Impact of FDI in U.A.E over the Main Elements of Sustainable Development: Economy and Environment

Samar Habib Khan and Shazia Agha

Department of Business, University of Modern Sciences, Dubai.

Corresponding Author: Samar Habib Khan

Abstract
During the past few years the Emirates has witnessed a buoyant economic growth by which it is considered as one of the most developing countries in the GCC\(^1\). The country accounts 40 percent of its export towards oil and natural gas contributing it to a massive 38 percent of country’s GDP\(^1\). In order to diversify its economy and reduce its future dependence on oil revenues which are exhaustible, the UAE’s government has placed several strategies in place. One of the strategies of the government is to attract FDI in the country by giving foreign investors some attractive incentives. However, there is a debate over the impacts of FDI on the host country. One of the main concerns in such debates is its effect on environmental degradation. In this paper, the aim of research is to show the contribution of FDI over the main elements of sustainable development: economy and environment, of U.A.E. The GDP per capita of the country is used as the indicator representing the economy of the country whereas the CO2 emission in kilo tons is used as the indicator representing environmental condition of the country. Paper researches the direction of the relationship between the variables by using several econometric tests such as Augmented Dickey-Fuller (ADF), Johansen co integration and Granger Causality tests. The results showed that there is no causality between the growth rate of GDP and FDI, growth rate of FDI and Co2. The only causality found is a uni-directional causality between the growths of GDP and the growth rate of CO2. The direction is from growth rate of pollution to the growth rate of GDP. This paper concludes that government should make policy that will ensure that transnational companies use equipment that is environmentally friendly.

Keywords: sustainable development, foreign direct investment (FDI), gross domestic product (GDP), CO\(_2\) emission, vecm, granger causality

INTRODUCTION
United Arab Emirates (U.A.E) has drawn the world’s attention by winning EXPO 2020 in 2013. One of the key themes of the EXPO is sustainability. Sustainable development considers the country’s development that promotes the scope of complete welfare for all generations by achieving the environmental and economic aims of society with lesser negative effects. Over the past few years, the UAE government has placed a lot of emphasis on sustainability. The vision of the Ministry of Environment is “We strive towards integrated management of Environment Ecosystem and Natural resources to realize Green Economy for the present and future generations”\(^6\)

For sustainable development of any country, investment is considered to be vital and important ingredient. Foreign direct equity investment [FDI] is usually preferred over other forms of external finance because on one hand it does not create debt and on the other hand its return totally depends upon the performance of project funded by the investors. To harvest full benefit of foreign direct investment and contribute to the national capacity building within the framework of sustainability, it is necessary that the main elements of sustainable development: economic growth and environmental preservation should be well coordinated with various national and international policy structures of foreign investment. Although there are few problematic policies for companies to contribute through foreign direct investment in UAE. Some of such barriers are the Companies Law and the Agencies Law which actually represents the largest legal barriers. The Companies Law states that foreigners and foreign companies are prohibited from owning more than 49 percent of a company established in the UAE (out of Free Zones) whereas the Agencies Law states that foreign importers must operate through an agent to import goods into the country, this agent must a company owned wholly by a UAE national or either simply a UAE national (without company).

In the past few years the Emirates has witnessed an increased economic growth by which it is considered as one of the most developing countries in the GCC. In UAE, the oil and natural gases contribute to the major
percentage of GDP and in order to shift its economy and reduce its future dependence on oil revenues which are exhaustible, the UAE’s government has placed several strategies in place. One of the strategies of the government is to attract FDI in the country by giving foreign investors some attractive incentives. Investment help in strengthening the country’s economy and it further plays a crucial role in the country’s strategy towards building a sustainable economy and national capacity. However, there is a debate over the effects of FDI on the host country. One of the main concerns in such debates is its effect on environmental degradation. The study aims at projecting the contribution of FDI over the main elements of sustainable development such as economy and environment in the U.A.E. The indicators GDP per capita and the CO2 emission in kilotons are used to represent the economy and environmental condition of the country.

Chart 1 below shows the trends of FDI inflows in the UAE during past 23 years. It is observed that FDI in UAE increased to 268303 AED Million in 2012 from 240284 AED Million in 2011. FDI in the UAE averaged 191759 AED Million from 2007 until 2012, reaching an all time high of 268303 AED Million in 2012 and a record low of 134017 AED Million in 2007. The figures are reported by the National Bureau of Statistics, UAE.10

http://data.worldbank.org/

Chart 2 Trend of GDP inflows of UAE: 1990-2013 [$ Million]

The GDP in the U.A.E increased 5.20 percent in 2013 from the previous year. GDP Growth Rate in the country averaged 4.66 percent from 2000 until 2013, reaching an all time high of 9.80 percent in 2006 and a record low of -4.80 percent in 2009 due to the economic crunch. GDP Growth Rate in the U.A.E is reported by the National Bureau of Statistics, UAE.9

http://data.worldbank.org/

Chart 3 Trend of CO2 inflows of UAE: 1990-2013 [$ Million]

CO2 emissions (metric tons per capita) in the United Arab Emirates was reported at 167597 kt in 2010,
according to the World Bank [7]. Carbon dioxide emissions are those coming from the burning of fossil fuels and the manufacturing of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring [8].

**METHODOLOGY**

The objective of this paper is to study the direct relationship between the FDI inflows, GDP and CO2. The annual GDP per capita is used as an indicator for economic growth; the annual CO2 is used as an indicator for pollution. The data for GDP, CO2 and FDI were obtained from World Bank Development Indicator. The study scope covers the period between 1990 and 2010. The choice of this scope is informed by the availability of uniform data in the country as well desire to study the relationship between the variables over a considerable length of time. The variables are presented in their log forms. Augmented Dickey-Fuller is used to test the stationarity of the variables. If the data is found to be stationary at the level, it can test VAR directly. In case the data is found non-stationary, the first differencing needs to be found to convert them into stationary. Secondly, Johansen Co-integration technique is used in order to find long run and short run relationship equilibrium between variables. If the series do not have co-integration or no long run equilibrium relation among time series, VAR model is supposed to be applied to measure Granger Causality test. In contrast, if there is equilibrium interrelation among the time series, VECM should be examined Granger Causality Test [2]. Granger causality test is used to test the direction of causality between FDI and GDP, FDI and CO2, GDP and CO2. Three different assumptions regarding stationary of time series of FDI, GDP and CO2 are examined as follows.

Model I: Trend and intercept

\[ \Delta Y_t = \mu + \rho_0 Y_{t-1} + \eta T + \sum_{j=1}^c \rho_j \Delta Y_{t-j} + \epsilon_t \]  

Model II: Intercept

\[ \Delta Y_t = \mu + \rho_0 Y_{t-1} + \sum_{j=1}^c \rho_j \Delta Y_{t-j} + \epsilon_t \]  

Model III: Neither time series nor intercept

\[ \Delta Y_t = \rho_0 Y_{t-1} + \sum_{j=1}^c \rho_j \Delta Y_{t-j} + \epsilon_t \]

The direction of causality determines the direction of the relationship among variables and Granger causality test has four different directions for these purposes:

a) Unidirectional Granger-causality from X to Y and not Vice-versa
b) Unidirectional Granger-causality from Y to X and not Vice-versa
c) Bidirectional (or feedback) causality from X to Y, and from Y to X.
d) Lack of Causality: There is no relationship among the variables.

The model is presented below:

1. \[ LGDP_t = \alpha_0 + \sum_{j=1}^c \alpha_j LGDP_{t-j} + \sum_{j=1}^c \alpha_j LFID_{t-j} + u_{1t} \]  
2. \[ LGDP_t = \beta_0 + \sum_{j=1}^c \beta_j LGDP_{t-j} + \sum_{j=1}^c \beta_j LC0_{t-j} + u_{2t} \]  
3. \[ LFID_t = \gamma_0 + \sum_{j=1}^c \gamma_j LFID_{t-j} + \sum_{j=1}^c \gamma_j LC0_{t-j} + u_{3t} \]  
4. \[ LC0_{t} = \delta_0 + \sum_{j=1}^c \delta_j LC0_{t-j} + \sum_{j=1}^c \delta_j LFID_{t-j} + u_{4t} \]  

**RESULTS**

**Stationarity through ADF Test**

Augmented Dickey Fuller unit root test is the first step to be performed in order to test the unit root in time series and to analyze the stationarity of FDI, GDP and CO2. The Lag length of each variable is selected by computer automatically based on minimum values of Schwartz Info Criterion (SIC) statistics and max lag is 4. The test equations include constant, Trend and constant and None.

Table 1 The results of ADF unit root test of UAE

<table>
<thead>
<tr>
<th>Test Statistics /Assumption</th>
<th>Level</th>
<th>First Difference</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UAE FDI</td>
<td>UAE GDP</td>
<td>UAE CO2</td>
</tr>
<tr>
<td>Intercept (p-value)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-1.267142 (0.6235)</td>
<td>-1.340857 (0.5895)</td>
<td>-0.255502 (0.9157)</td>
</tr>
<tr>
<td>Trend &amp; Intercept (p-value)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-4.794734 (0.0080)</td>
<td>-1.424195 (0.7386)</td>
<td>-2.387046 (0.3742)</td>
</tr>
<tr>
<td>None (p-value)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.798046 (0.3578)</td>
<td>0.089539 (0.9542)</td>
<td>1.401245 (0.8999)</td>
</tr>
</tbody>
</table>

Notes: *, ** and *** indicate the rejection of the null hypothesis at 10%, 5% and 1% level of significance, respectively.
Null Ho: Variable has a unit root
The results of ADF unit root test of UAE Table 1 illustrates the result of ADF unit root test of U.A.E and the result indicates that all variables tested in UAE has unit root and so variable is non stationary at level. However after the first difference the absolute T statistics is more than 5% critical value and P-value is less than 5 percent, thus the null hypothesis is rejected and the variables are proven stationary at first difference.

Optimal Lag Length Selection Results

Optimal lag length is necessary to define autoregressive time series and a residual in the process of ADF unit root test. Table 2 illustrates the optimal lag length criteria for U.A.E.

Table 2: The optimal lag length of FDI, GDP and CO2 in U.A.E

<table>
<thead>
<tr>
<th>SIC</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>60.33148</td>
<td>59.73404</td>
</tr>
<tr>
<td>61.10824</td>
<td>60.06438</td>
</tr>
<tr>
<td>60.77862</td>
<td>59.29467</td>
</tr>
<tr>
<td>59.25645*</td>
<td>57.34496*</td>
</tr>
</tbody>
</table>

* indicates lag order selected by the criterion
AIC: Akaike information criterion
SIC: Schwartz Bayesian information criterion

According to the table 2 the fourth lag was the most suitable for further process due to both AIC and SIC indicated the lowest value as 107.7813 and 109.394 respectively and its represents the accurately of analysis.

Co-Integration Through Johansen Co-Integration Technique:

After satisfying the stationarity condition of the variables in ADF Unit root test, analysis of co-integration through johansen co-integration technique is performed as it helps to determine whether the variables under study have the tendency to move together in the long run .This is to say that the existence of co integration implies that there is a long-run equilibrium relationship existing between the variables in the equation [4].

Table 3: Result of the co-integration test

<table>
<thead>
<tr>
<th>Hypothesized No of CE{s}</th>
<th>Eigenvalue</th>
<th>Trace Statistic</th>
<th>0.05 critical value</th>
<th>Prob **</th>
</tr>
</thead>
<tbody>
<tr>
<td>r = 0 *</td>
<td>0.698192</td>
<td>37.61003</td>
<td>29.79707</td>
<td>0.0052</td>
</tr>
<tr>
<td>r ≤ 1 *</td>
<td>0.465025</td>
<td>16.04667</td>
<td>15.49471</td>
<td>0.0413</td>
</tr>
<tr>
<td>r ≤ 2*</td>
<td>0.233520</td>
<td>4.787048</td>
<td>3.841466</td>
<td>0.0287</td>
</tr>
</tbody>
</table>

Note * denotes rejection of the hypothesis at the 0.05 level

Since all the three hypothesis are rejected, it can be concluded that none of the variables contain stochastic trends after all, because that is the only way there could be as many cointegrating relationship as variable [3].

Granger Causality Test For FDI, GDP and CO2

As results from previous test it is concluded that VECM technique should be examined in this study since there is an existence of co-integration between the variables [2]. The lag selection for performing VECM is done by choosing the lowest AIC(Akaike Information Criterion) value[1]. The value at Lag 1 is 60.12837 and the value at lag 2 is 59.85281. Hence lag 2 is chosen for calculating VECM.

Table 4: Granger causality test performed by VECM approach

<table>
<thead>
<tr>
<th>Dependent</th>
<th>Independent</th>
<th>chi- Square</th>
<th>P-value</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FDI)</td>
<td>D(GDP)</td>
<td>0.319437</td>
<td>0.8524</td>
<td>GDP 0 FDI</td>
</tr>
<tr>
<td>D(FDI)</td>
<td>D(CO2)</td>
<td>2.841651</td>
<td>0.2415</td>
<td>CO2 0 FDI</td>
</tr>
<tr>
<td>D(GDP)</td>
<td>D(FDI)</td>
<td>1.429803</td>
<td>0.4892</td>
<td>FDI 0 GDP</td>
</tr>
<tr>
<td>D(GDP)</td>
<td>D(CO2)</td>
<td>1.292034</td>
<td>0.5241</td>
<td>CO2 0 GDP</td>
</tr>
<tr>
<td>D(CO2)</td>
<td>D(FDI)</td>
<td>0.485011</td>
<td>0.7847</td>
<td>FDI 0 CO2</td>
</tr>
<tr>
<td>D(CO2)</td>
<td>D(GDP)</td>
<td>6.116011</td>
<td>0.0470**</td>
<td>GDP→CO2</td>
</tr>
</tbody>
</table>

Notes: *, ** and *** indicate the rejection of the null hypothesis at 10%, 5% and 1% level of significance, respectively
Null Ho: The variables do not have causality.

From the result analyzed, it can be inferred that there is no causality found between GDP and FDI. Further, result also shows that there is no causal relationship found between FDI and CO2. However, causal relationship is found between GDP and CO2. This is obvious, because of the significance of the probability value (4.70%) as shown in table 4. This causality runs from GDP to CO2 but does not run from CO2 to GDP which proves that the causality is uni-directional. This suggests that as Gross domestic production grows, the rate of pollution is likely to increase in the environment. This presumes that the sources of GDP have significantly negative impact on the environment of U.A.E. As the large percentage of GDP is coming from oil sector [5]. The finding of the study confirms the fact that it harmfully effects the environment of the country.

CONCLUSION AND RECOMMENDATION

The study analyses the causal relationship between Foreign Direct Investment and the main pillars of sustainable development: Economic growth (GDP as an
indicator) and Environmental protection (CO2 as an indicator). All the variables were stationary at first difference through augmented dickey fuller test. The Johansen Co-integration Test shows there is as many co-integrating relationship as variables. Since co-integration was found among the variables, Granger causality test was performed under VECM model. The test shows that there is no causality between growth of GDP and FDI, flow of FDI and CO2. Nevertheless, there is unidirectional causality between GDP and CO2. This means the emission of CO2 is caused with the growth of GDP in the country. The relationship can be considered as obvious as the main source of income of the country is from oil and natural gas sector. The paper recommends that there is need of U.A.E government to make policies that will attract more foreign direct investment so that the dependency of the country over the oil sector will be reduced and thus the negative effect of GDP growth over CO2 emission will also be lessened.

REFERENCES


