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Abstract

Given the persistence of low oil prices, which has become the new norm, and the continued shrinking of government revenues, the United Arab Emirates (UAE) is facing a new challenge for the upcoming years. The government should strike the balance between the need to adjust their spending policies to accommodate declining oil revenues and secure fiscal sustainability, versus adhering to the growth objectives as outlined in the 2021 Vision. The UAE aims to achieve sustainable growth in the non-energy sector (targeted at 5% in 2021), by prioritizing spending and preserving growth-conducive government expenditure on infrastructure and development projects. In order to understand the future implications of oil price volatility and the impact of fiscal consolidation on the UAE economy, we build a small-scale macroeconomic model for the UAE that takes into consideration all different channels through which main macroeconomic drivers can affect the economic activity. The results show that the oil price fluctuation has a significant impact on banks' liquidity, domestic credit and foreign direct investment, but a negligible effect on non-oil GDP growth, assuming that the government keeps the same level of spending, i.e., no fiscal consolidation pro-cyclical stance with the decline in oil price. However, the budget deficit and the need for financing would grow significantly. Moreover, using different scenarios for the pace of fiscal consolidation going forward, the model suggests that government expenditure is quite effective in raising aggregate demand and supporting non-oil real growth, in line with the UAE's vision 2021. This necessitates a countercyclical stance, where public spending increases with the decline in the oil price to preserve targeted growth in the non-energy sector. Hence is the challenge to reduce the pace of fiscal consolidation in response to continued fluctuations in the oil price, without compromising the need to support non-energy growth to attain further diversification of the economy.

JEL Classifications : E62, O40, O53, Q48

Keywords: Fiscal consolidation, Economic growth, Oil price effects, United Arab Emirates vision 2021.

ملخص

بالنظر إلى استمرار انخفاض أسعار النفط، الذي أصبح القاعدة الجديدة، واستمرار تقلص الإيرادات الحكومية، تواجه دولة الإمارات العربية المتحدة تحديا جديدا للسنوات المقبلة. يجب على الحكومة أن توازن بين الحاجة إلى تعديل سياساتها الإنفاقية لتتناسب مع تراجع عائدات النفط وضمان الاستدامة المالية، مقابل الالتزام بأهداف النمو على النحو المبين في رؤية 2021. وتهدف دولة الإمارات العربية المتحدة إلى تحقيق نمو مستدام في قطاع غير الطاقة (يستهدف 5٪ في عام 2021)، من خلال إعطاء الأولوية للإنفاق والحفاظ على الإنفاق الحكومي للنمو على مشاريع البنية التحتية والتنمية. ومن أجل فهم الآثار المستقبلية لتقلب أسعار النفط وتأثير ضبط أوضاع المالية العامة على اقتصاد دولة الإمارات العربية المتحدة، نبني نموذجا اقتصاديا صغيرا على نطاق صغير لدولة الإمارات العربية المتحدة يأخذ في الاعتبار جميع القنوات المختلفة التي يمكن من خلالها أن تؤثر محركات الاقتصاد الكلي الرئيسية على النشاط الاقتصادي). وتظهر النتائج أن تذبذب أسعار النفط له تأثير كبير على سيولة البنوك والائتمان المحلي والاستثمار الأجنبي المباشر، ولكن له تأثير ضئيل على نمو الناتج المحلي الإجمالي غير النفطي، بافتراض أن الحكومة تحتفظ بنفس مستوى الإنفاق، توطيد الموقف الدوري مع انخفاض أسعار النفط. ومع ذلك، فإن العجز في الميزانية والحاجة إلى التمويل سوف ينمو بشكل كبير. وعلاوة على ذلك، وباستخدام سيناريوهات مختلفة لوتيرة ضبط أوضاع المالية العامة في المستقبل، يشير النموذج إلى أن الإنفاق الحكومي فعال جدا في زيادة الطلب الكلي ودعم النمو الحقيقي غير النفطي، بما يتماشى مع رؤية الإمارات 2021. وهذا يتطلب موقفا معاكسا للدورات الاقتصادية، حيث يزداد الإنفاق العام مع انخفاض أسعار النفط للحفاظ على النمو المستهدف في قطاع غير الطاقة. ومن هنا يتمثل التحدي في الحد من وتيرة ضبط أوضاع المالية العامة استجابة للتقلبات المستمرة في أسعار النفط دون المساس بالحاجة إلى دعم النمو غير الطاقة لتحقيق مزيد من التنويع في الاقتصاد.

1. Introduction

After a four-year period of stability around $105 per barrel, the sharp fall in oil prices since the second half of 2014 has generated a heavy macroeconomic shock for the World's economy, especially for the major oil exporters, like GCC countries whose GDP, fiscal revenues and exports are for the most part heavily dominated by oil.

For the United Arab Emirates (UAE), even though relatively more diversified oil-producing country, oil price volatility is crucial for setting policies to stabilize and promote economic growth, particularly in the non-energy sectors. In fact, the oil sector continues to account for over a third of real economic output and more than half of budget revenues and export earnings. Thus, changes in hydrocarbon prices may lead to a substantial impact on the country's economy. For this reason, the UAE adopted long-range economic and social development strategies, such as Vision 2021[1], in order to promote sustainable development of non-energy sectors towards more diversification of the economy and to reduce the continued reliance on oil (the share of oil in GDP) to around 20% by 2021 (see the next section for more details).

However, the UAE is facing a new challenge for the coming years, given the recent and projected decline in government revenues. On the one hand, sustaining the momentum of growth in the non-energy sector requires preserving government spending on infrastructure and development projects, but on the other hand, keeping the same level of spending would increase considerably the need for financing with the decline in the oil price and as a result produce significant budget deficit. Hence is the need to prioritize spending to restructure the budget, trim the wasteful spending and mobilize the scope to generate non-energy revenues.

Indeed, the reduction in government spending, in order to ensure fiscal sustainability, could reduce the momentum of growth in the non-energy sector, through different channels. First, the reduction in financing infrastructure and capital projects would slow down investment that is necessary for private activity growth. Second, public financing requirement could shrink available financing to support private sector activity. Indeed, domestic financing through the reduction of government deposits in the banking system and/or increased borrowing by the government could crowd out necessary liquidity in support of private credit and non-energy growth. Another channel is that decreasing public investments, in the context of the persistent low oil prices, could attract less foreign direct investment (FDI), which could further slow down non-energy economic growth of the UAE.

In this regard, the important question is how to strike the balance between the need for fiscal consolidation to ensure sustainability and reduce the need to finance a growing deficit, versussafeguarding necessary government spending to attain sustainable growth of non-oil sectors towards further economic diversification in line with the country's vision 2021.

To shed some light on the optimal balance, we build a small-scale macroeconomic model for the UAE to understand the drivers of growth in the economy and to forecast the main macroeconomic indicators. This model allows us to anticipate how internal and external shocks might affect the economy under varying scenarios of the change in the oil price and the corresponding change in government spending.

Moreover, the aim of this paper is to examine the relationship between government spending and non-oil GDP in the UAE. In fact, the issue of whether fiscal consolidation can affect growth is particularly important, given the central role of oil revenues in the budget and the country's

[1] https://www.vision2021.ae/en

vision to promote the development of the non-oil economy. Using a macroeconomic framework of a forward-looking nature, we examine how changes in government spending, in the context of oil price volatility, have affected non-oil gross domestic product over the 1980-2015 period. The results shed light on the implications of the upcoming fiscal policy strategy with respect to fluctuations in the oil price on the UAE's economy and the underlying drivers of growth in the future.

Thus, understanding the future implications of oil price volatility on the economy and its transmission channels can lead to better decisions at various policy levels, namely the government and the central bank, and ensure that the results are conducive for further growth of private sector activity.

The remainder of this paper is as follows. Section II gives a brief background on the fiscal consolidation strategy of the UAE. Section III provides a review of related literature, while section IV describes data used and discusses our adopted macroeconomic framework. Section V presents the empirical results, and Section VI analyzes the dynamic response of the key variables to oil price shocks as well as fiscal policy reactions. Finally, Section VII concludes with some policy implications.

2. Background: Fiscal Consolidation and UAE Economic Growth

During the recent episode of continued reduction in oil prices, the UAE's economy demonstrated resilience to the decline in oil revenues and global trade slowdown thanks to its advanced economic diversification and its large financial buffers. In this context, the authorities responded with significant consolidation in 2015 and plan to continue its fiscal strategies in 2016 given the uncertain oil price outlook.

Although the UAE is one of the fastest growing and the most diversified economies in the GCC, its economy still depends heavily on the hydrocarbon prices. In fact, the oil sector continues to account for over a third of real economic output, nearly half of export earnings and around 80% of the total budget revenues (figure 1). Even with strong growth in non-oil output, the non-oil sector still depends on oil revenues (figure 2).

Given the projected persistence of low oil prices, the UAE's authorities have undertaken a significant fiscal adjustment in 2015, amounting to 8.5% of non-hydrocarbon GDP, in order to adjust to the sharp drop in oil revenues. The government raised electricity and water tariffs[2] and removed fuel subsidies[3] by moving to a market-based pricing of gasoline and diesel. The authorities have also announced plans for mergers[4] and consolidation in the public sector to cut cost and raise efficiency. Moreover, fiscal adjustment is also underway through mobilization of additional non-oil revenues. In fact, plans for a value-added tax (VAT) in the context of a GCC-wide initiative at a rate of 5% are currently underway to be introduced in 2018, as well as an increase in excise taxes on tobacco and alcohol and a tax on soft drinks.

On the spending side, the UAE Government plans to continue scaling back grants and capital transfers to GREs, as well as to stabilize the wage bill as a share of non-oil GDP. Therefore, the

[2] Water and electricity tariffs had been revised since January 1, 2015, in order to minimize government subsidies. In fact, the electricity subsidy in residential buildings ranges from 55% to 90% and the water subsidy ranges from 79% to 100%, according to an Urban Planning Council Document.

[3] Fuel prices were deregulated on August 1, 2015.

[4] The Abu Dhabi-based banks, NBAD and FGB announced in July 2016, that they would merge to form one of the largest banks in the Middle East and Africa, with assets of around $175bn, at a time when the emirate is seeking to revamp its economy to meet the challenges of lower oil prices.

recent significant cut in spending has reduced fiscal breakeven oil prices in the UAE (Table 1). Indeed, the fiscal breakeven price of oil declined from a peak of $76/bbl in 2014 to $58/bbl in 2015 and it is expected to decrease steadily to reach $55/bbl by 2017, according to the Institute of International Finance (IIF) projections.

In parallel of its fiscal consolidation, the UAE Government plans also to further reduce the contribution of oil to GDP to around 20% and to reach progressively the targeted 5% growth rate of the non-oil GDP by the year 2021, as per the National Vision 2021. Implementation of this vision will help to sustain high non-energy growth and will protect the economy from the volatility of international oil prices.

In this context, UAE growth has moderated in 2016 amid low oil prices and a slowdown in investments, due to the continued, albeit slower, pace of fiscal consolidation. In fact, the last reading of the Economic Composite Indicator[5] (ECI) as of the end of the first quarter of 2017 showed that the non-oil economic sector grew by 3.1% during the first quarter of 2017, against a 3% in the previous quarter. This rebound in growth is still below the 3.9% recorded in the third quarter of 2015, and significantly below the peak growth figure of 6.5% in the last quarter of 2013 (figure 4). Similarly, the overall ECI indicated a deceleration of the overall economy, reaching 3.3% in the first quarter of 2017, against an estimated average growth rate of 3% last year (figure 3), reflecting a growth rate of 3.8% in the oil sector in 2016.

Going forward, investments related to Expo 2020, such as the expansion of the national network of airports and rail network as well as the continued development of tourism and real estate sectors are expected to further support higher growth from 2017 onwards.

Clearly, the most prominent challenge facing the UAE's economy for the upcoming years is the need to continue its fiscal discipline, in parallel with promoting a sustainable growth of non-oil sectors amid the slump decline in oil prices and continued, albeit slightly improving, global trade slowdown.

3. Literature Review

Despite a considerable amount of empirical research on the relationship between fiscal consolidation and economic growth, the fundamental question of whether or not government spending can boost the pace of economic growth is widely debated. Results and evidence differ by country/region, the analytical approach employed, and categorization of public expenditures. According to a meta-analysis of 41 studies exploring the impact of fiscal policies on long-run growth, Nijkamp and Poot (2004) found that 17% of studies showed positive relationships between fiscal policy and economic growth, 29% indicated negative relationships, while 54% were inconclusive. Underlying the varying evidence are two conditions for the positive relationship between government spending and growth: (i) prioritizing spending on investment and infrastructure projects, (ii) to the extent that additional spending requires financing outside the budget, it should not be at the expense of crowding out financing and private activity.

2.1 Global evidence

Mostly based on cross-section studies that often include a sample of both advanced and developing countries, the empirical literature showed that the role of fiscal policy in stimulating

[5] Since the GDP of the UAE, the main measure of the economic activity, is available only on an annual basis with a considerable publication delay, the Research and Statistics Department (RSD) at the Central Bank of UAE constructed an Economic Composite Indicator (ECI) that can closely track the economic activity of the UAE on a quarterly basis. To this end, the ECI synthesizes a large number of macroeconomic variables reflecting the economic activity (See the appendix 1 for more details).

growth is poorly understood. On the one hand, government expenditure on development projects could boost the rate of private domestic investment and increase the job creation. On the other hand, higher government spending can weaken the private sector's contribution to the economy and even reduce its global productivity. Moreover, it can affect the overall economic performance if government spending is financed via increased taxes and/or borrowing, particularly domestically, to finance the expansionary fiscal policy.

Given the mixed effects of the impact of total government expenditures on economic activity, several studies have explored how different categories of public spending influence economic growth. These studies indicate that each type of government expenditure can affect growth through different channels. For example, public investment in infrastructure may affect positively economic activity by increasing the quantity of factors of production, while public spending on education and health services have an impact on growth by improving the marginal productivity of human capital. By contrast, some types of public spending, such as subsidies and military expenditure, may not improve the productivity. For example, Devarajan et al. (1993) studied a sample of 14 OECD countries and found that government expenditure on health care, transportation, and communication has positive effects on economic growth, while expenditure on education and defense fail to produce such a positive impact. However, a number of studies contradict these results, at least with respect to some types of government spending. For instance, Baum and Lin (1993) examined the impact of three different types of government expenditures (defense, welfare, and education) on the growth rate of GDP per capita using cross-section data from developed and developing countries over 1975-85. They found that the growth rate of education and defense expenditures has positive effects on growth rate.

3.2 Empirical literature on GCC

In general, the fiscal policies in oil-exporting countries depend mainly on the hydrocarbon revenue and the price volatility. In fact, the experience of those countries showed that oil prices influence fiscal policy and that can be a key propagation mechanism for transmitting oil price shocks to the domestic economy (Arezki and Ismail, 2010). In addition, some studies provided evidence on the pro-cyclicality of government expenditures in oil producing countries (Fasino and Wang, 2002; Husain et al., 2008), while others emphasize the trade-offs between increasing spending during the high oil price cycle and an efficient economic growth. Indeed, Ossowski et al (2008) found that even if the oil boom during 2004-2008 allowed oil-producing countries to increase public spending, these countries had relatively low indices of government effectiveness during this period. In this connection, Chemingui and Roe (2008) found that, in response to higher oil prices, fiscal policy is guided by the public policy objective of creating more public sector employment and increasing the citizen’s incomes as a means of sharing the oil revenue.

Regarding the GCC countries, fiscal consolidation has received less attention and its importance for economic stabilization has been somewhat neglected. However, the recent and projected decline of oil price has revived the interest of academia, central banks and governments on the role of fiscal policy in economic growth. According to the existing literature on the GCC, the empirical evidence on the influence of government spending on economic growth is also mixed, but most of the studies showed a positive and strong relationship between these variables, as well as a high fiscal dependence on oil prices.

In Saudi Arabia, using Vector Autoregression (VAR) and Granger causality analysis as well as annual data for 1960-96, Ghali (1997) found no evidence that government expenditure increased output growth, even after disaggregating the total expenditure into expenditures on consumption and investment. Conversely, Kireyev (1998) investigated the relationship between growth in

non-oil GDP and government spending using annual data for 1969-97. His empirical evidence suggests a significant and positive relationship between government spending and growth in the non-oil sector GDP. By spending component, Alshahrani and Alsadiq (2014) examined the impact of different types of government expenditures on economic growth, using Vector Auto Regression (VAR), Co-integration, and Vector Error Correction Model (VECM) techniques to estimate the short- and long-run effects over the period 1969-2010. The results revealed that the public investments and healthcare expenditure stimulate growth in the long-run, while openness to trade and spending in the housing sector can also boost short-run production.

In Oman, Treichel (1999) studied the link between the growth rate of global real expenditure and the non-oil real GDP growth from 1981 to 1997. He found that non-oil growth is attributed to a large government spending, although this relationship seemed to have weakened over the past decade.

In the UAE, Ghali and Al-shamsi (1997) tested the causal relationship between government spending (and its components) and total GDP growth, using a co-integration and error-correction framework, for the period of 1973 to 1995, on a quarterly basis. The results showed that government investment has a positive and significant effect on economic growth, while government consumption has a negative and insignificant one. In addition, Al-Mazrouei and Nejmeh (2012) examined the impact of public expenditure on total GDP in the period between 1990 and 2009, using three regression models. The analysis revealed a positive impact of public expenditure on gross domestic product in the UAE.

This study differs from the existing literature as follows. First, most of the existing studies consider that the oil price volatility affects the UAE economic growth only through government spending, neglecting other transmission channels, such as the domestic credit, the bank's liquidity and the FDI channels. For that reason, unlike other approaches in previous studies, the model adopted consists of building six simultaneous econometric equations, in order to take into consideration all different channels through which main macroeconomic drivers can affect the UAE economic activity. Second, this model is solved simultaneously, allowing for interactions among the variables, instead of solving it sequentially by blocks. Therefore, we can quantify the direct and indirect effects of specific shocks on economic growth. Finally, the model allows us to simulate alternative scenarios about the pace of fiscal consolidation going forward and to analyze the implications to the realistic attainment of Vision 2021, in the context of continued oil price volatility.

4. Methodology

The choice of what type of model to develop is based on the UAE's economy characteristics, data limitation, and the intended objectives. As the UAE depends highly on oil revenues to support its non-oil economic growth, one of the design criteria in the proposed macro model is to forecast the non-oil GDP growth, which is a better indicator of UAE economic activity. Indeed, given that the oil GDP depends mainly on the oil price fluctuations in the international market, the overall GDP is affected by this volatility, which could be a very misleading measure of growth for the UAE economy. In addition, this model should take into consideration all different channels through which main macroeconomic drivers can affect the UAE economic activity, in order to anticipate the implications of different shocks on the economy, such as domestic credit, government spending and FDI. Another important criterion is to analyze the impact of oil price fluctuations on the main drivers of economic activity. Finally, the model should be useful for evaluating alternative scenarios about fiscal policy, namely the growth of government spending that is necessary to achieve the UAE's Vision 2021.

4.1 Data description

For estimation purposes, we use annual data for the period 1980-2015, since the selected variables are not all available on a quarterly basis in the UAE. Nevertheless, this study period is relatively longer compared to those considered in other studies, especially on the GCC. Thereby, the main data sources for the Model are the Federal Competitiveness and Statistics Authority (Non-oil GDP and FDI), the Central Bank of the UAE (Domestic Credit, NPL, total deposit, the Economic Composite Indicator[6] (ECI) and Economic Partners Index[7]) and Ministry of finance (government expenditures). In addition, the Brent crude oil price is obtained from the Energy Information Administration (EIA), and the oil price data was abstracted from OPEC, while the federal funds rate (FFR) is sourced from Bloomberg. Detailed variable definitions and data sources are shown in appendix 2.

According to the literature, a number of other fundamental variables could have been relevant for this study. For example, the unemployment rate, wages, household incomes and private investments are also considered as the key factors in one of the six equations of our adopted Model, but they are not reliable or not available for our purposes. Fortunately, ignoring these variables might not be problematic, since our adopted model describes well the important channels through which main macroeconomic drivers can affect the UAE economic activity.

In the econometric analysis, all the series are expressed in real terms. Those that were originally available as nominal series were deflated by the CPI index. Moreover, all variables are expressed in the growth rate for estimation purpose, except for the FFR. Finally, stationarity of the variables was tested using the Augmented Dickey-Fuller (ADF) test, which indicates that all the series selected in this model are stationary.

4.2 Model specification

The model consists of building six main blocks, which are modeled by econometric equations and estimated using ordinary least squares (OLS). It comprises (1) non-oil GDP equation, (2) Government Spending equation, (3) bank deposit equation, (4) credit equation, (5) non-performing loans equation and (6) FDI equation. The structure of each equation is inspired from the economic theory, but adapted to the UAE specificity and to the data availability. It also takes into consideration the statistical significance and the forecasting accuracy of the adopted model. Figure 5 outlines the overall structure and interrelations of our empirical model. It gives a detailed description of the economic relationships between the exogenous and the endogenous variables of the model.

According to the relationships described in the Figure 5, each equation reflects the main drivers of each block and is expressed as a function of exogenous variables as well as some endogenous variables from the previous equations. Furthermore, in order to take into consideration some lagged effects of the independent variables in the equations, we added a statistically significant number of lags, in line with the economic theory and the existing literature. As a result, the six equations of our adopted models are described as follow.

[6] See the appendix 1 for more details.

[7] The Economic Partners Index (EPI) is calculated as a weighted average of the real GDP of ten major economic partners (India, Saudi Arabia, Oman, Switzerland, Turkey, UK, Kuwait, Qatar, USA and China). These countries are in the Top10 of the UAE export destination, the UAE tourism market and the UAE FDI inflows. For estimation purposes and given the data limitation, the weights are obtained as normalized share of these countries in UAE exports in the period 2013-2015.

4.2.1 Non-Oil GDP equation

Our first and main equation in our model includes four explanatory variables, which affect UAE's non-oil GDP growth ($\boldsymbol{NOGDPG_t}$). The first important factor is the Government Spending ($\boldsymbol{GS_t}$). Even with strong growth in UAE's non-oil activity, the non-Hydrocarbon sector still depends on Government expenditures[8]. In fact, in line with the country's vision 2021, the UAE authorities tried to boost the non-oil sector by preserving government spending on infrastructure and development projects, especially during the high oil price cycle.

Second, since the UAE has one of the most open economies in the world, the national GDP depends also on the economic activity of the UAE's economic partners, which is measured by the Economic Partners Index[9] ($\boldsymbol{EPI_t}$). This occurs through at least three channels: external demand, foreign investments and tourism. Higher EPI implies higher UAE exports, higher inward FDI flows and a higher number of foreign tourists, which increases consequently non-oil GDP growth. The third explanatory variable is the Domestic Credit ($\boldsymbol{DC_t}$). Indeed, it is very common in the literature that an increase in Bank credit affects positively the domestic growth, through mainly two channels: an increase in household consumption and in private investment.

For the fourth variable, given that domestic GDP does not depend entirely on Domestic Credit, the gap is captured by including a lag of the Economic Composite Indicator ($\boldsymbol{ECI_{t-1}}$) in the regression. The lag of the ECI[10] captures persistence and the effects of high frequency data that are not accounted for in the model, such as habits in consumption, expectations, or other factors.

Finally, in order to avoid some statistical problems, such as the endogeneity and the autocorrelation, we did not include in this equation the FDI as a driver of the non-oil economy sector, despite its importance, as it is highly correlated with variables in the model. In fact, as mentioned in the previous section, the EPI is highly correlated with the foreign investment flows and reflects well its fluctuations. Thus, the regression specification is given below:

$$\boldsymbol{NOGDPG_t = \delta_0 + \delta_1 GS_t + \delta_2 EPI_t + \delta_3 DC_t + \delta_4 ECI_{t-1} + \xi_t} \qquad (1)$$

Where $\boldsymbol{\delta_i}$ is the coefficient and $\boldsymbol{\xi_t}$ is the error term.

4.2.2 Government spending equation

According to the literature and the experience in many developed and developing countries, most of the econometric models consider Government expenditure as an exogenous variable, given that it is a discretionary Government decision and is usually tied to the projections of the budget. However, in the Oil exporting countries, there is a high correlation with the oil price fluctuation, a major source of revenues, and the fiscal policy[11]. An increase in spending is usually financed through collecting more oil revenues in a high oil price cycle. Thus, changes in oil revenues will have implications either on expenditures and/or on the budget balance. For the UAE, Government Spending growth ($\boldsymbol{GS_t}$) is mainly explained by oil revenues ($\boldsymbol{OR_t}$), which depend

[8] See the empirical literature in Section III.

[9] The Economic Partners Index (EPI) is calculated as a weighted average of the real GDP of ten major economic partners (India, Saudi Arabia, Oman, Switzerland, Turkey, the UK, Kuwait, Qatar, USA and China). These countries are in the Top10 of the UAE export destination, the UAE tourism market and the UAE FDI inflows. For estimation purposes and given the data limitation, the weights are obtained as a normalized share of these countries in UAE exports in the period 2013-2015.

[10] Since the ECI is available only from 2006 (See the appendix 1 for more details), we assumed in this study that, on an annual basis, this indicator has the same fluctuation as the UAE's GDP growth from 1980 to 2005, given the high correlation between these series.

[11] See the empirical literature on GCC in Chapter III.

on Oil Production ($\boldsymbol{OP_t}$) and Brent Price ($\boldsymbol{BP_t}$). Moreover, in the case of a budget deficit, the government could look for other sources of financing, such as issuing more debt or using its financial buffers, drawing down savings in Sovereign Wealth Funds (SWFs). In this equation, we focused only on debt ($\boldsymbol{Debt_t}$), given the absence of any reliable data on the rules governing the use of the UAE's financial buffers. Therefore, the model equation is shown below:

$$\boldsymbol{GS_t = \eta_0 + \eta_1 OR_t + \eta_2 Debt_t + \Omega_t} \quad (2)$$

Where $\boldsymbol{\eta_i}$ is the coefficient, $\boldsymbol{\Omega_t}$ is the error term and $\boldsymbol{OR_t = BP_t * OP_t}$ represents a proxy of oil revenue.

4.2.3 Liquidity equation

According to the existing literature, especially on oil exporting countries, the main macroeconomic determinants of bank deposit ($\boldsymbol{BD_t}$) are the non-oil GDP growth ($\boldsymbol{NOGDPG_t}$), the foreign direct investment inflows growth ($\boldsymbol{FDI_t}$) and the Brent Price fluctuation ($\boldsymbol{BP_t}$), which represent the main source of government deposits. Hence, the bank deposit equation is as follows:

$$\boldsymbol{BD_t = \gamma_0 + \gamma_1 BP_t + \gamma_2 FDI_{t-1} + \gamma_3 NOGDPG_{t-1} + \vartheta_t} \quad (3)$$

Where $\boldsymbol{\gamma_i}$ is the coefficient and $\boldsymbol{\vartheta_t}$ is the error term.

4.2.4 Domestic credit equation

Although researchers used multiple different approaches for the major economies, modeling Credit fluctuations in the UAE was difficult, because of the absence of reliable time series data for the variables that are used commonly in the literature. Thus, after several statistical tests verify the validity of economic theory. The key factors in explaining Domestic Credit ($\boldsymbol{DC_t}$) are Non-Performing Loans ($\boldsymbol{NPL_t}$) and bank Deposit ($\boldsymbol{BD_t}$). Moreover, given that the UAE dirham is pegged to the US dollar and the Central Bank of the UAE follows the US Federal Reserve's monetary policy, the federal funds rate ($\boldsymbol{FFR_t}$) was also included in the equation. In fact, an increase (decrease) of the US interest rate should be reflected by an increase (decrease) of the UAE Central Bank interest rate, which should affect the national credit market. For that reason, the final equation is as follows:

$$\boldsymbol{DC_t = \beta_0 + \beta_1 NPL_{t-1} + \beta_2 BD_t + \beta_3 FFR_t + \mu_t} \quad (4)$$

Where $\boldsymbol{\beta_i}$ is the coefficient and $\boldsymbol{\mu_t}$ is the error term.

4.2.5 Non-Performing Loans equation

Overall, the literature on the major economies has confirmed that macroeconomic conditions matter for credit risk (Keeton and Morris, 1987; Sales and Saurina, 2002). These macroeconomic factors included mainly GDP growth, and the financial factors are bank size, credit orientation, and credit terms. In our model, fluctuations in Non-Performing Loans ($\boldsymbol{NPL_t}$) are dependent on growth in non-oil activity ($\boldsymbol{NOGDPG_t}$), following this equation:

$$\boldsymbol{NPL_t = \theta_0 + \theta_1 NOGDPG_t + \tau_t} \quad (5)$$

Where $\boldsymbol{\theta_i}$ is the coefficient and $\boldsymbol{\tau_t}$ is the error term.

4.2.6 Foreign direct investment equation

In general, FDI in oil exporting countries has traditionally been concentrated in the extractive industries. Thus, given the importance of the oil sector in the UAE, the Foreign Direct Investment Inward flows ($\boldsymbol{FDI_t}$) is modeled as a function of the Brent Price ($\boldsymbol{BP_t}$), which is highly correlated with the foreign investments to the hydrocarbon sector, as well as the real non-oil GDP growth ($\boldsymbol{NOGDPG_t}$) that reflects the performance of the non-hydrocarbon sector. Thus, the regression specification is as follows:

$$\boldsymbol{FDI_t = \alpha_0 + \alpha_1 BP_t + \alpha_2 NOGDPG_{t-1} + \varepsilon_t} \qquad (6)$$

Where $\boldsymbol{\alpha_i}$ is the coefficient and $\boldsymbol{\varepsilon_t}$ is the error term.

4.3 Model estimation quality

The predictive power of the model is one of the important criteria for choosing this approach. Thus, in order to test the performance of our model, we estimated our six equations over the period 1980-2012 and then we predicted our outputs for the period 2013-2015, which means that we have 3 periods for forecasting. For this evaluation, the actual realizations for the exogenous variables in the models are used instead of assumptions.

We start our analysis by estimating the six equations using simple OLS regressions. In fact, in order to take into consideration all different channels through which main macroeconomic drivers can affect the UAE economic activity, this model is solved simultaneously, allowing for interactions among the variables, instead of solving it sequentially by blocks. The results are generally satisfactory and in line with economic theory (See Appendix 3).

Concerning the predictive performance of the model, there are many ways to measure forecast accuracy. We choose in this paper two of the most common methods, given the characteristic of our model. The first method is to calculate the Theil U-statistics[12], over the period 2012 to 2015.

$$U = \frac{\sqrt{\frac{1}{T}\sum_{t=1}^{T}(Y_t^s - Y_t^a)^2}}{\sqrt{\sum_{t=1}^{T}(Y_t^s)^2} + \sqrt{\sum_{t=1}^{T}(Y_t^a)^2}}$$

Where Y^s is the out-of-sample simulation for variable Y, Y^a is the actual historical value for Y, and T is the total number of forecasts for Y. Because it covers a finite range, the U statistic is easier to interpret than other accuracy gauges such as the root mean squared error (RMSE) or the Mean Absolute Error (MAE). In fact, a Theil U greater than 1 is undesirable and the closer the statistic is to 0 the more robust the predictive accuracy. In general, a Theil U less than or equal to 0.55 is deemed adequate. Table 2 gives the results for the six equations and indicates that the model mimics the behavior of the main macroeconomic variables in the UAE economy fairly well.

The second method to test the performance of the model is to compare the actual and fitted values during the whole period of the study (1980-2015). Figure 6 showed the estimations of the equation 1 related to the real non-oil GDP growth, compared to their historical values. The figures of the six equations (See appendix 4) indicate that the model picks up the major turning points in the series reasonably well.

[12] Theil, H. (1958), "*Economic Forecasts and Policy*". Amsterdam: North Holland.

5. Empirical Results

After evaluating the predictive accuracy of the model, we started this section by estimating the model over the period 1980-2015, and then we calculated the baseline forecasts for the period 2016-2021. Nonetheless, it should be noted that these projections do not take into consideration options that the Government may endure to reduce spending fluctuations with the oil price, such as (i) drawing down savings in SWFs, (ii) increasing taxation, and the potential increase in other fees.

5.1 Model estimation results

This model is solved simultaneously, in order to allow more interactions among the variables. Thus, Table 3 shows the estimation results for each equation of the adopted model during the period 1980-2015, which is expressed by its main explanatory variables. The obtained results are generally satisfactory and in line with economic theory. All coefficients are statistically significant and with the expected signs. Therefore, the six equations describe well the important channels through which main macroeconomic drivers can affect the UAE economic activity over the period 1980-2015.

According to the estimation results in Table 3, we found the following general results, which are in line with most literature. First, the oil price fluctuations affect positively the UAE economy, through banks' liquidity, domestic credit and foreign direct investment channels (equations 3, 4 and 6). Next, we find evidence in the equation 1 that the government expenditures promote non-energy economic growth in the UAE. In fact, the estimated coefficient of 0.33 on government expenditure suggests that a 1% increase in government expenditure would boost non-oil GDP by 0.33%, where the estimated effect is statistically significant. Moreover, the positive coefficient of oil revenues in equation 2 indicates that our results are consistent with the existing literature. That is, fiscal policy is pro-cyclical in oil producing countries (a rise in oil prices increases revenues, and stimulates both government expenditures and non-energy GDP growth).

5.2 Baseline forecast results

Given the performance of our model and the plausibility of its results, we used our six equations to estimate our baseline forecasts for the period 2016-2021, which correspond to the remaining period to achieve the UAE's vision 2021. In general, forecasting models require assumptions regarding future fluctuations of the exogenous variables, which are often numerous and difficult to predict. However, in our adopted model, all data used are endogenous, except for the UAE oil production, Brent price, FFR and the Economic Partners Index. Therefore, it is enough to take the projections of these four variables for the period 2017-2021, in order to find all required forecasts related to the six equations. Thus, the most important assumptions in our model concern the Oil production. The UAE oil production is sourced from the OPEC, while the Brent price projections are taken from the IMF World Economic Outlook (WEO) April 2017, which is derived from Brent crude oil future prices (figure 7). However, it should be noted that oil futures change daily and can be dramatically influenced by a shock or special events (Brexit, US elections, OPEC agreement, etc.), that will affect the oil price projections.

For the FFR, the assumptions are based on the Federal Funds Rate futures for the United States, available on Bloomberg, while the projection of the EPI is calculated using the GDP projections of the UAE economic partners, sourced from the responsible institutions of each country. Based on these assumptions, Figure 8 showed the real non-oil GDP growth projection from 2016 to 2021, which indicates that the non-oil economic growth would reach 4% in 2021 (See appendix 5 for the projections of other variables).

6. Scenario Analysis

In this section, we analyzed the dynamic response of the key variables to oil price shocks as well as fiscal policy reaction. For our simulations, we used our model to trace the movements of the endogenous variables under different economic scenarios. To produce such forecasts, we change the path of one exogenous variable at a time while holding other variables constant. We focused on two scenarios: (i) the effects of oil price shocks and (ii) the response of fiscal policy to these shocks, in order to promote the non-energy economic growth. The analysis of these scenarios is one of the goals of this study, which allows us to draw some alternative scenarios about the pace of fiscal consolidation going forward, as well as to analyze its implications on the realistic achievement of Vision 2021.

6.1 Passive scenarios

These scenarios simulate that Brent crude oil price will reach progressively $20, $40, $80, and $100 per barrel by the year 2021 (Figures 9), with an assumption that the Government will not react discretionally to these shocks. It means that public spending, as defined by the equation 2, depends mainly on oil revenues, which are linked directly to the oil price. Thus, we examined the impact of each shock on the six main macroeconomic variables, in order to quantify the direct and indirect effects of oil price shocks on economic growth. For the baseline scenario, we assumed the annual average prices of oil futures on April 3, 2017.

The main results indicate that the oil price fluctuation has a significant impact on all selected variables. Figure 10 illustrates the effects of oil price shocks on government spending growth during the period 2017-2021. According to these passive scenarios, the Government adjusts spending in line with the oil prices. In fact, higher oil price will encourage the authorities to spend more, in order to stimulate the non-oil economy (Scenarios 1, 2 and 3), while lower oil price will push them to reduce their spending, in order to contain the budget deficit and secure the fiscal sustainability (Scenarios 4 and 5).

Given that oil price fluctuations affect public spending and the other main macroeconomic drivers, the non-oil GDP growth is consequently affected through the described transmission channels (Figure 11). In fact, according to our baseline scenario, a continuous increase in oil prices lead to a progressive increase in non-oil economic growth, to reach 4% in 2021, from 2.7% in 2016. In addition, the positive oil price shocks in scenarios 1 and 2 reveal that the non-oil sector grows progressively to reach, respectively, 4.6% and 4.9% in 2021. However, an adverse shock of oil prices causes a slowdown of the non-oil economic growth, respectively, to 2.6% and 1.6% by the year 2021 (scenario 4 and 5).

The shocks of oil prices, under these scenarios, affect also the fiscal balance of the UAE (Figure 12). In fact, higher oil prices lead to a budget surplus, reaching 13.6% of GDP by the year 2021 (Scenario 1), while a lower oil price reduces the government revenue faster than public spending, resulting in a budget deficit (-10.2% of GDP in scenario 5). For this reason, the Government has started fiscal consolidation in 2015 by instituting several reforms, including the fuel subsidy removal.

However, in order to produce these passive scenarios, we changed only the oil price fluctuations and varied government spending as an endogenous variable with the oil revenue. For this reason, we tried in the next section to analyze the discretionary response of the Government, through further scenarios of fiscal policy going forward, in order to quantify the effects of active fiscal policy on non-oil economic activity, given these oil price shocks.

6.2 Active scenarios

In order to evaluate the effect of the fiscal policy responses on economic growth, we considered in these active scenarios, that government spending is an exogenous variable. It means that the UAE Government could adjust its spending to stimulate the non-oil economy and to reach progressively the targeted 5% non-oil growth rate by the year 2021 (Figures 13), in the context of oil price volatility. Of course, this adjustment is larger during episodes of lower oil price that shrinks revenues and slows down non-energy growth in order to counter decline in non-oil growth induced by the reduction in the oil price. To this end, we assumed the previous five scenarios of oil price shocks (Figures 7) and we tried to analyze the response of discretionary fiscal policy, i.e., the magnitude of necessary of fiscal adjustments, in order to achieve the UAE Vision 2021 of 5% non-energy growth in 2021.

The main results are in line with most of the literature on the effects of government expenditures on economic growth. Figure 14 illustrates the necessary government spending growth rates to attain the targeted 5% non-energy growth rate by the year 2021. Thus, these scenarios showed the central role of fiscal policy to promote the development of the non-oil economy. Indeed, higher public spending tends to increase growth rates in the short run as well as in the long-run, countering the effects of oil price shocks.

Moreover, these scenarios illustrate that during a period of lower oil prices (scenarios 4 and 5), the government could increase spending, compared to the period of high oil prices (Scenario 1 and 2), in order to compensate for the weakness of other channels in promoting non-oil growth due to lower oil price. Hence is the need for a higher fiscal stimulus and a larger fiscal deficit to sustain the momentum of non-energy growth (table 4).

Thus, sustaining the momentum of growth in the non-energy sector, by increasing government spending, despite the slump in oil revenue, will increase significantly the need for financing (Figure 15). In fact, according to these active scenarios, higher government expenditure in a period of high oil prices (Scenario 1 and 2) lead to a budget surplus, reaching respectively 13.3% and 8.3% of GDP by the year 2021. That is because the pace of the increase in government revenues with the oil price far exceeds the necessary increase in government spending that is compatible with the objective for non-energy growth target. Conversely, during a period of low oil prices (Scenarios 4 and 5), the budget deficit reaches respectively 12.1% and 21.2% of GDP by the year 2021 in order to sustain the growth of government spending at a rate that is compatible with the targeted non-energy growth, despite the decline in the oil price.

6.3 Scenarios comparison

According to the previous scenarios, it is clear that fiscal policy has a central role in promoting development of the UAE non-oil economy and that this role increases during episodes of lower energy price to sustain the momentum of growth, although at the cost of increasing the fiscal deficit and the need for financing. In fact, despite the oil price volatility, the Government, through discretionary higher spending, is able to sustain high non-energy growth and to reach progressively the targeted 5% growth rate of the non-oil GDP by the year 2021. However, in order to stimulate growth in the non-oil sector, there is a cost to be paid in terms of financing a higher deficit at a time of lower oil price (Table 4).

For example, assuming the oil price baseline scenario[13], the non-oil GDP is expected to grow by 4% in 2021 (Figure 16). To achieve the UAE Vision, the government could increase

[13] We assumed the annual average prices of oil futures on April 3, 2017 (See Figure 9 for more details).

progressively their spending to attain a growth rate of 9.3% in 2021, instead of 3.3% under the baseline scenario. This decision will affect the fiscal balance, by reducing the budget surplus from 1% of GDP to a deficit of 4.9% of GDP by the year 2021, assuming oil revenues are compatible with the futures of the oil price in the baseline scenario.

The need to increase public spending, to achieve the desired growth rate of the non-energy sector, varies according to the oil price fluctuations. Table 5 summarizes the important results, under the previous five scenarios of oil price shocks (Figure 7) and compares between the two policies (Passive vs Active).

During a period of high oil prices (Scenarios 1 and 2), it is easy for the Government to increase expenditures, given the available surplus (respectively 13.6% and 10.5% of GDP by the year 2021). However, during a period of low oil prices (Scenarios 4 and 5), the fiscal balance is already in deficit under the passive scenario (respectively -3.8% and -10.2% of GDP by the year 2021) and it will be a difficult decision to increase more spending, which could have further negative impacts on the deficit and the need for financing. For this reason, the government could look for other sources of financing, such as issuing more debt or using its financial buffers. Diversifying sources of financing would help the Government's decision to reach progressively the targeted 5% growth rate of the non-oil GDP by the year 2021 and insulate the non-energy growth from further downturns implied by the reduction in the oil price and the accommodating fiscal stance.

It is important to note here that attaining the targeted growth rate of 5% of non-oil GDP would increase diversification and the share of private non-energy activity in the economy. Hence, the need for additional government spending will be reduced over time even under a scenario of sustained low oil price, as other factors and private activity will gradually play a bigger role to solidify non-energy growth and compensate for slower government spending.

7. Conclusion and Policy Implications

The analysis of this paper has focused on the impact of fiscal consolidation on non-energy growth in the UAE economy. Persistent decline in the oil price has forced continued drive for fiscal consolidation with a goal to contain a widening fiscal deficit and the need for larger financing.

However, the pace of fiscal consolidation should be pursued gradually over time to strike the necessary balance between short-term financing needs and long-term non-energy growth objectives. For countries like the UAE that has options to diversify financing of the fiscal deficit in the short-run, gradual fiscal consolidation is necessary to support growth in the non-energy sector in line with the objectives to continue diversify the economy and reduce its dependency on energy resources over time.

Indeed, the analysis illustrates that under a passive scenario, continued reduction in government spending with the decline in the oil price results in further decline of non-energy growth and failure to attain the growth objective in line with Vision 2021.

As oil prices could continue to be volatile, scenario analysis illustrates the role of discretionary fiscal policy to mitigate the impact of this volatility on the economy and sustain the growth momentum to attain the objective of attaining 5% non-energy growth by 2021.

In episodes of higher oil price, the speed of spending should not be accelerated beyond what is necessary to attain the growth target, allowing for a build-up of fiscal surpluses that could support existing financial buffers.

The converse, however, requires tapping into these resources to sustain the growth momentum. That is, during episodes of lower oil price, a passive scenario risks lowering non-energy growth below the non-energy growth target. A countercyclical stance requires faster increase in government spending in order to sustain the growth momentum and counter the effects of lower energy price on various drivers of non-energy growth. A faster pace of government spending risks, however, a wider fiscal deficit that could be financed by tapping existing financial buffers that have been accumulated during the energy price boom.

The policy implication points to the need to manage fiscal consolidation with a long-term vision. Sustaining the growth momentum will reduce the role of fiscal support going forward as the economy continues on the path of increasing non-energy growth and the contributions of the private sector to economic activity.

Hence, oil producing countries that have options to diversify financing of the fiscal deficit, including by drawing down existing financial buffers, should establish the optimal pace of fiscal consolidation based on a targeted vision for the growth of non-energy sectors over time. The alternative of faster pro-cyclical fiscal consolidation in line with the decline of the energy price may reduce the fiscal deficit, although at a bigger risk of slower growth of the non-energy sector and continued reliance on fiscal support over time.

As energy-producing economies strive to reduce reliance on oil resources, the pace of managing fiscal resources and spending remains pivotal to strike the necessary balance and pave the way for a bigger fiscal withdrawal as the economy sustains the necessary momentum to lay the foundations of sustainable resources of private non-energy sectors of the economy. Having achieved this balance, the need for fiscal stimulus will be gradually reduced over time regardless of the continued volatility of the oil price.

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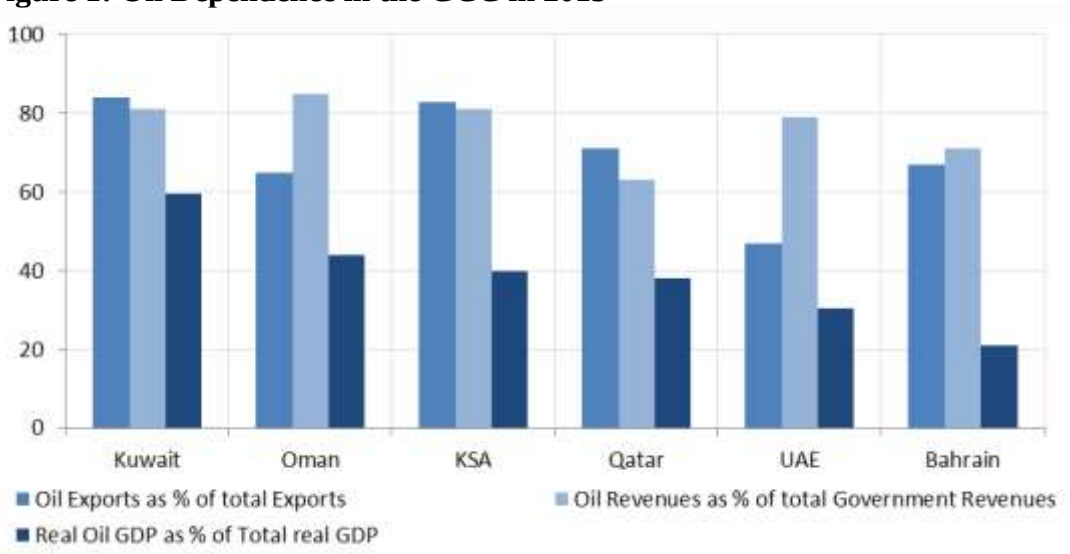
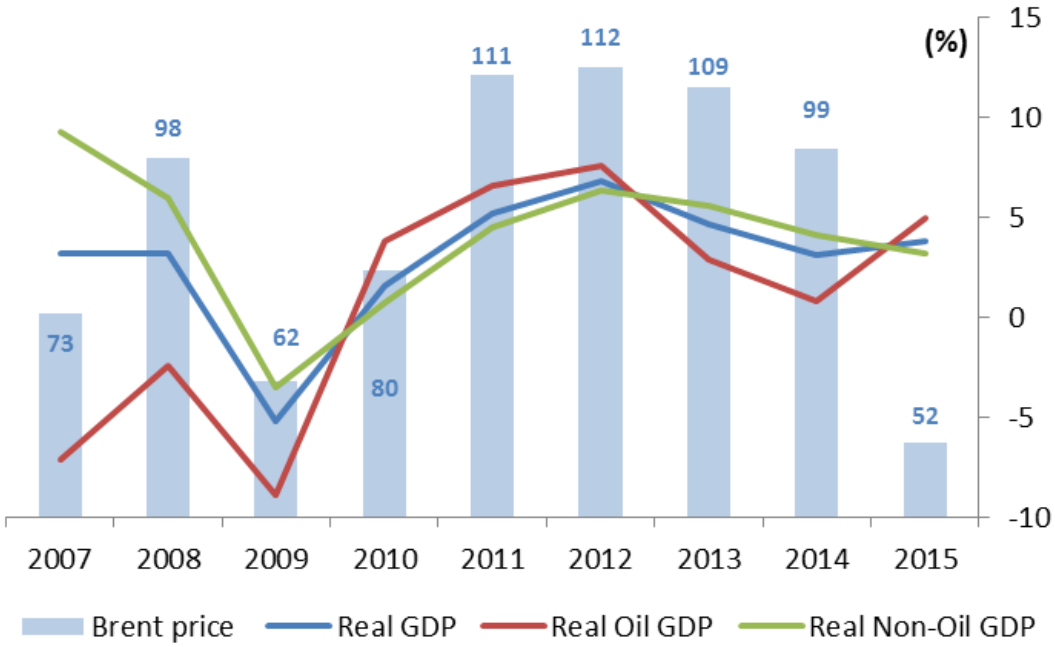
Figure 1: Oil Dependence in the GCC in 2015



Source: National authorities, GCC-Stat and IMF

Figure 2: Oil Dependence in the UAE



Source: National authorities, GCC-Stat and IMF

Figure 3: Quarterly overall ECI (%)

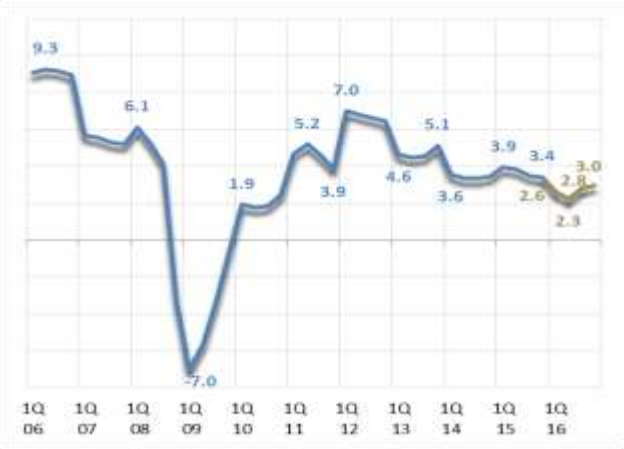
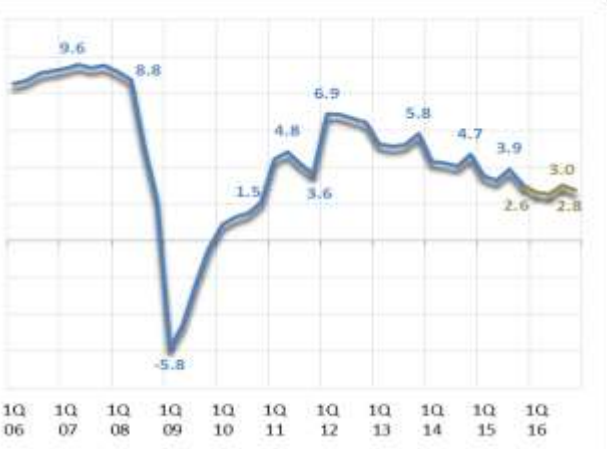


Figure 4: Quarterly non-oil ECI (%)



Source: Central Bank of UAE

Figure 5: Economic Relationships of the Adopted Model

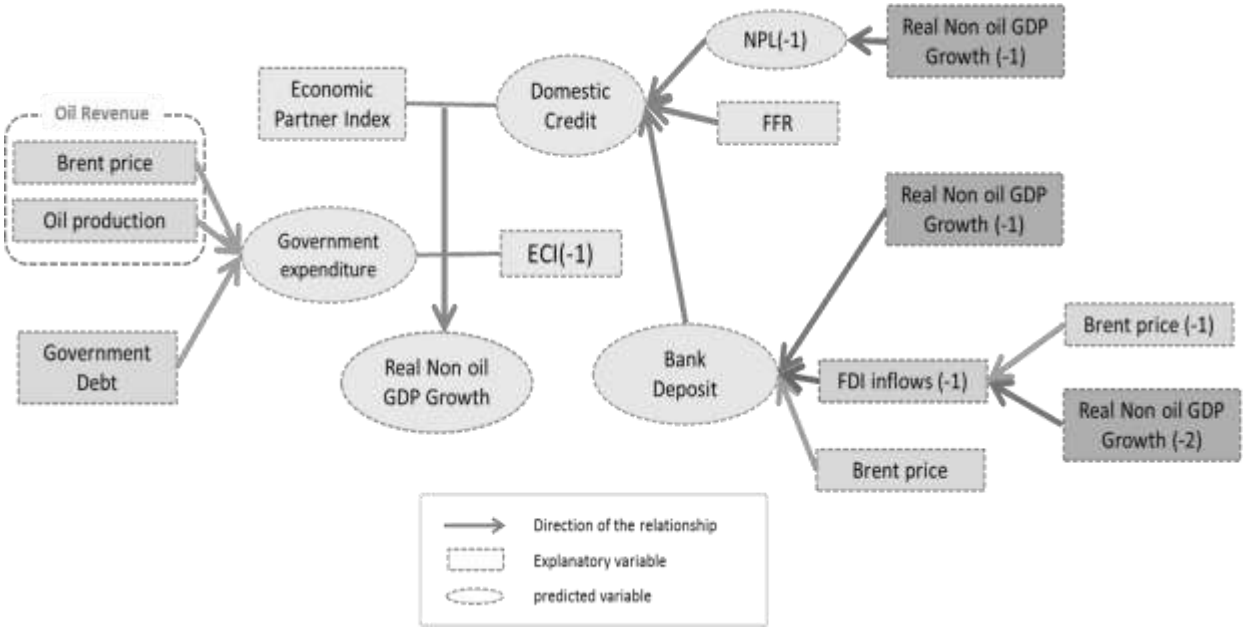
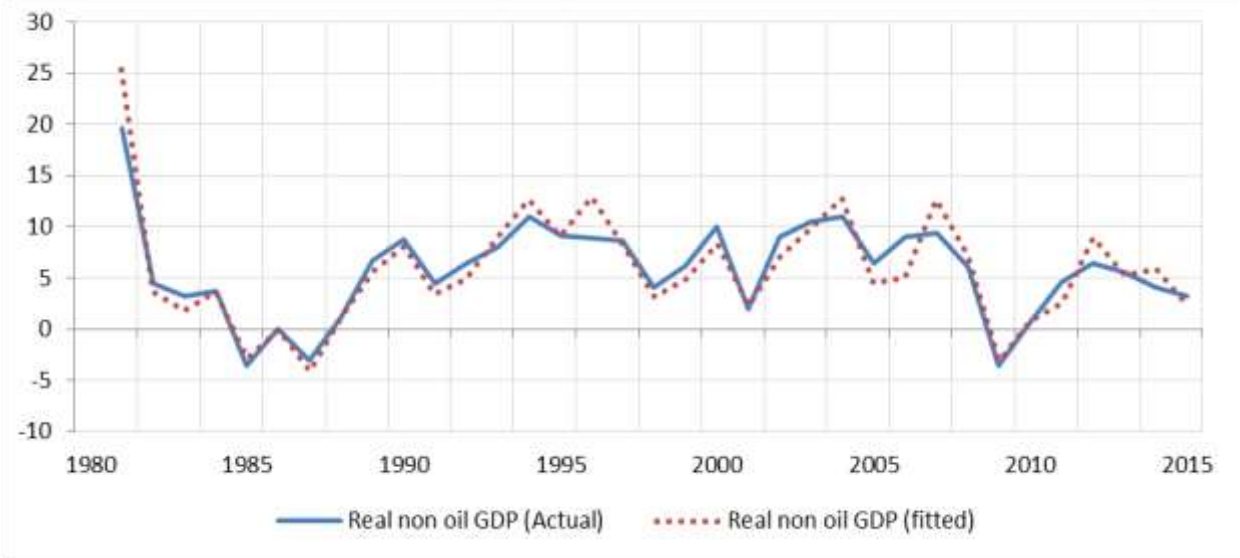
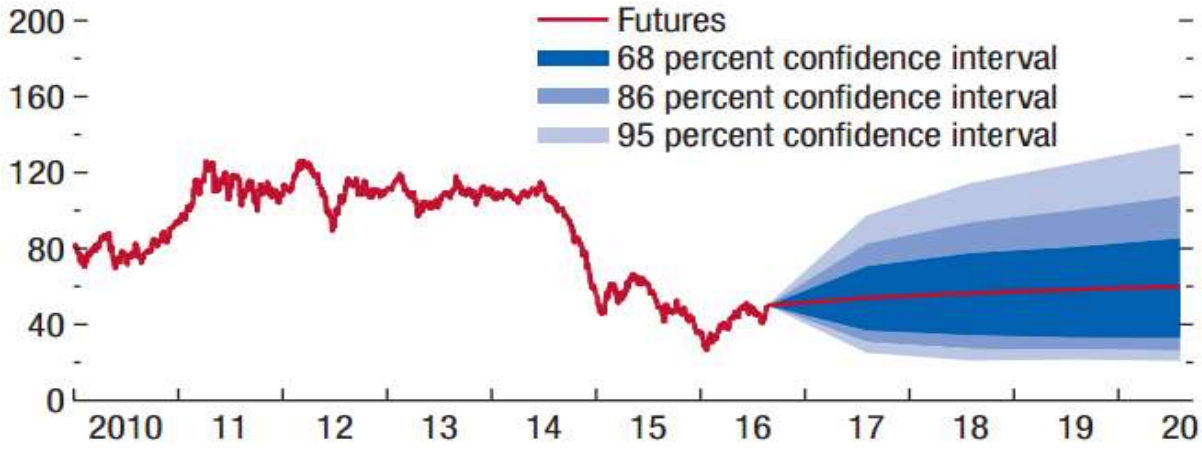


Figure 6: Real non-oil GDP growth (%): Actual vs Fitted



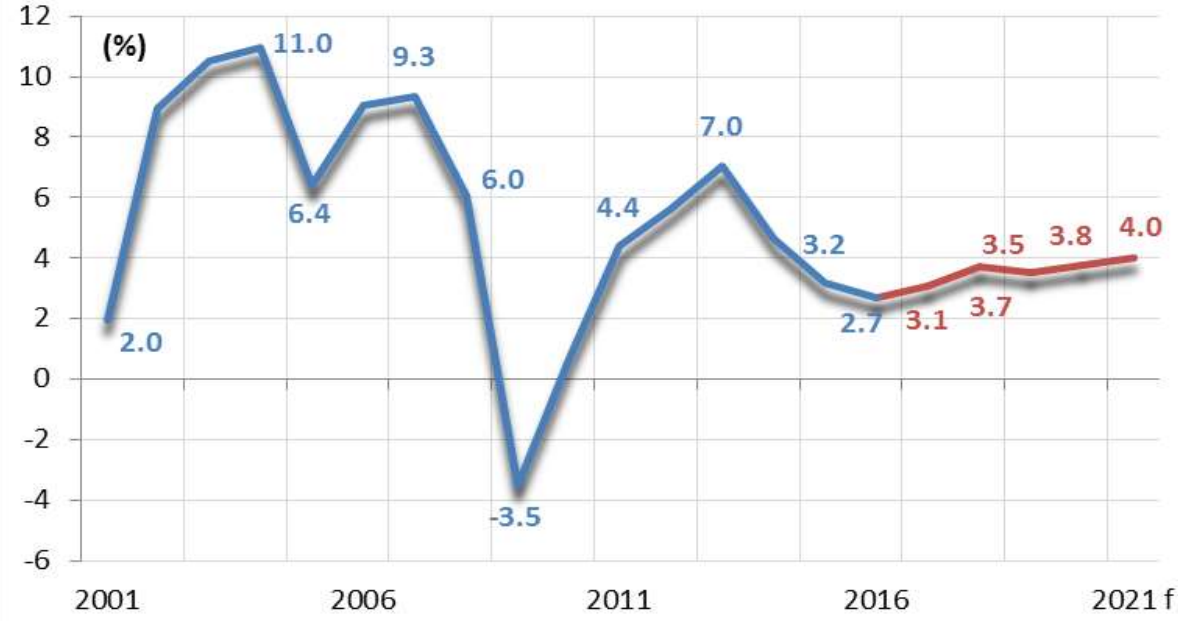
Source: Federal Competitiveness and Statistics Authority, IMF and Model estimation

Figure 7: Brent Price Prospects (US dollar per Barrel)



Source: IMF World Economic Outlook, April 2017

Figure 8: Baseline forecast of the Real non-oil GDP growth (%)

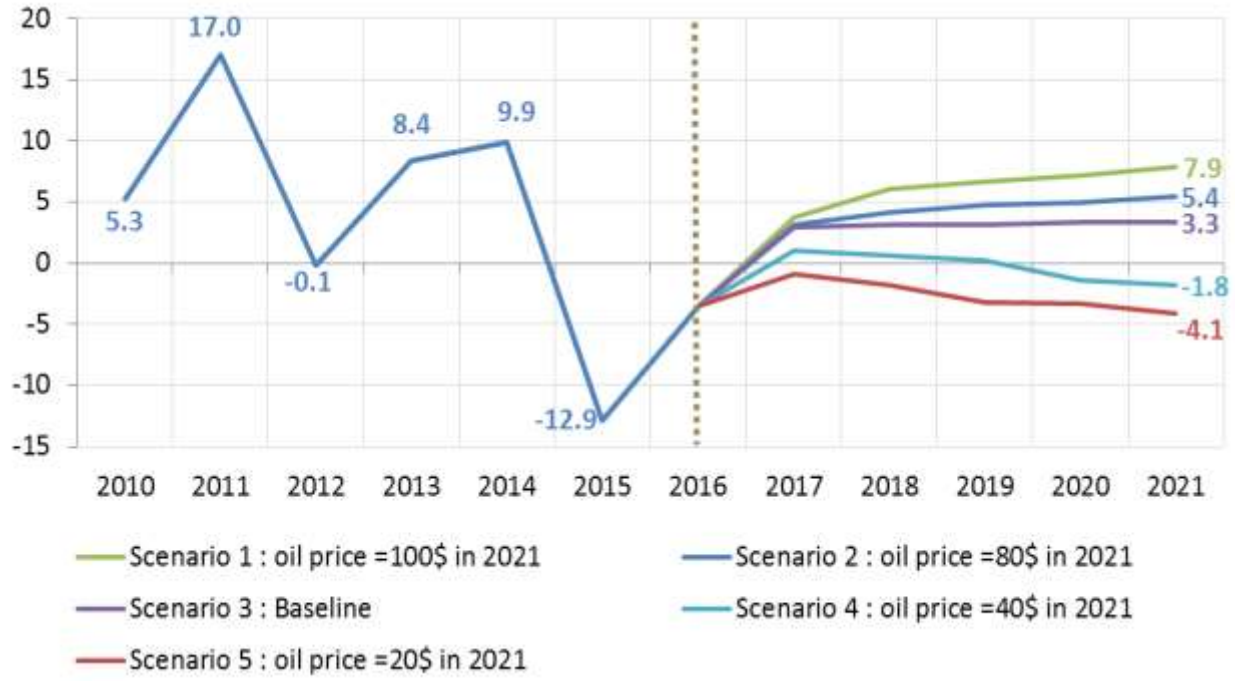


Source: Federal Competitiveness and Statistics Authority and Model projections

Figure 9: Brent crude oil price scenarios

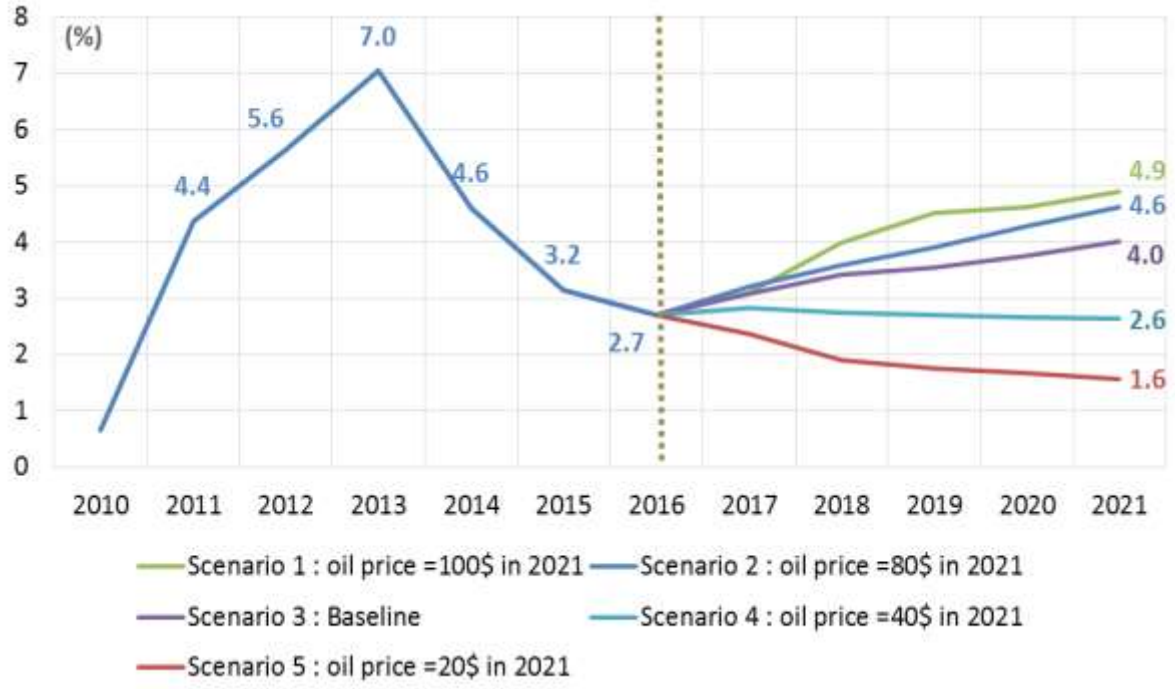
Source: OPEC/Bloomberg and model estimations

Figure 10: Effects of Oil Price Shocks on Government Expenditure Growth (%)



Source: Ministry of Finance, IMF and model estimations

Figure 11: Effects of Oil Price Shocks on Non-Oil GDP Growth (%)



Source: FCSA and model estimations

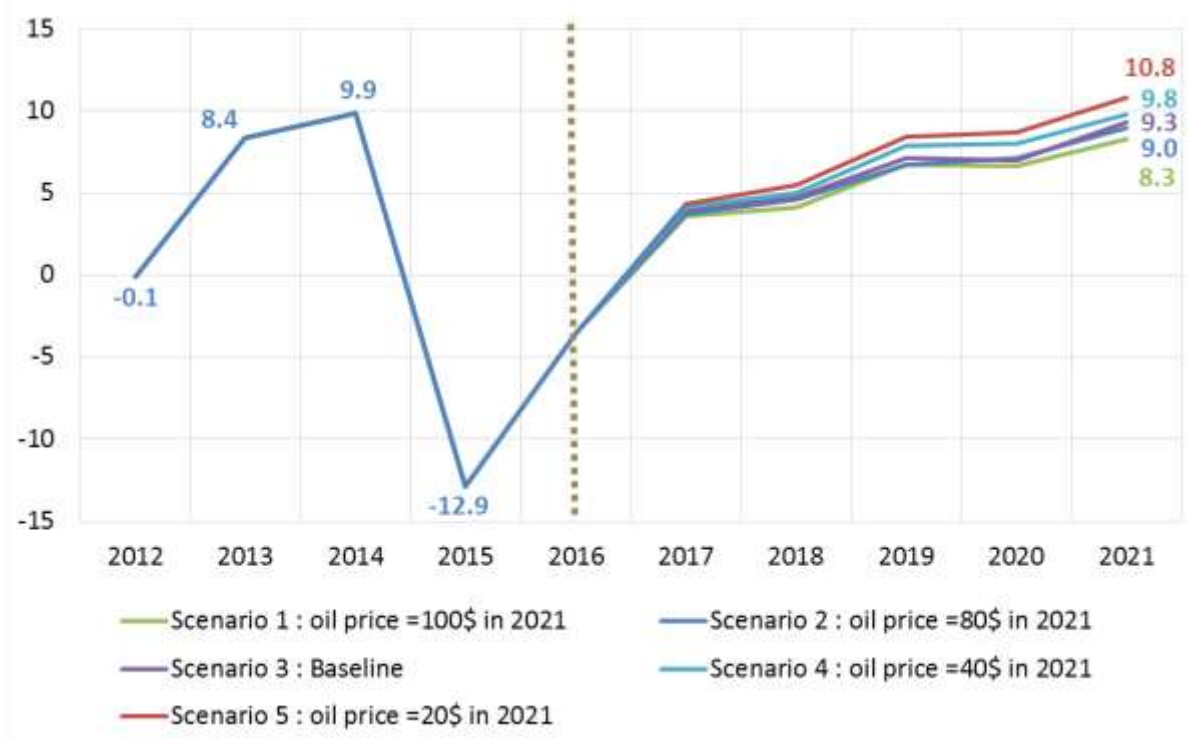
Figure 12: Effects of Oil Price Shocks on Fiscal Balance (% of GDP)

Source: Ministry of Finance, IMF and model estimations

Figure 13: Non-oil GDP growth (%), Vision 2021 Target

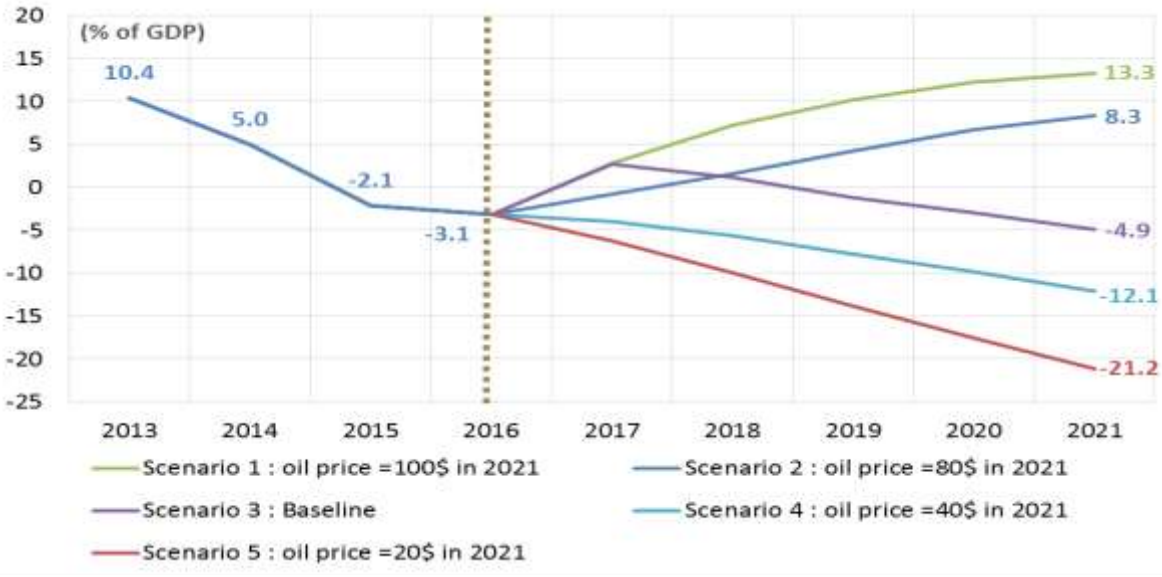
Source: FCSA and model estimations

Figure 14: Response of Government Expenditure Growth (%)



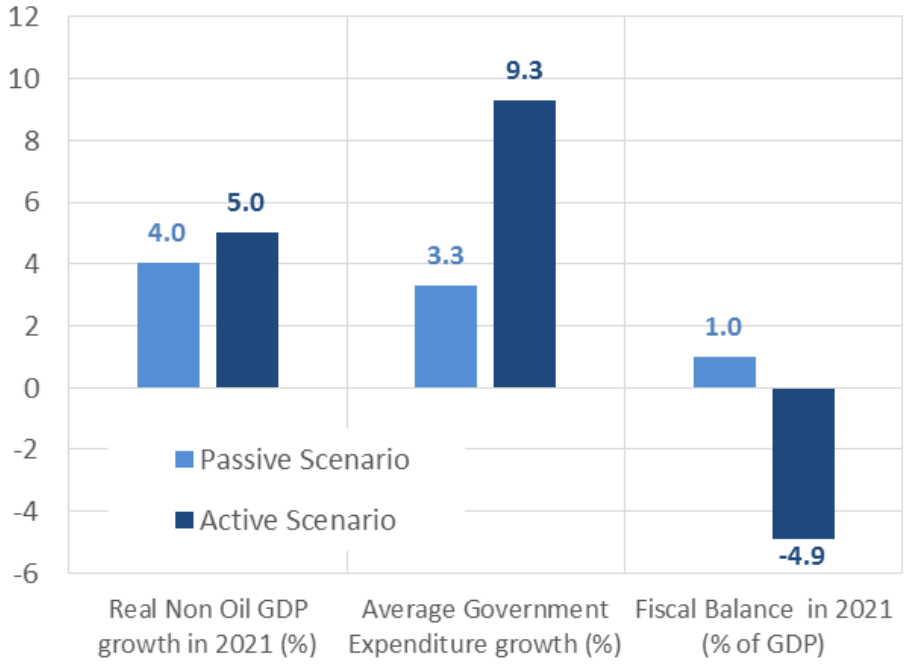
Source: Ministry of Finance, IMF and model estimations

Figure 15: Effects of Fiscal Policy Responses on Fiscal Balance (% of GDP)



Source: Ministry of Finance, IMF and model estimations

Figure 16: Comparison between Passive and Active Scenarios, under the Oil Price Baseline Scenario in 2021



Source: Model estimations

Table 1: Fiscal Breakeven Prices (including investment income)

	2011	2012	2013	2014	2015	2016f	2017f
GCC Average	70	69	78	87	79	69	66
Kuwait	36	46	52	56	50	52	49
Qatar	44	45	50	54	58	60	63
UAE	**66**	**64**	**68**	**76**	**58**	**56**	**55**
Oman	93	97	104	105	96	87	85
Saudi Arabia	83	78	93	105	97	77	72
Bahrain	112	121	119	122	112	105	103
Iraq	103	103	117	110	80	65	60
Iran	86	120	118	112	91	65	60
Algeria	108	124	109	130	111	89	82

Source: National authorities and the Institute of International Finance (IIF) projections

Table 2: Model Predictive Accuracy for the Period 2013-2015

	Equation (1)	Equation (2)	Equation (3)	Equation (4)	Equation (5)	Equation (6)
U-Statistic	0.13	0.11	0.08	0.06	0.09	0.06

Table 3: Estimations Results of the Adopted Model During the Period 1980-2015

Variables	Equation (1) NOGDP	Equation (2) Gov. spending	Equation (3) Bank Deposit	Equation (4) Credit	Equation (5) NPL	Equation (6) FDI
BP_t			0.21*			0.43**
$NOGDPG_{t-1}$			1.92*			1.02*
$NOGDPG_t$					-2.21**	
FDI_{t-1}			0.03**			
NPL_{t-1}				-0.04***		
BD_{t-1}				0.83*		
FFR_t				-1.50**		
OR_t		0.25*				
$Debt_t$		0.14*				
GS_t	0.33*					
EPI_t	1.51*					
DC_t	0.04**					
ECI_{t-1}	0.34*					
R^2	0.86	0.95	0.77	0.97	0.95	0.77

Notes: * : significant at 1% error level, **: significant at 5% error level, ***: significant at 10% error level

Table 4: Different Results of the Active Fiscal Policy, Under the Oil Price Scenarios

		2016	2017	2018	2019	2020	2021
The targeted Real Non-Oil GDP growth (%), Vision 2021		2.7	3.1	3.6	4.1	4.5	5.0
Scenario 1 :	Government Expenditure growth (%)	-3.5	3.6	4.1	6.7	6.6	8.3
oil price =100$ in 2021	Fiscal Balance (% of GDP)	-3.1	2.8	7.2	10.2	12.3	13.3
Scenario 2 :	Government Expenditure growth (%)	-3.5	3.7	4.6	6.7	7.1	9.0
oil price =80$ in 2021	Fiscal Balance (% of GDP)	-3.1	1.7	4.2	6.3	7.1	8.3
Scenario 3 :	Government Expenditure growth (%)	-3.5	3.9	4.7	7.1	7.0	9.3
Baseline	Fiscal Balance (% of GDP)	-3.1	2.7	1.2	-1.2	-3.0	-4.9
Scenario 4 :	Government Expenditure growth (%)	-3.5	4.1	5.0	7.9	8.0	9.8
oil price =40$ in 2021	Fiscal Balance (% of GDP)	-3.1	-3.9	-5.6	-7.7	-9.8	-12.1
Scenario 5 :	Government Expenditure growth (%)	-3.5	4.3	5.5	8.4	8.7	10.8
oil price =20$ in 2021	Fiscal Balance (% of GDP)	-3.1	-6.2	-9.9	-13.8	-17.5	-21.2

Source: Model estimations

Table 5: Different Results of the Passive and Active Scenarios by the Year 2021

	Scenario 1 : Oil price =100$		**Scenario 2 : Oil price =80$**		**Scenario 3 : Oil price =56$**		**Scenario 4 : Oil price =40$**		**Scenario 5 : Oil price =20$**	
	Passive	Active	Passive	Active	Passive	Active	Passive	Active	Passive	Active
Real Non-Oil GDP growth (%)	4.9	5.0	4.6	5.0	4.0	5.0	2.6	5.0	1.6	5.0
Government spending growth (%)	7.9	8.3	5.4	9.0	3.3	9.3	-1.8	9.8	-4.1	10.8
Fiscal Balance (% of GDP)	13.6	13.3	10.5	5.3	1.0	-4.9	-3.8	-12.1	-10.2	-21.2

Source: Model estimations

Appendices

Appendix 1: Economic Composite Indicator (ECI) for the UAE: Methodology and Estimates

In order to assess the economic activity for the UAE, policymakers examine different economic variables that could provide them high-frequency information about the economic developments. Since the GDP of the UAE, the main measure of the economic activity, is available only on an annual basis with a considerable publication delay, policymakers have to make decisions with a large amount of information obtained from different sources. Nevertheless, not all economic variables are published simultaneously, with various lags and frequencies, delaying the appropriate policy responses.

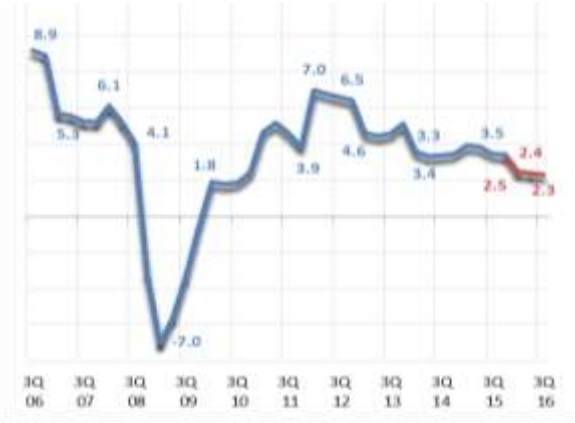
Adopted Methodology

To overcome this problem, we constructed an Economic Composite Indicator (ECI) that can closely track the economic activity of the UAE on a quarterly basis. According to the available data, the Principal Component Analysis (PCA) is the most appropriate method to calculate this indicator. This approach aims to extract a common factor from a group of relevant economic series and to capture the highest level of common trend. These macroeconomic variables are collected from different sources in order to obtain a dataset that covers a wide range of economic activity, such as global economy, sectoral activity, financial markets, money market and price trends. However, this methodologically rigorous approach depends highly on the quality of the data and the number of observations. Hence, the historical series of the indicator changes with the update of the selected variables.

ECI advantages

This constructed indicator could be a useful analytical and empirical tool for the policymakers since it offers a timely clear picture about the current economic situation. The ECI has three important advantages: first, it takes into account all important policy issues by synthesizing a large number of economic variables, both at the national and international levels. Secondly, it captures economic fluctuations for the UAE at relatively high frequency, compared to the available information. Finally, it will be used to give an early indication of turning points.

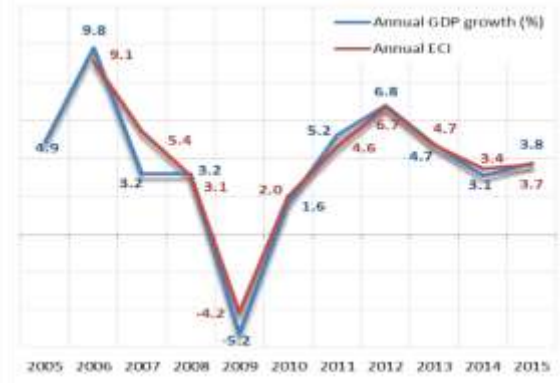
Quarterly Economic Composite Indicator (Y-o-Y change, %)



Annual analysis and results comparison

The annual ECI reflects the economy's historical performance and changes since 2006. There is a high correlation between the constructed ECI and the historical GDP growth of the UAE. This is not surprising since this indicator synthesizes large number of information reflecting the economic activity.

Annual Economic Composite Indicator (Y-o-Y change, %)



In the absence of published official data of quarterly GDP in the UAE, the ECI has proven to be a valuable tool for policymakers who are constantly looking for timely information about cyclical developments of the UAE's economic activity to inform timely policy decisions and contingency plans.

Appendix 2:

Detailed variable definitions and data sources

Abbr.	Variable	Units	Data source
BP_t	Brent price growth	Change, %	Energy Information Administration (EIA)
$NOGDPG_t$	Real Non-Oil GDP growth	Change, %	Federal Competitiveness and Statistics Authority
FDI_t	Foreign Direct Investment inflows growth	Change, %	Federal Competitiveness and Statistics Authority / UNCTAD
NPL_t	Non-Performing Loans growth	Change, %	Central Bank of UAE /IMF
BD_t	Total Bank Deposit growth	Change, %	Central Bank of UAE /IMF
FFR_t	US Federal Funds Rate	Rate, %	US Federal Reserve/ Bloomberg
OR_t	Oil Revenue growth	Change, %	IMF
OP_t	Oil production growth	Change, %	OPEC / Bloomberg
$Debt_t$	Total Government Debt growth	Change, %	Minister of Finance/IMF
GS_t	Government spending growth	Change, %	Minister of Finance/IMF
EPI_t	Economic Partners Index growth	Change, %	Central Bank of UAE
DC_t	Domestic credit growth	Change, %	Central Bank of UAE
ECI_t	Economic Composite Indicator growth	Change, %	Central Bank of UAE

Appendix 3:

Estimation results of the adopted Model during the period 1980-2012

Variables	Equation (1) NOGDP	Equation (2) Gov. spending	Equation (3) Bank Deposit	Equation (4) Credit	Equation (5) NPL	Equation (6) FDI
BP_t			0.23*			0.65**
$NOGDPG_{t-1}$			1.83*			0.32**
$NOGDPG_t$					-2.57**	
FDI_{t-1}			0.03***			
NPL_{t-1}				-0.03***		
BD_{t-1}				0.86*		
FFR_t				-1.63**		
OR_t		0.21*				
$Debt_{t-1}$		0.20*				
GS_t	0.37*					
EPI_t	1.71*					
DC_t	0.04**					
ECI_{t-1}	0.34*					
R^2	0.86	0.90	0.75	0.97	0.98	0.79

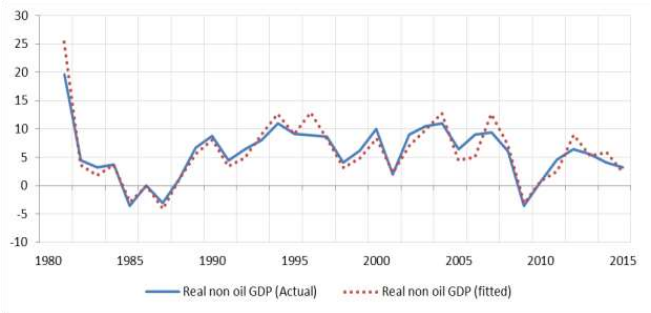
Notes: * : significant at 1% error level, **: significant at 5% error level, ***: significant at 10% error level.

The obtained results are generally satisfactory and in line with economic theory. All coefficients are statistically significant and with the expected signs.

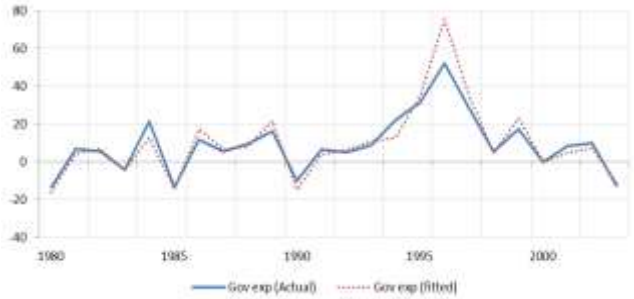
Appendix 4:

Testing performance of the Model: Actual vs Fitted

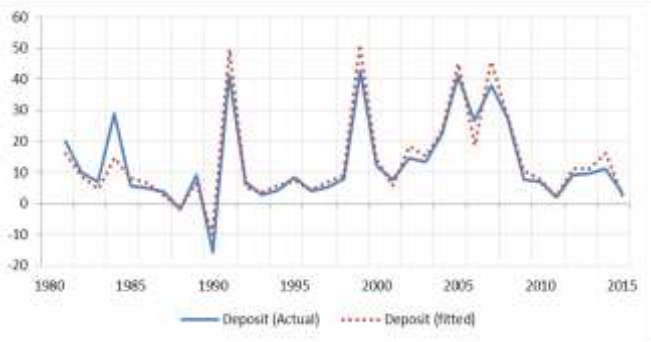
Equation 1: Real non-oil GDP growth (%)



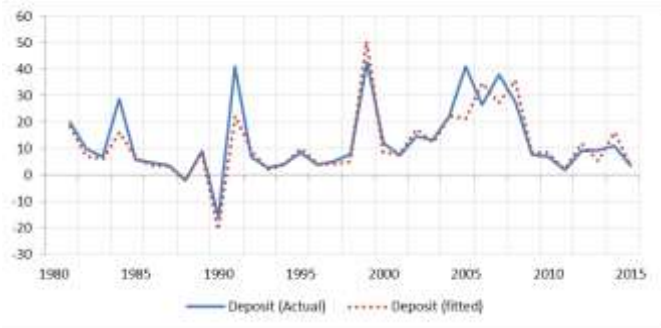
Equation 2: Government spending growth (%)



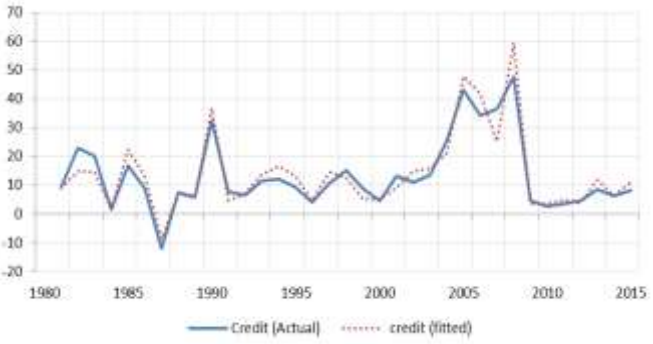
Equation 3: Bank Deposit growth (%)



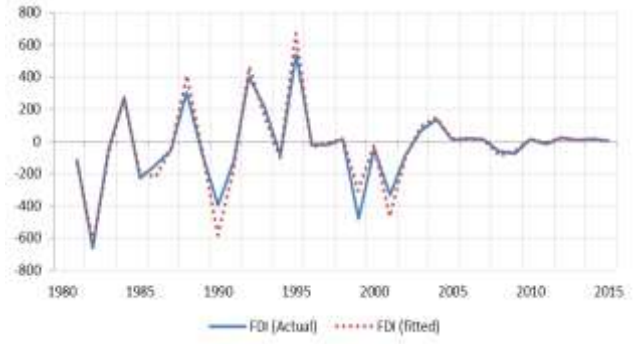
Equation 4: Domestic Credit growth (%)



Equation 5: NPL growth (%)



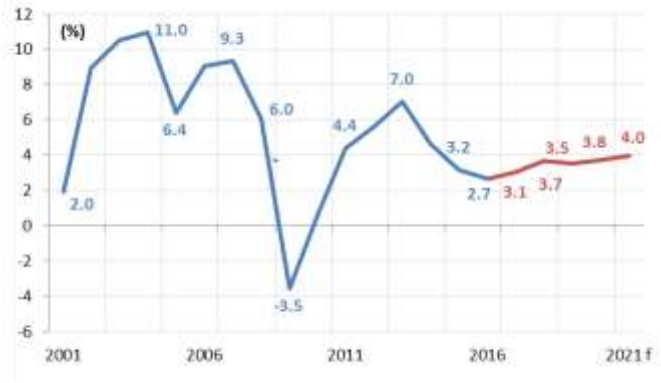
Equation 6: FDI inflows growth (%)



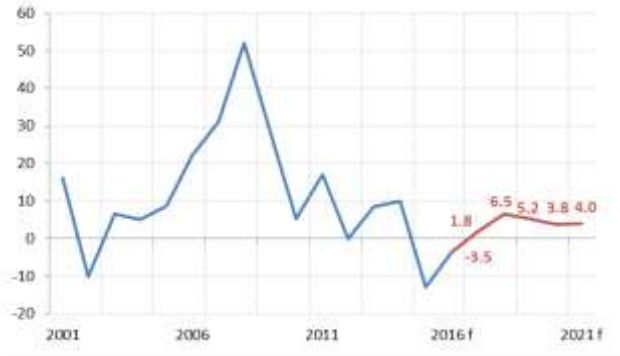
Appendix 5:

Baseline forecasts of the Model

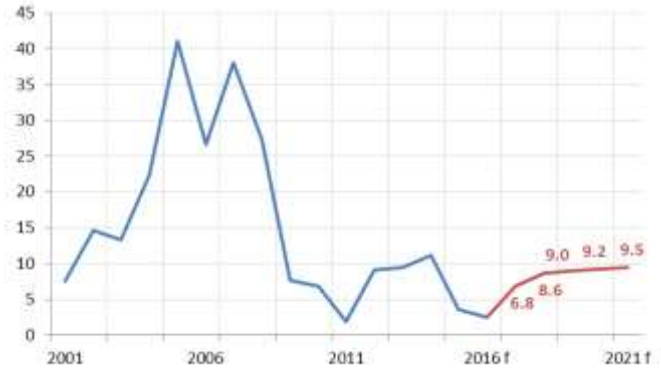
Equation 1: Real non-oil GDP growth (%)



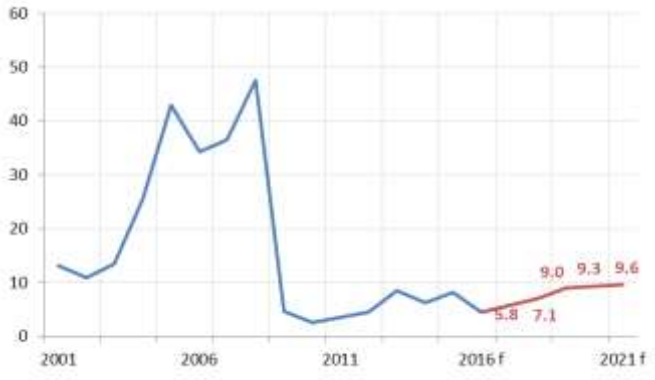
Equation 5: Government spending growth (%)



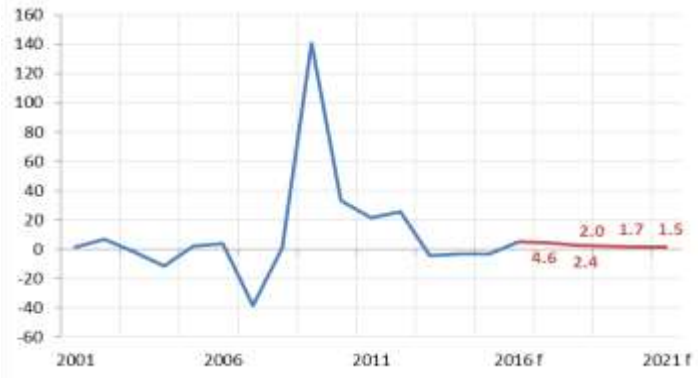
Equation 3: Bank Deposit growth (%)



Equation 4: Domestic Credit growth (%)



Equation 5: NPL growth (%)



Equation 6: FDI inflows growth (%)