# Determinants of Resource-Seeking Foreign Direct Investment: Co-Integration and Causality Analysis for Saudi Arabia

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*Authors' contributions*

*This research is an outcome of collaboration among three of the authors. The authors have read and approved the final manuscript.*

## ABSTRACT

Although, a vast amount of literature has emerged on determinants of FDI across the globe, yet research in a Saudi Arabian context remains limited. This study is an attempt to fill this gap where determinants of resource-seeking FDI are analyzed over a period of 30 years. The study uses Johansen tests of cointegration to find out the effect of hypothesized variables as determinants of resource-seeking FDI. In order to determine a causal link among the tested variables, a Granger causality test is also conducted. On overall basis, it can be concluded that the resource-seeking FDI in the country is mainly driven by greater trade openness, resilient fiscal performance and existence of greater oil reserves.

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## 1. INTRODUCTION

The determinants of FDI are diverse globally as they differ across the type of FDI that can be classified as a resource-seeking, efficiency-seeking, market-seeking or strategic-assets seeking. The literature provides a striking difference across motivations of multinational enterprises (MNEs) for each type of FDI. Although, a vast amount of literature has emerged on determinants of FDI, yet research in a Saudi Arabian context remains limited [1][1]. Hence, this paper contributes to the extant literature on FDI determinants in various ways; Firstly, it is an addition to the limited literature available on determinants of resource-seeking FDI in the Kingdom. The limited number of existing studies on FDI determinants, (mentioned in literature review) both on Kingdom of Saudi Arabia (KSA) and the Middle East and North Africa (MENA) region, appear to be focusing both on determinants of market-seeking as well as resource-seeking FDI simultaneously. In such a situation the real determinants of resource-seeking FDI might not get the deserved attention. This study addresses this neglect. Secondly, it is different in terms of techniques applied as most of the time-series studies apply the traditional regression analysis. In case, the data is non-stationary, it leads to spurious regression results. The present study takes care of this pitfall and uses the cointegration analysis instead. Thirdly, the study proves that what holds true on the determinants of FDI elsewhere also holds true for a resource-seeking FDI since the findings support the existing trend.

FDI trends in Saudi Arabia have largely been dominated by the resource-seeking FDI mainly towards the petrochemical sector[2]. In order to attract FDI, countries compete with each other by shaping up their investment climates, liberalizing FDI regimes and strengthening their locational factors. Government policies are designed in a way that affect physical infrastructure in the country and set rules to carry out business activity, e.g. the policy framework for competition among foreign firms and so on. Since the past few years, the Kingdom has embarked upon a proactive investment strategy where different liberalization measures have been taken to improve investment climate of the country. With the establishment of the Saudi Arabian General Investment Authority (SAGIA), Saudi government announced a new Foreign Investment Law in the year 2000 introducing major regulatory and financial incentives as follows:

a. Possibilities to own 100% ownership, repatriate profits and availability of subsidized loans to foreign investors.
b. No restrictions exist on repatriation of capital and minimum capital requirements.
c. The Kingdom has agreed to adopt its foreign investment laws to that of the WTO agreement on Trade Related Investment Measures (TRIMs).
d. Foreign investors are entitled to have access to generous regional and international financial programs, including the Arab Fund for Economic and Social Development, Arab Monetary Fund, Arab Trade Financing Program, Inter-Arab Investment Guarantee Corporation and Islamic Development Bank.
e. Financial incentives mainly include the Human Resources Development Fund, preferential allocations of natural gas and competitive industrial utility rates for water, power and land. Tax incentives in various regions include 50% deduction from expenses of annual training for Saudi employees with 50% deduction from annual salaries paid to the same.

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[1] *This was the only study that could be traced on FDI in Saudi Arabia.*
[2] *FDI stocks to this sector stood at 44% while inflows were around 41% in the year 2008* [20]*.*

Such measures have resulted in transforming the Kingdom into an attractive destination for FDI. Saudi Arabia was ranked as 13th out of 183 countries for the overall 'Ease of Doing Business', according to the International Finance Corporation's 'Doing Business' Report in 2011.

The paper proceeds as follows. The part that trails, deals with the review of literature on determinants of FDI. Section 3 focuses on development of theoretical framework in context of the FDI theories while section 4 concentrates on data and methodology employed for the research. This also takes up definitions and explanation of variables used in the study. Section 5 puts forward major findings from empirical analysis while the final part offers major policy implications and conclusions.

## 2. REVIEW OF LITERATURE

There exists a great deal of literature that deals with the factors that determine flow of FDI from home to the host countries. Determinants on the distribution of FDI to developed, developing or emerging countries have been examined by a number of studies.

A limited number of studies have investigated the determinants of FDI to the Kingdom of Saudi Arabia [1]. The study revealed that the role of market size, trade openness, wage rates, and country risk as important in attracting FDI to KSA. Along with the conventional methods of regression analysis, causality tests were also used in his analysis. The results showed that GDP levels affected FDI in a positive and significant way. Exports had significantly negative impact on inflows of FDI to KSA, while the socio-political risk variables were mostly significant with a negative impact on FDI inflows to the country.

Study on the location determinants of FDI in the GCC countries estimated that oil potential (measured by oil reserves), and oil utilization (measured through oil production), had a negative effect on FDI flows [2]. This was contrary to expectations about positive association between GCC oil resources and FDI flows. The relative degree of oil utilization (measured by oil production relative to oil reserves), had a positive influence on FDI flows. Similar to oil potential and oil utilization, oil prices surfaced with a negative effect. Estimates also exposed that factors like institutional quality, trade openness and infrastructure development, encourage FDI flows, while human capital was seen as significantly discouraging these flows.

The experiences of Egypt, Jordan, and Yemen on the determinants of foreign direct investment are reviewed in the literature [3]. The study concluded that economic factors, political, legislative, and administrative environment were important to influence the process of attracting foreign direct investment in the countries in addition to infrastructure variable.

The determinants of foreign direct investment across MENA region and other developing countries have also been analyzed [4]. By employing a panel data methodology, the study investigated about the determinants of FDI in 36 countries. The findings revealed that the key determinants of FDI inflows in MENA countries were size of the host economy, natural resources, magnitude of the government, along with some of the institutional variables.

The impact of recent global financial crisis and fiscal deficits across FDI on 15 European countries and Indian economy has been well explored [5]. Using a panel regression analysis, the study found fiscal health to be a very significant determinant of FDI inflows vis-à-vis certain other growth and developmental policy indicators, underlining the significance of

trimming government deficits for sustainable FDI. The gravity variables e.g. market size and past FDI inflows were discovered to be the additional key determinants of inward FDI.

## 3. THEORETICAL FRAMEWORK

According to received theory of international business, the flows of FDI depend upon the existence of ownership (O), location (L) and internalization (I) factors. The O-advantages represent firm's ownership of intangible assets, e.g. technology, patents, and skilled management etc. The location advantages stem from factors like abundant natural resources, large market size, cheap factors of production, and friendly business environment etc. The internalization advantages originate from firm's engagement in production abroad through FDI rather than relying on other modes of entry like franchising, licensing or subcontracting since these involve high transaction costs. Since, both ownership and internalization advantages are specific to firms while location factors are specific to host countries. In order to exploit the ownership advantages owned by the firms through internalization, there must be an existence of locational advantages in the host country. From a theoretical perspective, the location effects have been analyzed in eclectic paradigm, the OLI framework [6]. Hence, the theoretical framework for this paper builds on the location advantages of KSA in context of the OLI framework.

## 4. METHODOLOGIES

### 4.1 Data and Model Specification

Taking into account the extant literature on FDI determinants, the economic development process in the Kingdom and theoretical framework on international business, this section is devoted to model specification based on the variables that are professed to be key determinants of resource-seeking FDI. The dependent variable used in the analysis is flows of foreign direct investment (*fdi*) as these can capture net changes in assets or new investment [7]. While the independent variables used in the study are oil reserves (*ores*) fiscal balance (*fb*), and trade openness (*open*). Data for the period of analysis i.e. 1981-2010 was taken from different sources mentioned in Table A at appendix. The data on FDI flows was in millions of US dollars and was deflated by US GDP price deflator[3] for the year 2000. Oil reserves being in nominal values, are expressed in billion of barrels per year while fiscal balance and trade openness are expressed as ratios[4]. For statistical reasons, the variables were converted into natural log form. This also facilitates the results to be interpreted as elasticities. Further details about construction of these variables are provided in section that follows.

#### 4.1.1 Trade openness

Trade openness reflects integration of one country with the rest of the world. Literature reveals that open economies attract more FDI compared to those protected heavily. A liberal trade regime in the host market provides opportunities to trade for multinational firms (MNFs). As mentioned earlier, the FDI in KSA is largely dominated by flows to the hydrocarbon sector; such FDI contains some elements of trade generation. It leads to exports of oil from KSA to the rest of the world and imports from host to the home country of resources that are lacking in the latter. Openness was seen as important determinant for the

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[3] *The data on GDP deflator was obtained from* http://www.oecd.org.
[4] *It is important to mention here that the data provided by SAMA was provisional for the year 2010* [23]*.*

location choices of US multinationals [8] while exports showing a significant negative impact on KSA's FDI [1]. Additionally, a positively significant association between openness and FDI was extracted in various studies [9,10,11]. Trade openness is gauged by the ratio of exports plus imports to GDP while the expected sign is positive. Data on exports, imports and GDP variables was in millions of Saudi Riyals.

### 4.1.2 Fiscal discipline

Fiscal discipline is essentially desirable to attract larger flows of FDI to the host country. Fiscal health of an economy is perceived to be important as it would determine the level of economic risk that might prevail in the country. It might also reflect commitment and credibility of the government policies in the future. Fiscal deficits can lead towards a "*crowding out*" phenomenon through higher costs of borrowing for the foreign firms. There exist studies showing evidence that FDI increases with sound macroeconomic performance as proxied by higher fiscal balance [12]. Likewise, the government size was also found as an important determinant of FDI in the MENA countries [2, 9]. Simultaneously, countries with widening fiscal deficits are exposed to significant diminution of FDI [5]. Hence, it is perceived that an improvement in fiscal balance would decrease the economic risk; leading to higher FDI; while deterioration in it would work the other way around. Fiscal balance is measured as the difference between government income and expenditure as a percent of GDP.

### 4.1.3 Oil reserves

Resource-oriented FDI is beneficial to economies since it contains some elements of trade generation and also leads to vertical specialization between the producers of manufacturing and primary products [13]. In a theoretical context, internalization theory upholds the importance of equity-based control in exploitation of scarce natural resources [14]. Existence of natural resources has emerged as a gravitating force for various multinationals [15,16,17]. Resource-based FDI is intended to acquire resources not available in the home country or acquire at a lower cost than home country. Such a strategy helps MNEs in being more competitive and profitable towards existing and potential markets. Producers of primary and manufactured goods engage in FDI to ensure access to the physical resources like oil, minerals, raw materials, agricultural goods and complements that they are well equipped to produce.

Saudi Arabia has emerged as one of the leading suppliers of oil in the world market. This is evident from its possession of huge oil reserves[5] across the Gulf and also from the facts that the hydro-carbon sector has contributed on average 35% towards the GDP while the share of oil exports remains around 90% over the period of analysis. The existence of larger oil reserves is attractive since the foreign firms are privileged towards faster recovery of development costs. The hydrocarbon sector in the Kingdom has been a major recipient of FDI although recently other sectors have also joined the race. Consequently, given the resource endowments in Saudi Arabia as well as theoretical explanations on resource-seeking FDI [14,9], the existence of greater oil reserves is perceived to be an important determinant for a resource-seeking FDI. A positive relationship is hypothesized between FDI flows and oil reserves in the Kingdom.

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[5] *In 2010, Saudi Arabia's proven recoverable oil reserves were around 265 billion barrels.*

## 4.2 Testing for Co-Integration

Before proceeding to estimation on the determinants of FDI, the data was tested for stationarity. In case the series are non-stationary, (*i.e. their mean, variance and auto-covariance are not independent of time*), the regression analysis can be *spurious* [18]. Thus, to address the potential problems of co-integration, the data is first-differenced (Table 1).

### Table 1. Augmented Dickey-Fuller unit root test results

| Variables | Level | First difference |
|---|---|---|
| *fdi* | -2.44 | -8.22[*] |
| *open* | -2.66 | -4.01[*] |
| *fb* | -3.04 | -6.19[*] |
| *ores* | -1.62 | -5.09[*] |

*Note: 1-* [*] *indicates the level of significance at 1% rejecting the null hypothesis of the presence of unit root.*
*2- The lag lengths are based on Akaike Information Criteria (AIC).*

### Table 2. Tests of co-integration

| Null hypothesis | Trace statistic | 5% Critical value | Max-Eigen statistic | 5% critical value |
|---|---|---|---|---|
| $H_0$: $r = 0$ | 57.572[*] | 47.856 | 38.092[*] | 27.584 |
| $H_0$: $r \leq 1$ | 19.480 | 29.797 | 13.904 | 21.132 |
| $H_0$: $r \leq 2$ | 5.576 | 15.495 | 3.680 | 14.265 |
| $H_0$: $r \leq 3$ | 1.896 | 3.8415 | 1.896 | 3.842 |

*Note: 1-* [*] *indicates the level of significance at 5%. 2- r represents the number of co-integrating equations.*

Results of Johansen co-integration tests [19] reveal that there exists a stable long-term relationship across FDI flows and its perceived determinants (Table 2). Both the Trace and Maximal Eigen value statistics identify the existence of a unique co-integrating trajectory among the four variables as statistics above indicate that there is at least one co-integrating equation at 5% level and reject the *null hypothesis* of no co-integration.

According to the Granger representation theorem, when variables are co-integrated, there must also be an error correction model (*ECM*) that describes the short-run dynamics or adjustments of the co-integrated variables towards their equilibrium values. Our model involves four non-stationary variables; hence, the *ECM* would be a simultaneous equation system of four equations, one for each of the variables describing its short-run adjustment towards the long-run equilibrium. The process of adjustment might take some time, thus each equation in the *ECM* will have lagged variables. A lag of one year is considered as appropriate for each of the variables included in the analyses[6]. Hence, to proceed further, following co-integration equation is estimated:

$$fdi_t = \beta_0 + \beta_1 open_t + \beta_2 fb_t + \beta_3 ores_t + \mu_t$$

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[6] *The lag lengths chosen in the model are based on Schwarz criterion.*

The lower case letters represent natural logarithms of the variables while expected signs are positive.

## 5. RESULTS OF THE CO-INTEGRATING EQUATION

Since the model is estimated in logs, results of the estimated coefficients denote elasticities.

$$fdi = -24.56 + 5.23open + 0.34fb + 0.91\ ores + \mu$$
$$(11.83) \qquad (3.47) \quad (2.17)$$

Adjusted $R^2$ = 0.79; F-statistics = 21.26; Log likelihood = 48.29

Figures in brackets are test-statistics where the level of significance stands at 1% for all of the normalized co-integrating coefficients. An assessment of the tests of significance and the co-integrating equation indicates that results of parameters in the equation are in line with the conventional economic theory and statistically significant. The coefficient of determination ($R^2$), adjusted for the degrees of freedom, designates predictive power of the equation. The magnitude of the adjusted $R^2$ indicates the fact that the equation has performed reasonably well.

**Table 3. Short-run estimates of error correction model**

| Regressor | Co-efficients | t-statistics |
|---|---|---|
| C | -0.08246 | -0.93825 |
| $ECT_{t-1}$ | -1.35025 | -7.26350 |
| D(*fdi*(-1)) | -0.37085 | -2.55163 |
| D(*open*(-1)) | -3.22171 | -2.46720 |
| D(*fb*(-1)) | -0.24638 | -2.20540 |
| D(*ores*(-1)) | 4.678092 | 3.09612 |
| R-squared | 0.83 | |
| Adjusted R-squared | 0.79 | |
| F-statistic | 21.26 | |

The openness coefficient appears as significantly stronger for attracting FDI in the Kingdom. The result is consistent with the notion that FDI often complements trade flows. In case of Saudi Arabia; trade-creation is more likely to take place through oil exports and would also strengthen further via increase in imports required for oil exploration and its refinement. These findings are in line with many of the existing studies [15,8,9,10].

Findings on the fiscal balance as a proxy for economic risk are consistent with the expectations. This reveals the fact that an improvement in fiscal health reduces economic risk for investors and is likely to boost the levels of FDI in the Kingdom. This confirms the findings by the studies mentioned earlier [5,12,9].

Results on the existence of greater oil reserves in the country prove that the Kingdom is attractive for global FDI flows. This dictates that existence of resources like oil reserves is a big plus for attracting FDI to the country. It also affirms the significance of equity-based control in exploitation of scarce natural resources as pronounced by the *internalization theory*. These results are consistent with the existing theoretical strands and studies [14,15,16,17,9].

Short run estimates of the error correction model are presented in Table 3. These estimates of the independent variables are congruent with those of long-run, except for reserves. The estimated ECT coefficient emerges with a negative sign and is statistically significant. This reflects that there exists a cointegrating relationship between FDI and the perceived determinants. The ECT coefficient indicates that movements away from the long-run equilibrium will adjust back towards equilibrium in the next period[7].

## 5.1 Testing for Granger Causality

Since the series are found to be co-integrated, we use *ECM* model by Engle Granger (EG) to test for existence of Granger causality. If two of the series, $Y_1$ and $Y_2$ are both I (1) and co-integrated, then the *ECM* model is represented by the following equations:

$$\Delta Y_{t1} = \delta_0 + \sum_{i=1}^{m} \delta_i \, \Delta Y_{t1-i} + \sum_{i=1}^{m} \gamma_i \, \Delta Y_{t2-i} + \rho EC_{t-i} + \varepsilon_t \qquad -1$$

$$\Delta Y_{t2} = \lambda_0 + \sum_{i=1}^{n} \lambda_i \, \Delta Y_{t2-i} + \sum_{i=1}^{n} \omega_i \, \Delta Y_{t1-i} + \pi EC_{t-i} + \nu_t \qquad -2$$

Where $\varepsilon_t$ and $\nu_t$ are the white noise error terms, $EC_{t-i}$ is the error-correction term (lagged residual) derived from the long-run co-integrating relationship, while *m* and *n* are the optimal lag length orders of the variables which are determined by using the Akaike's criterion. Our null hypotheses take the following form: $Y_2$ will Granger cause $Y_1$ if $\gamma_i \neq 0 \forall_i$ and $\omega_i = 0 \forall_i$. $Y_1$ will Granger cause if $\omega_i \neq 0 \forall_i$ and $\gamma_i = 0 \forall_i$. The bidirectional causality exists if $\omega_i \neq 0 \forall_i$ and $\gamma_i \neq 0 \forall_i$. The causality test results are shown in Table 4 below.

**Table 4. Granger causality tests**

| Dependent variables | Independent variables; (Chi sqstatistics) | | | |
|---|---|---|---|---|
| | $\Delta$ **fdi** | $\Delta$ **open** | $\Delta$ **fb** | $\Delta$ **ores** |
| $\Delta$ fdi | -- | 6.088** | 4.864** | 9.586* |
| $\Delta$ open | 0.0736 | -- | 0.130 | 0.000 |
| $\Delta$ fb | 1.258 | 0.387 | -- | 13.855* |
| $\Delta$ ores | 32.938* | 5.593** | 24.559* | -- |

***Note**: * and **show that the null hypothesis is rejected at 1% and 5% respectively, based on Wald tests*

Results of the test support that there exists a long-run causality from openness (*open*), fiscal balance (*fb*) and oil reserves (*ores*) to *fdi*. Hence, the null hypothesis, that the coefficients of the independent variables (*open, fb and ores*) do not Granger cause *fdi*, is rejected. This implies that these variables significantly affect FDI in the Kingdom. There appears to be a unidirectional causality from *open* to *fdi* and from *fb* to *fdi*. However, there exists a two-way causation across *fdi* and *ores, open* and *ores, fb* and *ores*.

This lead and lag relationship among the variables appears to be acceptable for various reasons. Given the fact that existence of larger oil reserves in KSA attracts FDI, yet an increase in the latter paves the way towards exploration and discovery of further reserves.

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[7] *Since the ECT coefficient is greater than one, the speed of adjustment would be faster.*

Thus, the existence of a two-way relationship is corroborated between *fdi* and *ores*. Likewise, an increase in oil reserves leads to greater trade flows via oil exports. By the same token, an increase in oil exports would result into higher imports as some of the export earnings could be used to finance imports of technology and equipments. The imported technology and equipments can be used to explore further oil reserves in the Kingdom. Hence, the two-way relationship between *open* and *ores* is not surprising. Lastly, an improvement in fiscal area may augment the government spending which might be channeled into discovery of oil reserves, validating the lead and lag relationship between *fb* and *ores* in the Kingdom.

## 6. POLICY IMPLICATIONS AND CONCLUSIONS

The co-integration analysis proved useful in identifying the determinants of resource-seeking FDI in Saudi Arabia. On overall basis, it can be concluded that the resource-seeking FDI in Saudi Arabia is driven by greater trade openness, resilient fiscal performance and the existence of greater oil reserves. It also stems from the analysis that an open economy offers a more attractive environment for FDI through trade-creation effects. By the same token, strong fiscal performance enables host countries to spend more on development projects, insures foreign investors against economic risks and attracts more FDI. Lastly, the existence of large oil reserves in the Kingdom drives opportunities for foreign investors in terms of international trade and profitability thereon.

The paper presents useful policy implications for policy makers in the Kingdom. Results of the study reveal that foreign investors prefer countries that are more open to trade. The economy needs to sustain these inflows through strengthening of local industries and expansion of international trade. However, dependence of the country, mainly on the hydro-carbon sector, leaves it as fragile and exposed to external shocks. The country needs to offer extended opportunities to foreign firms by attracting manufacturing vis-à-vis service sector FDI in addition to the existing resource-seeking one. This is expected to help the economy to sustain and attract larger inflows of FDI from across the globe. Although, there exists an element of market-seeking FDI, yet this would be an area for future research.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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# APPENDIX

**Table A. Data sources for the variables used in the study**

| Variables | Sources |
| --- | --- |
| *fdi* | United Nations, *World Investment Reports*, 2010, 2011. [21,22] |
| *open* | SAMA, Forty *Seventh Annual Report,* 2011. [23] |
| *fb* | SAMA, Forty *Seventh Annual Report,* 2011. [23] |
| *ores* | SAMA, Forty Seventh Annual Report, 2011. [23] |

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