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The nexus between export diversification, imports, capital and economic growth in the United Arab Emirates: An empirical investigation

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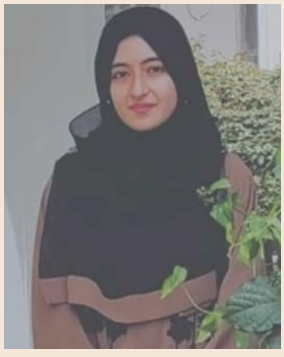
Abstract: Using the Vector Error Correction Model (VECM) and Toda-Yamamoto Causality approach, this paper investigates the short-run and long–run relationship between export diversification, physical and human capital, imports, and economic growth in the UAE. The study period in consideration is 1975-2017. The findings obtained from the VECM test confirm the existence of a significant long-run relationship between export diversification, imports, and economic growth in the UAE. Besides, the Toda Yamamoto Granger Causality test results reveal that imports Granger-cause UAE's economic growth which proves the validity of the Import-Led Growth hypothesis for the UAE economy in the long-run. The results also confirm that a unidirectional causal relationship exists from export diversification to economic growth for the UAE. This finding indicates the success of the UAE economy in attaining economic diversification and reduction in oil–dependency.

Subjects: Middle East Studies; Econometrics; Development Economics

Keywords: export diversification; economic growth; VECM; granger causality



Saima Shadab

ABOUT THE AUTHOR

Saima Shadab is currently working as Assistant Professor of Economics at Aligarh Muslim University, India. She is also a Ph.D. student at the Department of West Asian Studies, Aligarh Muslim University and has conducted her research on "Economic Diversification in the Gulf Cooperation Council Countries". She mainly specializes in Middle East Economics, Development Economics, International Trade and advanced Econometric analysis.

PUBLIC INTEREST STATEMENT

The study aimed at examining the impact of export diversification on the economic growth of the United Arab Emirates. Annual time series data was utilized from 1975-2017 for the short-run as well as long-run analysis. The results reported that export diversification has an inverse and significant relationship with economic growth in the long-run that indicates that a reduction in the concentration of exports encourages economic growth in the UAE. Also, a positive and significant relation between imports and economic growth was also found. This implies that the UAE has successfully diversified by reducing the concentration of exports within the oil sector. An increase in non-oil exports for diversification significantly encourages UAE's economic growth. Therefore, the study can help policymakers, economists and the government of UAE to focus on development of the non-oil sector in order to attain sustainable economic growth in the long-run.

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1. Introduction

The role of exports as one of the major drivers of economic growth has been supported widely in the economics literature. Conversely, the dependency upon primary exports as one of the significant contributors to economic growth has remained a matter of debate for various economists and policymakers. In general, multiple studies point out that resource-based economies suffer from deteriorating terms of trade due to massive dependence on a primary export product that ultimately leaves the manufacturing sector less competitive (Corden, 1984; Singer, 1999). In this context, the Gulf Cooperation Council (GCC) countries are oil-exporting economies that survive mainly on oil export revenues to maintain their economic growth. Due to this, the economic stability of the GCC countries always remains susceptible to oil price volatilities (Shadab, 2019a). In this regard, the GCC countries aim to diversify away from the oil sector to attain self-reliance from oil dependency and sustainable economic growth in the future. One of the most important tools to achieve economic diversification for these countries is through export diversification. For the oil-exporting Arab economies, export diversification implies reducing the level of concentration of exports within the oil sector. Export diversification encourages production and investments in the non-oil exports that could serve as a crucial contributor to economic growth and also help these countries plan for the post-oil era. A vast number of studies support the notion that export-led growth leads to positive economies of scale, specialization, increase in employment opportunities, utilization of advanced technology, and an increase in economic growth. By creating a diverse range of exports and reducing the concentration of exports, export diversification has proven to be an essential tool for countries that are in the first stage of economic development, wherein, their per capita GDP is less than 20,000 USD-$25000 (Shahbaz et al., 2019).

Presently, among the six GCC countries, the UAE economy is regarded as a successful model of economic diversification (Shadab, 2019b). One of the major contributors to the diversification of the UAE is the country's trade policy. The UAE kept a modern and open outlook towards international trade and competition from the world market. It shares a common external tariff policy with the Gulf Cooperation Council member countries. Further, the setting up of Free Trade Zones (FTA) such as the Ras Al Khaimah Free Zone led to export diversification in the UAE (Al-Shayeb & Hatemi-J, 2016). The share of oil exports in total exports has significantly declined over the years. For instance, the percentage share of oil exports in total exports was around 52 percent in 2000, the share declined to 34.95 percent in 2010 and fell further to 20.93 percent in 2017.

In this context, to the author's knowledge, empirical evidence on the impact of export diversification on the UAE's economic growth is non-existent. Therefore, this study is an attempt to examine the relationship (both short-run and long-run) between export diversification and economic growth for the UAE. To ensure the reliability of the results, physical capital, human capital, and imports are included as control variables that could have a significant impact on economic growth. The study uses time series analysis techniques such as the Johansen Cointegration test, VECM Granger Causality test, and the Toda-Yamamoto test to conduct the empirical analysis.

2. Literature review

In this section, a brief review of existing literature with relevance to the present study has been conducted. Export diversification is frequently suggested as a major economic policy tool in attaining self-sufficiency from dependency upon natural resources as it contributes to an increase in economic growth (Herzer & Nowak-Lehnmann, 2006). The concept of Export Diversification was for the first time emphasized by (Prebisch, 1962; Singer, 1999), and is commonly referred as the Prebisch-Singer hypothesis. The Prebisch-Singer hypothesis states that the developing countries require diversifying exports from primary products to manufactured products for attaining rapid industrialization. This is essential for the developing countries as export diversification in manufacturing products not only leads to industrialisation, but brings about resilience from exposure to the price volatilities of the primary exports. The impact of export diversification on economic growth has been subject to a matter of debate among economists and policymakers. Sarin et al. (2020) focussed on investigating the effect of export diversification on economic growth through meta-analysis, the results accounted

that out of 66 number of studies, 62 reported positive impact of export diversification, whereas three studies reported negative effect and the remaining one reported no effect of export diversification on economic growth. Similar empirical evidence related to the relation between export diversification and economic growth is present in the work of Hesse (2009) as it aptly reports that export diversification can result in higher economic growth by ensuring structural transformation in the productive base of a country as it moves from producing primary exports to manufactured exports. Besides, certain studies have examined the relationship between export diversity and per capita income patterns across countries. For instance, Imbs and Wacziarg (2003), Caballero and Cowan (2008), and Lederman and Klinger (2006). in their study revealed a U-shaped pattern between export diversification and economic growth which implies that countries in their initial stages of economic development focus on export diversification. However, after attaining a higher level of per capita income, such countries shift their focus on export specialization.

Existing studies on diversification in the UAE are limited in both numbers as well as scope. The existing literature in this area is only indirect as the impact of diversification is mostly examined using different sub-categories of non-oil exports as a proxy variable of export diversification. For instance, Shayah (2015), in his case study, examined whether diversification in the UAE is successful by examining the impact of an increase in non-oil exports over oil exports.

Some of the previous empirical studies have aimed to test the validity of the export-led growth hypothesis for the UAE economy by using either of the following; manufactured exports, total exports or non-oil exports as focal variables (Alodadi (2016); Kalaitzi and Cleeve (2018); Kalaitzi and Chamberlain (2020); A. Kalaitzi, 2015). Some studies have tested the validity of the import–led growth hypothesis by including total imports or other categories of imports (A. S. Kalaitzi, 2018; Shahbaz & Rahman, 2012). Other studies have included both exports and imports as focal variables. The findings of some existing studies reveal that exports play a crucial role in the economic growth of the UAE. For instance, Kalaitzi and Chamberlain (2020) in their study on the role of exports on the economic growth of the UAE examine the impact of merchandise exports on economic growth for the period 1975-2012 in order to test the validity of the Export-Led Growth Hypothesis for the UAE economy. The study incorporates the Cointegration test, ECM, and dynamic ordinary least squares test to confirm the long-run relationship between UAE exports and economic growth. The study employs the Toda Yamamoto Granger Causality Test to examine the long-run causal relationship. The findings confirm that in the short run, there is no causal relationship between exports/imports and economic growth for the UAE, which in turn proves the invalidity of the export-led growth/import-led growth hypothesis in the UAE. Also, a bidirectional causal relationship exists between primary export and economic growth in the short run, which is an indirect indication of the importance of oil exports in the UAE. In another study by Kalaitzi and Cleeve (2018), the ELG hypothesis in the UAE was examined. The study includes manufactured exports in the model as a focal variable and proxy variable for export diversification.

Besides, certain studies have examined the determinants of economic diversification for the UAE. For instance, Haouas and Heshmati (2014) examined the determinants of economic diversification in the UAE using the Normalized Herfindahl Hirschman Index. The results reveal that increased gross fixed capital formation and trade openness and a decrease in inflation stimulate economic diversification in the UAE by bringing a decline in export concentration. Alodadi (2016) examined the impact of total exports, investment, tourism, government spending, labor and capital of the oil sector, and the non-oil sector on GDP of Saudi Arabia and UAE. Findings from the study confirm that for the UAE's economy, the oil sector remains a crucial contributor to economic growth. However, results also revealed that non-oil exports significantly impact the UAE's economic growth. The study applied time series techniques such as the Johansen Cointegration test and the VECM test for the empirical analysis.

Therefore, the existing studies on export diversification or export-led growth give mixed results. Moreover, these studies have failed to incorporate export diversification as the focal variable for examining its impact on economic growth in the UAE. Despite continuous efforts to diversify, UAE

is still significantly dependent upon oil exports to obtain revenues. Therefore, even if the export-led growth hypothesis is valid for the UAE's economy, does it imply that the UAE has successfully attained export diversification over the years? Export diversification may explain the success of the UAE in diversifying away from the oil sector. Currently, the UAE serves as a suitable diversification model for the rest of the GCC countries. Therefore, in order to empirically examine the relationship between export diversification and economic growth in the UAE, this study incorporates International Monetary Fund's (IMF) Export Diversification Index to empirically investigate the relationship between export diversification and economic growth in the UAE in the short-run and long-run. The export diversification index, which is an index based on the Theil Index, has been prepared by the IMF. It is one of the most widely used proxy indicators used to measure the degree of economic diversification in a country. In addition, the study includes and examines the short-run and long–run relation between imports, human capital, physical capital, and economic growth.

3. Data

As per data availability, the study period in consideration for this analysis is 1975–2017. The IMF Export Diversification Index (ED) has been used as a proxy variable for the level of economic diversification in the UAE. Data on the UAE's Gross fixed capital formation (at constant 2015 prices in US $) has been used as a proxy variable of physical capital. Population (only working age group of 15-65) has been used as a proxy variable of human capital. GDP (at constant 2015 US $ prices) has been used as a proxy variable for economic growth and is the dependent variable in this study. All the variables were transformed into their logarithmic forms. For the sake of simplicity, the log of gross domestic product has been expressed in short form as LGDP, log of physical capital as LPC, log of human capital as LHC, log of export diversification as LED, and log of imports as LIMP.

Data of the ED index has been obtained from the IMF database. The ED index specifies the degree of export diversification in a country. The data for gross domestic product (at constant 2015 US $ prices) or LGDP, gross fixed capital formation or physical capital (LPC) and total imports (LIMP) has been derived from United Nations Statistical Division (UNSTATS) online database, whereas data for LHC has been extracted from World Development Indicators. The graphical plot of all the variables is shown in Figure 1. Table 1 reports descriptive statistics of all the log-transformed variables. It is evident from the table that all the variables are normally distributed as the p-values are greater than the five percent level.

4. Methods

This study follows the framework of Kalaitzi and Cleeve (2018) for the specification of the model. Accordingly, it is assumed that the production function of the UAE economy may be expressed as a function of human capital, physical capital, export diversification, and imports. The equation can be represented in the following equation,

$$Yt = AtKt^{a}Lt^{b} \tag{1}$$

Where, $0 < \alpha + \beta < 1$

In equation 1, Y denotes the aggregate production of the UAE economy, A denotes the total factor productivity, K is the stock of physical capital, and L is the human capital. α and β are the shares of physical capital and human capital of total GDP. As shown in equation 2, the independent focal variable, Export Diversification, the control variable; imports and other exogenous factors; and C together represent A, which denotes the total factor productivity. The subscript t represents time.

$$At = f(ED,\ IMP,\ Ct) = ED_t^{\omega}\ IMP_t^{\varphi}\ C_t \tag{2}$$

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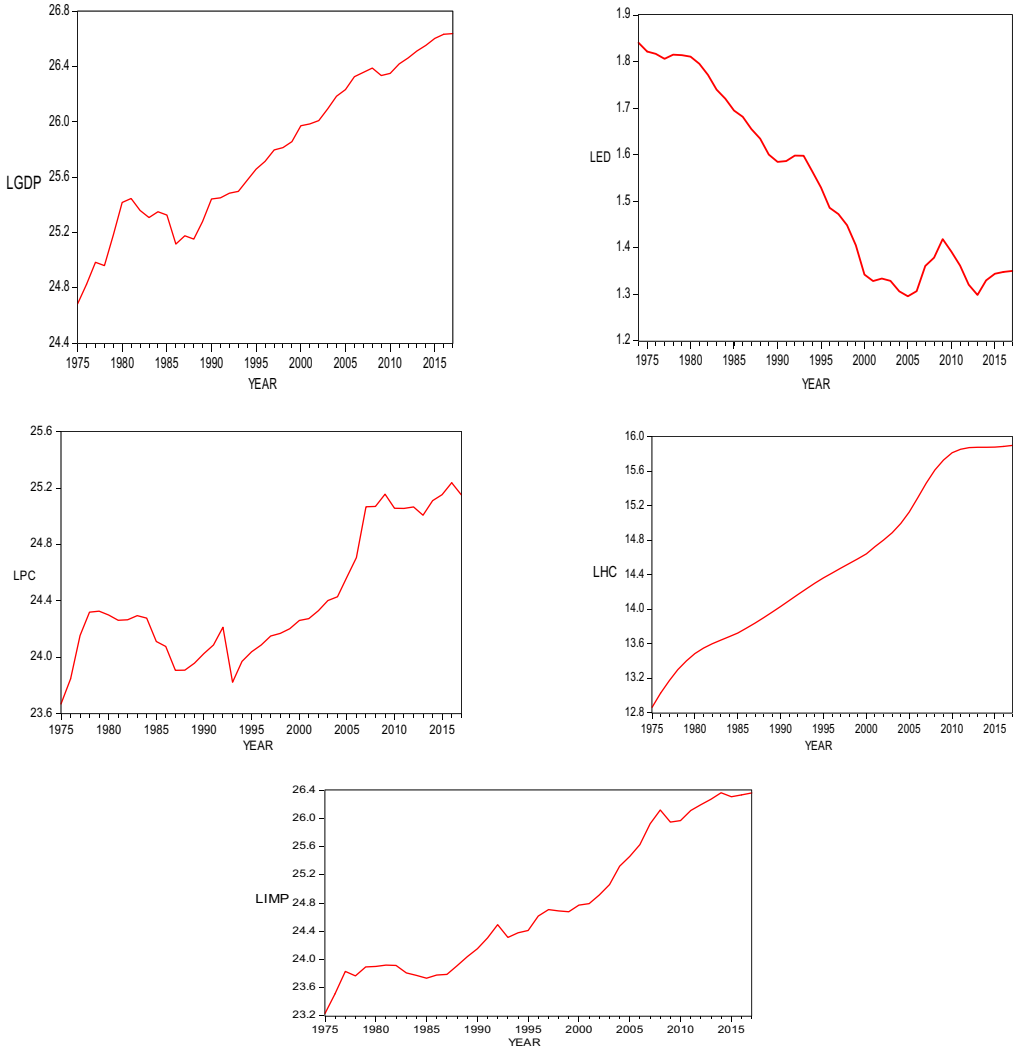
Figure 1. Graphical Plot of all the variables for the time period 1975-2017.



Here, α, β, ω, φ represent elasticities of production with respect to physical capital, human capital, export diversification, and imports.

Therefore, with respect to equation 1 and 2, the general model (after log transformation) has been specified as follows:

$$LGDP_t = C_0 + \alpha_1 LPC_t + \beta_2 LHC_t + \omega_3 LED_t + \varphi LIMP_t + \in_t \ldots (3) \quad (3)$$

Where t is a time subscript and is = 1975 ..... .2017. *C* denotes the intercept, and the rest of the coefficients represent the constant elasticities while □ is the error term.

4.1. Unit root test

Since this study includes a model that consists of a time trend (t), a simple regression analysis will lead to misleading and unreliable results due to the presence of non-stationarity. Moreover, before performing the VECM test, it is necessary to ensure that the time series variables are integrated of order one. Therefore, this study employs the Augmented Dickey-Fuller (ADF) unit root test (Dickey & Fuller, 1979).

Table 1. Descriptive Statistics

	LGDP	LPC	LHC	LED	LIMP
Mean	25.76604	24.40696	14.51950	1.525341	24.77783
Median	25.71515	24.27234	14.41867	1.485686	24.61736
Maximum	26.63922	25.23687	15.89657	1.821439	26.36672
Minimum	24.68396	23.66620	12.86302	1.295483	23.23637
Std. Dev.	0.558638	0.454637	0.932275	0.187360	0.973366
Skewness	0.008010	0.587847	0.146286	0.312860	0.402840
Kurtosis	1.805571	2.015047	1.814810	1.588613	1.751114
Jarque-Bera	2.556560	4.214699	2.670074	4.270509	3.957499
Probability	0.278516	0.121560	0.263148	0.118214	0.138242
Observations	43	43	43	43	43

Source: Author's own elaboration

4.2. Johansen cointegration test

This study employs the Johansen's Cointegration test to examine the long-run relationship between all the variables (Johansen, 1995). This test is crucial as it *"determines the number of cointegrating vectors in a non-stationary time series"* and is therefore superior to the Vector Autoregression (VAR) model formulated by Sims (1980).

It is applied using two different likelihood tests, namely, the trace test and the maximum eigenvalue test based on the VAR model of order p. These two tests are represented as follows in equation 4 and 5:

$$J_{trace} = -T\sum_{i=r+1}^{n} \ln(1-\lambda_i) \tag{4}$$

In this equation, the null hypothesis is as follows:

Ho: No. of the cointegrating vector(s) is less than or equal to the no. of cointegration relations (r).

$$J_{max} = -T\ln 1-\lambda_{r+1} \tag{5}$$

Here T is the sample size, and $\hat{\lambda}_i$ is the i^{th} largest canonical correlation. The trace statistic tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of n cointegrating vectors. The maximum eigenvalue test, on the other hand, tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of r+1 cointegrating vectors (A. Kalaitzi, 2015).

4.3. Vector error correction model/restricted VAR model

The application of the VECM test becomes valid if the time series variables are found cointegrated. The VECM test helps to ascertain the significance of the long-run relationship between the variables and also reveals the direction of the causal relationship between the time series variables. The VECM model of the present study has been specified as follows -

$$LGDPt = \alpha_1 + \sum_{i=1}^{n} \beta_{1i} LGDP_{t-i} + \sum_{i=1}^{n} \delta_{1i} LPC_{t-i} + \sum_{i=1}^{n} \omega_{1i} LHC_{t-i} + \sum_{i=1}^{n} \varphi_{1i} LED + \sum_{i=1}^{n} \gamma_{1i} LIMP + \pi_1 ECT_{t-1} + \varepsilon_{1t} \tag{6}$$

$$LPC_t = \alpha_2 + \sum_{i=1}^{n} \beta_{2i} LGDP_{t-i} + \sum_{i=1}^{n} \delta_{2i} LPC_{t-i} + \sum_{i=1}^{n} \omega_{2i} LHC_{t-i} + \sum_{i=1}^{n} \varphi_{2i} LED + \sum_{i=1}^{n} \gamma_{2i} LIMP + \pi_2 ECT_{t-1} + \varepsilon_{2t} \quad (7)$$

$$LHC_t = \alpha_3 + \sum_{i=1}^{n} \beta_{3i} LGDP_{t-i} + \sum_{i=1}^{n} \delta_{3i} LPC_{t-i} + \sum_{i=1}^{n} \omega_{3i} LHC_{t-i} + \sum_{i=1}^{n} \varphi_{3i} LED + \sum_{i=1}^{n} \gamma_{3i} LIMP + \pi_3 ECT_{t-1} + \varepsilon_{3t} \quad (8)$$

$$LED_t = \alpha_4 + \sum_{i=1}^{n} \beta_{4i} LGDP_{t-i} + \sum_{i=1}^{n} \delta_{4i} LPC_{t-i} + \sum_{i=1}^{n} \omega_{4i} LHC_{t-i} + \sum_{i=1}^{n} \varphi_{4i} LED + \sum_{i=1}^{n} \gamma_{4i} LIMP + \pi_4 ECT_{t-1} + \varepsilon_{4t} \quad (9)$$

$$LIMP_t = \alpha_5 + \sum_{i=1}^{n} \beta_{5i} LGDP_{t-i} + \sum_{i=1}^{n} \delta_{5i} LPC_{t-i} + \sum_{i=1}^{n} \omega_{5i} LHC_{t-i} + \sum_{i=1}^{n} \varphi_{5i} LED + \sum_{i=1}^{n} \gamma_{5i} LIMP + \pi_5 ECT_{t-1} + \varepsilon_{5t} \quad (10)$$

In the above VECM equation, n is the lag order, β, δ, ω, γ and ϕ represent coefficients of the variables, ECT is the Error Correction Term, π is the speed of adjustment towards the long-run equilibrium that would take place after an exogenous shock to the model. The expected sign of ECT's coefficient is expected to be negative in order to ensure that the model converges towards equilibrium.

4.4. Toda yamamoto granger causality test

The VECM Granger Causality test provides the direction of causality between the time series variables only for the short-run period. Therefore, in order to obtain the long-run direction of causality between the variables, this study employs the Toda Yamamoto or Modified WALD test (Toda & Yamamoto, 1995) that has been specified as follows:

$$LGDP_t = \alpha_0 + \sum_{i=1}^{k+d} \beta_{1i} LGDP_{t-i} + \sum_{i=1}^{k+d} \delta_{1i} LPC_{t-i} + \sum_{i=1}^{k+d} \omega_{1i} LHC_{t-i} + \sum_{i=1}^{k+d} \varphi_{1i} LED_{t-i} + \sum_{i=1}^{k+d} \gamma_{1i} LIMP_{t-i} + \varepsilon_{1t} \ldots \quad (11)$$

$$LPC_t = \alpha_2 + \sum_{i=1}^{k+d} \beta_{2i} LGDP_{t-i} + \sum_{i=1}^{k+d} \delta_{2i} LPC_{t-i} + \sum_{i=1}^{k+d} \omega_{2i} LHC_{t-i} + \sum_{i=1}^{k+d} \varphi_{2i} LED_{t-i} + \sum_{i=1}^{k+d} \gamma_{2i} LIMP_{t-i} + \varepsilon_{2t} \quad (12)$$

$$LHC_t = \alpha_3 + \sum_{i=1}^{k+d} \beta_{3i} LGDP_{t-i} + \sum_{i=1}^{k+d} \delta_{3i} LPC_{t-i} + \sum_{i=1}^{k+d} \omega_{3i} LHC_{t-i} + \sum_{i=1}^{k+d} \varphi_{3i} LED_{t-i} + \sum_{i=1}^{k+d} \gamma_{3i} LIMP_{t-i} + \varepsilon_{3t} \quad (13)$$

$$LED_t = \alpha_4 + \sum_{i=1}^{k+d} \beta_{4i} LGDP_{t-i} + \sum_{i=1}^{k+d} \delta_{4i} LPC_{t-i} + \sum_{i=1}^{k+d} \omega_{4i} LHC_{t-i} + \sum_{i=1}^{k+d} \varphi_{4i} LED_{t-i} + \sum_{i=1}^{k+d} \gamma_{4i} LIMP_{t-i} + \varepsilon_{4t} \ldots \quad (14)$$

$$LIMP_t = \alpha_5 + \sum_{i=1}^{k+d} \beta_{5i} LGDP_{t-i} + \sum_{i=1}^{k+d} \delta_{5i} LPC_{t-i} + \sum_{i=1}^{k+d} \omega_{5i} LHC_{t-i} + \sum_{i=1}^{k+d} \varphi_{5i} LED_{t-i} + \sum_{i=1}^{k+d} \gamma_{5i} LIMP_{t-i} + \varepsilon_{4t} \quad (15)$$

In the above equations, the optimal lag length is denoted by k, $d$represents the maximum order of integration of the time series variables LGDP, LPC, LHC, LED, and LIMP. $\beta, \delta, \omega, \varphi, \gamma$ are coefficients.

5. Results -

5.1. Unit root test result

Table 2 reports result from the ADF unit root test of all the time series variables that have been incorporated in this study. It is evident that all the variables are found non-stationary at levels as the p-values are insignificant for each variable. It may also be observed that the critical values are greater than the ADF t-statistic for all the variables when they are at their level form. Further, the series is found stationary at first differences with significant p-values. Therefore, the null hypothesis, i.e., variables LGDP, LPC, LHC, LED, and LIMP are non-stationary, can be rejected. This confirms that all the variables in the series are integrated of order 1[or I(1)], which allows the series to be tested for cointegration.

5.2. Johansen cointegration test result

Data in Table 3 shows that the null hypothesis of no cointegration among the variables is clearly rejected at a five percent level of significance. In other words, it is evident that there exists a long-run relationship between the variables. The trace statistics are greater than the five percent critical value at each of the rank order, i.e., 0, 1, 2. This implies that there are three cointegrating equations. The null hypothesis of no cointegration is rejected at 1 percent level of significance, as evident from Table 3. The existence of a long-run relationship is also evident and clear from the table as the p-values of the hypothesized number of cointegrating equations (at most one and at most two) at a five percent level of significance are less than the critical values. The optimal lag length for the Johansen Cointegration test is found by using the VAR Lag Order Selection Criteria test. The optimal lag length given by the Akaike Information Criterion (AIC) is four and has been followed accordingly for the cointegration and causality test.

Therefore, the Johansen cointegration test results confirm the existence of a long-run relationship between the variables. Since the variables are cointegrated, it becomes valid to perform the VECM test to examine the long-run relationship further.

5.3. Estimates from the VECM test

Results from the VECM test have been reported in Table 4. It may be observed from the results that the model is valid since the Error Correction Term (ECT) is negative (−0.46) and highly significant at one percent level of significance (−0.0001). The ECT indicates the pace at which a model pulls back to its equilibrium state following an exogenous shock. Therefore, ECT with a negative sign indicates that the variables will converge towards equilibrium in the long run.

The coefficients of the variables have also been reported in Table 4. The signs of the coefficients in VECM must be interpreted oppositely. In simple words, coefficients of the variables with a positive sign imply a reverse or negative relationship between the dependent and the corresponding independent variable. It must also be noted that the relationship between Export Diversification Index and Economic Growth is not direct. This is because the Export Diversification Index is proximately similar to the "Theil Index" and is therefore negatively related to the degree of diversification. Values near to 0 of the ED index imply a greater degree of diversification (or lesser concentration of exports), whereas values near to one imply a lesser degree of diversification (or high export concentration within a sector). Therefore, the expected relationship between the ED index and GDP is inverse as it would imply that lesser export concentration has a positive impact on GDP. This finding is consistent with similar studies (Al-Marhubi, 2000; Hinlo & Arranguez, 2017; Kilolo, 2018) examining the relationship between ED and GDP. As stated earlier, the ED reflects the degree of concentration of exports in

Table 2. ADF UNIT ROOT TEST RESULTS AT LEVEL AND FIRST DIFFERENCE

Variables	Constant*	Constant and Trend*	Without Constant and trend*
LGDP	0.6544	0.4342	0.9999
ΔLGDP	0.0001	0.0010	0.0001
LPC	0.7901	0.8314	0.9838
ΔLPC	0.0000	0.0003	0.0000
LHC	0.8240	0.3916	0.9988
ΔLHC	0.0075	0.0323	0.05
LED	0.5434	0.7689	0.0883
ΔLED	0.0149	0.0446	0.0031
LIMP	0.9193	0.8197	1.0000
ΔLIMP	0.0001	0.0008	0.0001

*MacKinnon (1996) one-sided p-values.

Table 3. Johansen Co-integration Test Unrestricted Cointegration Rank Test—Trace

Cointegrating rank (r)	Eigen Value	Trace Statistic	Critical Value (5 percent level of significance)	P-value**
None *	0.873411	172.4454	69.81889	0.0000
At most 1 *	0.740469	93.90658	47.85613	0.0000
At most 2 *	0.513272	42.64922	29.79707	0.0010
At most 3	0.308230	15.28729	15.49471	0.0537
At most 4	0.033231	1.284243	3.841466	0.2571

Note: Trace test indicates three co-integrating equations. * denotes rejection of the null hypothesis (i.e., no co-integration) at 5 percent level of significance respectively. ** denotes MacKinnon-Haug-Michelis (1999) p-values.

a country. Therefore, a decline in the ED index would imply a lesser concentration of exports and a greater degree of diversification and vice versa. Since the value of t-statistic for ED is 5.56 percent, it can be stated that ceteris paribus, there is a highly significant and inverse relationship between LED and LGDP in UAE in the long run. The findings show that a one percent increase in export diversification index leads to a 3.21 percent increase in UAE's LGDP.

A negative and insignificant relationship is found between LPC and LGDP in the UAE, ceteris paribus. Furthermore, a negative and significant relationship is found between LHC and GDP. This implies that both physical capital and human capital fail to significantly contribute to the economic growth of the UAE.

Lastly, a highly significant and positive relationship exists between imports (LIMP) and LGDP. A one percent increase in LIMP leads to a 1.65 percent increase in LGDP. This implies that imports significantly encourage UAE's economic growth in the long run.

Overall, the VECM results obtained are significant as the value of R-squared is high (65 percent), which implies that the ECT explains 65 percent of the variation in GDP (the dependent variable). The p-value of the F-statistic is also significant at the 5 percent level as it is equal to 0.01 percent.

In order to check reliability of the results, diagnostic tests were applied on the VECM model. As evident from Table 4, the model is normally distributed. Also, the null hypothesis of the existence of heteroskedasticity and serial correlation is also rejected.

Table 4. Vector Error Correction Estimates (Long–run)

Variables	Coefficients	Standard Errors	T-statistics
ECT*	−0.467779 (0.0001)**	(0.10146)	[4.61058]
ΔLPC	0.191181	(0.19552)	[0.97782]
ΔLHC	1.757563	(0.35429)	[4.96083]
ΔLED	3.219917	(0.57821)	[5.56880]
ΔLIMP	−1.56431	(0.34239)	[−4.83790]
C	−19.86473		
ΔGDP	1		
R-squared	0.65		
Adjusted R-squared	0.40		
F-statistic	2.636178		
Prob(F-statistic)	0.018032		
Durbin-Watson stat	2.582606		
Residual Test			
Jarque-Bera Test Statistic = 0.83	P-value 0.65		
Heteroskedasticity Breusch Pagan Godfrey Test Statistic = 1.57	P-value = 0.16		
Serial Correlation LM Test	P-value = 0.80		

Dependent Variable: GDP

Lags = 3

Time period: 1979-2017

Observations: 39 after adjustments

***ECT refers to Error Correction Term**

****Indicates P-value of the ECT**

Δ refers to variables in their first difference form.

Table 5. VECM Granger Causality Test Results

	DEPENDENT VARIABLES				
Independent Variables	**ΔLGDP P-value**	**ΔLPC P-value**	**ΔLHC P-value**	**ΔLED P-value**	**ΔLIMP P-value**
ΔLGDP	-	0.3810 (3.069640)	0.9694 (0.248370)	0.8069 (0.976812)	0.2306 (4.302749)
ΔLPC	0.1159 (5.912739)	-	0.4970 (2.382126)	0.3603 (3.210171)	0.2570 (4.042059)
ΔLHC	0.0050*** (12.82567)	0.2672 (3.947018)	-	0.1367 (5.533464)	0.1764 (4.938408)
ΔLED	0.2871 (3.772802)	0.7412 (1.249302)	0.3640 (3.184809)	-	0.6915 (1.460179)
ΔLIMP	0.0053*** (1.270670)	0.2713 (3.910441)	0.6109 (1.818585)	0.0225** (9.582240)	-
All Variables	0.0090 (26.53496)	0.5485 (19.77252)	0.8160 (7.593430)	0.1395 (17.27497)	0.1971 (15.87381)

Note: ***, **, * indicates significance at 1 percent, 5 percent, and 10 percent levels of significance. Degrees of freedom = 3. Optimal Lag Length suggested by the AIC Criterion has been followed for this test. Values in parentheses are Chi Square values. Δ indicates variables in first difference.

5.4. Short-run VECM Granger causality test results

In order to test the directional relationship between the variables, the short-run Granger Causality test by Granger, C.W. (1988) has been employed in this study. As evident from the results (Table 5), the null hypothesis that Export Diversification doesn't granger cause GDP and vice versa cannot be rejected at any level of significance. However, an indirect causal relationship is found to exist between export diversification and economic growth (GDP) through imports. This is because a one-way directional relationship is found to run from Imports to GDP at all conventional levels of significance and also from Imports to Export Diversification at a five percent level of significance. This implies that imports encourage greater innovation and investment in the export sector by improvement in technology and productivity that ultimately results in the lesser concentration of exports, greater diversity in the range of export categories, and hence diversification of exports. Since export diversification helps reduce the concentration of exports within the oil sector and also less exposure to oil price volatility, this, in turn, results in sustainable and stable economic growth. Therefore, it can be stated that an indirect causal relationship does exist between export diversification and economic growth. Further, the one-way causal relationship running from IMP to GDP indicates the validity of the Import-Led Growth hypothesis for the UAE economy.

Apart from this, the null hypothesis that Human Capital (HC) doesn't granger cause GDP is rejected at all conventional levels of significance.

5.5. Toda yamamoto granger causality test results

In order to examine the long-run causal relationship between the time series variables incorporated in this study, the Toda Yamamoto Granger Causality test has been applied to the variables. Here, the VAR model was augmented by setting up optimal lag length (d) equal to three and was further increased by order of integration (k) that is equal to one. As evident from Table 6, the results of the Toda Yamamoto Granger Causality Test (or Modified WALD test) indicate that the Import-Led Growth hypothesis is valid for the UAE economy in the long-run. The null hypothesis that Imports do not granger-cause economic growth is rejected at all the conventional levels of significance. The results also reject the null hypothesis of export diversification doesn't granger cause economic growth at 5 percent level of significance. Therefore, the results indicate that export diversification through an increase in non-oil exports and a lesser concentration of exports within the oil sector promotes the economic growth of the UAE.

Table 6. Toda Yamamoto Granger Causality Test Results

DEPENDENT VARIABLES

INDEPEDENT VARIABLES	LGDP p-values	LPC p-values	LHC p-values	LED p-values	LIMP p-values	All Variables
LGDP	-	0.6305 (1.728866)	0.9162 (0.512074)	0.8394 (0.841840)	0.2637 (3.979257)	0.0139 (25.19516)
LPC	0.4265 (2.781809)	-	0.8333 (0.867159)	0.1742 (4.967471)	0.5831 (1.948788)	0.2281 (15.24962)
LHC	0.1493 (5.328141)	0.4747 (2.503492)	-	0.0059*** (12.49274)	0.5256 (2.232392)	0.2474 (14.89165)
LED	0.0131** (10.76208)	0.5777 (1.974509)	0.0935* (6.404716)	-	0.4554 (2.611694)	0.00014 (31.91611)
LIMP	0.0031*** (13.87904)	0.2467 (4.140318)	0.2941 (3.713449)	0.7302 (1.295359)	-	0.2230 (15.34775)

Note: ***, **, * indicate significance at 1 percent, 5 percent and 10 percent levels of significance. Degrees of freedom = 3. Optimal Lag Length suggested by the AIC Criterion has been followed for this test. Order of integration (d) = 1 and Optimal Lag Length (k) = 3. Figures in the tables are p-values.

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Further, the null hypothesis of human capital doesn't granger-cause export diversification, and vice versa is also rejected. This implies that there exists a bidirectional relationship between human capital and export diversification. Therefore, these results indicate that decrease in the concentration of exports within the oil sector and an increase in non-oil exports for export diversification brings improvement in productivity levels and knowledge of the human capital. This improvement in the level of productivity and skills of human capital, in turn, lead to further expansion of the non–oil exports.

6. Conclusion

This study empirically examined the relationship between export diversification and economic growth over the period 1975-2017. Apart from export diversification, the impact of imports, physical capital, and human capital on economic growth were also investigated. The Johansen Cointegration test results revealed that all the variables are cointegrated and, therefore, move together in the long-run. The VECM test results suggested that export diversification has an inverse and significant relationship with economic growth in the long-run that indicates that a reduction in the concentration of exports encourages economic growth in the UAE. Also, a positive and significant relation between imports and economic growth was also found. This implies that by importing goods, the UAE economy attains an increase in productivity and technological advancements that encourage economic growth.

A negative and insignificant relationship was found between physical capital and economic growth that indicates the need of the UAE government to channelize revenues in productive investments that could help bring an increase and stability in economic growth. Furthermore, the VECM Granger Causality test results suggest that an indirect causal relationship is found to exist between export diversification and economic growth through imports. This is because a one-way directional relationship is found to run from Imports to GDP and also from Imports to Export Diversification. Further, the one-way causal relationship running from imports to GDP also indicates the validity of the Import-Led Growth hypothesis for the UAE economy.

Lastly, the Toda-Yamamoto Causality test results also confirm the validity of the Import Led Growth hypothesis for the UAE in the long-run. Moreover, a one-way causal relation exists from export diversification to economic growth in the long-run. This implies that the UAE has successfully diversified by reducing the concentration of exports within the oil sector. An increase in non-oil exports for diversification significantly encourages UAE's economic growth. There also exists a bidirectional relationship between human capital and export diversification.

Therefore, these results indicate that decrease in the concentration of exports within the oil sector and an increase in non-oil exports for export diversification brings improvement in productivity levels and knowledge of the human capital. For the past many years, UAE relies on the imported workforce. This imported workforce is much more skilled and productive than the domestic workforce of the UAE. More than 70 percent of the workforce is foreign workforce in the UAE. Therefore, this improvement in the level of productivity and skills of human capital, in turn, lead to further expansion of the non-oil exports.

Keeping in view the above discussed findings, this study presents an important policy implication. The study suggests that although the UAE has managed to build and expand its non-oil sector, the economy is still exposed to oil price volatilities and dependent upon oil revenue for stable economic growth. Therefore, there is a strong need for the UAE government to focus on economic diversification to attain reduction in oil dependency. For this purpose, the UAE government must actively focus on diversifying exports and reducing concentration of exports within the oil sector. Despite the overall results, this study suffers from a few limitations. First, the econometric model employed in this study may affect the reliability of the results due to the presence of bias related to omitted variables. Also, there might be problem of endogeneity of some regressors present in the model. Second, the export diversification index is "commodity focused" and includes only a limited number of goods. Therefore, future studies may examine export diversification using disaggregated data of

different commodities to examine the impact of specific non-oil export products (such as high technology goods, merchandise goods, etc.) on economic growth of the UAE.

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Authors' contributions
The author is the sole contributor. The author read and approved the final manuscript.

Availability of data and materials
The datasets used and/or analysed during the current study are available at the World Bank website: https://databank.worldbank.org/reports.aspx?source=world-development-indicators# and the United Nations Statistics Division website: https://unstats.un.org/home/.

Disclosure Statement
The author declares that he/she has no competing interests in this section.

List of Abbreviations
ADF = Augmented Dickey Fuller
AIC: Akaike Information Criterion
GCC = Gulf Cooperation Council
LGDP = Log of Gross Domestic Product at Constant 2015 US $ Prices
LPC = Log of Gross Fixed Capital Formation at Constant 2015 US $ Prices
LHC = Log of Population of Working Age (15-64)
LED = Log of IMF Export Diversification Index
LIMP = Log of Imports.
VAR = Vector Autoregressive Model
VECM = Vector Error Correction Model
UAE = United Arab Emirates
UNSTATS = United Nations Statistics Division

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