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Impact of Oil Prices and GDP on National Expenditure in the GCC Countries: ARDL Technique for Co-integration

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Abstract

The conducted research is of great importance for GCC countries as it focuses on the annual rates of change for the gross national expenditure, the gross domestic product (GDP), and oil prices (dollars per barrel). These three variables are linked by a long-term equilibrium relationship in both Saudi Arabia and Qatar, no for the other countries, using the appropriate technique (ARDL/Bounds Testing methodology). The error correction model (ECM) showed the availability of high speed of adjustment to modify the deviation and return to equilibrium after a certain shock in the relevant chains. In the long term, a decrease of 1 unit in the annual growth of oil barrel prices will lead to an increase in the annual growth of the national expenditure by (0.195) units in Saudi Arabia and (0.46) units in Qatar. For the rest of the GCC countries, we were able to model the relationship between the three variables through the traditional form of the ARDL model. Our results show that the flexibility of the national expenditure in the short term, according to an increase of 1 unit in the annual growth of oil barrel prices, will be negative in both Oman and Bahrain, by -0.373 and -0.198 units respectively, and positive in Kuwait (0.162) unit. In the UAE, there is no direct impact of the annual growth of barrel oil prices, but it is lagged two years. An annual increase of 1 unit in the GDP will have a positive impact on the gross national expenditure in all GCC countries, as is the case in both Saudi Arabia and Qatar and through the long-run equilibrium equation, 1.102 and 1.1225 units respectively. While, in the short term, it will be 0.762 in the UAE, 1.05 in Oman, and 1.133 units in Bahrain. In Kuwait, there is no direct effect of the GDP annual increase, but it is lagged one year. Also, we were able to calculate the multiplier, in the long term, for an increase in each of the annual GDP growth and the oil barrel prices, in the United Arab Emirates, Oman, Kuwait and Bahrain.

Keywords: Domestic product; National expenditure; Oil prices; ARDL model; Cointegration; GCC countries

Introduction

In May 1981, the Gulf Cooperation Council (GCC) was founded by Saudi Arabia, the United Arab Emirates, Oman, Kuwait, Qatar and Bahrain. This happened as an expression of the conviction that the GCC countries recognized the importance of cooperation among them on the one hand, to ensure institutional action, to consolidate internal stability and promote development climates and, on the other hand, to face external challenges. There is no doubt that the GCC countries have distinguished themselves from the rest of the Arab countries with abundant resources and natural resources from oil and gas and their derivatives. These resources also formed the essence of the local output, which contributed greatly to the availability of liquidity and investment at home and abroad. The first oil boom had an impact on the expansion of the GCC countries' roles, so that the level of public revenues and public expenditure was the highest in 1981, compared with the rest of the developing world. While the world's countries resorted to imposing taxes and duties to deal with rising costs, the GCC didn't need to do any of these tactics due to the fact that the revenues outweighed the components of national expenditure, such as government spending, family and capital formation. To illustrate the path of cooperative mobility, the integration process included major stations such as the establishment of a free trade area in 1983, the establishment of the Customs Union in 2003, and the beginning of one market in January 2008. The main objective was to establish a unified Arab Gulf currency similar to the European Monetary Union. This was originally planned in January 2010, but unfortunately the GCC countries have not succeeded in reaching this goal until now for the emergence of different views on this issue among the member states. In December 2006, Oman announced its inability to join the "single currency" by 2010 due to the proposed strict tax restrictions. In May 2007, Kuwait abandoned a fixed exchange rate with the dollar and pegged its currency to a basket of currencies. In May 2009, the UAE had withdrawn from the agreement after the decision of the Council to determine the location of the Central Bank in Riyadh and not in its territory, and that is because of the dominance of Saudi Arabia in the GCC. In 2015, saudian population was 59.86% of the total GCC population (31,540,372 out of 58,52,692) [1] In terms of natural resources, GCC countries possess almost half of the world's oil reserves and their place in the international trade market is marked by steady progress, especially with the EU and the United States of America [2].

It is useful, in this regard, to mention that the economies of the GCC countries are in the center of the international arena, for two main reasons:

GCC countries contain 40% of the world's oil reserves and 23% of the natural gas reserves, which gave the GCC countries a prominent position in the production and export of hydrocarbons.

The GCC countries have a large foreign exchange reserves due to the increase in world oil demand and prices from 2001 to the first half of 2008. Consequently, the GCC countries have a significant impact on the international financial markets, as they were classified at the end

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of 2008 in the second place after China as an exporter of net capital, so that 13.6% of the world's capital exports come from Kuwait, Saudi Arabia, and the United Arab Emirates, 23.4% from China, and 12.9% from Germany[1]. In addition, three of the world's largest sovereign wealth funds, currently operating in international markets, return to Qatar through the Qatar Investment Authority, the United Arab Emirates, the Abu Dhabi Investment Authority, the Kuwait Investment Authority and the International Finance Institute. These authorities possessed about $630 billion in 2008, running into $1.1 trillion if Saudi Arabian Monetary Agency (SAMA) is included; this explains the GCC countries' holding of 6.4% as the average annual growth rate until 2008, while this average was zero in the rest of the world due to the recent global financial crisis[2] which began to spread globally in September 2008.

Among the reasons why the GCC countries linked their currencies to the US dollar, we mention the following:

Oil revenues have a very high impact on the total exports and revenues of the Gulf States. Since the calculation of oil prices is in US dollars, the stabilization of the national currencies of the GCC countries in US dollars has been a goal of providing sufficient stability in their incomes in order to avoid the risks of external changes.

The strength and credibility of American institutions and the global confidence in the US economy have pushed the GCC countries closer to linking their national currencies to the US dollar to provide a climate of stability and growth in their economies. Before concluding this round in the GCC trade and financial space, we note that the period 2002-2008 witnessed a decline in the value of the US dollar (Devaluation), which led to the decline in the value of the currencies of the Gulf against the Euro, the Yen and the Pound sterling. As a result of this decline, there was an increase in the prices of goods imported from Europe, which ranks first in the imports of the GCC countries [3].

Research questions

To this research, there are several objectives; we summarize them in the following aimed questions that we have worked hard to answer in this article:

1. Is there homogeneity among GCC countries in national expenditure and total domestic savings?
2. Is there a co-integration relationship among the oil price, GDP and the total national expenditure (as annual growth rates) in each of the GCC countries?

Research Methodology

The research methodology depends, on the one hand, on the analytical statistical approach to the time series; on the other hand, on the technique of co-integration through ARDL models according to the methodology proposed by Pesaran, et al. [4].

The research hypothesis

The revenues of the various oil booms contributed to the growth of the gross domestic product, which led to the superiority of revenues over expenditure and investment, and consequently contributed to the acceleration and consolidation of the sustainable development foundations and the capital accumulation, and the climatic conditions of education and raising family awareness were retrieved in all fields of education, health and social issues.

[1]IMF, Global Financial Stability Report, October 2009.
[2]IMF, 2010.

Research structure

The research consists of six sections; the first provides a general introduction to the topic that shows up the problem of the study clearly and the purpose of its setting up. The second section takes a general economic review for the time series of the study. The third section illustrates a descriptive reading of the evolution of the time series, especially the components of national expenditure, GDP and savings, indicating the different trends of these variables as well. The fourth section discusses, in depth, the theoretical basis of the study and some related applied literature; then the practical aspect is approached. The fifth section is devoted to ARDL estimates in each of the GCC countries and the measurement of the elasticity of national expenditure (as a dependent variable) related to the price of a barrel of oil calculated as an annual average of the observations available each year. Finally, the conclusion is in the sixth section, and then the researchers have come up with some important, aimed recommendations.

A General Economic Outlook on the Time Series Subject of Study

Before we look at the evolution of the time series related to the subject, it was necessary to talk firstly about a brief definition of those variables as the World Bank has known. We will then present the data available for the time series of each GCC country. There is no doubt that this will be useful in terms of providing a clear economic vision of the relationship between variables and the possibility of interdependence and interaction in the framework of an economic model in the short and long term. For the definition of variables, it is sufficient for the reader to access the World Bank website for detailed consideration[3]. We will only point out that the variables of the final expenditure of the government's general consumption, the final expenditure of household consumption, the total capital formation, the total national expenditure, the total domestic saving, are all calculated as percentages of GDP. What we see as important is the equations that link these variables to each other as follows:

Final consumption expenditure=Government consumption expenditure+Households consumption expenditure.

Total national expenditure=Final consumption expenditure+Gross capital formation.

Domestic savings=GDP-Final consumption expenditure.

Domestic savings=GDP-Total national expenditure+Gross capital formation.

For each of the GCC countries, we will focus our attention on the three variables: GDP, national expenditure, and domestic savings (Table 1).

Descriptive Reading of the Evolution of Time Series

The economies of the GCC countries are affected by fluctuations in the price of oil and gas, especially as the producing countries are obliged to sell at the market price[4]; therefore, there was a fear of a drop in the price of oil, which actually happened in 2015, to levels below $76 a barrel[5]. On the contrary, the improvements in the oil prices will be reflected positively in GDP; we, ourselves, have shown that clearly through graphs using the logarithm function, as it is evident that GDP is moving in parallel with the movement of oil prices. It is known that

[3]https://www.worldbank.org
[4]Dow Jones & Company.
[5]http://dr-omair.net/wp

Oil Prices and GDP[1]		National expenditure and domestic savings		Country
Sample size for time series	Periods	Sample size for time series	Periods	
48 Years	1968-2015	48 Years	1968-2015	Saudi Arabia[2]
51 Years	1965-2015	50 Years	1965-2015	Kuwait
49 Years	1967-2015	48 Years	1967-2015	Oman
36 Years	1980-2015	35 Years	1980-2015	Bahrain
46 Years	1970-2015	22 Years	1994-2015	Qatar
41 Years	2015-1975	14 Years	2001-2014	UAE

Table 1: Sample size for time series and periods.

[1]Federal Reserve Economic Data FRED.

[2]The value of capital formation in Saudi Arabia was -2.004 billion $ in 1973. This was due to the Arab-Israeli war in October of that year, and the use of oil as an arm in the war against Israel and its allies. In order to address this outlier, we used to estimate the linear relationship of the previous five years, and then adjusted the value to 2.088, thus correcting the ratio of national spending to GDP by 48.59% instead of 21.21%.

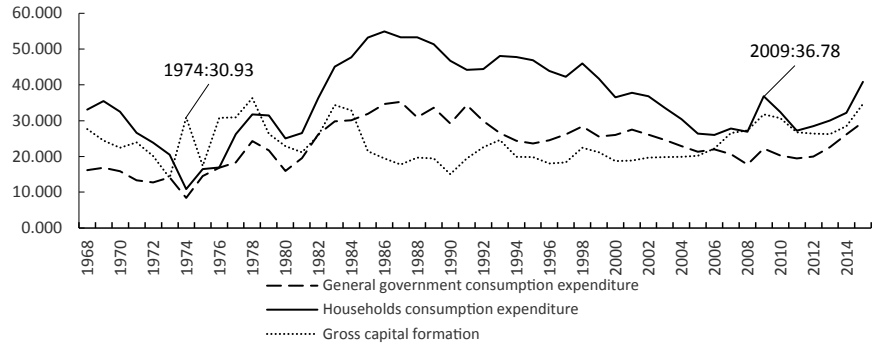

Figure 1: Components of Saudi National Expenditure (Percent of GDP).

the price of that product is affected by several factors, security, political and economic, and it is not only about the levels of global production, but even psychological aspects affect the volume of exchange in global stock exchanges. Therefore, the GCC's GDP cannot be used as a single variable for oil price changes, but the opposite is clear to everyone because the oil plays an important role in the GDP of the GCC countries. According to the World Development Indicators, for the year 2017, the Oil rents[6] (% of GDP) are about 13.13% in United Arab Emirates, 2.01% in Bahrain, 36.61% in Kuwait, 21.80% in Oman, 23.10% in Saudi Arabia, 14.23% in Qatar. This comes up the importance of studying these two random variables, and this is what we will do in the fourth section of this research.

The increase in spending, for example, will inevitably lead to a reduction in domestic savings. The increase of foreign direct investment in the host country will help to bring new technology and contribute to raising the efficiency of human resources and increasing the employment rates in that country. In this section, we'll try to look at the graphs of the time series that are causing this search. Since the size of the time series varies between the GCC countries, we will show the fees for each country separately to see how the components of national expenditure develop and the value of the latter in comparison to the GDP linked mainly to oil prices.

Saudi Arabia

Historically, the first oil boom (1974-1985) provided huge revenues for the GCC countries, in general, and Saudi Arabia in particular, which led them to concentrate on the infrastructure through long-term development plans. This had a positive effect on the capital creation in these countries. However, there is a decline in capital formation during the period 1979-1981 (Figure 1) as the Gulf region witnessed major events, such as the victory of Iranian revolution and the outbreak of the Iran-Iraq War in 1980. After that period household spending grew steadily in 1986 amounted to 54.96% of GDP. Since that year, household spending has witnessed a significant downward trend until 2014, rising to 40.82% in 2015. Similarly, this is what we see in terms of government spending and capital formation, but less sharply, so that they reached 29.56% and 34.65% respectively. It is generally known that total domestic savings are developing in line with GDP growth (Figure 2). We also notice a decline in the nominal GDP for 2009 compared with 2008, from about $520 billion to $429 billion at current prices (17.45%). The main reasons for this decline were the decline in the GDP of the Saudi oil sector in 2009 due to the emergence of the global financial and economic crisis in the business world in September 2008 (the subprime crisis in the United States), which led to a sharp decline in global demand for oil and following by a drop in prices. This contraction in domestic GDP was accompanied by a decrease in the value of domestic savings, which decreased from 288 billion to 176 billion dollars (38.87%), which negatively affected investment in infrastructure because the capital formation is a part of the local saving. Inspectimg Figure 3, it is useful to say in this context that national expenditure sometimes exceeds GDP rates, which happened in Saudi Arabia during the period 1983-1989 when the national expenditure exceeded 7.38% (average value) of GDP, and the growth of household expenditure had a clear impact on this overflow (Figure 1). It is useful to mention that the price of the oil barrel fell from $93.17 in 2014 to $48.66 in 2015, which reflected negatively on the decline of GDP (14.304%), the domestic savings (39.079%) and the growth in national expenditure (3.637%), due to the availability of the financial reserve owned by the Saudi Arabia Kingdom.

[6]The Oil rents are the difference between the value of crude oil production at world prices and total costs of production.

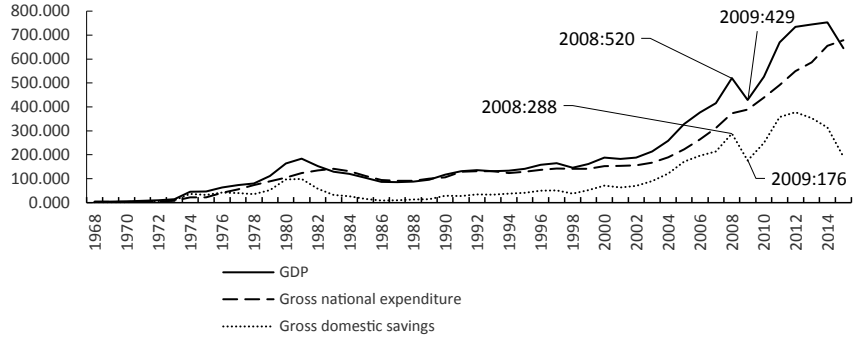

Figure 2: GDP, Gross National Expenditure and Gross Domestic Savings in Saudi Arabia.

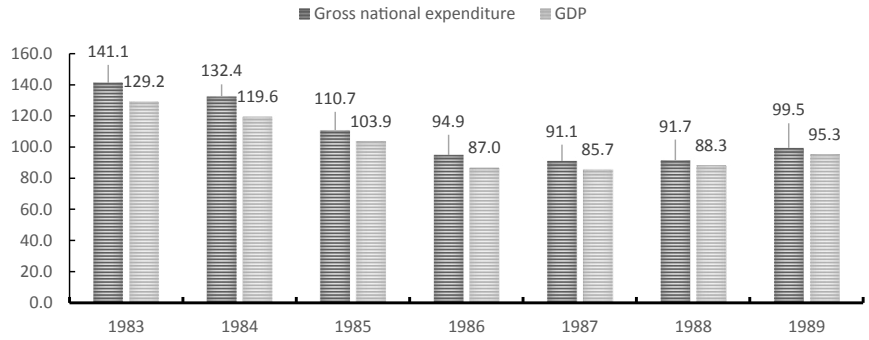

Figure 3: GDP and Gross National Expenditure in Saudi Arabia during the Period 1983-1989.

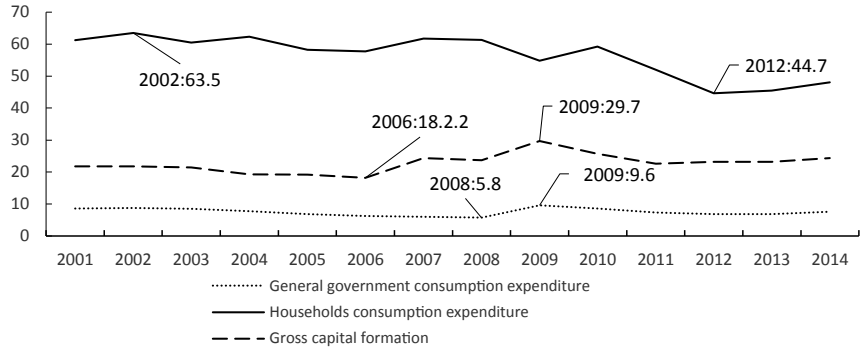

Figure 4: Components of the Gross National Expenditure in the UAE (Percent of GDP).

United Arab Emirates

There is statistical data only for the period 2001-2014, which made the time series related to the UAE shorter than the rest of the GCC countries. If we look at Figure 4, we will find a similarity in the temporal movement between the three components of the national expenditure variable, so that the household expenditure is the highest and it fluctuates from 44.67% to 63.51%, which is about half the GDP, while the capital formation (respectively the government expenditure) fluctuates between 18.2% and 29.73% (resp. between 5.75% and 9.59%). The temporal movement of GDP, national expenditure and domestic savings (Figure 5) reveal an almost parallel movement with a tendency to widen the gap between GDP and national expenditure over the last five years 2010-2014. The average of annual growth rate of GDP is about 8.96%, compared to 4.63% for the annual growth rate of national expenditure. As previously mentioned in the case of Saudi Arabia, the decline in oil prices in 2009 (average price of $61.65 per barrel) had a negative effect on GDP, national expenditure and savings compared with 2008, recording 19.63%, 16.64% and 13.12% respectively.

Oman

If we examine the proportions of the components of national expenditure, government expenditure, household expenditure and capital formation, we find out that, during the period 1967-2014, it changed between a minimum and a maximum level: between (4.38%) and (37.19%) in government spending, between (9.57%) and (73.8%) in household expenditure and between (3.9%) and (49.36%) in capital formation (Figure 6). If we look for the evolution of oil prices, we find out that it had witnessed a significant increase since 2003, so that the average annual price per barrel for that year was about $31, and rose to

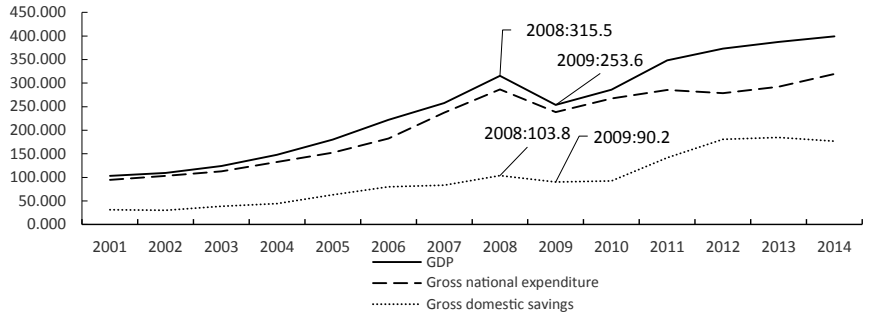

Figure 5: GDP, Gross National Expenditure and Gross Domestic savings in the UAE.

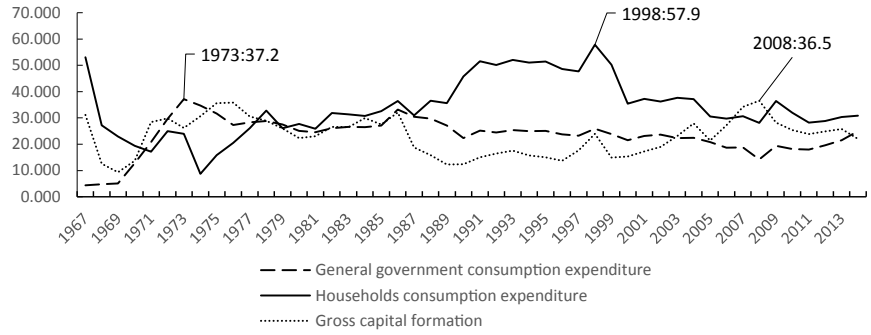

Figure 6: Components of the Gross National Expenditure in Oman (percent of GDP).

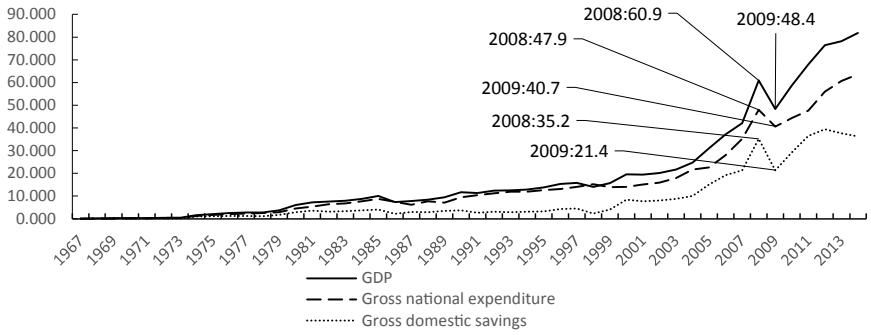

Figure 7: GDP, Gross National Expenditure and Gross Domestic savings in Oman.

$41.5 in 2004, then to about $72 in 2007, and to $100 per barrel in 2008. Many economists considered 2008 as the culmination of the second oil boom despite the rapid decline in the price of the oil barrel from $103.3 an average for September 2008 to $44.6 at the end of this year. This dramatic change explains the huge growth in GDP in Oman as it increased from about 21.63 billion in 2003 to 60.91 billion in 2008, an annual growth rate of 23% (Figure 7). Due to the global financial crisis in 2008, and with the continuous decline of the oil prices reaching $61.65 as an average price per barrel in 2009, GDP, national spending and savings fell at the same year; respectively, 20.55%, 15.19% and 39.23%; the later percentage is considered very high with negative impact on capital formation (Figure 7). In addition, we notice a significant decline in GDP in 2015 compared to 2014 due to the significant decline in oil prices, which fell from 81.8 billion dollars to 70.26 billion dollars (14.11%).

Kuwait

Figure 8 shows that the household expenditure is the highest proportion of national spending since Kuwait's independence from Britain on 19-6-1961. It also shows that the Iraqi invasion of Kuwait on August 2, 1990 and the annexation of Kuwait to Iraq as being its 19th province[7] had a significant impact on the components of national expenditure in Kuwait between 1990 and 1991. The government expenditure, household spending and capital formation grew by 96.71%, 59.85% and 137.48%, respectively. The value recorded in 1991 is therefore exaggerated (outlier); however, we let that value as it is due to its impact on the subsequent years. After 1991, Kuwait recaptured its sovereignty and the components of its expenditure had been declined again. Kuwait had set its first development plan for the period 2010-2014; it was planned to spend about 105 billion dollars on development projects. Currently, Kuwait is planning to re-launch its development plan on the basis of its political stability and will invest about 100 billion dollars over the next five years to finance infrastructure

[7]Kuwait was liberated from Iraq on 25 February 1991.

projects, restore and increase fixed assets and capital formation[8]. As for the GDP, the gap has been widening between it and the national expenditure since 2003. Due to the global financial crisis, the output fell by 28.15% in 2009 compared with 2008; similarly, both national spending and savings fell to (15.08%) and (40.95%) resppectively. We note that GDP and savings are very similar in time movement since 1985 and move in parallel, maintaining the same tendency in terms of rise and fall. Finally, the decline in the price of the oil barrel from $97.91 to $93.17 between 2013 and 2014 had a negative impact on both GDP and domestic savings, with the former falling by 6.06% and the second by 15.79% (Figure 9).

[8]Kuwait News Agency (KUNA), quoting Prime Minister Sheikh Jaber Mubarak Al-Hamad Al-Sabah, in an interview with the British newspaper Oxford Business Group on 14-9-2014.

Qatar

Figure 10 shows Qatar's advantage of capital formation compared to the government or household expenditure. This reflects the country's interest in sustainable development, especially in the areas of fixed assets of the economy, infrastructure development, housing construction, schools, universities and hospitals, etc... The continuous decline in the price of the oil barrel will negatively affect the Qatari GDP, and therefore will affect the balance of trade and the balance of payments as well as the public budget. But despite the decline in

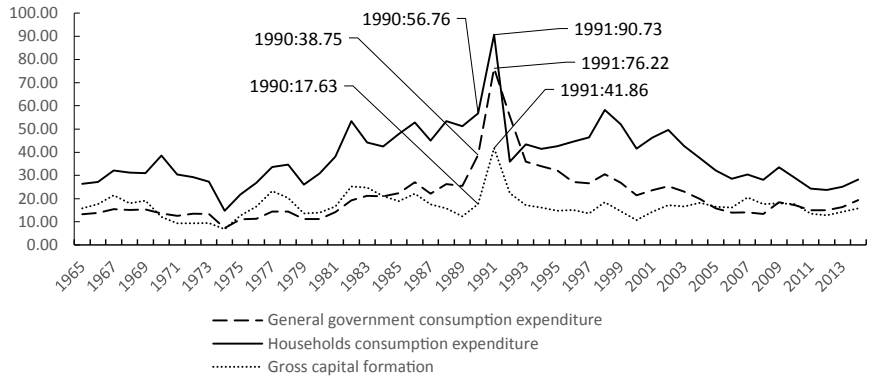

Figure 8: Components of national expenditure in Kuwait (Percent of GDP).

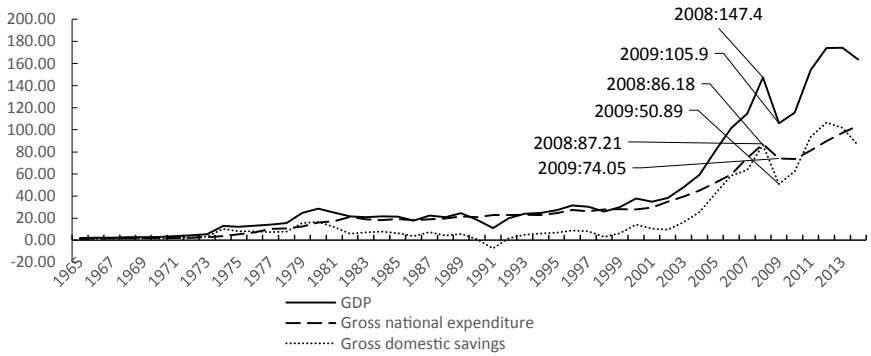

Figure 9: GDP, total expenditure and savings in Kuwait.

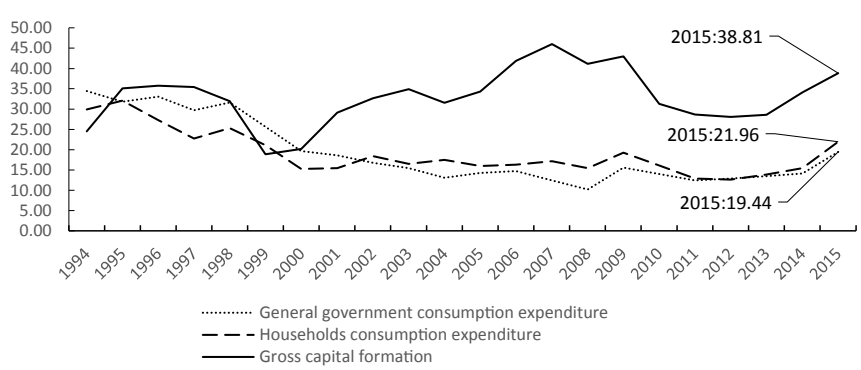

Figure 10: Components of national expenditure in Qatar (Percent of GDP).

the price of the oil barrel from $93.17 in 2014 to $48.66 in 2015, we are witnessing a growth in the proportion of components of national expenditure during these two years. We also note that the movement of GDP, national expenditure and savings declined in 2009 compared to 2008, so that the declining rate reached 15.16%, 0.96% and 25.78% respectively (Figure 11). We also notice the almost parallel mobility of both GDP and savings. GDP and domestic savings have been negatively affected by the decline in the price of oil between 2014 and 2015, which has reduced domestic output by 20.56% and domestic savings by 33.85%.

Bahrain

Obviously, it seems that the capital formation grew rapidly with the second oil boom and reached 35.17% in 2008, the highest in a decade (Figure 12). After that year, the capital formation variable dropped to 16.303% in 2014. In the contrary, we see a downward trend in government expenditure since 1986 (the end of the first oil boom), where the highest percentage (27.22%) in its time movement in 35 years. Figure 12 shows the predominance of household spending on national expenditure. Finally, Bahrain, like other GCC countries, was affected by the global financial crisis; each of the GDP, national expenditure and domestic savings declined in 2009 compared with 2008 by 10.78%, 10.45% and 26.08%, respectively. We also notice that during the period 1991-2008, there was a significant similarity in the trends of both GDP and savings, while during the period 2009-2014, the gap between the two variables widened due to the relatively large decline in the savings variable compared to the decline in GDP (Figure 13).

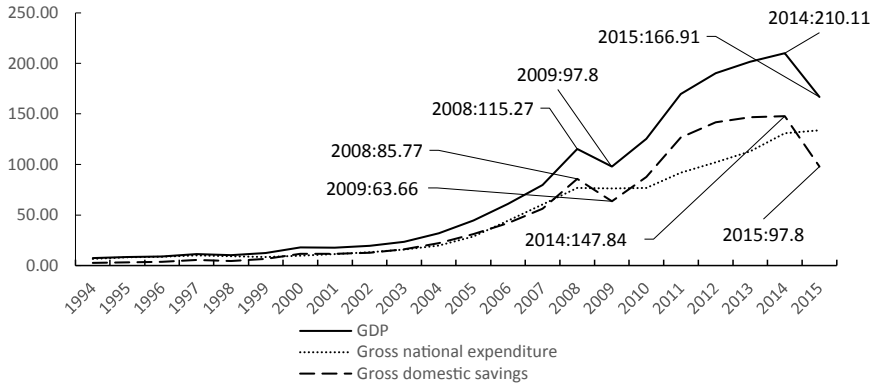

Figure 11: GDP, total expenditure and savings in Qatar.

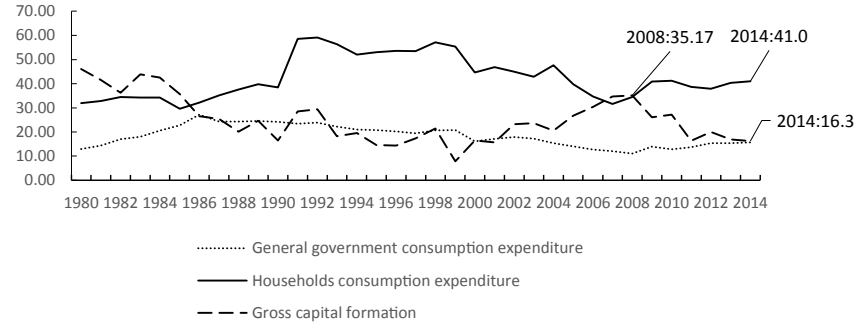

Figure 12: Components of national spending in Bahrain (Percent of GDP).

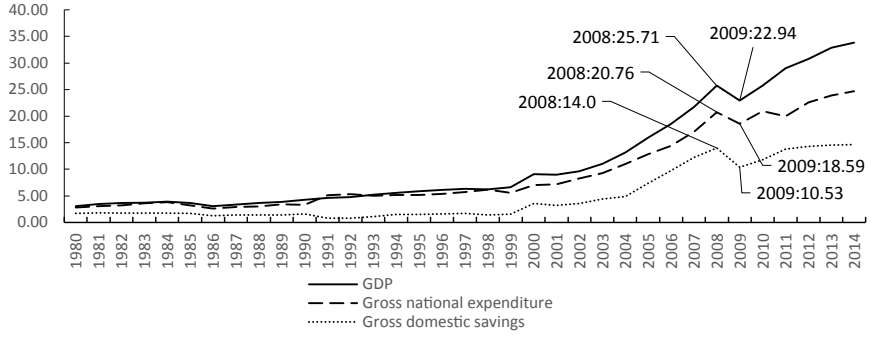

Figure 13: GDP, total expenditure and savings in Bahrain.

The Theoretical Foundations of the Study and Some Applied Literature

Basically, in the literature of scientific analysis, the researcher should avoid engaging into things that aren't based on measurement or experiment; instead he should use available statistical data because the availability of accuracy in the data is a prerequisite for the quality of analysis and for the achievement of logical, aimed conclusions, which in turn give a climate of objectivity and allow decision-makers to take the necessary decisions based on the recommendations or proposals reached by the researcher. The "number" remains a "dead" number if the researcher is unable to study it and extract the important information involved. Such a need manifests the importance for statistics in the econometrics because the models are taught from different aspects of the experiment, and they need to approach different hypotheses, and thus to accept or reject the null hypothesis in different locations. Since the statistical data that we have obtained from the World Bank is on annual time series, and since the study utilizes the technique of combined integration of the ARDL self-regression model, according to the restrictive testing methodology proposed et.al. [4-7] Pesaran & Smith;

Pesaran & Shin Pesaran,Pesaran we will briefly outline the relevant steps followed to reach our desired goal, namely building error correction model (Error Correction Model - ECM) [6,8,9].

One of the basic assumptions for using ARDL models is the stationarity of the relevant time series. In the applied field, however, we will generally be faced with phenomena lacking of stationarity. This has given the ARDL models a significant push forward in the expansion of their usage to extend non stationary time series and progress towards building the corrected error model and decision-making. The lagged periods of exogenous or endogenous variables are justified in psychological factors and institutional factors, in customs and traditions, in technical and technological reasons, in political and social causes, and finally in the nature of employment contracts and unemployment.

The ARDL model is a dynamic equation that attracted researchers, especially in its version of error correction (ECM). Its popularity in applied econometrics has increased since the beginning of the theorem [10] which showed that a linear combination of non-stationary time series is stationary. According to the researchers the ECM model provides an excellent structure that allows for the exploitation of mobile information with data and information available in economic theory [11] they tried to demonstrate the importance of estimating the ECM model [12] then the use of the co-integration procedure proposed by Johansen, et al. [13-16] has been appearded afterwards. For Johansen technique [17] carried out a study of the foreign direct investment flows in the world [18] performed an important study of the components of public debt in Lebanon [19] analyzing the co-integration of expenditure and savings in Jordan.

Concerning the usage of co-integration in the ARDL structure[9], we mention, for instance, [20,21] In real broad money supply M2 in Japan and its relation to real GDP and market interest rate using the quarterly data; [22] also revealed a correlation between demand for money, interest rates and exchange rates by analyzing quarterly data in Hong Kong[10]; [23] Established a strong relationship between the development of the stock market and the financial and economic growth of Pakistan; [24] for the relationship of the real monetary bloc relation to the logarithm (LM1 or LM2) in Hungary with the economic and financial variables calculated by the natural logarithm except for the rate of inflation, which is composed of real income at constant prices and nominal exchange rate[11]. The main objective was to ensure that there is a long-run equilibrium (LRE) among these variables, [25] In a research paper in Zimbabwe, revealed (ARDL) with co-integration for annual time series on household final consumption expenditure (dependent variable) GDP, government expenditure, the total government debt, the size of the public debt and interest payments on unpaid government debt. [26] used the ARDL model with a co-integration for M2 (Real broad money supply) and its relation to variables such as GDP, discount rate and inflation rate in Pakistan. Very recent researches used the ARDL/Bounds testing Methodology proposed by Pesaran, Shin and Smith (PSS). For examples, [27] studied the long-run equilibrium relationship between the highest daily value of the exchange rate for the EURO against the US dollar and the opening price in the short and long terms, [28] published an important book showing the importance of the ARDL model with co-integration, [29] carried out a depth study relating socio-economic variables and crimes in United States.

How do we use PSS technique to build an ARDL model with a co-integration between the variables which are mixed between stationary and not? As it is well known, PSS aims to test the null hypothesis that there is no co-integration between the variables involved in the model versus the alternative hypothesis, which recommends a long-term equilibrium relationship between variables, i.e. co-integration. The PSS procedure tests this equilibrium relationship, regardless of whether the basic variables are stationary (Integrated at order 0) I(0), or stationary in the first differences I(1), or I(d), 0<d<1, the so-called fractionally integrated. This means that if we find one variable I(2) then the PSS procedure becomes invalid.

In the economy, the analysis of stationarity is extremely important in time series. In fact, there are several reasons for not being stationary the most common are: the average of the time series varies with time, or the variance changes over time. The stationary time series has a tendency to go back to its average and fluctuate around it in a seemingly random way. However, most economic or financial phenomena are non-stationary time series and require diverse differences to acquire stationary. There are many ways in the literature of econometrics to address the subject of stationary. In this section, we will be satisfied with the the time series Augmented Dickey-Fuller ADF to test the root of the unit proposed earlier [30,31].

We will now examine the co-integration of the following three variables:

a. Annual GDP Growth:

$$X_{1t} = 100 \times \frac{GDP_t - GDP_{t-1}}{GDP_{t-1}}$$

b. Annual percentage change in oil prices (Dollars per Barrel):

$$X_{2t} = 100 \times \frac{PRICE_t - PRICE_{t-1}}{PRICE_{t-1}}$$

c. Percentage of annual change in total national expenditure (dependent variable):

$$Y_t = 100 \times \frac{GNE_t - GNE_{t-1}}{GNE_{t-1}}$$

[9]Hassler & Wolters (2007), and Tang (2007).
[10]Shahbaz, Ahmed and Ali (2008).
[11]Dritsakis (2011).

We have annual data for variables GDP_t, $PRICE_t$, and GNE_t covering the time periods shown in Table 1. Thus we have three variables Y_t, X_{1t} and X_{2t}. What do we say about the ARDL model (p,q_1,q_2) and how do we build the ECM model?

Step 1: Test the stationarity of the three variables. The purpose here is to statistically confirm the existence of d=0 or 1, which means that we may fall on a mixture of I(0) and I(1). What is important is that strings I(2) should not be among the variables involved in the model. Note that the Engle & Granger or Johansen for co-integration procedure require that the times series be integrated from the same order, while this does not require doing PSS, which makes it safer to handle from the perspective of integration order.

Step 2: In the absence of any prior knowledge of the relationship between long-term variables, we consider the Unrestricted Error Correction Model (UECM) or conditional (PSS) because we did not place constraints on parameters of variables at the level, e.i., β_1, β_2 and β_3 are considered the most common case without restriction of the Unrestricted intercept, no trend parameter:

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 X_{1,t-1} + \beta_3 X_{2,t-1} + \sum_{i=1} \varphi_i \Delta Y_{t-i} + \sum_{j=0}^{q_1} \gamma_j \Delta X_{1,t-j} + \sum_{k=0}^{q_2} \delta_k \Delta X_{2,t-k} + \varepsilon_t \quad (E_1)$$

How do we determine the value of the delay (p)? This is done through the AIC or SBC criterion, taking into account the behavour of the residues as a white noise usinf the he Ljung-Box statistics. It is natural that we do not go too far in value (p) because this has negative consequences for the degrees of freedom of the model. In the famous article (PSS 2001), and in the size of 104 series quadratic observations, the choices (p=1...7) were about 7.3% of the available residues. Basing on the PSS approach, we cannot choose the same class (p). In general, we usually obtain different degrees (p, q_1, q_2).

Step 3: We test for a long-term equilibrium relationship between variables at the level such that:

$H_0 : \beta_1 = \beta_2 = \beta_3 = 0$, there is no long-term equilibrium relationship.

$H_a : \beta_i \neq 0$, at least for *i*, this means that there is long-term equilibrium relationship.

We calculate the Bounds testing F under the PSS approach and we denote it $F_Y(Y|X_1,X_2)$. This statistic is not subject to Fisher's classical distribution but is subject to a non-standard distribution of the degree of integration of the time series, e.i. I(1) or I(0), the number of parameters estimated in the model and the existence or absence of constraints on the trend and the inetrcept. The PSS procedure determines two sets of critical values. The first set represents the minimum values that result from the assumption of all time series in model are I(0) and therefore there is no co-integration. The second set consists of large values and assumes all time series I(1) and thus there is co-integration. If the calculated F is outside the specified bound suggested by PSS procedure, then we will reach to one of these two inferences:

If the calculated F is greater than the upper critical value of the bound, then we accept the co-integration.

If the calculated F is smaller than the minimum critical value of the bound, then we reject the co-integration.

However, if F statistic is included in the bound, then the decision will be inconclusive, indicating that the F statistic depends on the quality of integration I(0) or I(1).

The PSS method also allows the t-test "Bounds t-test" and tests the significance of parameter β_1:

$H_0 : \beta_1 = 0$, there is no long-run equilibrium relationship.

$H_a : \beta_1 < 0$, there is a long-run equilibrium relationship.

Decision method

If t calculated is outside the upper critical value of the bound, then we accept co-integration.

While if it is outside the minimum critical value of the bound, then we reject the co-integration, and we conclude that the time series in the model are considered to be I(0).

Step 4: Let us conclude that there is a co-integration between the variables. How will we determine the optimal orders (p, q_1, q_2) for the short-term dynamic relationship of the ARDL model at the level? Since these orders are not necessarily equal, it is best to perform a comprehensive survey of their different values, which is allowed by the available data sizes.

$$Y_t = c_0 + \sum_{i=1}^{p} \varphi_i Y_{t-i} + \sum_{j=0}^{q_1} \gamma_j X_{1,t-j} + \sum_{k=0}^{q_2} \delta_k X_{2,t-k} + \boldsymbol{\varepsilon_t} \quad (E_2)$$

For each of them we calculate the values of the automatic criteria such as AIC and SBC, for example. We select the orders that allow for the minimum value of those criteria. Through our experience in modeling of the time series, we recommend; in addition to the AIC and SBC criteria, the Ljung-Box statistic that tests non-correlation of residues.

Let's take up the following arguments: $1 \leq p \leq H$, $0 \leq q_1 \leq H_1$, $0 \leq q_2 \leq H_2$, this allows the estimation of a large number of models equal to: $H \times (H_1+1) \times (H_2+1)$. For example, if H=10, $H_1=H_2=9$, we will get 1000 ARDL(p, q_1, q_2).

Step 5: After determining the optimal values (p, q_1, q_2), we estimate the linear relationship between the variables at the level in the long run:

$$Y_t = \alpha_0 + \alpha_1 X_{1,t} + \alpha_2 X_{2,t} + \eta_t$$

Thus, the OLS method is obtained by the estimated $\hat{\eta}_t$ and EC_t:

$$EC_t = Y_t - \hat{\alpha}_0 - \hat{\alpha}_1 X_{1,t} - \hat{\alpha}_2 X_{2,t} \quad (E_3)$$

Step 6: We Consider the Conventional ECM:

$$\Delta Y_t = c_0 + \sum_{i=1}^{p} \varphi_i \Delta Y_{t-i} + \sum_{j=0}^{q_1} \gamma_j \Delta X_{1,t-j} + \sum_{k=0}^{q_2} \delta_k \Delta X_{2,t-k} + \gamma EC_{t-1} + \varepsilon_t \quad (E_4)$$

We then estimate it in OLS.

The parameter γ indicates the speed of adjustment to the equilibrium in the event of deviation. γ should be negative (doesn't equal to zero), at a significant level of 5%, in order to ensure the dynamic movement towards the equilibrium relationship in the long term. In general, we will find -1< γ< 0. When γ is close to (-1) this means that the return to equilibrium will be almost complete in next time.

Step 7: Estimating the (E_4) model and accepting the hypothesis that the residues are not correlated with the Ljung-Box statistic, Dave Giles, professor of economics at Victoria University in Canada, advises that the roots of the polynomial $\hat{\varphi}(B) = \left(1 - \sum_{i=1}^{p} \hat{\varphi}_i B^i\right)$ are outside the unit circle, which provides the dynamic stationartity of the estimated model.

Note (1): In the long term $\Delta Y_t=\Delta X_1=\Delta X_2=0$. Thus, through (E_1) we obtain the relationship in the long run:

$$Y_{t-1}=-\frac{\beta_2}{\beta_1}X_{1,t-1}-\frac{\beta_3}{\beta_1}X_{2,t-1}.$$

ARDL Model with or without Co-integration

This section is of great importance as it will be the backbone of the study and its main objective. Let us first examine the stationarity under the ADF technique and put the results in Table 2. Obviously, the tests indicate that the stationarity is accepted for the variables at the level except Y_t requires the first differences to become stationary in Saudi Arabia and Qatar.

In this table, it is not feasible to study co-integration in the UAE, Oman, Kuwait and Bahrain because the three variables are stationary, while we will study the co-integration by PSS technique in Saudi Arabia and Qatar.

Saudi Arabia

To evaluate the model of multiple linear regression so that Y_t is a dependent variable in the period 1969-2014 (t-statistics):

$$\hat{Y}_t = 0.846+1.102\ X_{1t}-0.195\ X_{2t} \qquad (E_5)$$
$$(0.39)\quad (9.33)\quad (-1.63)$$
$$R^2 \cong 85\ \%$$

(E_5) cannot be considered as a long-term equilibrium relationship before we determine the results of PSS technique. In the unit root test table, it appears that Y_t variable needs the first differences I(1) to acquire the stationarity, while the variables X_{1t} and X_{2t} are at level I(0). This helps us to go toward the PSS technique to study the co-integration of the three variables.

Let us adopt the ARDL (p, q_1, q_2) model with a co-integration as shown in equation (E_1). To determine the optimal values for grades (p=1, …, 6, q_1=0, …, 6, q_2=0, …, 6), we estimated 294 models and computed the AIC and Figure 14 explain it:

The model appears to be ARDL (6, 3, 5). To test the zero hypothesis H_0 versus the alternative hypothesis H_1:

H_0: $\beta_1=\beta_2=\beta_3=0$

H_1: $\beta_1 \neq \beta_2 \neq \beta_3 \neq 0$

After examining the importance of the estimated parameters of the ARDL(6, 3, 5), it was shown that $\left(t_{\hat{\delta}_5}=-1.33\right)$. Therefore, we considered the most appropriate choice (q_2=3) and then recalculated ARDL (6.3.3) on the restricted F statistic as shown in Table 3:

Through (E_3), we get the others:

$$EC_t = Y_t-\left(0.846+1.102\ X_{1t}-0.195\ X_{2t}\right) \qquad (E_6)$$

We can now estimate the conventional ECM or the conventional error correction model:

τ	τ_μ	τ_τ	**Annual Gross National Expenditure Growth Y_t**	**p**	**Country**
-14.12	-13.95	-13.79	In the first differences	2	Saudi Arabia
…	…	…	There is not enough data	…	UAE
-3.89	-4.78	-5.52	In the level	1	Oman
-3.05	-3.97	-4.06	In the level	1	Kuwait
-4.17	-4.04	-3.97	In the first differences	2	Qatar
-4.65	-5.94	-5.99	In the level	1	Bahrain
τ	τ_μ	τ_τ	**Annual Growth in GDP X1t**	**p**	**Country**
-4.51	-5.05	-5.48	In the level	1	Saudi Arabia
-4.05	-4.98	-4.92	In the level	1	UAE
-4.98	-5.78	-6.1	In the level	1	Oman
-5.91	-6.91	-6.9	In the level	1	Kuwait
-4.36	-5.13	-5.24	In the level	1	Qatar
-3.38	-4.81	-5.18	In the level	1	Bahrain
-5.73	-6.17	-6.33	In the level	1	Annual growth in the price of barrel of oil X_{2t}
Critical values at a significant level 5%:(-3.5), (-2.93) and (-1.95) for the testing of τ_τ, τ_μ, and τ respectively.					

Table 2: The unit root ADF test for the three variables.

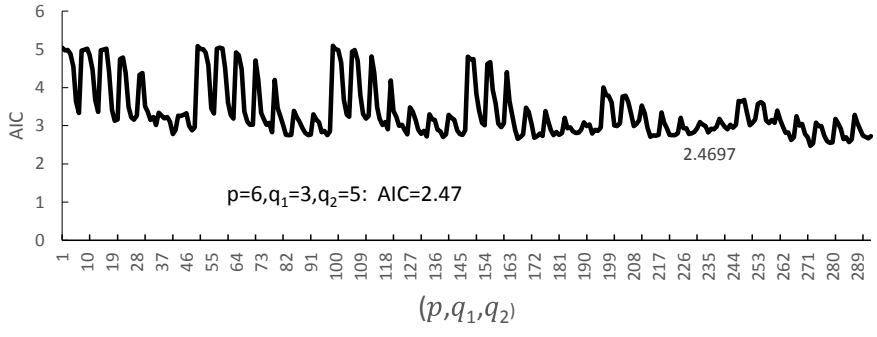

Figure 14: Determination of the optimum order of the ARDL model.

$F_Y(Y\|X_1,X_2)$	Model	Significant level	Bound critical values Unrestricted intercept and no trend	
5.72 ≥ 4.85	ARDL (6, 3, 3)	1%	5.15	6.36
		5%	3.79	4.85
		10%	3.17	4.14
		We accept co-integration at a significant level of 5%		

Table 3: PSS for co-integration in Saudi Arabia (k=2).

Variable	Coefficient	Std. Error	t-Statistic	Prob
Constant	-0.387	0.747	-0.518	0.609
ΔY_{t-1}	0.015	0.131	0.117	0.908
ΔY_{t-2}	0.175	0.092	1.892	0.071
ΔY_{t-3}	-0.076	0.076	-0.992	0.332
ΔY_{t-4}	0.052	0.041	1.277	0.214
Δy_{t-5}	0.032	0.033	0.996	0.329
ΔY_{t-6}	-0.025	0.024.	-1.043	0.308
$\Delta X_{1,t}$	0.452	0.101	4.462	0.000
$\Delta X_{1,t-1}$	-0.383	0.205	-1.871	0.074
$\Delta X_{1,t-2}$	-0.301	0.179	-1.681	0.106
$\Delta X_{1,t-3}$	0.169	0.146	1.153	0.261
$\Delta X_{2,t}$	-0.048	0.054	-0.885	0.385
$\Delta X_{2,t-1}$	0.111	0.064	1.729	0.097
$\Delta X2_{t-2}$	0.122	0.065	1.882	0.072
ΔX2,t-3	-0.060	0.055	-1.080	0.291
EC_{t-1}	-0.766	0.266	-2.878	0.008
RSS=408.345 s=4.2136 R^2=96.32% $\bar{R}^2 = 93.93\%$ F(15,23)=40.17 DW=1.42 LB(12)=11.95 ≤ 21.03=$\chi^2_{0.05;12}$ Dependent variable: ($\Delta \mathbf{Y}_t$) Independent variables: ($\Delta \mathbf{X}_{1t}$) and ($\Delta \mathbf{X}_{2t}$) **n=46**.				

Table 4: Estimation of the corrected error model (ECM) for Saudi Arabia.

Given the importance of this model, we would say that the signal of the equilibrium parameter is negative enough and that is what makes us endorse the ECM model (Table 4). This means high speed is available in adjusting the deviation and returning to equilibrium after a certain shock occurs in the relevant time series. A deviation from the equilibrium level of the year (t-1) will be corrected by 76.6% in the next year, ine time (t). Returning to the long-term equilibrium equation, equation (E_1), a decrease of one unit in the annual rate of change in oil prices will lead to a rise in the national expenditure by (0.195) provided that the other factors remain constant. But how can domestic output remain stable despite the increase in the price of the oil barrel? The decline in oil prices has a significant impact on the low prices of airline tickets and holiday packages, so the airline sector is one of the sectors benefiting from the decline in oil prices. The decline in oil prices contributes to the decline in the prices of imported goods. The GCC countries import a large proportion of food commodities from foreign markets, which in turn will have a positive effect on national spending, such as household spending which averaged about 35.6% of GDP during the period 1968-2014. And we should not forget that many sectors, led by the industrial sector, will be one of the most beneficiaries of the decline in oil prices. Some experts believe that the decline in oil prices positively affects the reduction of inflation; in general, in the oil-countries, which contributes to attracting new investments.

A one unit increase in economic growth (GDP growth) will result in an increase of about 1.102 units in national expenditure ratios. This means that economic growth clearly affects spending growth almost of the same magnitude. The decision-makers in Saudi Arabia should pay attention to the decline in oil prices, work on a multiplicity of sources of wealth, slowly free from the link with oil prices and guide the Saudi economy in the fields of industry and innovation in the diversity of sources of production.

United Arab Emirates

We will examine the relationship of the annual growth of GDP (Y_t) to the annual change in the price of crude oil (X_t) over the period 1976-2014 (39 years). For the total national expenditure, the reserves are available only for the period 2001-2014. For this we will only have ARDL (p, q) for Y_t and X_t variables. As we noted in the variable unit root test, we are at level I(0) (Table 5).

After extensive study, we proposed the ARDL (6, 6) model. After examining the estimated parameters, we obtained the following model:

This model shows that, in the short term, the average annual growth of the average price of the oil barrel affects positively the GDP growth. In fact, an increase of one unit in the annual growth rate of the average price of the oil barrel leads to an increase in the annual growth of the UAE GDP by 0.443 units, while the other variables are fixed. Since the variables Y_t and X_t are stationary, in the long term, we can deal with the following equation:

$$Y=5.21+0.214Y - 0.29Y+0.433\ X - 0.039X+0.136X.$$

$$(1-0.214+0.29)Y=5.21+(0.433 - 0.039+0.136)X.$$

$$1.076Y=5.21+0.53X.$$

$$Y = \frac{5.21}{1.076} + \frac{0.53}{1.076}\ X = 4.842 + 0.4926X \cdot$$

Thus, we obtain the elasticity of the annual growth of GDP according to an increase of 1 unit in the annual growth rate of oil price

in the long term is (0.4926) units. This result is critical as it reflects the importance of non-oil resources in the annual growth of GDP in the UAE, which represents about 50% of its nominal value (Figure 15).

Let's now take the national expenditure as a dependent variable, X_{1t} and X_{2t} as independent variables. We have short time series covering the period 2002-2014 (13 years). To this end, we will try to obtain information that shows the elasticity of annual national expenditure according to GDP growth and the growth of the average price of oil in the short and long term. Because of the small size of data, we were able to estimate the ARDL (0.0, 2) model:

$$\hat{Y}_t = \underset{(5.82)}{0.762}\, X_{1t} + \underset{(1.58)}{0.138}\, X_{2,t-2} \qquad (E_7)$$

$$LB(4) = 3.046 \le 9.49 = \chi^2_{0.05;4}$$

We also notice that the elasticity of the annual growth rates of national expenditure, according to the annual growth of 1 unit in the GDP, is 0.76 units while there is no direct impact on the price of the oil barrel; however, it will worth approximately 0.138 units delayed by two years if an increase of 1 unit occurs in the growth rates of the oil barrel.

Oman

As shown in the unit root test, the three time series appear to be static at level I(0) and thus the traditional ARDL model is sufficient for the available period 1968-2014 (47 years). Through the AIC standard, we were able to classify the ARDL(p_y=2, p_{x1}=1, p_{x2}=6). After the deletion of the nonsignificant parameters, the opinion was based on the ARDL model (1.0, 0) (in the brackets of the t-statistic).

$$\hat{Y}_t = \underset{(2.65)}{0.1486}\, Y_{t\ 1} + \underset{(9.42)}{1.05}\, X_{1t} - \underset{(\ 2.97)}{0.373}\, X_{2t} \qquad (E_8)$$

LB(6)=7.33, LB(12)=8.39

Based on this model, an increase of 1 unit in the annual growth rate of the average price of the oil barrel leads to a decrease in the annual growth rate of national expenditure in Oman by (0.373) units, while an increase of 1 unit in annual GDP growth leads to a 1.05 units an increase in national expenditure. To achieve this objective, we have calculated the marginal growth of national expenditure in the long term, respectively, from the annual growth of MPX1 and the annual growth of MPX2 oil prices. In the long term we have the following equation:

$$Y=0.1486Y+1.05X_1-0.373X_2$$

We will find:

$$\left[MPX1 = \frac{1.05}{0.8514} \cong 1.233\right] \text{ and } \left[MPX2 = \frac{-0.373}{0.8514} \cong -0.438\right]$$

Thus, a significant increase in national expenditure will result in 1.233 units as a result of an increase 1 unit in economic growth, while a decrease of about 0.44 units will result from an increase of 1 unit in the annual price growth of the one barrel of oil.

Kuwait

As shown in Table 2, the variables are stationary at the level and thus there is no need to study co-integration. After determining the optimal values for the model through the AIC throughout the time period 1966-2014 (49 years), we found the model ARDL (p_y=1,p_{x1}=3,p_{x2}=2), so that (AIC(1,2,3)=4.2210). After estimating the model and deleting the nonsignificant parameters according to the t-statistic and at a significant level of 5%, we obtained the estimate of ARDL (0, 2, 3):

$$\hat{Y}_t = \underset{(6.54)}{0.2314} X_{1,t-1} + \underset{(4.99)}{0.1833} X_{1,t-3} + \underset{(4.85)}{0.1617} X_{2,t} + \underset{(5.52)}{0.1776} X_{2,t-2} \qquad (E_9)$$

Variable	Coefficient	Std. Error	t-Statistic	Prob
Constant	5.210	1.212	4.299	0.0002
y_{t-1}	0.214	0.066	3.234	0.0032
Y_{t-6}	-0.290	0.104	-2.8	0.0093
X_t	0.433	0.033	13.198	0.0000
X_{t-5}	-0.039	0.029	-1.389	0.1761
X_{t-6}	0.136	0.054	2.49	0.0192

RSS=466.428 s=4.1563
R^2=88.35% $\overline{R}^2 = 86.19\%$ F(5,27) =40.93 DW=1.92
LB(6)=6.9 ≤ 12.59=χ^2 0.05;6
Variable dependent Y_t
Independent variable X_t
Number of views (n=39).

Table 5: Estimation of the traditional model ARDL (6,6) for the United Arab Emirates.

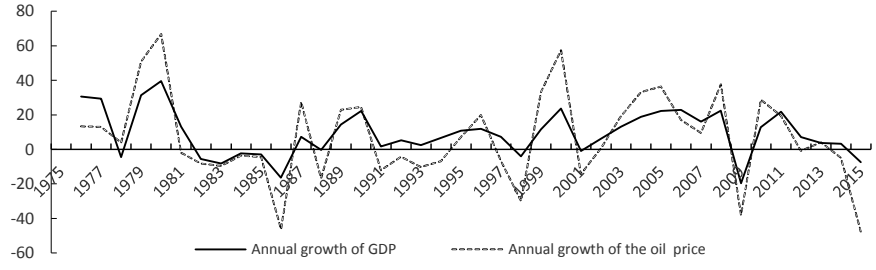

Figure 15: Annual growth of GDP and the price of oil in the United Arab Emirates.

LB(6)=3.0, LB(12)=8.61

The marginal growth of national expenditure resulting from the annual growth of 1 unit per barrel of oil is 0.1617 units, while the long-term multiplier effect of X_1 and X_2 is as follows:

LRM(X_1)=0.4147; LRM(X_2)=0.3393

What distinguishes the State of Kuwait is the positive impact on the national expenditure of both the annual growth of GDP and the average price of a barrel of oil.

Qatar

Since the total national expenditure in Qatar available in 1994-2014 is not stationary in level, but stationary in the first differences I(1), while the two series, the annual growth of GDP and the average price of a barrel of oil, are at the level I(0), we will study he ARDL (p_Y, p_{x1}, p_{x2}) model with co-integration. However, since a small sample of data is available, and in order to maintain the greatest degrees of freedom and after taking several models, we proposed the ARDL model (1.0,0) with a co-integration (Figure 16):

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 X_{1,t-1} + \beta_3 X_{2,t-1} + \varphi_1 \Delta Y_{t-1} + \alpha_1 \Delta X_{1,t}\ \alpha_2 \Delta X_{2,t} + \varepsilon_t \quad (E_{10})$$

After calculating the restricted F statistic in the form (E_1), we found ($F_Y(Y \mid X_1, X_2)$=5.67>4.85), and thus we accept co-integration at a significant level of 5%. Consequently, here is the error correction form model:

$$\Delta \hat{Y}_t = \underset{(2.9)}{0.464}\ \Delta Y_{t-1} + \underset{(5.85)}{1.0212} \Delta X_{1,t} - \underset{(-3.01)}{0.3733} \Delta X_{2,t} - \underset{(-2.83)}{0.4847} EC_{t-1} \quad (E_{11})$$

LB(3)=2.85, LB(6)=4.28

$$\Delta \hat{Y}_t = \underset{(2.9)}{0.464}\ \Delta Y_{t-1} + \underset{(5.85)}{1.0212} \Delta X_{1,t} - \underset{(-3.01)}{0.3733} \Delta X_{2,t} - \underset{(-2.83)}{0.4847} EC_{t-1} \quad (E_{12})$$

The negative sign of the equilibrium equation with 5% significance level in the period (-1 ≤ -0.4847<0) makes us accept the hypothesis of co-integration between the three variables. If a deviation from the balance of the year (t-1), it will be corrected in year (t) by (48.5%), which is so high that within one year about 50% of the deviation will be corrected. A drop of 1 unit in the change of the annual rate of oil prices will lead to a rise in the change of the national expenditure by 0.46 units. A 1 unit rise in GDP growth will result in an increase of about (1.1225) units in the national spending ratio at the long-term. This means that economic growth clearly affects spending growth almost of the same magnitude.

Bahrain

To see the figure of the three stationary variables at level I(0), we observe a similarity in the time movement during the period 1981-2014, as it seems to us that the oil price series is the most divergent compared to both the annual growth of GDP and national expenditure.

Based on AIC criterion, the prposed model is ARDL(3,6.3). The estimated model is presented in Table 6.

An increase of 1 unit in annual GDP growth and average oil price leads to a marginal growth of national expenditure (1.133) and (-0.198) units respectively. The long-term multiplier effect of X_1 and X_2 is as follows:

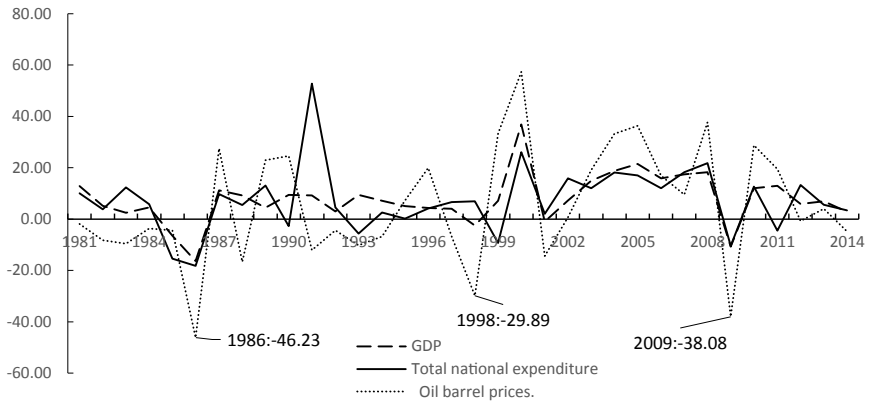

Figure 16: Annual percentage changes in GDP, total national expenditure and oil barrel Qatar.

Variable	Coefficient	Std. Error	t-Statistic	Prob
Y_{t-3}	-0.3000	0.147	-2.041	0.054
$X_{1,t}$	1.133	0.237	4.78	0.000
$X_{1,t-2}$	0.255	0.137	1.864	0.076
$X_{1,t-3}$	1.00	0.319	3.130	0.005
$X_{1,t-6}$	-0.492	0.154	-3.196	0.004
$X_{2,t}$	-0.198	0.106	-1.875	0.075
$X_{2,t-3}$	-0.438	0.111	-3.928	0.001
RSS = 1335.92 s = 7.9759				
R^2=68.5 % $\overline{R}^2 = 59.5\%$ DW=2.09				
LB(6)=1.68 LB(12)=12.47				
Dependent variable Y_t				
Independent variables ($X_{1,t}$) and ($X_{2,t}$)				
Sample size 34.				

Table 6: Estimation of the traditional model ARDL (3,6,3) for Bahrain.

$$\mathrm{LRM}(X_1) = \frac{(1.133 + 0.255 + 1 - 0.492)}{1.3} = 1.4585$$

$$\mathrm{LRM}(X_2) = \frac{(-0.198 - 0.438)}{1.3} = -0.489$$

Consequently, an increase of 1 unit in national spending will result from a 1.4585 units as an increase in economic growth, while a decrease of around 0.49 units will result from an increase of 1 unit in the price barrel of oil.

Discussion and Conclusion

After completing this research, the following results must be mentioned:

1) National expenditure in the GCC countries is affected by GDP and prices of oil traded in the market. This was evident between 2008 and 2009 in all GCC countries. Savings declined in Saudi Arabia, UAE, Oman, Kuwait, Qatar and Bahrain were 38.87%, 13.12%, 39.23%, 40.95%, 25.78% and 26.08% respectively. At the national expenditure level, the changes were respectively: +4.14%, -16.94%, -15.19%, -15.08%, -0.95% and -10.45%. It is clear that the impact was more negative on saving on national expenditure. The reading of the temporal movement of both national expenditure and domestic savings also shows that national expenditure generally exceeded savings till 2008, but we have also witnessed a remarkable rise in Qatar in savings exceeding the national expenditure.

2) There is a co-integration under the PSS technique between the annual growth of national expenditure, GDP and oil prices in Saudi Arabia and Qatar, which allowed the measurement of the speed of return toward equilibrium after a deviation in the previous year. Saudi Arabia and Qatar had a positive effect on the annual growth of GDP on national expenditure, while there was a negative effect between oil price growth and national expenditure. In the rest of the GCC, we were able to form the relationship between the three variables through the traditional form of the ARDL model. We calculated the elasticity of national expenditure according to the change in oil price growth and GDP growth. The results in the UAE, Oman, Kuwait and Bahrain were as follows:

UAE: We note that the annual growth elasticity of national expenditure according to the annual growth 1 unit of the average price of a barrel of oil reached in the short term 0.46 units, while long-term elasticity is equal to 0.138 units, which reflects the impact of national expenditure on oil price changes. In the UAE, we also calculated the annual growth elasticity of GDP according to an increase 1 unit in the annual growth rate of the oil barrel in the long run; it was 0.4926 units.

Oman: In the short term, national expenditure elasticity was 1.05 units due to an increase of 1 unit in annual GDP growth and (-0.373) units following an increase of 1 unit in the annual growth of the average price of the oil barrel. In the long run, the elasticities of national expenditure growth on the increase of 1 unit in both oil price and GDP growth rates are 1.233 and -0.44 units respectively.

Kuwait: What distinguishes the State of Kuwait is the positive impact on the national expenditure of both the annual growth of domestic output and the average price of the oil barrel. The long-term effect of the multiplier on GDP growth and oil barrel price oil growth were 0.4147 and 0.3393 units respectively.

Bahrain: Finally, in the Kingdom of Bahrain, the marginal growth of national expenditure resulted from an increase of 1 unit of the annual growth of the domestic product X_1 and the average price of oil of X_2 about 1.133 and -0.198 units respectively. The long-term effect of the multiplier for both variables was 1.4585 and -0.489 units respectively.

Recommendations

Finally, some important recommendations must be made to limit the control of oil imports to more than 50% of the GDP in the GCC countries:

1. Liberalization, quietly, from the power of changing oil prices on domestic savings in all GCC states and capital formation, particularly in Kuwait, Oman and Bahrain.
2. Working on rooting the infrastructure for sustainable development and promoting alternative resources for oil, especially solar energy.
3. Maintaining the political and social stability in the country, encouraging access to education and closing the gap between the poor and the rich, which makes societies more cohesive and mutually supportive and thus allowing their citizens to take decisions.
4. Providing food security and improved nutrition, promoting sustainable agriculture and developing five-years plans for the Arab industry to be launched in all fields; thus enhancing the independence of Gulf societies from the global economic shocks. Focusing on ensuring healthy living and promoting social welfare. Working on motivating the concepts of the rule of law and eliminating different corruption forms.

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