



An Investigation of the Long-run Dynamic Interrelationship of GDP, Production Sectors and FDI in the UAE

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

This paper examines a 238 cointegrated stationary observation for the United Arab Emirates (UAE) over the period 1978-2011. It employs a restricted Vector Autoregressive (VAR) model, and the estimation method is based on seemingly unrelated regression (SUR) model for a complete system of equations. The empirical results reveal that the agriculture sector has a negative interrelationship with FDI and GDP. While the industrial sector achieved a positive linkage with agriculture, export and service sectors. Furthermore, the FDI inflows have led to reduced levels of imports.

Keywords: GDP; FDI; Export; import; industrial sector; UAE.

JEL Classification: C13, C22, E13, E22, F14.

1. INTRODUCTION

The UAE's economic policy since 1990s has paid a big concern on redirecting the natural resources to diversify the economy and mitigate

the share of oil export to GDP [1,2] in which Dubai, for instance, became a distinct example for building a new economy. This perspective, however, reflects a long-run economic policy which recognizes that crude oil will be depleted

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in the future. Thus, reinforcement non-oil sectors are highly crucial to achieve a robust economy and reduce the negative influence of sharp fluctuations of global oil prices. Overall, the UAE's economic policy considers that enhancing the inter-sectorial linkage is a key motivation for stimulating level of productivity, and then achieving a high rate of economic growth as a result. Based on this view, this paper addresses the status of the UAE's production sectors; agriculture, services and industry, and GDP, export and FDI. A key challenge facing the UAE' economic policy is to achieve a stable economic growth by means which diversify its economy via enhancing contribution of non-oil [1,3]. This policy, however, targets to promote inter-sectorial linkages amongst sectors of the economy.

Theoretically, Solo growth theory considers a technology as an exogenous agent to achieve an economic growth, it explains the long-run growth [4]. Furthermore, this theory assumed that with the absence of technical progress, the growth will slow down as a result of diminishing returns [5]. In addition, Power-Balance theory, which is a subclass of Solow model postulated that international power balance as an important factor in development, including pattern and terms of trade [5]. Based on that, this study attempts to specify whether or not the UAE economy is subjecting to Solow model. However, and according to the data used in this study we noted that the growth of value added of producing sectors, GDP and FDI almost witnessed parallel volatilities. The durations 1978-1987 and 1988-1999 exhibit, somewhat, a case of diminishing returns, while the period from 2000 through 2011 represents a sharp fluctuations, as shown in the following Fig. 1.

However, Fig. 1 the figure above illustrates a case of instability of economic activities, which could be attributed to the changes of market oil prices especially the period spanned through 1975 to 1985 [6,7]. Accordingly, we can say that the economic activities are heavily related to changes occur in oil prices and the technical progress has no tangible influence on the UAE economy, where it experiences a low level of technical progress. In other words, the economic policy has paid an attention to exogenous technical progress via import, and FDI inflows which are achieved a remarkable value added compared to services and agricultural sectors. This implies that this economy does not endogenize technical progress as supposed by

Romer^(*). However, the contribution of current paper lies particularly in two trends. First, it employs the VECM method which is amenable for long-run analysis via testing seven related equations that will specify the extent of inter-sectorial linkage amongst the variables studied. Second, this paper provides empirical evidence by incorporating the core sectors of the economy. The reason for electing the UAE for our analysis is that it has implemented a variety of programs and policy initiatives since 1990s [3]. However, the UAE is considered one of the fastest growing economies in terms of diversification in comparison to the rest of GCC countries. The objective of this paper is to investigate the interrelationships between the variables studied for the UAE economy over the period of 1975 – 2011. The rest of the paper will tackle the related literature in section 2. Section 3 has the empirical strategy including the VECM method. The empirical results and its analysis will be addressed in section 4, and then section 5 is for concluding remarks.

2. REVIEW OF LITERATURE

There many studies which have paid increasing interest to state whether a country's economy grows well with endogenous or exogenous factors. The UAE economy has attracted an attention in this respect due to its dramatic changes as a desired direction for foreign investors and doing business. Accordingly, the literature review of this study will pay more concern on studies related to the UAE economy. [9] reviewed the status of MENA countries' agriculture trade using country specific economy-wide models. This paper quantifies the impact of unilateral trade liberalization and suggested domestic policies that would contribute most in expansion of developing country exports. In Malaysia [10] examined how far agriculture output has been affected by inter-sectorial spillover. The results reveal that expansion of manufacturing output that associated with reduced agriculture output in the short run is associated with agriculture expansion over the long-run. In this context also, [11] found that a high level of agriculture productivity growth can lead to industrialization, and this progress would enhance level of service sector. Based on that, the presence of a sound agriculture policy is

^(*)Romer assumes that economic growth is primarily result endogenous and not external forces. Romer, P. M. (1994). "The origins of endogenous growth." *The Journal of Economic Perspectives* 8(1): 3-22.

significantly needed for countries which their agriculture sector still contributes modestly.

However, an increase in the level of agriculture is affected positively on the economy via reinforcement inter-sectorial linkages with other economic sectors of a country. However, the existence of inter-sectorial linkage is a significant indicator for a stable economic growth [12]. Other study also confirmed a significant relationship between agricultural development, manufacturing sector and other non-farm [13]. Furthermore, FDI inflows consider as an important agent in the development process of a country through the transfer of financial resources and technology particularly in sectors that need a high level of capital and technical progress [14]. In addition, [15] concludes that FDI contributes to the productive capacity of the host country. While [16] addressed a long – term equilibrium relationship between FDI, trade openness, capital formation, human capital and GDP per capita growth rate. It approves a causal relationship between FDI and economic growth in all south Asian economies. Moreover, [17] tested the relationship between FDI, oil and gas, and refinery industries production and their export in seventeen countries selected. The study reveals a positive and significant relationship between FDI and export of oil and gas industries in the UAE and China, as well as between FDI and natural gas production. While [18] infers that FDI in the Arab countries has not affected positively on economic growth, and vice versa for Asian countries. In this respect [19] tested to what extent the six members of the GCC countries have recognized the importance of FDI in the process of growth and hence what are the measures adopted aiming at attracting foreign capital. However, the result indicated that there is a weak relationship between FDI and GDP, and this finding supports endogenous growth hypothesis. In other words, this means that GCC countries are not subjected to Solo growth theory, which assumes that the growth could be achieved via exogenous factors. In addition, another study mentioned that the last three decades, 1973-2003, the economic sectors in the UAE experienced a remarkable growth which is significantly was heavily related to global oil prices [20]. Accordingly, we can say that the impact of investment and trade on other sectors of an economy is not definitely unified in terms of its positive and negative influence. It is, of course, variant due to the nature and size of the economy studied, as well as the contribution of its economic sectors within a certain period. As

well as the pattern and policy of trade and investment, for instance, [21] specified that GDP, FDI and domestic investment have a mutual interrelationship. This study, however, revealed a two –way causality runs among the said variables, while unidirectional causality is found from export to FDI. And FDI inflows have an insignificant role in export and import. Furthermore, [22,23] measured the intensity of intra-regional trade in GCC countries. The study revealed that the intensity index is negative for these economies –except for the UAE and Saudi Arabia in which the size of economy and level of production has a major impact in determining the index adopted. On the contrary, other studies proved that the size of GDP is a significant factor in attracting FDI [24,25]. This finding is evidently recognized the linkage between FDI and the economy as a key determinant of FDI. Also [26] examined the linkage between GDP growth and tourism in the long – term, this study proved that the economic growth in Spain has been sensible to persistent expansion of international tourism. In addition [27] concludes that FDI inflows have stimulated the industries in India and China, but the political uncertainty and corruptions put a break on the FDI inflow to India. Accordingly, the role of state is highly important in attracting FDI. Therefore, the political reformation ought to be an initial platform for evolution an economy. [28] found that the natural resource abundance in the UAE's is a recipe for growth, as well as, terms of trade shocks have strong positive effects on economic growth in the UAE. This result asserts that a high reliance on crude oil exports has led to more volatility in its trading sector. Hence, the economic growth of this economy is highly linked to shocks occur in global economies as much as its relation to the domestic economy. [29] indicated that the UAE economy is benefiting from high oil prices, but more significantly from the government's commitments for diversification. In respect of foreign trade impact, [30] found a sharp increase in trade flows in the UAE, which is attributed to the government policies and the infrastructure support extended by the Dubai in particular. In addition, this study also reveals that efficiencies and cost advantages are sufficient adequately to provide sustainable strategic policies given its trading infrastructure facilities rather than looking for short-run benefits. Hence, we can argue that the logistic support is a key matter in stimulating economic activities of sectors of a country, which leads at the end to achieve a remarkable economic growth. In this context, [31] confirms that the sectorial composition is an important part

of the variation in growth rates across countries. Moreover, [32] asserts that the industrial structure has been significant of macroeconomic development and economic growth.

Through the above, we can state that an economic policy ought to be consistent with all sectors of a country in terms of redirection the economy's potential, as well as, current producing sectors toward parallel targets that could improve the level of value added and then sustained economic growth. Therefore, the intersectorial linkage is definitely a significant agent to figure up to what extent the UAE's economic policy has accomplished its strategic goals.

3. METHODOLOGY

This study uses a Vector Autoregressive (VAR) model via utilizing a complete system of

equations, in which the number of equations equal the number of endogenous variables [33]. Accordingly, It comprises an equal number of observations, where there are (M) equations (M = 7) and (T) observations (T = 238). However, 7 variables will be examined which are; Industry (*ind*), Service (*ser*), Agriculture (*agr*), Foreign direct investment (*FDI*), Export (*exp*), Import (*imp*) and Gross domestic product (*GDP*). The model adopted is based on an initial functional relation which could specify as follows:

$$GDP = f(ind, ser, agr, FDI, exp, im) \quad (1)$$

The variables above are measured in thousand millions USD per annum. However, equation 1 could be shaped in its logarithmic model by the following form:

$$\begin{aligned} \text{Log}(GDP) = a + B1 \log(ind) + B2 \log(ser) + B3 \log(agr) + B4 \log(FDI) + B5 \log(exp) \\ + B6 \log(im) + u_i \end{aligned} \quad (2)$$

As formerly reported that this study is using a complete system of equations. So, the general VAR model will be formulated as in the following equations:

$$\begin{aligned} \text{Log}(Agr) = a_0 + B1 \log(GDP)_{t-i} + B2 \log(ind)_{t-i} + B3 \log(ser)_{t-i} + B4 \log(agr)_{t-i} + B5 \log(FDI)_{t-i} + \\ B6 \log(exp)_{t-i} + B7 \log(im)_{t-i} + u_{1t} \end{aligned} \quad (3)$$

$$\begin{aligned} \text{Log}(exp) = a_1 + B8 \log(ind)_{t-i} + B9 \log(GDP)_{t-i} + B10 \log(ser)_{t-i} + B11 \log(agr)_{t-i} + B12 \log(FDI)_{t-i} + \\ B13 \log(exp)_{t-i} + B14 \log(im)_{t-i} + u_{2t} \end{aligned} \quad (4)$$

$$\begin{aligned} \text{Log}(FDI) = a_2 + B15 \log(ser)_{t-i} + B16 \log(GDP)_{t-i} + B17 \log(ind)_{t-i} + B18 \log(agr)_{t-i} + B19 \log(FDI)_{t-i} \\ + B20 \log(exp)_{t-i} + B21 \log(im)_{t-i} + u_{3t} \end{aligned} \quad (5)$$

$$\begin{aligned} \text{Log}(GDP) = a_3 + B22 \log(agr)_{t-i} + B23 \log(ser)_{t-i} + B24 \log(GDP)_{t-i} + B25 \log(ind)_{t-i} + B26 \log(FDI)_{t-i} \\ + B27 \log(exp)_{t-i} + B28 \log(im)_{t-i} + u_{4t} \end{aligned} \quad (6)$$

$$\begin{aligned} \text{Log}(Im) = a_4 + B29 \log(agr)_{t-i} + B30 \log(ser)_{t-i} + B31 \log(GDP)_{t-i} + B32 \log(ind)_{t-i} + B33 \log(FDI)_{t-i} \\ + B34 \log(exp)_{t-i} + B35 \log(im)_{t-i} + u_{5t} \end{aligned} \quad (7)$$

$$\begin{aligned} \text{Log}(Ind) = a_5 + B36 \log(agr)_{t-i} + B37 \log(ser)_{t-i} + B38 \log(GDP)_{t-i} + B39 \log(ind)_{t-i} + B40 \log(FDI)_{t-i} \\ + B41 \log(exp)_{t-i} + B42 \log(im)_{t-i} + u_{6t} \end{aligned} \quad (8)$$

$$\begin{aligned} \text{Log}(Ser) = a_6 + B43 \log(agr)_{t-i} + B44 \log(ser)_{t-i} + B45 \log(GDP)_{t-i} + B46 \log(ind)_{t-i} + B47 \log \\ (FDI)_{t-i} + B48 \log(exp)_{t-i} + B49 \log(im)_{t-i} + u_{7t} \end{aligned} \quad (9)$$

Where; $a_0 \dots a_6$ are intercepts, $B_1 \dots B_{49}$ are coefficients to be estimated, and $u_{1t} \dots u_{7t}$ represent correlated error terms of the model. Also, *GDP*, *ind*, *ser*, *agr*, *FDI*, *ex*, and *im* have mutually contemporaneous effect on each other in the system. However, the unit root test is employed to check the stationarity of the data adopted, as shown in Table 1:

As we note in table above, the two statistic tests depict that the probabilities (P-value) are statistically significant at the 1 percent level. Therefore, the null hypotheses are rejected and we accepted the alternative one. Meaning that, there is no unit root, and the data are stationary, which could be used in this model. Accordingly, the results that we will obtain will be statistically valid and economically meaningful for interpreting the output of the model. Furthermore, and in order to select an ideal lag for the model, we have used Eviews software to state the lag length for this study. However, we found that lag one is the optimum option in this respect, as shown in the following table.

As shown in Table 2, the three criteria (LR, SC and HQ) stated that lag one is the most suitable lag for the model adopted in this study. While two criteria (FPE and AIC) indicated that lag 2 is the ideal lag. Thus, this model will be based on lag 1, due to its selection by the majority of criteria, three criteria relative to two criteria. In addition,

and in order to identify whether or not the variables adopted are co-integrated, the Johansen trace test is conducted as indicated in Table 3. It shows that the variables used in this study are cointegrated, which means that these variables could be drifted together in the long-run.

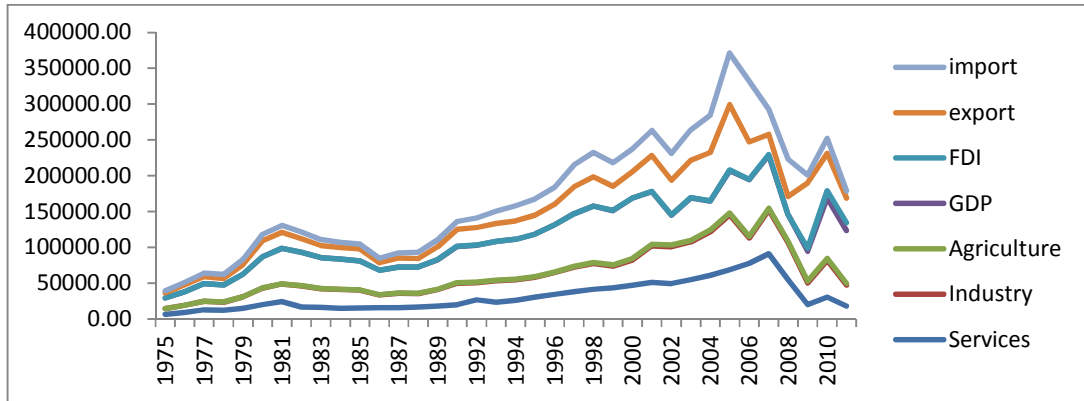


Fig. 1. The UAE' value added of production sectors, GDP and FDI, 1975-2011 (Million USD)

Source: By the author based on data of IMF. <http://www.imf.org/external/data.htm>

Table 1. Group Unit root test for the VAR model

| Group unit root test: Summary | | | | |
|---|-----------|---------|----------------|-----|
| Series: AGRI, EX, FDI, GDP, IM, IND, SER | | | | |
| Sample: 1976 2011 | | | | |
| Exogenous variables: Individual effects | | | | |
| Automatic selection of maximum lags | | | | |
| Automatic selection of lags based on SIC: 0 to 4 | | | | |
| Newey-West bandwidth selection using Bartlett kernel | | | | |
| Method | Statistic | Prob.** | Cross-sections | Obs |
| Null: Unit root (assumes common unit root process) | | | | |
| Levin, Lin & Chu t* | -2.38508 | 0.0085 | 7 | 235 |
| Null: Unit root (assumes individual unit root process) | | | | |
| PP - Fisher Chi-square | 29.4246 | 0.0092 | 7 | 245 |

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality Source: By the author based on Eviews software

Table 2. VAR lag order criteria

| VAR Lag Order Selection Criteria | | | | | | |
|--|-----------|-----------|-----------|------------|-----------|------------|
| Endogenous variables: AGRI EX FDI GDP IM IND SER | | | | | | |
| Exogenous variables: C | | | | | | |
| Sample: 1976 2011 | | | | | | |
| Included observations: 34 | | | | | | |
| Lag | Log L | LR | FPE | AIC | SC | HQ |
| 0 | -89.29232 | NA | 6.80e-07 | 5.664254 | 5.978505 | 5.771423 |
| 1 | 83.44534 | 264.1870* | 5.00e-10 | -1.614432 | 0.899574* | -0.757084* |
| 2 | 139.8469 | 63.03701 | 4.79e-10* | -2.049816* | 2.663944 | -0.442289 |

* indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion Source: By the author based on Eviews software

Table 3. Johansen test for co-integration

Sample (adjusted): 1979 2011
 Included observations: 33 after adjustments
 Trend assumption: Linear deterministic trend
 Series: AGRI EX FDI GDP IM IND SER
 Lags interval (in first differences): 1 to 2
 Unrestricted Co-integration Rank Test (Trace)

| Hypothesized | Trace | 0.05 | | |
|--------------|------------|-----------|----------------|---------|
| No. of CE(s) | Eigenvalue | Statistic | Critical value | Prob.** |
| None * | 0.903038 | 239.1537 | 125.6154 | 0.0000 |
| At most 1 * | 0.818245 | 162.1502 | 95.75366 | 0.0000 |
| At most 2 * | 0.720478 | 105.8820 | 69.81889 | 0.0000 |
| At most 3 * | 0.637407 | 63.81772 | 47.85613 | 0.0008 |
| At most 4 * | 0.418658 | 30.34004 | 29.79707 | 0.0433 |
| At most 5 | 0.279639 | 12.44030 | 15.49471 | 0.1370 |
| At most 6 | 0.047796 | 1.616202 | 3.841466 | 0.2036 |

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level; * denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values

| Unrestricted co-integration rank test (Maximum Eigenvalue) | | | | |
|--|------------|-----------|----------------|---------|
| Hypothesized | Max-Eigen | 0.05 | | |
| No. of CE(s) | Eigenvalue | Statistic | Critical Value | Prob.** |
| None * | 0.903038 | 77.00349 | 46.23142 | 0.0000 |
| At most 1 * | 0.818245 | 56.26821 | 40.07757 | 0.0003 |
| At most 2 * | 0.720478 | 42.06424 | 33.87687 | 0.0042 |
| At most 3 * | 0.637407 | 33.47768 | 27.58434 | 0.0078 |
| At most 4 | 0.418658 | 17.89974 | 21.13162 | 0.1336 |
| At most 5 | 0.279639 | 10.82410 | 14.26460 | 0.1632 |
| At most 6 | 0.047796 | 1.616202 | 3.841466 | 0.2036 |

Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level; * denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values, Source: By the author based on Eviews software

However, since the data used are cointegrated, and to obtain an accurate econometric result, we can adopt a restricted VAR model, which is usually call Vector Error Correction Model (VECM), accordingly, the former VAR model equations could be reformulated in the following system:

$$\begin{aligned} \text{Log (Agr)} = & a_0 + B_1 [\delta_0 + \theta_1 \log (\text{GDP})_{t-1} + \theta_2 \log (\text{ind})_{t-1} + \theta_3 \log (\text{ser})_{t-1} + \theta_4 \log (\text{agr})_{t-1} + \theta_5 \log \\ & (\text{FDI})_{t-1} + \theta_6 \log (\text{exp})_{t-1} + \theta_7 \log (\text{im})_{t-1}] + B_2 \log (\text{GDP})_{t-1} + B_3 \log (\text{ind})_{t-1} + B_4 \log \\ & (\text{ser})_{t-1} + B_5 \log (\text{agr})_{t-1} + B_6 \log (\text{FDI})_{t-1} + B_7 \log (\text{exp})_{t-1} + B_8 \log (\text{im})_{t-1} + u_{1t} \end{aligned} \quad (10)$$

$$\begin{aligned} \text{Log (Exp)} = & a_1 + B_9 [\delta_1 + \theta_8 \log (\text{GDP})_{t-1} + \theta_9 \log (\text{ind})_{t-1} + \theta_{10} \log (\text{ser})_{t-1} + \theta_{11} \log (\text{agr})_{t-1} + \theta \\ & 12 \log (\text{FDI})_{t-1} + \theta_{13} \log (\text{exp})_{t-1} + \theta_{14} \log (\text{im})_{t-1}] + B_{10} \log (\text{GDP})_{t-1} + B_{11} \log (\text{ind})_{t-1} \\ & + B_{12} \log (\text{ser})_{t-1} + B_{13} \log (\text{agr})_{t-1} + B_{14} \log (\text{FDI})_{t-1} + B_{15} \log (\text{exp})_{t-1} + B_{16} \log (\text{im})_{t-1} \\ & + u_{2t} \end{aligned} \quad (11)$$

$$\begin{aligned} \text{Log (FDI)} = & a_2 + B_{17} [\delta_2 + \theta_{15} \log (\text{GDP})_{t-1} + \theta_{16} \log (\text{ind})_{t-1} + \theta_{17} \log (\text{ser})_{t-1} + \theta_{18} \log (\text{agr})_{t-1} + \theta \\ & 19 \log (\text{FDI})_{t-1} + \theta_{20} \log (\text{exp})_{t-1} + \theta_{21} \log (\text{im})_{t-1}] + B_{18} \log (\text{GDP})_{t-1} + B_{19} \log (\text{ind})_{t-1} + \\ & B_{20} \log (\text{ser})_{t-1} + B_{21} \log (\text{agr})_{t-1} + B_{22} \log (\text{FDI})_{t-1} + B_{23} \log (\text{exp})_{t-1} + B_{24} \log (\text{im})_{t-1} + \\ & u_{3t} \end{aligned} \quad (12)$$

$$\begin{aligned} \text{Log (GDP)} = & a_3 + B_{25} [\delta_3 + \theta_{22} \log (\text{GDP})_{t-1} + \theta_{23} \log (\text{ind})_{t-1} + \theta_{24} \log (\text{ser})_{t-1} + \theta_{25} \log (\text{agr})_{t-1} + \\ & \theta_{26} \log (\text{FDI})_{t-1} + \theta_{27} \log (\text{exp})_{t-1} + \theta_{28} \log (\text{im})_{t-1}] + B_{26} \log (\text{GDP})_{t-1} + B_{27} \log \\ & (\text{ind})_{t-1} + B_{28} \log (\text{ser})_{t-1} + B_{29} \log (\text{agr})_{t-1} + B_{30} \log (\text{FDI})_{t-1} + B_{31} \log (\text{exp})_{t-1} + B_{32} \\ & \log (\text{im})_{t-1} + u_{4t} \end{aligned} \quad (13)$$

$$\begin{aligned} \text{Log}(Im) = & a4 + B33 [\delta4 + \theta29 \log(GDP)_{t-1} + \theta30 \log(ind)_{t-1} + \theta31 \log(ser)_{t-1} + \theta32 \log(agr)_{t-1} + \theta \\ & 33 \log(FDI)_{t-1} + \theta34 \log(exp)_{t-1} + \theta35 \log(im)_{t-1}] + B34 \log(GDP)_{t-1} + B35 \log(ind)_{t-1} + \\ & B36 \log(ser)_{t-1} + B37 \log(agr)_{t-1} + B38 \log(FDI)_{t-1} + B39 \log(exp)_{t-1} + B40 \log(im)_{t-1} + \\ & u_{5t} \end{aligned} \quad (14)$$

$$\begin{aligned} \text{Log}(Ind) = & a5 + B41 [\delta5 + \theta36 \log(GDP)_{t-1} + \theta37 \log(ind)_{t-1} + \theta38 \log(ser)_{t-1} + \theta39 \log(agr)_{t-1} + \theta \\ & 40 \log(FDI)_{t-1} + \theta41 \log(exp)_{t-1} + \theta42 \log(im)_{t-1}] + B42 \log(GDP)_{t-1} + B43 \log(ind)_{t-1} + \\ & B44 \log(ser)_{t-1} + B45 \log(agr)_{t-1} + B46 \log(FDI)_{t-1} + B47 \log(exp)_{t-1} + B48 \log(im)_{t-1} + \\ & u_{6t} \end{aligned} \quad (15)$$

$$\begin{aligned} \text{Log}(Ser) = & a6 + B49 [\delta6 + \theta43 \log(GDP)_{t-1} + \theta44 \log(ind)_{t-1} + \theta45 \log(ser)_{t-1} + \theta46 \log(agr)_{t-1} + \\ & \theta47 \log(FDI)_{t-1} + \theta48 \log(exp)_{t-1} + \theta49 \log(im)_{t-1}] + B50 \log(GDP)_{t-1} + B51 \log(ind)_{t-1} + \\ & B52 \log(ser)_{t-1} + B53 \log(agr)_{t-1} + B54 \log(FDI)_{t-1} + B55 \log(exp)_{t-1} + B56 \log(im)_{t-1} + \\ & u_{7t} \end{aligned} \quad (16)$$

Furthermore, the estimation method will utilize the Seemingly Unrelated Regression (SUR) model, which proposed by [34]. It assumes that error terms are correlated across the equation estimated. However, the reason of using (SUR) method is to obtain an efficient estimation via merging different equations [35]. It is also a flexible analytic strategy because the correlation amongst exogenous variables [36,37]. However, as we formerly mentioned, in this study, seven individual relationships are linked together via their disturbances correlated.

4. EMPIRICAL RESULT AND ANALYSIS

Based on the mentioned empirical methodology, the model is regressed via using Eviews software, where we obtained the following results:

Besides, R-squared and Durbin- Watson statistic values of the regression above are shown in the following table.

According to the table above, we note that R-squared value ranged between 0.50 and 0.63 in which reflects the strength relation amongst the endogenous and exogenous variables adopted into the system of equations. As well as, DW value depicts the absence of autocorrelation problem. This means the models adopted are statistically valid. Hence, It is economically will be meaningful in analyzing the interrelationship amongst the variables of study.

Agriculture equation in Table 4 illustrates that the increase of the aggregate of production sectors, GDP and FDI by one time will reduce level of agriculture sector by 0.11 times. This result, however, reflects that there is no linkage between agriculture sector and other sectors of the UAE economy. It is due to the modest level of this sector which has no link with the

economy; this finding could be recognized via monitoring GDP and FDI variables, which have achieved a negative impact on the agriculture sector. However, their rising by one time will influence in decreasing level of agriculture by 0.16 and 0.03 times respectively. Hence, this result can be interpreted due to the high growth of GDP and FDI inflows into the UAE which led to weaken the modest role of the agriculture sector in this country. Moreover, It was noted that the industry sector has had a positive effect, in which its increase by one time will enhance the level of agriculture by 0.11 times.

Export equation reveals that the FDI inflows have led to mitigate the level of exports. This implies, that on the long-run, the UAE has seen a slowdown in the level of export, and the reason for that could be attributed to concentrating of FDI flows in the real estate and construction sectors in comparison to other investment. Accordingly, we can point that the policy of attracting FDI to the UAE economy does not target achieving an improvement in the level of export, as much as, it is for meeting the domestic market needs. However, due to the result obtained, the increase of level of FDI by one time will cause in dropping level of export by 0.09 times.

FDI equation shows that the export of the UAE has a high positive influence on the level of FDI and import, an increase in the level of export by one time will lead to rising their levels by 1.69 and 1.45 times.

Table 5 illustrates that the values of R-squared of export and imports variables depict an important linkage with other variables in the model regressed. Meaning that, the foreign trade is an important criteria for attracting FDI, which stimulates foreign investors. We therefore can

say that foreign trade sector of the UAE is a vital element which significantly contribute in shifting producing factors and technology on the long-run. In other words, the UAE's foreign trade is crucially led to a reinforcement level of FDI over the period 1978-2011. On the contrary, we note

that the lagged FDI has a negative effect on FDI as a dependent variable of the equation system. This means the current FDI is not positively affecting in attracting more FDI. Accordingly, the foreign trade is the major catalyzer for encouraging foreign investors.

Table 4. Regression result for the VECM of study

| Variable | Coefficient | Std. error | t-statistic | Prob. |
|------------------------|-------------|------------|-------------|------------|
| (Agr. equation) | | | | |
| $(Agr)_{t-1}$ | -0.113015 | 0.029519 | -3.828573 | 0.0002(*) |
| $(Exp)_{t-i}$ | -0.190422 | 0.166361 | -1.144627 | 0.2539 |
| $(FDI)_{t-i}$ | 0.063545 | 0.040861 | 1.555141 | 0.1217 |
| $(GDP)_{t-i}$ | -0.033142 | 0.010898 | -3.041159 | 0.0027(*) |
| $(Im)_{t-i}$ | -0.163459 | 0.062539 | -2.613722 | 0.0097(*) |
| $(ind)_{t-i}$ | -0.047527 | 0.039179 | -1.213081 | 0.2267 |
| $(ser)_{t-i}$ | 0.177434 | 0.058031 | 3.057559 | 0.0026(*) |
| C | 0.113197 | 0.068070 | 1.662938 | 0.0981 |
| (Exp. equation) | | | | |
| $(agr)_{t-1}$ | 0.113892 | 0.020061 | 5.677420 | 0.0000 |
| $(exp)_{t-1}$ | 0.158790 | 0.109120 | 1.455184 | 0.1474 |
| $(FDI)_{t-i}$ | 0.742807 | 0.614978 | 1.207859 | 0.2287 |
| $(GDP)_{t-i}$ | 0.276207 | 0.151049 | 1.828595 | 0.0692 |
| $(Im)_{t-1}$ | -0.094659 | 0.040286 | -2.349708 | 0.0199(**) |
| $(ind)_{t-1}$ | -0.379434 | 0.231184 | -1.641266 | 0.1025 |
| $(ser)_{t-1}$ | 0.281793 | 0.144829 | 1.945690 | 0.0533 |
| C | 0.170858 | 0.214521 | 0.796463 | 0.4268 |
| (FDI equation) | | | | |
| $(agr)_{t-1}$ | -0.223488 | 0.251632 | -0.888154 | 0.3757 |
| $(exp)_{t-1}$ | -0.032046 | 0.074157 | -0.432137 | 0.6662 |
| $(FDI)_{t-1}$ | 0.866551 | 0.482566 | 1.795714 | 0.0743 |
| $(GDP)_{t-1}$ | 3.422020 | 2.719643 | 1.258261 | 0.2100 |
| $(Im)_{t-1}$ | 1.694407 | 0.667989 | 2.536578 | 0.0121(**) |
| $(ind)_{t-1}$ | -0.450275 | 0.178156 | -2.527416 | 0.0124(**) |
| $(ser)_{t-1}$ | 1.796531 | 1.022375 | 1.757214 | 0.0806 |
| C | 1.451935 | 0.640484 | 2.266934 | 0.0246(**) |
| (GDP equation) | | | | |
| $(agr)_{t-1}$ | -1.162681 | 0.948685 | -1.225571 | 0.2220 |
| $(exp)_{t-1}$ | -2.177318 | 1.112801 | -1.956611 | 0.0520 |
| $(FDI)_{t-1}$ | -0.157139 | 0.327946 | -0.479162 | 0.6324 |
| $(GDP)_{t-1}$ | -0.266629 | 0.081413 | -3.275008 | 0.0013(*) |
| $(Im)_{t-1}$ | -1.318214 | 0.458828 | -2.873000 | 0.0046(*) |
| $(ind)_{t-1}$ | 0.483591 | 0.112696 | 4.291111 | 0.0000(*) |
| $(ser)_{t-1}$ | -0.069320 | 0.030057 | -2.306314 | 0.0223(**) |
| C | -0.389586 | 0.172484 | -2.258680 | 0.0251(**) |
| (Im. equation) | | | | |
| $(agr)_{t-1}$ | 0.114227 | 0.108056 | 1.057111 | 0.2919 |
| $(exp)_{t-1}$ | 0.001839 | 0.160052 | 0.011487 | 0.9908 |
| $(FDI)_{t-1}$ | -0.073036 | 0.187740 | -0.389026 | 0.6977 |
| $(GDP)_{t-1}$ | 0.177651 | 0.055327 | 3.210900 | 0.0016 |
| $(Im)_{t-1}$ | -0.241020 | 0.116129 | -2.075459 | 0.0394(**) |
| $(exp)_{t-1}$ | -0.764237 | 0.654477 | -1.167706 | 0.2445 |
| $(FDI)_{t-1}$ | 0.615674 | 0.160750 | 3.830000 | 0.0002(*) |
| $(GDP)_{t-1}$ | -0.072088 | 0.042873 | -1.681435 | 0.0945 |
| $(Im)_{t-1}$ | -0.482150 | 0.246033 | -1.959699 | 0.0516 |

| Variable | Coefficient | Std. error | t-statistic | Prob. |
|------------------------|-------------|------------|-------------|------------|
| $(Im)_{t-1}$ | -0.894752 | 0.154131 | -5.805126 | 0.0000(*) |
| $(ind)_{t-1}$ | 0.513051 | 0.228299 | 2.247272 | 0.0259(**) |
| $(ser)_{t-1}$ | 1.127643 | 0.267794 | 4.210867 | 0.0000(*) |
| C | 0.090490 | 0.078919 | 1.146607 | 0.2531 |
| (Ind. equation) | -0.236183 | 0.097367 | -2.425696 | 0.0163(*) |
| $(agr)_{t-1}$ | -0.112167 | 0.548741 | -0.204408 | 0.8383 |
| $(exp)_{t-1}$ | 0.242175 | 0.134780 | 1.796819 | 0.0741 |
| $(FDI)_{t-1}$ | -0.089665 | 0.035947 | -2.494414 | 0.0135(**) |
| $(GDP)_{t-1}$ | -0.336883 | 0.206284 | -1.633103 | 0.1042 |
| $(Im)_{t-1}$ | -0.492089 | 0.129230 | -3.807850 | 0.0002(*) |
| $(Ind)_{t-1}$ | -0.227640 | 0.191416 | -1.189243 | 0.2360 |
| $(ser)_{t-1}$ | 0.577017 | 0.224529 | 2.569897 | 0.0110(**) |
| C | 0.082084 | 0.066169 | 1.240520 | 0.2164 |
| (Ser. equation) | -0.295628 | 0.085605 | -3.453401 | 0.0007(*) |
| $(agr)_{t-1}$ | -1.111134 | 0.482452 | -2.303098 | 0.0224(**) |
| $(exp)_{t-1}$ | 0.480227 | 0.118498 | 4.052610 | 0.0001(*) |
| $(FDI)_{t-i}$ | -0.071780 | 0.031604 | -2.271238 | 0.0244(**) |
| $(GDP)_{t-1}$ | -0.224012 | 0.181364 | -1.235148 | 0.2184 |
| $(Imp)_{t-1}$ | -0.268980 | 0.113619 | -2.367389 | 0.0190(*) |
| $(Ind)_{t-i}$ | 0.037679 | 0.168292 | 0.223891 | 0.8231 |
| $(Ser)_{t-1}$ | 0.521255 | 0.197406 | 2.640530 | 0.0090(*) |
| C | 0.123778 | 0.058176 | 2.127642 | 0.0348 |

Source: By the author based on Eviews software; (*)(**) statistically significant at the (0.01) and (0.05) levels, respectively

Table 5. R-squared and DW values of the model of study

| Equation name | R-squared | DW |
|---------------|-----------|------|
| Agr. | 0.50 | 2.08 |
| Exp. | 0.63 | 1.91 |
| FDI | 0.53 | 2.28 |
| GDP | 0.62 | 2.28 |
| Im. | 0.66 | 1.56 |
| Ind. | 0.56 | 2.08 |
| Ser. | 0.61 | 1.95 |

Source: By the author based on Eviews software

Besides, the GDP equation represents that the coefficient of the whole equation has an inverse impact on GDP in the long-run. This result could be explained by the modest role of FDI and production sectors in which have not achieved a developmental impact over the period studied. However, this statement dates back to the negative role of other variables of the study, particularly agriculture sector, in which the increase of its production by one time will lead to decrease level of GDP by 1.31 times. While we note that the rising of level of export by one time will improve level of GDP by 0.48 times. This reflects, however, the significant role of export of the UAE relative to other variables. In the equation of the import, we see that the variables studied together have a negative impact on the level of import. This clarifies that their aggregate

increase by one time will cause in declining level of imports by 0.24 times. However, this finding could be revealed via the role of FDI and aggregate GDP. Their rising by one time has led to reduced level of imports by 0.07 and 0.48 times respectively. In contrast, the industry and services sectors have accomplished a positive interrelationship, in which the growing of the said variables by one time lead to raising import levels by 0.51 times. Hence, this result infers the necessity of the import sector in meeting the industry sector needs. As well as, service sector has an important impact on import sector, meaning that, the industry and service sectors have mutual significance influence on the UAE's economy in the long-run.

Furthermore, the industry equation shows a negative relationship between industry sector and other variables of the study at all. The growing of level of FDI and imports by one time lead to drop level of industry sector by 0.23 times. Whereas service sector has a positive impact, its increase by one time will derive to rising level of industry sector by 0.57 times. Accordingly, it can be seen the FDI inflows have a highly competitive against the industry sector of the UAE. In other hand, the domestic industry sector does not competed FDI inflows. This implies that these flows enjoy in a high level of technology. However, the industry sector in the

UAE is a weak competitor to FDI inflows over the period of the study. Thus, the UAE's industrial policies ought to be geared to reinforce level of productivity and technology used in order to compete its counterpart in the long-run.

Finally, service equation illustrates that the whole equation coefficients have a negative effect on the service sector. As well as, FDI, agriculture and import also have inversely influenced on the service sector. While, export and lagged service variable have a positive with the service sector. Meaning that, the service sector is crucially related to export, which is a reflection of a significant positive interrelationship between foreign trade and FDI over the period studies. Hence, we can say that the commercial policies of the UAE have affected in improving level of service sector indirectly via the increase of level of import and export, which is in turn, enhanced level of service sector in the long –run.

5. CONCLUDING REMARKS

This study investigated the interrelationship amongst the economic sectors of the UAE economy. It employed a system of equations. The empirical models reveal that the agriculture sector is still vulnerable and has a negative interrelationship with GDP and FDI. This asserts the failure of agriculture policies over the study period, while the industrial sector has a slight positive impact on the agriculture sector. As well as, the positive linkage between industrial, service sectors and import assured the necessity of the import sector in meeting the industry sector needs, and, of course, this linkage is crucially related to the service sector. Furthermore, FDI inflows have a highly competitive against the industry sector, where it does not able to compete foreign investors. And the service sector is found significantly interrelated with export sector in which the commercial policies have led to increasing exports, and thus enhanced level of services sector consequently.

Besides, FDI inflows have been affected in reducing level of exports, where it does not concentrate in manufacturing sectors, as much as, in real estate and construction sectors. However, the policy of attracting FDI to the UAE is not targeted to achieve an improvement in sectors which could increase exports significantly. It is focused on meeting the domestic demand. Nonetheless, the export sector has achieved a positive impact in

attracting FDI in the long-run. Also, the foreign trade of the UAE is significantly contributing in shifting producing factors and technology in the long-run, but it does not lead to increased levels of export. On the contrary, the export sector has achieved a dynamic developmental influence on the GDP, and vice versa for the other sectors. Finally, the study extrapolates that the UAE's economic policy has concentrated on the policy of reducing imports due to the growing f other sectors have led to reduce the level of imports over the period 1978-2011.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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