The Driving Forces of Economic Growth Utilizing the ARDL Approach: Evidence from the United Arab Emirates

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Abstract
This paper examines the long-run and the short-run determinates of economic growth in the United Arab Emirates (UAE) during the period 1976 to 2014. It utilizes the sources of growth as specified in previous literature to include: capital, energy, financial development, labor and trade openness. In order to check for the robustness of the initial long-run relationships, the study adopted three long-run tests. Our results in general go along with previous empirical studies on the determinants of economic growth. The findings show that the electricity consumption and the degree of trade openness are the main drivers of economic growth. The study confirms the results of number of previous studies for the UAE economy in particular and the natural resources rich countries in general in its conclusion that financial development has a detrimental effect on economic growth.

Keywords: Real GDP, Labor Force, Capital Formation, Electricity Consumption, ARDL, UAE
JEL Classification: G20, F14, O4, O11, P52

1. Introduction
The debate on the driving forces of economic growth has been discussed extensively in the literature. Most of them considered that financial development and trade openness are the two main influencers of economic growth to any country, in addition to the other conventional inputs. However, the empirical findings were always mixed and inconclusive. For instance, a large number of studies revealed that financial development has a significant and positive impact on economic growth (Goldsmith, 1969; McKinnon, 1973; King and Levine, 1993; Bencivenga et al., 1995; Levine, 1997; Rousseau and Wachtel, 1998; Levine et al., 2000; Amable and Chatelain, 2001; Liu and Shu, 2002; Calderon and Liu, 2003; Dabos and Williams, 2009; Aghion et al., 2005; Pradhan, 2011; Zhang et al., 2012; Onayemi, 2013; Samargandi et al., 2014; Herwartz and Welle, 2014; Altaee and Al-Jafari, 2015; Pradhan et al., 2016; Durusu-Ciftci et al., 2017; Altaee and Al-Jafari, 2019). On the other hand, other empirical studies found a negative or no relationship between financial development and economic growth. For instance, Lucas (1988) indicated that
financial development must not be considered as the only main source of economic growth. Similarly, others found a negative influence of financial development on economic growth (Singh, 1997; Andersen and Trap, 2003; Ayadi et al., 2015; Ductor and Grechyna, 2015).

On the other hand, trade openness is another important influencer that was investigated to measure its effect on economic growth. Again, the results were mixed and inconclusive. Several researchers found that trade openness has a positive and significant impact on economic growth (Altaee and Al-Jafari, 2015; Yavari and Mohseni, 2012; Chang and Mendy, 2012; Rao and Rao, 2009; Foster, 2008; Dollar and Kraay, 2004; Lee et al., 2004; Karras, 2003; Frankel and Romer, 1999; Edwards, 1997; Sachs and Warner, 1995). On the other hand, other studies found a negative or no impact of trade openness on economic growth (Eris and Ulasan, 2013; Adhikary, 2011; Babatunde, 2011; Krugman, 1994).

Other factors such as capital, electricity consumption and labor also were examined to assess their importance on economic growth. The empirical findings suggested a positive and significant effect of gross fixed capital formation, energy and labor on economic growth (Altaee and Al-Jafari, 2019; Keho, 2017; Altaee, et al., 2016). Others found contrary negative relationships ((Hye and Riaz, 2008; Okonkwo and Gbadebo, 2009; Noor and Siddiqi, 2010) or no effects between the previous variables and economic growth (Sarker and Alam, 2010; Yusma and Wahilah, 2013).

Therefore, the objective of this paper is to reach a definite answer and conclusion to the drivers of economic growth in the United Arab Emirates. The UAE was selected due to a several intriguing reasons: The economy of the UAE is the considered to be the second largest Arab economy after Saudi Arabia. In addition, the UAE has several positive economic characteristics such as an abundance of wealth in energy resources, a good investment opportunity in various industrial and service sectors, and has a young population that enriches its labor market.

This paper is unlike previous empirical studies in several ways: it fills the gap that was created by the scarcity of researches that investigated this debatable subject on the UAE economy. In addition, it utilizes a larger and more updated sample size that spans for approximately forty years. Moreover, it employs more modern econometrical tests and techniques on the divers of economic growth in the UAE that will ultimately provide policy makers with the necessary recommendations.

The study is organized into five sections. Section 2 displays the previous related studies. On the other hand, data selection and empirical models are presented and discussed in section 3. In section 4, we analyze and discus the findings of the study. Finally, the conclusion and policy implications are presented in section 5.

2. Literature Review
There are no shortages in the literature that investigated the driving forces of economic growth of countries worldwide. However, results were always mixed and inconclusive. Therefore, this
section will shed some light on the findings of recent published articles that examined this debatable issue.

For instance, Olayungbo and Quadri (2019) tested the relationship between remittances, financial development and economic growth for 20 sub-Saharan African countries. The findings reveal that remittances and financial development have a positive impact on economic growth in both the short-run and the long-run. In addition, the study also found a uni-directional causal relationship from the GDP to remittances and from the financial development to the GDP. Similarly, Altaee and Al-Jafari (2019) investigated empirically the influences of saving and financial development on economic growth in Turkey. They utilized the ARDL approach and the error correction model (ECM) on a time series data from 1968 until 2017. The results showed a short and long-run positive and significant impact of saving and financial development on economic growth in Turkey. In addition, higher capital formation and higher employment rate were significant factors to achieve a sustainable economic growth. On the other hand, Elijah and Musa (2019) tested the impact of trade openness on economic growth in Nigeria. The findings suggest a negative effect of trade openness on economic growth in both short-run and long-run. The study emphasized the need for the Nigerian government to diversify its economy and give more attention to the agricultural and manufacturing sectors in order to achieve an export-led economic growth.

A year earlier, Bist and Read (2018) explored the long-term relationship between financial development and economic growth for 16 selected low-income countries utilizing the unit root tests and the panel cointegration analysis. The findings reveal a long-run cointegration between financial development and economic growth. The results of the long-run show a positive and significant impact of financial development on economic growth. Further, Malefane and Odhiambo (2018) investigated the influence of trade openness on economic growth in South Africa utilizing the ARDL bounds testing approach. The empirical results of the long-run show a positive and significant relationship between the ratio of total trade to GDP (proxy of trade openness) and economic growth. On the other hand, the findings of the short-run show a positive relationship between the ratios of trade to GDP, export to GDP, imports to GDP (three proxies of trade openness) and economic growth in South Africa. However, the study failed to find a positive relationship between trade openness index and economic growth. The study concludes that international trade is a very significant to economic growth in South Africa and therefore, the government must pursue an export-promotion policy. Similarly, Altaee and Al-Jafari (2018) empirically examined the relationship between trade openness and economic growth in the Gulf Cooperation Council (GCC) countries. The study reveals that export, energy, and gross fixed capital formation are the driving forces of economic growth in the GCC countries. However, imports found to have a negative influence on economic growth.

On the other hand, Ofori-Abebrese, et al. (2017) studied the impact of financial development on economic growth in Ghana employing the ARDL approach and the Granger causality test during the period 1970-2013. The results show a positive and significant relationship between credit from domestic sources to the private sector and economic growth. Moreover, the findings show a uni-directional causality running from economic growth to domestic deposit. The study recommended
that policy makers must concentrate on the development of the financial system to encourage investment and ultimately lead to a sustainable economic growth. In addition, another study by Tsaurai (2017) investigated the relationship between financial development, trade openness and economic growth in Argentina utilizing the Vector error correction model (VECM). The study showed a long-run positive and significant uni-directional causality running from financial development to economic growth and from economic growth to trade openness. The study suggested that an accelerated financial development and trade openness will lead to a sustainable economic growth in Argentina.

The drivers of economic growth in Nigeria were tested by several researchers. Lowal, et al. (2016) examined the effect of financial development and trade openness on economic growth in Nigeria using the ARDL approach. The results reveal a long-run relationship between economic growth and financial development, and between economic growth and trade openness, leading to a conclusion that improving the financial and trade sectors will lead to a sustainable economic growth in Nigeria. Similarly, Iheanecho (2016) tested also the influence of financial development on economic growth in Nigeria. The findings of the long-run show a negative and insignificant relationship between financial intermediary development and economic growth. Similar results were also obtained for the short-run where the relationship between the two variables found to be negative but statistically significant. The study recommended that the Nigerian government must diversify its economy and not to rely solely on oil. In addition, more development of the financial system is needed in order to achieve a high and sustainable economic growth. Another study was also completed on another rich oil country by Altaee, et al. (2016) where it investigated the relationship between gross fixed capital formation, export, import, and financial development on economic growth in the Kingdom of Saudi Arabia. The results revealed a positive relationship between fixed capital formation, exports and economic growth in both the short-run and the long-run. On the other hand, financial development exhibited a negative influence on economic growth in the short-run and positive effect in the long-run. Similar results were confirmed by Sbia and Alrousan (2016) where financial development revealed a negative effect on economic growth for the UAE in the short-run but changed to a positive impact in the long-run. The study concluded that financial development stimulates foreign direct investment that will lead to economic growth in the UAE.

Another study by Altaee and Al-Jafari (2015) on the determinants of economic growth for the Kingdom of Bahrain. The results show that trade openness and financial development have a causal effect on economic growth. On the other hand, economic growth found to have no causal impact on trade openness and financial development, supporting the trade-led growth and finance-led growth hypotheses. The study concluded that more development in the financial sector and more trade openness will achieve a good and sustainable economic growth for the Kingdom of Bahrain.

To test the drivers of economic growth in Australia, Rahman, et al. (2015) investigated the relationship between financial development, trade openness and economic growth. The empirical findings show a long-run relationship among the variables. Moreover, financial development,
international trade and capital found to have an impact on economic growth in Australia in both the short-run and the long-run. On the other hand, Al-Malkawi, et al. (2012) examined the impact of financial development on economic growth in the United Arab Emirates utilizing the ARDL approach to co-integration on a time series data from 1974-2008. In addition, they used the monetization ratio and financial intermediation ratio as proxies of financial development. The results showed a negative and statistically significant relationship between the monetization ratio and economic growth. Moreover, the results reveal a bi-directional causality between the two variables. The study recommended that UAE government must follow a policy of extensive business and financial services liberalization. Earlier study by Mosesov and Sahawneh (2005) examined the relationship between financial and economic development of the UAE from 1973 to 2003. The study revealed that labor and capital variables showed no positive nor significant relationship between the financial variables and the GDP. The study recommended that the UAE government needs to stop relying mainly on oil and focus on diversifying the economy and stimulate other sectors as well.

3. Data and Research Methodology

3.1 Data Sources

Data under investigation were collected from several sources. The labor force data were extracted from Penn World Table 9.1, available on www.ggdc.net/pwt. Data on electricity were obtained from the World Bank, World Development Indicators (WDI) available online at: http://www.worldbank.org. All other remaining variables (capital formation, financial development, real GDP, and trade openness) were taken from the UN, Basic Data Selection, statistical division, available online at: https://unstats.un.org/unsd/snaama/Basic. Figures 1 to 6 show the behavior of the variables under investigation from 1976 until 2014. It’s clear that real gross domestic product, labor force and trade openness exhibited a consistent upward trend over the years, giving us an early prediction of a positive relationship between trade openness and economic growth.

![Figure 1. Real Gross Domestic Product, 1976-2014](image1)

![Figure 2. Gross Fixed Capital Formation, 1976-2014](image2)
3.2 Research Methodology

We specify an empirical growth model that introduces labor force, gross fixed capital formation, electricity consumption, trade openness, and financial development as:

\[ \ln RGDP_t = \alpha_0 + \beta_1 \ln LABF_t + \beta_2 \ln CAPITAL_t + \beta_3 \ln ELECT_t + \beta_4 \ln FINDEV_t \\
+ \beta_5 \ln OPEN_t + \varepsilon_t \]

where \( RGDP \) is the growth rate of real \( GDP \), \( LABF \) is labor force, \( CAPITAL \) is the gross fixed capital stock, \( ELECT \) is the electricity consumption per capita, \( FINDEV \) measures the financial development proxy by domestic credit to private sector (% of the GDP), and \( OPEN \) measures trade openness (the share of export plus import in the GDP). “\( \ln \)” is the natural logarithmic operator, \( \alpha_0 \) and \( \beta \)'s are respectively constant and parameters to be estimated, and \( \varepsilon_t \) represents the error term with zero mean and constant variance.

In order to investigate the long-run as well as the short-run relationship between economic growth and its sources for the UAE, we conduct an Autoregressive Distributed Lagged (ARDL) bounds test that was developed by Pesaran and Shin (1999) and later extended by Pesaran et al. (2001). This technique is preferred to other techniques for a number of reasons. First, unlike the Granger
method, it integrates the short-run dynamics with the long-run equilibrium in a single reduced form equation without losing any information for the long-run. Second, the approach can be applied whether the underlying variables being used are purely I(0) or purely I(1), or mixed, while other co-integration techniques require that all variables to be integrated on the same order. Third, it is more statistically significant approach for examining correlation when faced with small data size as other techniques require large data size for validity to hold (Pesaran and Shin, 1999; Pesaran et al. 2001). Fourth, and finally, this approach has become increasingly popular and utilized in recent years (Jayaraman and Choong, 2009). In addition to the ARDL technique, three different sensitivity techniques were employed to check the robustness of the initial long-run relationship among the series. These include the Dynamic OLS (DOLS) by Stock and Watson (1993), and the Fully Modified OLS (FMOLS) by Phillips and Hansen, (1990), and the canonical cointegration regression (CCR) by Park, (1992). Therefore, a conditional ARDL model of order \((n, m^1, m^2, m^3, m^4, m^5)\) is employed to determine the long-run relationship between economic growth and its drivers. The long-run ARDL form of Pesaran and smith (1999) was stated as:

\[
\Delta \ln RGDP_t = \alpha_0 + \sum_{i=1}^{n} \phi_{RGDP}\Delta \ln RGDP_{t-i} + \sum_{i=0}^{m^1} \phi_{CAPITAL}\Delta \ln CAPITAL_{t-i} + \sum_{i=0}^{m^2} \phi_{LABF}\Delta \ln LABF_{t-i} \\
+ \sum_{i=0}^{m^3} \phi_{ELECT}\Delta \ln ELECT_{t-i} + \sum_{i=0}^{m^4} \phi_{FINDEV}\Delta \ln FINDEV_{t-i} + \sum_{i=0}^{m^5} \phi_{OPEN}\Delta \ln OPEN_{t-i} \\
+ \beta_{RGDP} \ln RGDP_{t-1} + \beta_{CAPITAL} \ln CAPITAL_{t-1} + \beta_{LABF} \ln LABF_{t-1} + \beta_{ELECT} \ln ELECT_{t-1} \\
+ \beta_{FINDEV} \ln FINDEV_{t-1} + \beta_{OPEN} \ln OPEN_{t-1} + \epsilon_t \nonumber
\]

In the first stage, the null hypothesis of no co-integrating relationship \(H_0: \beta_{RGDP} = \beta_{CAPITAL} = \beta_{LABF} = \beta_{OPEN} = \beta_{FINDEV} = \beta_{ELECT} = 0\) is tested against the alternative hypothesis of the existence of co-integrating relationship \(H_a: \beta_{RGDP} \neq \beta_{CAPITAL} \neq \beta_{LABF} \neq \beta_{OPEN} \neq \beta_{FINDEV} \neq \beta_{ELECT} \neq 0\). The calculated F-statistic value is compared with the upper and lower critical values which are given by Narayan (2004). If the calculated F-value is higher than the upper critical value, then the null hypothesis of no cointegration will be rejected whether or not the variables are I(0) or I(1).

After confirming the evidence of cointegration, the second step is to test the causal relationship between economic growth and the growth determinants in the framework of the vector error correction model (VECM). The error correction model (ECM) representation of the ARDL approach is as follows:

\[
\Delta \ln RGDP_t = \alpha_0 + \sum_{i=1}^{n} \psi_{RGDP}\Delta \ln RGDP_{t-i} + \sum_{i=0}^{m^1} \psi_{CAPITAL}\Delta \ln CAPITAL_{t-i} + \sum_{i=0}^{m^2} \psi_{LABF}\Delta \ln LABF_{t-i} \\
+ \sum_{i=0}^{m^3} \psi_{ELECT}\Delta \ln ELECT_{t-i} + \sum_{i=0}^{m^4} \psi_{FINDEV}\Delta \ln FINDEV_{t-i} + \sum_{i=0}^{m^5} \psi_{OPEN}\Delta \ln OPEN_{t-i} \\
+ \lambda ECT_{t-1} + \epsilon_t \nonumber
\]

Where, \(ECT\) is the error correction term calculated as:
\[ ECT_t = \ln RGDP_t - \alpha_0 - \beta_{\text{CAPITAL}} \ln \text{CAPITAL}_t - \beta_{\text{LABF}} \ln \text{LABF}_t - \beta_{\text{ELECT}} \ln \text{ELECT}_t - \beta_{\text{FINDEV}} \ln \text{FINDEV}_t - \beta_{\text{OPEN}} \ln \text{OPEN}_t \]

The essence of the error correction model is to show the speed of adjustment back to long-run equilibrium after a short-run shock.

In order to confirm the consistency of the model, we conduct a number of diagnostic tests. Specifically, these tests examined the serial correlation, functional form, normality and heteroscedasticity associated with the selected model. In accordance with Pesaran and Pesaran (2009), who emphasized the need to analyze the stability of the long-run coefficients in conjunction with the short-run dynamic model, the cumulative of the recursive residuals (CUSUM) as well as the cumulative sum of squares of recursive residual (CUSUMQ), suggested by Brown et al. (1975), were examined empirically. The null hypothesis of the test is: all coefficients in the given regression are stable.

4. The Empirical Results and the Discussion

4.1 The Results of the Unit Root Tests

The first step of our empirical analysis is to test the stationary properties of economic growth and its drivers. Therefore, the study uses two unit roots tests. They are the Augmented Dickey–Fuller test (1979) and the Phillips and Perron test (1988). Table 1 shows the results of unit root tests of the variables in level and at the first difference.

Table 1: Results of Unit Root Tests

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level ADF</th>
<th>Level PP</th>
<th>First Difference ADF</th>
<th>First Difference PP</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGDP</td>
<td>-0.7726</td>
<td>0.8154</td>
<td>-0.7945 (0.8093)</td>
<td>-5.1250** (0.0002)</td>
<td>I(1)</td>
</tr>
<tr>
<td>CAPITAL</td>
<td>-0.4663</td>
<td>0.8869</td>
<td>-0.6150 (0.8554)</td>
<td>-5.9780** (0.0000)</td>
<td>I(1)</td>
</tr>
<tr>
<td>LABF</td>
<td>-2.7356</td>
<td>0.0775</td>
<td>-3.4223 (0.2549)</td>
<td>-3.8124** (0.0061)</td>
<td>I(1)</td>
</tr>
<tr>
<td>ELECT</td>
<td>-7.8810</td>
<td>0.0000</td>
<td>-6.1729** (0.0000)</td>
<td>-5.1250** (0.0002)</td>
<td>I(1)</td>
</tr>
<tr>
<td>OPEN</td>
<td>-1.6578</td>
<td>0.7502</td>
<td>-1.7035 (0.7301)</td>
<td>-4.5116** (0.0049)</td>
<td>I(1)</td>
</tr>
<tr>
<td>FINDEV</td>
<td>-3.2156</td>
<td>0.0971</td>
<td>-2.7205 (0.2346)</td>
<td>-4.8107** (0.0022)</td>
<td>I(1)</td>
</tr>
</tbody>
</table>

Notes: (1) ***significance at 1%, **significance at 5%, and * significance at the 10%, (2) the numbers within the parentheses for the p-values, and (3) all variables are in ln the natural log form.

Table 1 shows that variables are integrated of different order; while ln ELECT is stationary at level I(0), other variables are integrated of order I(1). The implication is that the regression results are not spurious, as they involve a similar pattern of movement. Accordingly, the ARDL bound test can be applied.
To determine the appropriate lag order of differenced variables included in the model, Sequential Modified Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC) and Hannan-Quinn Information Criterion (HQ) are used. However, a lag of order 1 is chosen as it is suggested by all criteria.

4.2. The Results of the Long-Run Analysis and Bounds-Test Approach

The results of the ARDL bounds test for co-integration show that the calculated $F$-statistic is 6.6. Given that our sample size is not large enough and meets the small sample size requirement to suggest the application of the critical values reported by Narayan (2004). Therefore, the results show that the variables used are co-integrated. Table 2 shows the results of the ARDL bounds testing for co-integration, and Narayan critical values. Having found that series included in this study are co-integrated, the study estimates the model using the ARDL bounds test approach.

Table 2: F-Bounds Test

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>Value</th>
<th>Sig.level</th>
<th>Bound Critical Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F$-statistic</td>
<td>6.608&quot;**&quot;</td>
<td>1%</td>
<td>4.257 I(0) 6.040 I(1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5%</td>
<td>3.037 I(0) 4.443 I(1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10%</td>
<td>2.508 I(0) 3.763 I(1)</td>
</tr>
</tbody>
</table>

Notes: The superscripts "**" denote statistical significance at the 1%.

The next step of the ARDL approach would be to estimate the coefficients of the long-run relationship of the variables and the associated error correction model (ECM). The results of the long-run effect of the five determinants of economic growth are presented in Table 3 for the ARDL, FMOLS, DOLS and the CCR methods. The long-run results are similar for the four estimations in terms the sign and the importance of the variables. The consistent results demonstrate the robustness of the long-run estimates.

The coefficient of $ELECT$ was a positive and statistically significant at the 1% level, which implies that GDP and electricity consumption move in the same direction and suggest a pro cyclical relationship in the long-run. Indeed, three models, out of four, propose electricity as the main contributor to growth for UAE economy. The degree of trade openness also stimulates economic growth and it is statistically significant. Results show that the degree of trade openness is the second contributor to growth after electricity. This suggest that in the long-run, 1% increase in trade openness to the UAE would on average lead to 0.689% increase in economic growth. In the same manner, gross fixed capital formation has a positive and significant effect on economic growth in the long-run for the UAE at the 1% significant level for all models. All else is same, these results show that 1% increase in the capital input would increase economic growth by 0.397% for the ARDL method, 0.417% for FMOLS, 0.475% for DOLS, and 0.210% for CCR model.

However, the financial development variable has a negative and significant relationship with economic growth in the long-run for all model estimates. The coefficients value of -0.649, -0.546, -0.507 or -0.410 infer that a 1% increase in financial development would reduce economic growth either by as high as -0.65 or by as low as -0.41.
Table 3: The Estimated Long-Run Growth Models

<table>
<thead>
<tr>
<th>Variable</th>
<th>ARDL</th>
<th>FMOLS</th>
<th>DOLS</th>
<th>CCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAPITAL</td>
<td>0.397171***</td>
<td>0.417078***</td>
<td>0.475447***</td>
<td>0.210467***</td>
</tr>
<tr>
<td></td>
<td>0.067273</td>
<td>0.032628</td>
<td>0.019967</td>
<td>0.031406</td>
</tr>
<tr>
<td>LABF</td>
<td>0.358611***</td>
<td>0.294026***</td>
<td>0.348034***</td>
<td>0.09917***</td>
</tr>
<tr>
<td></td>
<td>0.051002</td>
<td>0.024332</td>
<td>0.01536</td>
<td>0.022318</td>
</tr>
<tr>
<td>ELECT</td>
<td>0.752588***</td>
<td>0.724164***</td>
<td>0.730232***</td>
<td>0.731711***</td>
</tr>
<tr>
<td></td>
<td>0.035311</td>
<td>0.017523</td>
<td>0.008958</td>
<td>0.017351</td>
</tr>
<tr>
<td>FINDEV</td>
<td>-0.649309***</td>
<td>-0.545673***</td>
<td>-0.506604***</td>
<td>-0.409638***</td>
</tr>
<tr>
<td></td>
<td>0.104786</td>
<td>0.040459</td>
<td>0.038848</td>
<td>0.042337</td>
</tr>
<tr>
<td>OPEN</td>
<td>0.688681***</td>
<td>0.631016***</td>
<td>0.434400***</td>
<td>1.030831***</td>
</tr>
<tr>
<td></td>
<td>0.142138</td>
<td>0.055199</td>
<td>0.048959</td>
<td>0.048373</td>
</tr>
<tr>
<td>R²</td>
<td>0.995</td>
<td>0.991</td>
<td>0.999</td>
<td>0.925</td>
</tr>
<tr>
<td>R² Adj</td>
<td>0.994</td>
<td>0.980</td>
<td>0.998</td>
<td>0.916</td>
</tr>
</tbody>
</table>

Notes: The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are underneath. DOLS, FMOLS, and CCR stand for Dynamic Ordinary Least Squares, Fully Modified Least Squares, and Canonical Cointegrating Regression, respectively.

These results support the earlier works of Al-yousif (2002), Mosesov and Sahawneh (2005), and Al-Malkawi, et al. (2012) that postulated financial development has a significant but negative contribution to economic growth in the UAE. This finding is in line with Mahran (2012), and Samargandi et al. (2013), whom find negative impact of the banking sector on economic growth in the Kingdom of Saudi Arabia. This unexpected result can be attributed to that financial system in the UAE has been still in the transition phase and still needs more maturity before it will be able to contribute positively to economic growth.

4.3 The Results of Short-Run Drivers of Economic Growth

The error correction representation for the selected ARDL model is presented in Table 4. In terms of significance, all parameters except one are significant at the 1% significant level. In terms of direction, the results point out that an increase in capital, labor, electricity consumption, and trade openness, in level leads to an increase in economic growth, whereas financial development resulted in retardation in growth. This confirm that promoting investment, employment, electricity, and trade openness would serve as an effective strategy in spurring economic growth in the short-run. The lagged effect of labor hinders economic growth. The short-run impact of financial development on economic growth is negative (-0.487) and is statistically significant at 1 per cent level.

The negative and statistically significant estimates for ECT -0.547 lends support to the long-run relationship among the series in the case of the UAE. The coefficients are all statistically significant at 1 per cent level. Banerjee et al. (1998) found that a negative and highly significant coefficient of a lagged error correction terms further proves the existence of a cointegrating relationship between the variables. The short-run deviations from the long-run equilibrium are corrected by 54.7 per cent towards long-run equilibrium path each year.
Table 4: The ARDL Cointegrating Short-Run Error–Correction Model (1, 0, 1, 0, 1, 0)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔRGDP(-1)</td>
<td>0.452948***</td>
<td>0.133731</td>
<td>3.387011</td>
<td>0.0020</td>
</tr>
<tr>
<td>ΔCAPITAL</td>
<td>0.217273***</td>
<td>0.075663</td>
<td>2.871601</td>
<td>0.0074</td>
</tr>
<tr>
<td>ΔLABF</td>
<td>0.888211***</td>
<td>0.213108</td>
<td>4.167892</td>
<td>0.0002</td>
</tr>
<tr>
<td>ΔLABF(-1)</td>
<td>-0.69203***</td>
<td>0.209050</td>
<td>-3.310369</td>
<td>0.0024</td>
</tr>
<tr>
<td>ΔELECT</td>
<td>0.411705***</td>
<td>0.097011</td>
<td>4.243898</td>
<td>0.0002</td>
</tr>
<tr>
<td>ΔFINDEV</td>
<td>-0.48671***</td>
<td>0.059928</td>
<td>-8.121533</td>
<td>0.0000</td>
</tr>
<tr>
<td>ΔFINDEV(-1)</td>
<td>0.131499</td>
<td>0.080170</td>
<td>-1.640263</td>
<td>0.1114</td>
</tr>
<tr>
<td>ΔOPEN</td>
<td>0.376740***</td>
<td>0.071611</td>
<td>5.260997</td>
<td>0.0000</td>
</tr>
<tr>
<td>ECT(-1)</td>
<td>-0.54705***</td>
<td>0.080432</td>
<td>-6.801440</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared     | 0.995       |
Adjusted R-squared     | 0.994       |
Durbin-Watson stat     | 2.239       |

Notes: Δ means the first difference and ECT(-1) is the error correction term. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

4.4. The Diagnostic and Stability Tests on the ECM

The validity of the results is dependent on how good the model is fitting the data and the stability of the model. For this purpose, several diagnostic and stability tests are conducted to check for the robustness of the ARDL model.

The overall goodness of fit of the estimated long-run models is shown in Table 3 and are quite high, with R² values of 0.995, 0.991, 0.999, and 0.925 for ARDL, FMOLS, DOLS and CCR model, respectively.

Table 5 reviews the results of the various stability tests. The residuals are normally distributed as indicated by Jarque–Bera test. The Lagrange Multiplier serial correlation test also confirms that there is no serial correlation in the model. The model also appears not be heteroscedastic as it passes the Breusch–Pagan–Godfrey of no heteroscedasticity. Finally, as it is suggested by Ramsey RESET test the model is correctly specified. Accordingly, one can conclude that in this model, all diagnostics are well.

Table 5: Results of the Diagnostic Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Statistic</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial Correlation: CHSQ</td>
<td>1.0674</td>
<td>0.3015</td>
</tr>
<tr>
<td>Functional form F(1,34)</td>
<td>0.1976</td>
<td>0.6600</td>
</tr>
<tr>
<td>Heteroscedasticity: CHSQ(1)</td>
<td>9.1537</td>
<td>0.3295</td>
</tr>
<tr>
<td>JB normality</td>
<td>0.4246</td>
<td>0.8087</td>
</tr>
</tbody>
</table>

Another necessary check is testing the stability of the long-run coefficients to ensure that the data used in this study are free of any structural changes over time. Figure 7 shows the plot of the cumulative sum of recursive residual (CUSUM) and the cumulative sum of squares of recursive residual (CUSUMSQ) of the model, respectively. The reported CUSUM and CUSUMSQ show...
that the model is stable and confirms the stability of the long-run coefficients of the explanatory variables.

Figure 7. Plot of the CUSUM and CUSUMSQ

5. Conclusion and Policy Implications
This paper investigates the driving forces of economic growth in the UAE. It utilized the ARDL approach on a time series data from 1976 to 2014. The results reveal that variables are co-integrated for long-run relationship. In addition, the variables of electricity, trade openness, gross fixed capital formation, and labor all contributed to economic growth and found to have a positive and significant effect in all models. In contrast, financial development found to have a negative and significant relationship with economic growth in the long-run for all models. On the other hand, the short-run effect of financial development on economic growth found to be negative and statistically significant. Moreover, the overall goodness of fit for the estimated long-run models are quite high. In addition, the stability tests show that the residuals are normally distributed and the model has no heteroscedasticity and the model is correctly specified.

The study recommends that policymakers in the UAE must pursue a high degree of trade openness and stimulate electricity consumption. At the same time, they should give more emphasis on policies that provide a favorable environment for the private sector to grow. Another important policy implication of the study is that financial sector development in terms of the flow of credit to the private sector should be given more focus to improve its efficiency.
References


