital over current expenditures. This paper investigated through a multivariate cointegration and error correction model the dynamic relationship over the past two decades between government current and capital expenditures and non-oil real GDP growth in five GCC countries—Bahrain, Oman, Qatar, Saudi Arabia, and the U.A.E.—to determine whether there was any support for the authorities' reluctance to reduce expenditures and for their typical choice of cutting capital over current outlays.

The results of Granger causality tests did not strongly support the proposition that changes in government current and capital spending tend to slow or accelerate non-oil real GDP growth in the GCC countries in the sample. Also, a strong unidirectional causal relationship running from government spending to non-oil growth was not found. The government in GCC countries could, in principle, cut spending without negatively affecting non-oil growth. Although these results seem to be counterintuitive given the important role that government spending seems to play in supporting and promoting non-oil activities in these countries, they possibly reflected the ambiguous impact of spending on growth, as highlighted in the growth literature. In addition, in the past decade, important changes in economic policy and development strategy took place in the GCC countries in the sample that have most likely weakened the structural dependence of non-oil activities on government spending as some other empirical studies have demonstrated.

The government in GCC countries, however, needs to carefully choose the type of expenditure category to be adjusted because of diverse effects on short- and long-run non-oil real growth. Our empirical results indicated that, in the short run, current expenditure has a negative effect on non-oil economic growth, and capital spending, a positive one, although both relationships were weak. In the long run, it was found that in most GCC countries in the sample non-oil real GDP was negatively related to capital spending and positively related to current spending. This most likely reflected the changing structure in government expenditure over the past decades when non-oil activities have continued to expand while government capital outlays have experienced a downward trend.

Although these empirical results should be interpreted with caution because of data limitations, they have important policy implications at a time when the authorities in the region have set to achieve a high sustainable rate of non-oil growth to generate jobs for a rapidly rising indigeneous labor force. The government in GCC countries could increase capital spending in the short run to boost non-oil growth, although in the long run, non-oil real growth prospects could be hindered if increasing government capital outlays crowd out more productive investments by the nongovernment sector. In contrast, lower current expenditure could boost non-oil real growth in the short run by, for instance, increasing government savings, freeing funds to finance more efficient nongovernment activities. Nevertheless, given the long-run structural relationship of these variables in the GCC economies, in order to permanently cut current expenditure without compromising non-oil real GDP growth in the long run calls for the adoption of structural reforms that foster non-oil sector development independent from government spending. This could be achieved through the creation of a business-friendly environment, privatization, and the opening up of the economy to foreign direct investment to bring expertise and new technologies. It is encouraging that government policies in GCC countries are currently moving in this direction.

Econometric Methodology

Test for unit roots

To avoid the potential problem of estimating spurious relationships, it is necessary to test the time series properties of the variables under investigation for unit roots. If a variable is stationary, i.e., it does not have a unit root, it is said to be I(0) (i.e., integrated of order zero). If a variable is not stationary in its level form but stationary in its first-differenced form, it is said to be integrated of order one, or I(1). More generally, the series Xt will be integrated of order d, that is, Xt ~ I(d), if it is stationary after differencing d times, so Xt containts d unit roots. A popular unit roots test is the Augumented Dickey Fuller (ADF) test,[19] which is based on estimating the following regression:

$$\Delta X_t = a_0 + a_1 t + a_2 X_{t-1} + \sum_{i=1}^{k} c_i \Delta X_{t-i} + e_t \tag{5}$$

The null hypothesis for unit roots is H_0: $a_2 = 0$. We apply this test to each of the variables and determine the stationarity property in their levels as well as in their first differences.

Test for conintegration vectors

If the time-series varaibles are found to be nonstationary and integrated of the same order, tests can be performed to see if the variables are cointegrated. An identified conintegrating relationship among variables implies there exists a long-term equilibriating relationship (at least in statistical sense) among those variables. Generally, a set of varibles are said to be cointegrated if a linear combination of their individual integrated series, which are I(d), is stationary. Intuitively, if Xt ~ I(d) and Yt ~ I(d), a regression is run, such as:

$$Y_t = \beta * X_t + \varepsilon_t \tag{6}$$

If the residuals (ϵ_t) from the regression are I(0), then X_t and Y_t are said to be cointegrated. Clearly, the series need to be integrated of the same order for cointegration to be possible. Note, if ϵ_t are stationary, differences among the variables tend to die out, and therefore the variables are thought to exist in a long-run equilibriating balance. The constant and trend values can be included in equation (6) as needed.

Test for causality

According to the concept of causaliy, due to Granger (1969), a variable B is caused by A if B is better predicted from past values of B and A together rather than from past values of B alone. It follows that four patterns of causality can be distinguished:

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[19] Dickey and Fuller (1981), and Fuller (1976).

(i) unidirectional causality from A to B; (ii) unidirectional causality from B to A; (iii) feedback or bi-directional causality; and (iv) no causality. Then, the pattern of causality between the two stationary variables ΔX and ΔY can be identified by estimating a regression on ΔY and ΔX using current and past values of ΔX and ΔY and by testing appropriate hypotheses. For example, causality between two variables can be tested as follows:

$$\Delta Y_t = C_0 + \alpha_0 \Delta X_t + \sum_{i=1}^{m} \alpha_i \Delta X_{t-i} + \sum_{i=1}^{m} \beta_j \Delta Y_{t-j} + \mu_t \qquad (7)$$

$$\Delta X_t = C_1 + \delta_0 \Delta Y_t + \sum_{i=1}^{m} \gamma_i \Delta X_{t-i} + \sum_{i=1}^{m} \delta_j \Delta Y_{t-j} + \nu_t \qquad (8)$$

where α_i and β_i are coefficients that describe the effects of m current and past vaules of ΔXt and ΔYt on ΔYt, where γ_i and δ_i describe the effects of m current and past values of ΔXt and ΔYt on ΔXt. The μ_t and ν_t are mutually uncorrelated white noise series. The Granger causality can be tested through the null hypotheses that $\alpha_i = 0$ in equation (7) and $\delta_j = 0$ in equation (8) for all i and j, which can be done using standard tests, such as the t-test, F-test, or Wald-test. If $\alpha_i = 0$ and $\delta_i = 0$ for all i and j, then there is no causality, and the current value of each variables is solely affected by its own past history. Also, if some α_i 0, then ΔY is said to be caused by ΔX, while if some δ_i 0, ΔX is caused by ΔY. If both α_i 0 and δ_i 0, then there is bi-directional causality, and both variables are related to current and/or past effects of the other variable.

Engle and Granger (1987) provide a more comprehensive procedure for causality test for variables that are found to be cointegrated. This procedure, known as "error-correction model" (ECM), incorporates information from the cointegrated properties of time series and allows for—in addition to the causal linkage from the short-run adjustment of individual variables per se—a causal linkage between two (or more) variables stemming from an equilibriating (or cointegrated) relationship.

Suppose that there exists a cointegrated relationsip as represented by equation (5), with Xt ~ I(1) and Yt ~ I(1). An ECM can be formulated to test causality as following,

$$\Delta Y_t = C_0 + \alpha_0 \Delta X_t + \sum_{i=1}^{m} \alpha_i \Delta X_{t-i} + \sum_{i=1}^{m} \beta_j \Delta Y_{t-j} + \lambda_1 ECT_{t-1} + \mu_t \qquad (9)$$

$$\Delta X_t = C_1 + \delta_0 \Delta Y_t + \sum_{i=1}^{m} \gamma_i \Delta X_{t-i} + \sum_{i=1}^{m} \delta_j \Delta Y_{t-j} + \lambda_2 ECT_{t-1} + \nu_t \qquad (10)$$

where the ECT_{t-1} is the error correction term lagged one period. The other variables are defined as equation (7) and (8). The ECT_{t-1}, which is stationary, is the fitted value of ϵ_t from equation (6), and thus represents the disequilibrium residuals of a conintegrating equation. Note that the only difference between the specifications of equation (9) (10) and equation (7) (8) lies in the term ECT_{t-1}. Causality test should be based on equation (9) and (10) if the seriese are found to be cointegrated. While causality tests were originally designed for stationary variables, Engel and Granger (1991) extended the idea to be used with conintegration models.

The inclusion of ECT_{t-1} in the ECM gives an extra avenue through which the effects of causality can occur. This additional channel of causality effect functions through the relevant variables' gradual correction of deviation from long-run equilibrium through a series of partial short-run adjustments.The tests are first done on the null hypotheses that $\alpha_i = \lambda_1 = 0$ in equation (9) and $\delta_j = \lambda_2 = 0$ in equation (10) for all i and j. If the null hypotheses can not be rejected, there is no further tesing and there is no causality from either lagged values of the variables or the ECT_{t-1}. If the null hypothesis is rejected, causality is inferred. An assessment is then needed to determine further whether the causality is related to short-run stationary variations, or short-run causality or to the ECT_{t-1} term, the departure from (or shock to) the long-run equilibrium relationship, or long-run causality.

Table 4. Augmented Dickey-Fuller Unit Root Tests

	Bahrain			Oman		
	$\ln(GDP_t)$	$Ln(CAP_t)$	$\ln(CUR_t)$	$\ln(GDP_t)$	$\ln(CAP_t)$	$\ln(CUR_t)$
Level	$-2.78^{c,t***}$	-1.49^{***}	-1.28^{***}	-1.39^{c***}	-3.60^{c*}	$-2.56^{c,t***}$
Lag	0	1	1	1	2	1
First Differences	$-4.83^{c,***}$	-3.54^{**}	-4.27^{***}	-2.10^{**}	$-4.13^{c,t**}$	-3.42^{***}
Lag	0	1	1	0	0	0

	Qatar			Saudi Arabia		
	$\ln(GDP_t)$	$\ln(CAP_t)$	$\ln(CUR_t)$	$\ln(GDP_t)$	$\ln(CAP_t)$	$\ln(CUR_t)$
Level	$-1.24^{c,t***}$	$-1.24^{c,t***}$	-3.29^{c*}	-0.87^{c**}	$-3.17^{c,t***}$	-2.54^{c*}
Lag	0	0	0	1	0	0
First Differences	$-4.49^{c,t**}$	$-5.12^{c,t***}$	-6.48^{c***}	-3.68^{***}	-5.58^{***}	-3.76^{***}
Lag	1	0	0	0	0	0

	U.A.E.		
	$\ln(GDP_t)$	$\ln(CAP_t)$	$\ln(CUR_t)$
Level	$-2.43^{c,t***}$	-2.85^{c***}	0.59^{***}
Lag	1	1	0
First differences	-3.44^{***}	-2.51^{**}	-3.94^{***}
Lag	0	0	0

Note: *, **, and *** denote significance at 10 percent, 5 percent, and 1 percent, respectively.

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