Examining the Relationship between FDI, Economic Growth, Energy consumption and Exports in Yemen

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ABSTRACT

The aim of this paper is to examine the cointegration among FDI, economic growth, energy consumption and exports in Yemen for the 1990-2014 period. The ARDL bounding the maximum likelihood and also identify the long-run and short-run relationship between the research variables. It is important to highlight these relationships in less developing countries due to low FDI inflows. Overall, the main findings show there is cointegration among FDI and GDP, energy consumption, exports. In the long and short run the results depict there is negative relationship between FDI, GDP and exports. But in long and short run there is positive relationship between FDI and energy consumption. This shows the importance of FDI to Yemen economy in order to enhance economic growth. The country needs various policies to attract FDI in Yemen. Furthermore, it is also very important to focus on exports to support FDI inflows in coming years in Yemen.

Key words: FDI, economic growth, energy consumption and exports, Yemen.

1. Introduction

Beginning in the mid-1980s, world foreign direct investment (FDI) flows increased rapidly with a growing number of multinational enterprises (MNEs) as the engine of the increased international economic activities. Both industrialised and developing countries are becoming more receptive to FDI flows such that a majority of FDI policy changes in these countries are in the direction of more liberalization of FDI inflows (United Nations, 1992). There are various benefits which FDI brought for economic growth. It is important to design the effective policies in order to achieve high economic growth. Various countries have different policies to enhance FDI in order to meet the new economic challenges. In this context, it is important to have affective policies. Many researchers have examined the relationship between FDI and several variables such as economic growth, trade and energy

consumption (Apergis et al., 2006; Tang et al., 2008; Lee, 2013; Omri, 2014; Tang and Tan, 2014; Bhattacharyaa et al., 2016).

The financial and economic systems integration through social and cultural aspects in a phenomenon known as globalization has transformed the world into a small village. Globalization has introduced opportunities for success, but the inherent risks associated with it have also been multiplied. The FDI benefits of the economy of the host country further facilitate the superior utilization of available raw resources, improve management and marketing methods, provide access to up-to-date technologies, and improve human capital via job training and HRM strategy. Aside from the above, foreign money inflows reserves can be used to finance current account trade deficits of balance of payments. Contrary to the external debt, money inflows via FDI do not entail debt redemption and interest liabilities. In the past years, several developing nations have established sweeping reforms towards liberalization and these have led to dynamic competition among these countries on the global level.

The net FDI inflows have various challenges in Least Developed Countries (LDCs). In that countries, the understanding causality relations among economic growth, exports and FDI in LDCs poses an important research question as this group of countries includes the most vulnerable economies of the world, suffering from drastic economic and social problems, extreme poverty, hunger and inadequate levels of human development. For quite some time, practically since the dissolution of colonial empires, assisting development in the economically backward areas of the world has been on the international community's agenda. Developed countries of the world, often under the leadership of the United Nations, have pursued extensive, multifaceted aid schemes and economic development assistance programs with the aim of encouraging sustainable economic growth and human development in developing areas.

Recognizing the special needs of the Least Developed Countries, (LDCs) the United Nations has organized three major conferences on LDCs over the last three decades. Despite the fact that export revenues and FDI inflows remain at the core of the major development assistance programs for the LDCs, only a very limited number of empirical studies have targeted their impact on economic growth in this group of countries. Although there exists voluminous empirical literature on both the ‘exports–growth’ and ‘FDI–growth’ nexuses, the bulk of this literature focuses on the case of “developing countries” in general, with no explicit focus on LDCs. The LDCs, however, provide a particular subset of developing countries, as they share very similar developmental problems and characteristics, having been subject to the same development assistance and poverty alleviation schemes for many decades (Tekin, 2012). Furthermore, the body of empirical evidence on the more general case of developing countries still remains to be inconclusive, as the results of existing studies

are obviously country- and methodology-specific. Most of the existing empirical works, on the other hand, are taint with severe estimation biases as they employ earlier econometric techniques which do not take into account cross-sectional dependency and heterogeneity issues. There is therefore a need for further research on causality relationships among economic growth, exports and FDI in the countries which have weak FDI inflows. This is what this study strives to do.

This paper examines the possibility of cointegration and causality among FDI, GDP, real exports and energy consumption in Yemen. The country has various challenges regarding political instability, closed economy and slowed economic growth. It is important to shed light on all these factors to enhance FDI and economic growth in the long run. It also needs important decisions that how to develop bilateral relationship with Yemen to improve economy. The remainder of this study is structured as follows. Section 2 reviews the overview of Yemen. Section 3 provides the literature review. The data sources and model framework are presented in Section 4. Results and discussion are presented in Section 5. The conclusion and policy implications are discussed in Section 7.

1. Overview of Yemen Economy

Several countries have experienced a considerable FDI increase owing to its significant impacts on developed and developing nations. Nevertheless, in Yemen, low levels of FDI inflows have been experienced and the country is considered as one of the countries having the least amount of FDI inflows in the Middle East. It has revealed that Yemen still had low levels of FDI inflows and on top of this, its FDI inflows experienced sharp decline and had been negative for some years. The events Yemen experienced in 2011 had serious effects on the performance of the national economy, causing substantial damages in all economic sectors. As a consequence,Gross domestic product at current as well as constant prices shrank lastYear as a result of a slump in economic activities.Gross domestic product at constant prices shrank by 15.3% in 2011 after having expanded by 6.8% in 2010. The fall in GDP in 2011 was essentially as a result of a reduction of economic activity in both sectors of manufacturing of commodities and production of services by 14.0% and 16.1% respectively. On the other hand, non-oil GDP at constant prices receded by -14.8% in 2011 after expanding by 7.2% in 2010.

The economic situation in 2012 despite the continuation of politicaltensions in Yemen which followed theevents of 2011 in addition to the processof political transition, the nationaleconomy witnessed in 2012 positivegrowth in most economic sectors, as aresult of relative improvement in thepolitical situation and gradual return ofstability in the country, as reflected inimprovement of some

economicindicators. As a consequence GDP data atconstant prices showed an increase of 2 %in 2012, compared with a decrease of12.8% in 2011. Likewise the nonoilsectors achieved real growth of 4.4% compared with a contraction of 11.9 % in 2011 In 2012 the Yemeni economy experiencedsome recovery in its performanceachieving a growth rate of 2% in GDP atconstant prices and 4.4% in nonoil GDP.This recovery followed the deteriorationof most economic indicators andworsening in performance of mostcommodity and service producing sectorsof the economy during 2011, as a result ofthe events suffered by the country andtheir serious consequences on the financialand economic situation as well as livingstandards, culminating in contraction ofthe economy by 12.8%.The increase inGDP in 2012 was essentially as a result ofan expansion of economic activity inservices sector by 4.0%. On the otherhand, non-oil GDP at constant pricesincreased by 4.4% in 2012 after decliningby 11.9% the previous year. Average percapita GNP rose by 6.1% to US dollars 1264 in 2012. Looking the energy consumption UN Yemen there are various challenges to provide enough energy supply in the country. Energy growth remained low due to inefficient supply resources (see Figure 1).

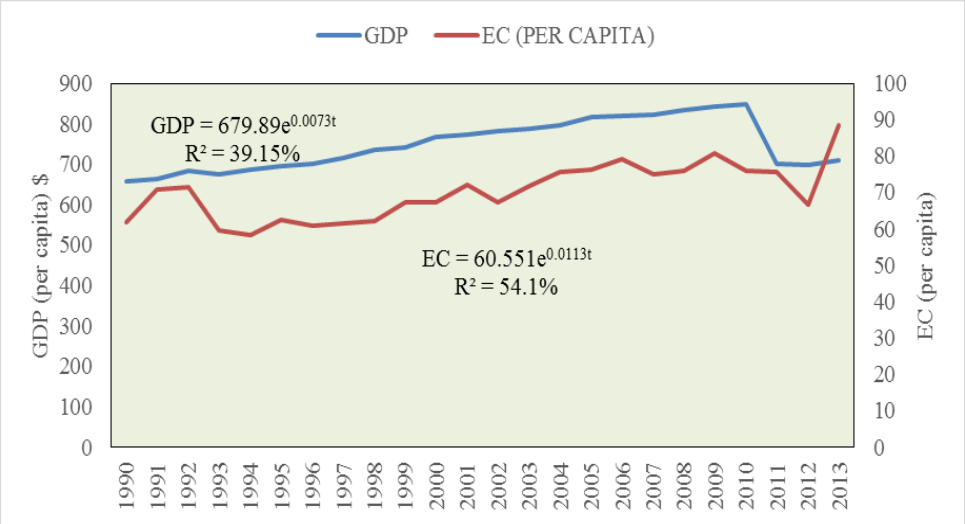

Figure 1.1: Economic Growth and Energy Consumption in Yemen (1990-2013).
Source: World Bank Indicators Yemen (2016).

The relative share of Non-Arab Asian countries increased from 76% in 2011to 0% in 2012, due to a rise in export value by 6% during 2012. Next came Arab Countries which lowered its share from 14% in 2011 to 10% in 2012, because of a fall in export value by 26%.The decline of exports, especially oil and gas exports during 2012 had a negative effect on the volume of trade with some of Yemen's trade partners. China maintained the first rank of importers from Yemen which it occupied in 2011, where its relative share increased from 32% in 2011 to 40% in 2012, as a result of a rise in export value by 23%. The performance of emerging and developing countries varied at the same time from strong to recovering from the effects of the international financial crisis and as a result of an increase in the prices of primary commodities in some of these economies, or their fall in others, owing to

weak external demand for their exports, in addition to political disturbances which afflicted some parts of this group of countries Generally speaking, however the economic performance was in line with expectations. Following is an outline of the most important international and regional economic development during the year 2011.The value of exports increased from US$ 7650 million in 2010 to US$ 8662 million in 2011, i.e. an increase of US $1012 million, or 13% over last year. Ratio of exports to GDP amounted to 28.5% compared with 25% last year. In 2011, the trade balance recorded surplus of US$ 120 million, against a deficit of US$823 million in 2010. Ratio of this surplus to GDP amounted to 0.4% in 2011. The realization of this surplus is attributed to the rise of oil and gas exports (see Figure 2).

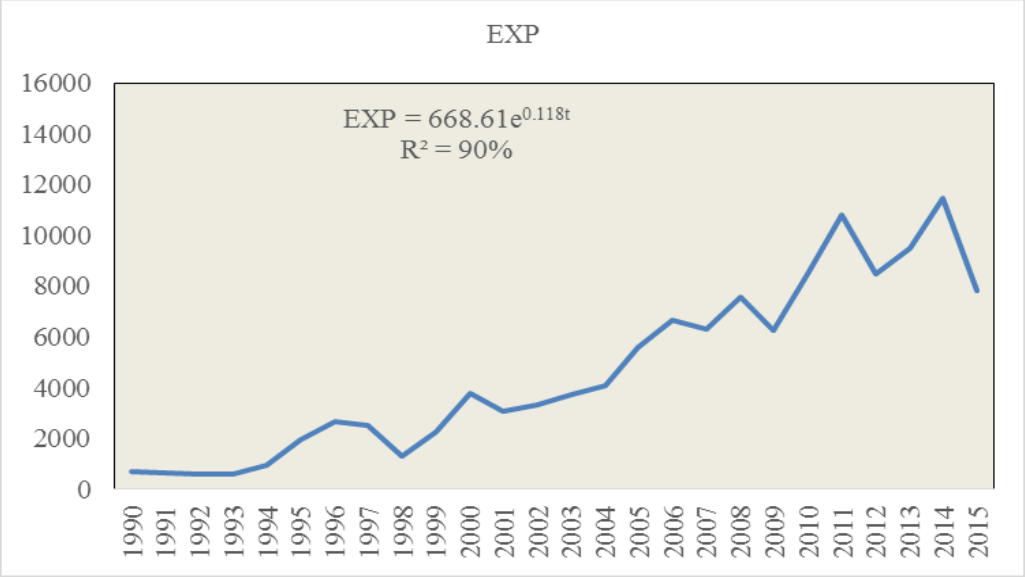

Figure 1.2: Exports in Yemen (1990-2015).
Source: World Bank Indicators Yemen (2016).

FDI inflows in Yemen is depicting negative growth rate, which shows that they are not enhancing the economic performance in this context. Country needs to enhance the FDI inflows to flourish in future. It is very important to make effective decisions that how to attract FDI in Yemen economy. In the context of Yemen, the Inward FDI Potential Index is lower than its Inward FDI Performance Index and according to UNCTAD (2007), Yemen is among the under-performing nations. In 2008, UNCTAD stated that Yemen was among the nations that were performing lower than their potential and suggested that Yemen should engage in considerable reforms to encourage its investment environment and its share of total FDI inflows. Figure 3 shows that during 1990-2013 the growth for inflows depicting negative trend in 1990s whereas it started increasing in 2005 and then started a

decline again. It shed light on various economic perspectives in Yemen and political instability is one of the main reason.

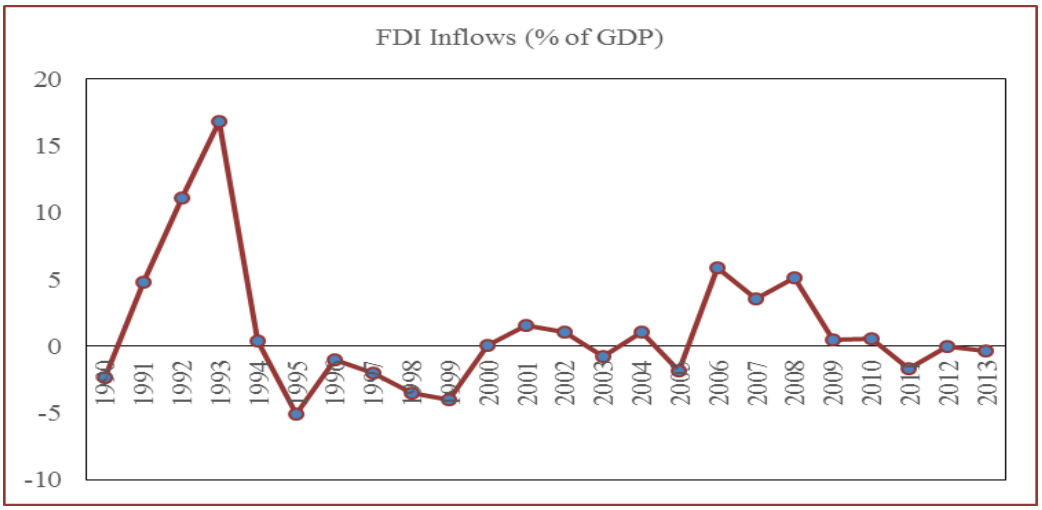

Figure 1.3: FDI in Yemen (1990-2015).
Source: World Bank Indicators Yemen (2016).

Looking the trends of FDI, economic growth, energy consumption and exports in Yemen. The objective of current study is to examine the determinants of FDI in Yemen economy.

2. Literature Review

2.1 Relationship between FDI and GDP

There is close relationship between FDI and economic growth. The economic performance enhances by foreign direct investment inflows. Belloumia (2014) explored the relationship between foreign direct investment (FDI), trade openness and economic growth in host countries for the period from 1970 to 2008. The results of Granger causality indicated that there is no significant relationship from FDI to economic growth, from economic growth to FDI, from trade to economic growth and from economic growth to trade in the short run. Moreover, it was justified that FDI can generate positive spill over externalities for the host country. Their empirical results fail to confirm this belief for the case of Tunisia. They go against the generally accepted idea considering the positive impact of FDI on economic growth to be automatic. The results found for Tunisia can be generalized and compared to other developing countries which share a common experience in attracting FDI and trade liberalization.

Omria (2014) investigated the causality links between foreign direct investment and economic growth using panel data models for a global panel of 54 countries over the period 1990–2011. They also implement these empirical models for 3 regional sub-panels. The results provide evidence of bidirectional causality between FDI inflows and economic growth for all the panels. Moreover indicate the existence of unidirectional causality running from emissions to economic growth.
Pegkas (2015) analyzed the relationship between the foreign direct investments and economic growth in the Eurozone countries over the period of 2002–2012. He employed panel data estimations to test the relationship between the variables. The finding showed there is a positive long-run cointegration relationship between FDI stock and economic growth. Furthermore, Hakimia and Hamdib (2016) investigated the possible economic impacts of the trade liberalization on the environmental quality in Tunisia and Morocco. They used Panel VECM and Panel cointegration of both countries as a group.

Abbes (2015) analyzed the relationship between foreign direct investment and economic growth in 65 countries, using co-integration and panel Granger causality tests in panel data. The results showed a disparity in terms of the relationship between the co-integration of the panel study. Furthermore, indicate a unidirectional causality from FDI to GDP, which could be a good tool to prioritize the allocation of resources across sectors to promote foreign direct investment.Ahmed (2012) examined the relationship between the FDI inflows and GDP on Malaysia's productivity growth the period of 1999 to 2008.used time series quarterly data. His results the FDI inflows and inputs used are negatively contributed to total factor productivity (TFP). Meanwhile, FDI plays a significant role in achieving economic growth through input driven as indicated by the contribution of the TFP.

2.2 relationship between Economic Growth and Energy Consumption (GDP, EC)

Due to economic growth the energy patters also changes. Huang et al. (2008) highlighted the relationship between energy consumption and economic growth for 82 countries from 1972 to 2002.they used panel data for the estimation of the panel VAR model in each of the four groups. They founded: (a) in the low income group, there exists no causal relationship between energy consumption and economic growth; (b) in the middle income groups (lower and upper middle income groups), economic growth leads energy consumption positively; (c) in the high income group countries, economic growth leads energy consumption negatively

Al-mulal, et al. (2013) explored relationship between renewable energy consumption and GDP growth has been investigated in high income, upper middle income, lower middle income, and high income countries. To achieve this goal, the fully modified OLS was utilized. The results revealed that

79% of the countries have a positive bi-directional long run relationship between renewable energy consumption and GDP growth.

Alshehrya and Belloumia (2015) showed causal relationships between energy consumption, energy price and economic activity in Saudi Arabia based on a demand side approach. They employed a Johansen multivariate cointegration approach and incorporate CO2 emissions as a control variable. In summary, the findings indicate that there exists at least a long-run relationship between energy consumption, energy price, and economic growth. Moreover, a long-run unidirectional causality stands from energy consumption to economic growth emissions. Even though, the energy-led growth hypothesis is valid, the share of energy consumption in explaining economic growth is minimal. Energy price is the most important factor in explaining economic growth.

Caraianiet al. (2015) investigated on the causality relationship between energy consumption and GDP in the context of emerging European countries covering the period 1980–2013. They used time sires. They shows mixed results. There is a balance in confirming conservation, growth and neutrality hypotheses. In some specific cases results imply that energy consumption and economic growth are jointly determined. However, a comparative analysis for different significance levels draws attention on the differences in judgment of results for this type of studies. Discussions on the results in terms of causality are conducted in order to identify future trends for research.

Jammazia and Alouic (2015) investigate the cross linkages between CO_2 emission, economic growth and energy consumption for six GCC countries (Saudi Arabia, Oman, Bahrain, Kuwait, UAE and Qatar) over the period (1980–2013). The results pointed out the existence of bilateral causal effects between EC and EG while only a unidirectional relationship was found from EC to CO2 emissions. The intensity of the co-movements reaches its zenith at coarser scales (in the long run). In addition, the decoupling effects are identified in the short run becoming less pronounced in the long run. Overall, the findings support the hypothesis of the so-called neighborhood-effect since we found striking similarities across countries in the pattern of relationships between the variables.

Shahbaza et al. (2015) examined the relationship between renewable energy consumption and economic growth period of 1972Q1–2011Q4. They employed auto-regressive distributed lag (ARDL) model and rolling window approach (RWA) for cointegration in context of Pakistan. The study used quarterly data. They results revealed that all the variables in the study are cointegrated that shows the long run relationship between the variables. The causality analysis shows the feedback effect between economic growth and renewable energy consumption.

Liu et al. (2015) According to the Chinese government's CO2 reduction commitment, the production and consumption of traditional and renewable energy in China from 2001 to 2012, this paper forecasts the energy consumption, gross CO2 emissions and CO2 emission intensity in China from 2013 to 2020 via system dynamics simulation. Coupled with the energy system and renewable energy policy factors, the effects of different economic growth rates and policy factors on the energy consumption were estimated. The results showed that in different economic growth rates scenarios, total energy consumption and CO2 emissions increased by 36,140.75 kWh and more than 10,000 billion kg in 10% GDP growth rate scenario than in the 7% scenario in 2020.

Azama et al. (2015) examined impact of various factors on energy consumption in three ASEAN countries over the period 1980 to 2012. After using sundry appropriate diagnostic tests for checking time series data, .findings validate that FDI inflows, economic growth, trade openness and human development index have positive and statistically significant impacts on energy consumption. Furthermore, variable urbanization has positive and statistically significant impacts on energy consumption for Thailand and Indonesia only.

Bastola and Sapkota (2015) examined the causal relationships among energy consumption, pollution emission, and economic growth for Nepal employed time series econometric methodology. Both Johansen cointegration and ARDL (Autoregressive Distributed Lag.Thier result Granger causality tests suggest presence of long-run bidirectional causality running from energy consumption to carbon emission and vice-versa and a unidirectional causality running from economic growth to both carbon emissions and energy consumption. These findings imply that policies that boost energy consumption may not spur economic growth, rather are more likely to exert adverse effects on the environment.

Khan et al. (2015) they examined the causal relationship between energy consumption and economic growth for ASEAN-5 countries. Used examination annual time series data in the period of 1980–2012 are used. The results of Johansen co-integration test reveal that there exists one co-integrating relationship among the variables in case of Indonesia, Malaysia, the Philippines and Singapore. The results uncover the existence of two co-integrating associations among the variables for Thailand. The Granger causality test suggests that there is no unilateral causality for Indonesia as in all the three cases. In case of Malaysia the economic growth caused energy consumption.

Leitão, (2015) explored relationship between energy consumption and foreign direct investment (FDI) for the period 1990-2011. He used unit root test and panel data in Portugal. The empirical results illustrated that the income per capita and political globalization present a positive impact on energy

consumption. Furthermore, the components of globalization promote Portuguese foreign direct investment

Lu et al. (2016) The long-term dynamic changes in the triad, energy consumption, economic development, and Greenhouse gas (GHG) emissions, in Japan after World War II were quantified, and the interactions among them were analyzed based on an integrated suite of energy, energy and economic indices. The results quantitatively showed that two different energy strategy periods, one before 1973 using new sources of higher quality energy and one after 1973 focused on improving the efficiency of energy generation methods, could explain the linear increase in national economic development in Japan over the 66 years from 1946 to 2011. Japan benefited both ecologically and economically from importing fossil fuels, which accounted for 8.7% of the nominal GDP of Japan averaged over the entire study period.

Tanga et al. (2016) they analyzed the relationship between energy consumption and economic growth in Vietnam. Using the neoclassical Solow growth framework for the 1971–2011 period. Results showed confirm the existence of cointegration among the variables. In particular, energy consumption, FDI and capital stock were found positively influence economic growth in Vietnam. The Granger causality test revealed unidirectional causality running from energy consumption to economic growth.

Bhattacharyaa et al. (2016) they investigated the effects of renewable energy consumption on the economic growth of major renewable energy consuming countries in the world. Using the Renewable Energy Country Attractiveness Index developed by the Ernst & Young Global Limited, they choose 38 top renewable energy consuming countries to explain the growth process between 1991 and 2012. With panel estimation techniques, their findings establish cross-sectional dependence and heterogeneity across the countries. They confirm the evidence of long-run dynamics between economic growth, and traditional and energy-related inputs. Furthermore from long-run output elasticities indicate that renewable energy consumption has a significant positive impact on the economic output for 57% of our selected countries.

Adams et al. (2016) examined the relationship between energy consumption and economic growth relationship using panel data of 16 sub-Saharan African (SSA) countries for the period 1971–2013. They employed a panel vector autoregressive model (PVAR) in a generalized method of moments (GMM) framework. In summary, the findings supported the feedback hypothesis for energy consumption and growth. Moreover, they found an interaction variable between energy consumption

and economic growth. Looking the causality perspective, the results provide strong evidence of a uni-directional relationship from trade openness to energy consumption.

2.3 Relationship between foreign direct Investment and export (FDI, EXP).

Sun (2012) investigated the impact of FDI on domestic exporting firm's test case for this hypothesis is China. He showed that domestic firms respond to an increase in the presence of FDI by increasing their exports. Furthermore, though the increase in foreign presence can drive up production costs and make the domestic market more profitable. Zhua et al. (2016) examined the impact of foreign direct investment (FDI), economic growth and energy consumption on carbon emissions in five selected member countries in the Association of South East Asian Nations (ASEAN-5).

Goswami and Saikia (2012) investigated mainly the trends of FDI in India during the period 1992---2011 using time series data. They found bi-directional causality between FDI and Exports. In summary, they have advantage of trade with neighboring countries and the potentiality to develop various industries as being endowed with vast natural resources. But on the other side failed to attract any sizeable amount of FDI due to infrastructural and other bottlenecks. It shows the need to remove such fundamental constraints through strategic intervention.

Amighinia and Sanfilippo (2014) highlighted the impact of FDI and imports on the African exports. Their results supported the view that South–South integration has a strong potential for accelerating structural transformation in the continent. Schmeiser (2013) showed that in a theoretical environment where monopolistic competitive firms choose between exporting and servicing through a multinational with foreign direct investment (FDI), a gravity representation of exports and FDI can be derived. I then discuss the extent to which the resulting gravity equations are comparable and suggest a gravity-type regression that allows for direct interpretation of the differential effects of variables on exports and FDI. Due to economic growth the energy patters also changes.

Amighinia and Sanfilippob (2014) highlighted the impact of FDI and imports on the upgrading of African exports. Found that South–South flows impact differently from North–South ones on the ability of recipients to absorb the positive spill overs. Franco (2013) Examined effects of U.S. FDI on export intensity at the sectoral level in 16 OECD countries over the period 1990–2001 by bringing together international economics and international business perspective on FDI motivations. He found that asset exploiting motivations, and in particular market seeking FDI, are those that affect export intensity to a greater extent.

Kahoulia and Maktoufb (2015) developed a static and dynamic gravity model to test the determinants of FDI between 14 investment partners and 39 host countries during the period 1990–2011 and evaluate the impact of the recent economic crisis on FDI. Their results estimated take into account the endogenous nature of the effects of integration and the existence of the dynamic effect.

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Begum et al. (2015) study investigates the dynamic impacts of GDP growth, energy consumption and population growth on emissions using econometric approaches for Malaysia. Empirical results from ARDL bounds testing approach show that over the period of 1970–1980, per capita CO2 emissions decreased with increasing per capita GDP (economic growth); however from 1980 to 2009, per capita emissions increased sharply with a further increase of per capita GDP.

Liddle and Lung (2015) We examine (i) reduced form production function models for both the industry and service/commercial sectors, where aggregate energy consumption is expected to cause aggregate output; and (ii) reduced form demand models, where income is expected to cause (separately) per capita residential electricity consumption and per capita gasoline consumption. We uncover for 12 different panels a set of super-consistent causality findings across two demand models that income "Granger-causes" per capita consumption. By contrast, the results from the production function models suggest that a different modeling framework is required to glean new, useful insights.

Whereas, Tang and Zhang (2016) investigated how manufacturing exports are affected by the FDI interaction in China. They have estimated the data for 21 manufacturing sectors for 31 regions over 8 years. They found that manufacturing has great role in increased FDI. Moreover, they concluded that a well-designed FDI policy and high quality infrastructure can enhance FDI.

The previous studies have highlighted role of FDI in various countries but the current study is filling the gap by using FDI determinants in Yemen economy. The result can brought various effective policy implications for Yemen economy.

3. Data Source and Methodology

Annual time series data for the (1990-2013) period has used FDI (Foreign Direct Investment), Energy Consumption (EC), GDP per capita(GDP) and Exports (EXP) in Yemen are employed. The data were obtained from a single source, the World Bank's development databases (2016) available online at (http://data.worldbank.org/). Micro-fit version 4.1 and E-views version 8.2 statistical packages are utilized. Thus, following Shahbaz et al. (2014), Shahbaz and Lean (2012), Esteve and Tamarit (2012) highlighted that the relationship can be formulated as in equation1.

$$FDI_t = f\ (GDP_t + EC_t + EXP_t) \quad (1)$$

All the variables in equation (1) are transformed into natural logarithms (L).This transformation is useful to provide more appropriate and efficient results compared to the simple linear model. This reduces the hetrosecdasticity problem and obtains the growth rate of the variable (Bekhet and AL-Smadi.2015; Hamdi et al., 2014; Khan et al., 2014). The ,equation (1) is remember as in Equation (2) .

$$LFDI_t = \mu + \beta_1 LGDP_t + \beta_2 LEC_t + \beta_3 LEXP_t + \varepsilon_t \quad (2)$$

In order to determine the level of stationarity [*I (0), I (1)* and *I (d)*] augmented Dicky-Fuller [ADF] (1979, 19810), Phillips-perron [P-P] (1989) and Kwiatkowaki, Phillips, Schmidt and Shin [KPSS] (1999) statistical tests are used. To examine the co-intergration relationship among the variables above, ARDL bounds testing model which was developed by Pesaran and Pesaran 1997; Pesaran and Smith, 1998; Pesaran and Shin, 1999; and Pesaran et al., 2001) is employed. This is because it can be used with small sample sizes, estimates long-run and short-run relationship simultaneously and allows testing for the existence of relationship among variables for stationary data at level *I (1)* orand *I*(*1*) or both. (Hamdi et al., 2014; Chandran, 2009; Pesaran and Shin, 1999; Pesaran and Pesaran, 1997). Equation (3) is being constructed to examine the long-run short-run relationships among the variables. However, the maximum Eigen value test aims determine the minimum number of co-intergrstion (Brook, 2008).

$$\begin{bmatrix} \Delta LFDI \\ \Delta LGDP \\ \Delta LEXP \\ \Delta LEC \end{bmatrix} = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \\ \beta_4 \end{bmatrix} + \begin{bmatrix} \phi_{11}\ \phi_{12}\ \phi_{13}\ \phi_{14} \\ \phi_{21}\ \phi_{22}\ \phi_{23}\ \phi_{24} \\ \phi_{31}\ \phi_{32}\ \phi_{33}\ \phi_{34} \\ \phi_{41}\ \phi_{42}\ \phi_{43}\ \phi_{44} \end{bmatrix} \begin{bmatrix} LFDI \\ LGDP \\ LEXP \\ LEC \end{bmatrix} + \sum_{s=1}^{k} \begin{bmatrix} \alpha_{11}\ \alpha_{12}\ \alpha_{13}\ \alpha_{14} \\ \alpha_{21}\ \alpha_{22}\ \alpha_{23}\ \alpha_{24} \\ \alpha_{31}\ \alpha_{32}\ \alpha_{33}\ \alpha_{34} \\ \alpha_{41}\ \alpha_{42}\ \alpha_{43}\ \alpha_{44} \end{bmatrix} \begin{bmatrix} \Delta LFDI \\ \Delta LGDP \\ \Delta LEXP \\ \Delta LEC \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \end{bmatrix} \quad (3)$$

Where Δ is the first difference operator, $\phi_{ij}s$ denote the long run coefficients of the variables. $\alpha_{ij}s$ The short run coefficients, $\varepsilon_{ij}s$ denote the error terms which are normally distributed, K represents the optimal lag length, s is the lag order and I, j=1,….., 4.

Nere is sometimes misaims to link with Equation (4)

$$\begin{bmatrix}\Delta LFDI\\ \Delta LGDP\\ \Delta LEXP\\ \Delta LEC\end{bmatrix}=\begin{bmatrix}\delta_1\\ \delta_2\\ \delta_3\\ \delta_4\end{bmatrix}+\sum_{s=1}^{k}\Delta\begin{bmatrix}\beta_{11}\ \beta_{12}\ \beta_{13}\ \beta_{14}\\ \beta_{21}\ \beta_{22}\ \beta_{23}\ \beta_{24}\\ \beta_{31}\ \beta_{32}\ \beta_{33}\ \beta_{34}\\ \beta_{41}\ \beta_{42}\ \beta_{43}\ \beta_{44}\end{bmatrix}\begin{bmatrix}LFDI\\ LGDP\\ LEXP\\ LEC\end{bmatrix}+\begin{bmatrix}\gamma_1\\ \gamma_2\\ \gamma_3\\ \gamma_4\end{bmatrix}\begin{bmatrix}ecM_1\\ ecM_2\\ ecM_3\\ ecM_4\end{bmatrix}+\begin{bmatrix}\varepsilon_1\\ \varepsilon_2\\ \varepsilon_3\\ \varepsilon_4\end{bmatrix} \quad (4)$$

Where $\delta_i s$ denote the intercepts, $\beta_{i\,j} s$ presents the short-run coefficients and $\gamma_i s$ represents the coefficients of ecM_{t-1} and I, j=1,….., 4. However, ecM$_{t-1}$ is the lagged value of the residuals derived from the F-bounds test among the variable .This is used to detectlong-runcausality among the variables while, the joint χ^2 statistic for the first differenced lagged independent variables is used to test the direction of short-run causality between the variables (Bekhet and Al-smadi, 2015; Hamdi et al., 2014; Boutabba, 2014). For example, ΔLEC does not Granger cause ΔLCO$_{2t}$ if β_{12} =…..= $\beta_{12,i}=0.$ in final step, cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) is used to check the stability of the long-run parameters movement for ΔLFDI model.

4. Empirical Results

5.1 Data Quality, Stationarity and Co-integration Results

The first aim of any statistical procedure is to give a succinct description of the data being analysed. Also, in the time series data the descriptive statistical tests, normality and correlation matrix are very important steps to determine whether the data collected are adequate and sufficient for time series analysis (Bekhet and Al-Smadi, 2015). Table 2 shows that (LFDI, LEC, LGDP, LEX) variables are positively and significant interrelated among each other within the acceptance range of correlation coefficients. Furthermore, it reveals that these variables have no possibility of the negative effects of multicollinearity and that all variables are normally distributed, as confirmed by skewness and Jarque-Bera normality tests (Menyah et al., 2014; Brooks, 2008).

Table 1: Data Quality Results.

Variable	LFDI	LGDP	LEXP	LEC
Mean	1.778	6.613	8.009	4.245
Median	1.827	6.604	8.168	4.266
Maximum	3.127	6.742	9.287	4.481
Minimum	-0.118	6.487	6.414	4.065
Std. Dev.	0.683	0.082	0.935	0.108

Skewness	-0.613	0.116	-0.475	0.088
Kurtosis	4.199	1.588	1.993	2.227
Jarque-Bera	2.944	2.047	1.916	0.628
Probability	0.229	0.359	0.383	0.730
LFDI	1.000			
LGDP	0.250	1.000		
LEXP	-0.076	0.667	1.000	
LEC	0.195	0.587	0.666	1.000

Then the table 2 shows that the ADF, P-P and KPSS unit root tests results include for the above variables stationary at I(1) with intercept and trend at different level of significance (1%, 5% and 10%).

Table 2: Unit Root tests.

	ADF		PP		KPSS		Decision
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	
LFDI	-3.218	-5.454	-3.288	-10.131	0.100	0.203	I(1)
LGDP	-1.688	-4.286	-1.688	-4.286	0.424	0.313	I(1)
LEXP	-3.167	-4.025	-1.113	-6.304	0.678	0.426	I(1)
LEC	-0.985	-5.404	-1.733	-5.544	0.577	0.256	I(1)

Table 3 shows that the F-statistics values result for the LFDI are cointegrated with LGDP, LEC, and LEX models are integration at I (1). This means that there are long-run relationships among the variables in these models. In addition, the F-statistics values result for the LFDI model show that the calculated F-statistic value falls in the range indicating that it is for either accepting or rejecting the Ho. So the results of these models are can signed with the past studies results to confirm the long-run relationship among the variables (see Belloumia, 2014; Omri, 2014; Kahoulia and Maktoufb, 2015; Tang and Zhang, 2016).

In context of GDP it raises energy demand due to economic growth. It shows that it can also affect the economic growth of an economy (Sadorsky, 2010 al., 2010). It means that it may influence energy consumption through economic growth channel in Yemen. But in Yemen there is weak relationship between energy and FDI and economic growth.

Table 3: F-bound Test Results.

Models	F-statistics	Bound critical values						Decisions
		1%		5%		10%		
		I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	
$LFDI_t$	6.634	2.84	4.12	2.27	3.44	1.95	3.08	Co-integration
$LGDP_t$	0.751	2.84	4.12	2.27	3.44	1.95	3.08	No co- integration
$LEXP_t$	4.131	2.84	4.12	2.27	3.44	1.95	3.08	Co-integration
LEC_t	0.047	2.84	4.12	2.27	3.44	1.95	3.08	No co- integration

Long run results among the variables (see Table 4) are warranted to estimate the coefficients of the long run relationship between the above variables. It shows that energy consumption positively associated with FDI. This means that 1% rise in is energy consumption raises the FDI by 7.96%. Whereas, the GDP and EXP have negative long run relationship with FDI in Yemen. In case of GDP, if there will be any change it will result in 1.33% decrease in GDP. While, exports show as 0.57% decrease with FDI. It means there is no support from FDI to economic growth and exports. The findings are in line with the literature such as Sun (2011) and Goswami and Saikia (2012).

Table 4: Long Run Analysis.

Variables	Coefficients	Standard Error	T-ratio	Probability
LGDP	-1.3378	1.7648	-0.75803	0.458
LEXP	-0.57661	0.16638	-3.4656	0.003
LEC	7.9631	1.6627	4.7893	0.000
C	-18.4361	10.2172	-1.8044	0.088

The short run results displayed in Table 5 shows that there is negative relationship between FDI and GDP and EXP. This means that again the short run there is close interaction between energy consumption and FDI but the relationship is same as for GDP and exports as in long run. Based on the results, FDI should have significant contribution to the GDP per capita growth for the Yemen economy but there is need of improvements in human capital and macroeconomic stability. The negative coefficient for GDP is consistent with the convergence hypothesis in the literature, although it is not statistically significant in the case of less develop. Also for the export as one of the contentious issues in the empirical literature on trade and growth is the possibility of the endogeneity of trade share as a measure of trade openness. However, in practice the challenge lies in finding good instruments for trade share if the variable is proven or intuitively believed to be endogeneous. With

the changing global trade dynamics and revolutions in technology, capacity to trade may not necessarily be directly correlated with some of the instrumental variables.

Table 5: Short run Analysis.

Variables	Coefficients	Standard Error	T-ratio	Probability
LGDP	-1.3378	1.7648	-.75803	.458
LEXP	-0.57661	.16638	-3.4656	.003
LEC	1.5301	1.3323	1.1484	.266
C	-18.4361	10.2172	-1.8044	.088
ecm	-1.0000	0.00		

In addition, the stability tests presented in Figure 4, as CUSUM and CUSUM square to see the stability of the long-run relationship for the FDI model (Bekhet and Matar, 2013; Lau et al, 2014).

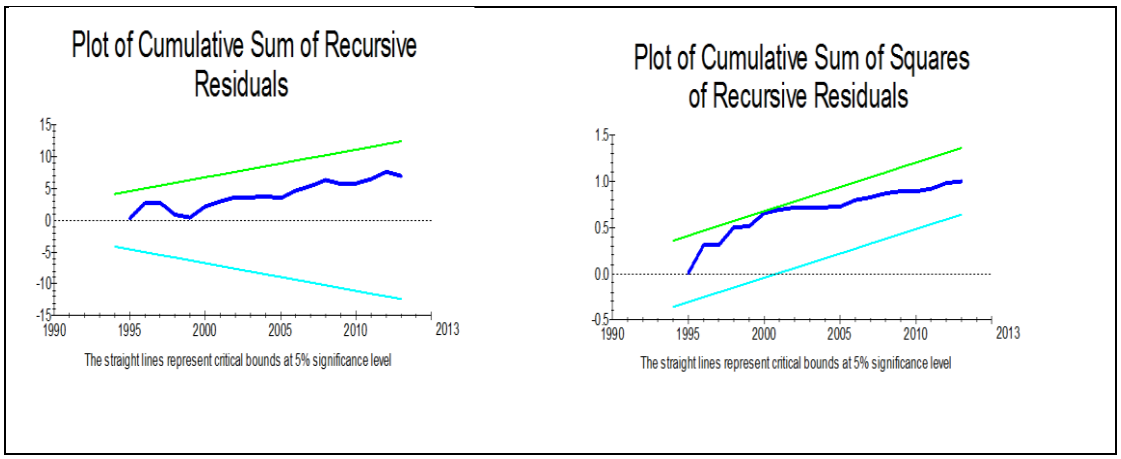

Figure 4: CUSUM and CUSUM square tests for the (1990-2013) period.

5. Conclusion and Policy Implications

This paper examine the cointegration among FDI and various determinants such as economic growth, energy consumption and exports in Yemen for the 1990-2013 period. We have used the ARDL bounding the test approach and also identify the long-run and short-run relationship between the research variables. Overall, the main findings show there is cointegration among FDI, economic growth, energy consumption and exports. In the long and short run the results depict there is negative relationship between FDI, GDP and exports. But in long and short run there is positive relationship between FDI and energy consumption.

Our current findings brought various policies. Baharoon et al. (2016) mentioned that policy-makers should enhance renewable energy in Yemen. Let's be prepare the people to invest in solar and other energy resources. Moreover, the absence of transparency and government accountability in global

competition can foster corruption and rent-seeking behavior by governments which are counter-productive to economic growth. As countries compete to attract FDI as suggested by our results, governments may relax their enforcement of standards thereby placing pressure on other governments to follow suit. One of the main concerns is that 'bidding wars' could erode the tax base of smaller less competitive countries channeling public expenditure away from priority sectors. Incentive competition can also lead to low taxes on mobile activities such as exports and immobile activities.

Furthermore, the FDI inflows generate the possible spillovers of technology and knowledge (that determine by the level of absorptive capacity) through the interaction of technology knowledge and local human capital to upgrade their skills and firms to transfer the technology to the economy. This spillover effects might be able to improve the Yemen firms and human capital development to contribute significantly to Yemen's economic growth. As expected the production supported by advance technology will educate the skilled labor and eventually improved the productivity and enhance the economic growth to be productivity driven growth that must show technical progress through TFP contribution.

Kolhoff (2013) explained that there is ongoing efforts for EIA legislation which can be influenced to a great extent by the power and capacity of, on the one hand, the environmental authorities supporting EIA and, on the other hand, the sector authorities hindering the development of EIA in Yemen. The political system is the most important context factor influencing the rules of policy-making and the power of the different actors involved. The importance of context factors on the development of ambitions is dependent on the phase of EIA system development. Moreover, some ambitions seem to be influenced by particular factors; for instance the ambitions for the object of study seem to be influenced by the level of environmental awareness of the sector ministries and parliament.

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