FDI and Economic Growth in Oil Exporting Countries

Mohsen Mehrara
Faculty of Economics, University of Tehran, Tehran, Iran
mmehrara@ut.ac.ir

Maysam Musai
Faculty of Social Sciences, University of Tehran
mousai@ut.ac.ir

Abbas Rezazadeh Karsalari
Department of Management, Islamic Azad University, Tafresh Branch, Tafresh, Iran
Rezazadeh296@yahoo.com

Abstract
This paper investigates the causal relationship between Foreign Direct Investment (FDI) and non-oil GDP in a panel of 11 selected oil exporting countries by using panel unit root tests and panel cointegration analysis for the period 1970-2010. A three-variable model is formulated with oil exports as the third variable. The results show a strong causality from oil revenues and economic growth to FDI in the oil exporting countries. Yet, FDI does not have any significant effects on non-oil GDP in short- and long-run. It means that it is the oil and non-oil GDP that drives FDI in mentioned countries, not vice versa. However, in these countries the bulk of FDI is focused on and targeted largely at extractive industries, particularly the oil sector. According to the results, decision makings should be employed to exploit FDI more efficiently toward higher productivity and economic base diversification in the future

Keywords: Panel Unit Root, Panel Cointegration, Granger Causality, Foreign Direct Investment (FDI), Oil Exporting Countries

JEL classifications: F39, O40

1. Introduction
Although economic theory points to a positive effect of foreign direct investment on economic growth, the direction of causality between the variables has continued to generate controversy among researchers and economists alike. Accepting the causal relationship between economic variables is important because it provides useful information on the variables government and its agencies need to control in order to realize desired levels of targeted variables (Sajid and Sarfraz, 2008). For example, if empirical analysis shows that causality runs from foreign direct investment to economic growth, then government and policy makers would employ strategies to attract foreign investment so as to promote economic growth. On the other hand, if causality is found to run from economic growth to foreign direct investment, government would employ policies that accelerate economic growth in order to encourage foreign investment inflows. FDI is usually considered to be an instrument of cash and non-cash inflow into the host countries from
overseas. It plays an important role to make substantial contribution in the economic growth of the developing countries. The Vital role of FDI in the economic growth is that it creates more benefits for the host countries rather than just fill ing the short-term capital deficiency problem, (Borensztein et al. 1998). It is not only about investment, but also about transfer of technology, training, skills and other relevant materials. According to UNCTAD (2008), foreign direct investment has potentially involved to make employment, raise productivity, transfer technology and skills, enhance export and improve the economic conditions of developing countries. Moreover, the spillover effect of multinational companies (MNEs) provides high training and labour management that leads to economic benefits for recipient countries (Borensztein et al. 1998).

The focus of the paper is, therefore, to examine the relationship between FDI and economic growth in petroleum exporting countries for the period 1970-2010. The direction of causality between these two variables is examined by utilizing a cointegration and error correction modeling framework. The paper is organized in four sections. Section 2 reviews the relevant literature. Section 3 discusses the methodology, data and empirical results of the study. Section 4 concludes.

2. Literature Review

Foreign direct investment is one of the most important policies for the promotion of economic growth and development in poor developing countries. FDI can serve as a machine of growth and development for developing countries by increasing the chance for their integration into global financial and capital flows, expand employment and exports base, generate technological capability-building and efficiency spillovers to local firms, as well as establish investment arrangements that increase the potential of host countries for economic growth. FDI, in several particular prevailing beliefs, is considered more important than domestic investment and other capital flows for growth. FDI is defined as a whole package of resources such as physical capital, modern technology and production techniques, managerial and market knowledge. These utilities tend to spillover to domestic enterprises in the host country. Therefore, FDI would contribute directly and more strongly than domestic investment in accelerating the level of growth in the host economy. This is because FDI has a more advanced level of technology, managerial capacity and know-how that result in higher levels of efficiency and productivity (Colen et al. 2008).

FDI plays a vital role in promoting export and economic growth of an economy. It is argued that FDI promotes exports of the host countries by increasing the productivity and productive capacity of the host country by increasing capital stock, transfer of technology, managerial skills and upgrading the skills of the local workforce through training. Further, FDI also increases the opportunity for the host countries to export by facilitating access to the new and large foreign markets. However, the role of FDI in promoting export is a controversial topic and basically depends upon the motive for such investment. If the motive for FDI is to bypass the trade barriers of the host countries, to gain access to large foreign market and to reap the benefits of economies of scale, this may not promote export.

FDI plays an important role in promoting exports of host countries. It promotes exports by facilitating the host countries access to customers in global, regional and home-country markets. In addition, host countries sometimes also get benefits of lobbying activities of the MNCs in their home countries for favorable treatment of exports from their affiliates. Exports are a main determinant of overall economic growth. The theoretical rationale for this hypothesis hinges on a number of arguments which include the following: first, that the export sector may generate positive externalities on non-export sectors through more efficient management styles and improved production techniques (Feder, 1983). Second, export expansion will increase productivity by offering potential for scale economies (Helpman and Krugman, 1985; Krugman 1997). Third, exports are likely to alleviate foreign exchange constraints and can thereby provide greater access to international markets (Esfahani, 1991).

Liu et al (2002) examined the causal relationship between inward FDI, trade and economic growth in China using quarterly data at aggregate level for the period 1981 to 1997 and found two-way causal relationship between inward FDI and exports. Metwally (2004) examined the relationship between FDI, exports and economic growth in three countries, viz., Egypt, Jordan and Oman, during the period from 1981 to 2000 by using a simultaneous equation model. The result suggests that the export of goods and services is strongly influenced by the inward FDI in these three countries (Vernon, 1966) presented that the switch from importing to exporting (as the production of maturing and standardized goods is located in Host countries) increases Host’s economic
growth. While Aharoni’s Behavioural Theory (Aharoni, 1966) focused mainly on the determinant side of FDI, FDI (in particular in less developed countries) was also found to increase economic growth. FDI could help to recognise and promote opportunities, providing the Host country with capital, know-how and management. Kindleberger (1969) looked at the effects of FDI by contrasting public opinion and prejudices about MNEs and FDI with “true” effects, arguing that most fears were unjustified and exaggerated. FDI generally had positive effects on economic growth through new technology, which were often large enough to make leaders in developing countries become anxious to attract FDI and to provide investment incentives to influence MNEs’ investment decisions. Falki (2009) investigated impact of FDI on economic growth in Pakistan, for the period 1980-2006. The relationship between FDI and economic growth is analyzed by using the production function based on the endogenous growth theory; other variables that affect economic growth such as trade, domestic capital and, labour is also used. The results of the study show a negative and statistically insignificant relation between the GDP and FDI Inflows in Pakistan.

3. Data and empirical results
We apply a three variable model to examine the causal relationship between foreign direct investment (FDI) and non-oil GDP with oil revenues included in model as conditioning variable along with these two variables. Data used in the analysis are annual time series during the period 1970-2010 on (logarithm of) real FDI and real non-oil GDP (GDP) and real oil revenues (OIL) in constant 2005 prices for the 11 oil exporting countries. The data were obtained from World Development Indicators (WDI) 2010, published by the World Bank, UNCTAD (2010) and OPEC Bulletins. The choice of the starting period was constrained by the availability of data.
To test the nature of association between the variables while avoiding any spurious correlation, the empirical investigation in this paper follows the three steps: We begin by testing for non-stationarity in the three variables of FDI, GDP and OIL. Prompted by the existence of unit roots in the time series, we test for long run cointegrating relation between three variables at the second step of estimation using the panel cointegration technique developed by Pedroni (1995, 1999). Granted the long run relationship, we explore the causal link between the variables by testing for granger causality at the final step.

3.1. Panel Unit Roots Results
The panel data technique referred above has appealed to the researchers because of its weak restrictions. It captures country specific effects and allows for heterogeneity in the direction and magnitude of the parameters across the panel. In addition, it provides a great degree of flexibility in model selection. Following the methodology used in earlier works in the literature we test for trend stationarity the three variables of FDI, GDP and OIL. With a null of non-stationary, the test is a residual based test that explores the performance of four different statistics. Together, these four statistics reflect a combination of the tests used by Levin-Lin (1993) and Im, Pesaran and Shin (1997). While the first two statistics are non-parametric rho-statistics, the last two are parametric ADF t-statistics. Sets of these four statistics have been reported in Table 1.
The first three rows report the panel unit root statistics for FDI, GDP and OIL at the levels. As we can see in the table, we cannot reject the unit-root hypothesis when the variables are taken in levels and thus any causal inferences from the three series in levels are invalid. The last three rows report the panel unit root statistics for first differences of FDI, GDP and OIL. The large negative values for the statistics indicate rejection of the null of non-stationary at 1% level for all variables. It may, therefore be concluded that the three variables of FDI, GDP and OIL are unit root variables of order one, or, I (1) for short.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI</td>
<td>0.26</td>
<td>-0.39</td>
<td>-0.74</td>
<td>-1.10</td>
</tr>
<tr>
<td>GDP</td>
<td>-1.03</td>
<td>-1.16</td>
<td>-1.22</td>
<td>-0.82</td>
</tr>
<tr>
<td>OIL</td>
<td>-0.76</td>
<td>-1.84</td>
<td>-0.27</td>
<td>-0.22</td>
</tr>
<tr>
<td>ΔFDI</td>
<td>-10.31***</td>
<td>-7.89***</td>
<td>-6.91***</td>
<td>-12.81***</td>
</tr>
<tr>
<td>ΔGDP</td>
<td>-11.24***</td>
<td>-6.63***</td>
<td>-8.11***</td>
<td>-18.62***</td>
</tr>
<tr>
<td>ΔOIL</td>
<td>-6.57***</td>
<td>-9.28***</td>
<td>-11.39***</td>
<td>-18.43***</td>
</tr>
</tbody>
</table>

***significant at 1%
3.2. Panel Cointegration Results

At the second step of our estimation, we look for a long run relationship among FDI, GDP and OIL using the panel cointegration technique developed by Pedroni (1995, 1999). This technique is a significant improvement over conventional cointegration tests applied on a single country series. While pooling data to determine the common long run relationship, it allows the cointegrating vectors to vary across the members of the panel. After including real OIL as an additional variable, the cointegration relationship we estimate is specified as follows:

\[ FDI_t = \alpha_i + \delta_t + \beta_t \cdot GDP_t + \gamma_t \cdot OIL_t + \varepsilon_t \]  

(1)

Where \( \alpha_i \) refers to country effects and \( \delta_t \) refers to trend effects. \( \varepsilon_t \) is the estimated residual indicating deviations from the long run relationship? With a null of no cointegration, the panel cointegration test is essentially a test of unit roots in the estimated residuals of the panel. Pedroni (1999) refers to seven different statistics for this test. Of these seven statistics, the first four are known as panel cointegration statistics; the last three are group mean panel cointegration statistics. In the presence of a cointegrating relation, the residuals are expected to be stationary. These tests reject the null of no cointegration when they have large negative values except for the panel-\( v \)-test which reject the null of cointegration when it has a large positive value. All of these seven statistics under different model specifications are reported in Table 2. The statistics for all different model specifications suggest rejection of the null of no cointegration for all tests except the panel and group \( \rho \)-tests. However, according to Perdroni (2004), \( \rho \) and PP tests tend to under-reject the null in the case of small samples. We, therefore, conclude that the three unit root variables FDI, GDP and OIL are cointegrated in the long run.

<table>
<thead>
<tr>
<th>Table 2: Results of Panel Cointegration test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistics</td>
</tr>
<tr>
<td>Panel v-stat</td>
</tr>
<tr>
<td>Panel Rho-stat</td>
</tr>
<tr>
<td>Panel PP-stat</td>
</tr>
<tr>
<td>Panel ADF-stat</td>
</tr>
<tr>
<td>Group Rho-stat</td>
</tr>
<tr>
<td>Group PP-stat</td>
</tr>
<tr>
<td>Group ADF-stat</td>
</tr>
</tbody>
</table>

*** Significant at 1%
** Significant at 5%

3.3. Panel Causality Results

Cointegration implies that causality exists between the series but it does not indicate the direction of the causal relationship. With an affirmation of a long run relationship among FDI, GDP and OIL, we test for Granger causality in the long run relationship at the third and final step of estimation. Granger causality itself is a two-step procedure. The first step relates to the estimation of the residual from the long run relationship. Incorporating the residual as a right hand side variable, the short run error correction model is estimated at the second step. Defining the error term from equation (1) to be \( ECT_{it} \), the dynamic error correction model of our interest by focusing on FDI and GDP is specified as follows:

\[ \Delta GDP_t = \alpha_i \cdot ECT_{it-1} + \gamma_{1it} \cdot \Delta FDI_{it-1} + \gamma_{2it} \cdot \Delta FDI_{it-2} + \delta \cdot \Delta GDP_{it-1} + \delta \cdot \Delta GDP_{it-2} + \lambda_t \cdot \Delta OIL_{it-1} + \lambda_t \cdot \Delta OIL_{it-2} + \varepsilon_{it} \]  

(2)

\[ \Delta FDI_t = \alpha_i \cdot ECT_{it-1} + \gamma_{1it} \cdot \Delta FDI_{it-1} + \gamma_{2it} \cdot \Delta FDI_{it-2} + \delta \cdot \Delta GDP_{it-1} + \delta \cdot \Delta GDP_{it-2} + \lambda_t \cdot \Delta OIL_{it-1} + \lambda_t \cdot \Delta OIL_{it-2} + \varepsilon_{it} \]  

(3)
Where $\Delta$ is a difference operator; ECT is the lagged error-correction term derived from the long-run cointegrating relationship; the $\beta_y$ and $\beta_h$ are adjustment coefficients and the $\epsilon_{yt}$ and $\epsilon_{ht}$ are disturbance terms assumed to be uncorrelated with mean zero.

Sources of causation can be identified by testing for significance of the coefficients on the lagged variables in Eqs (2) and (3). First, by testing $H_0: \gamma_{yi} = \gamma_{y2i} = 0$ for all $i$ in Eq. (2) or $H_0: \delta_{hi} = \delta_{h2i} = 0$ for all $i$ in Eq. (3), we evaluate Granger weak causality. Masih and Masih (1996) and Asafu-Adjaye (2000) interpreted the weak Granger causality as ‘short run’ causality in the sense that the dependent variable responds only to short-term shocks to the stochastic environment.

Another possible source of causation is the ECT in Eqs. (2) and (3). In other words, through the ECT, an error correction model offers an alternative test of causality (or weak exogeneity of the dependent variable). The coefficients on the ECTs represent how fast deviations from the long run equilibrium are eliminated following changes in each variable. If, for example, $\beta_y$ is zero, then GDP does not respond to a deviation from the long run equilibrium in the previous period. Indeed $\beta_y = 0$ or $\beta_h = 0$ for all $i$ is equivalent to both the Granger non-causality in the long run and the weak exogeneity (Hatanaka, 1996).

It is also desirable to check whether the two sources of causation are jointly significant, in order to test Granger causality. This can be done by testing the joint hypotheses $H_0: \beta_y = 0$ and $\gamma_{yi} = \gamma_{y2i} = 0$ for all $i$ in Eq. (2) or $H_0: \beta_h = 0$ and $\delta_{hi} = \delta_{h2i} = 0$ for all $i$ in Eq. (3). This is referred to as a strong Granger causality test. The joint test indicates which variable(s) bear the burden of short run adjustment to re-establish long run equilibrium, following a shock to the system (Asafu-Adjaye, 2000).

The results of the F test for both long run and short run causality are reported in Table 3. As is apparent from the Table, the coefficients of the ECT, GDP and OIL are significant in the FDI equation which indicates that long-run and short-run causality run from GDP and OIL to FDI. So, GDP and OIL are strongly Granger-causes FDI. OIL does Granger cause GDP at short as well as long-run. Weak exogeneity of OIL indicate that this variable does not adjust towards long-run equilibrium.

Moreover, the interaction terms in the FDI equation are significant at 1% level. These results imply that, there is Granger causality running from GDP and Oil to FDI in the long-run and short run, while FDI have a neutral effect on non-oil GDP in both the short- and long-run. In other words, OIL is strongly exogenous and whenever a shock occurs in the system, FDI and non-oil GDP would make short-run adjustments to restore long-run equilibrium.

**Table 3: Result of Panel Causality Tests**

<table>
<thead>
<tr>
<th>Source of causation (independent variable)</th>
<th>Dependent Variable</th>
<th>Short-run</th>
<th>Long-run</th>
<th>Joint (short-run/long-run)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ΔGDP</td>
<td>ΔFDI</td>
<td>ΔOIL</td>
<td>ECT(-1)</td>
</tr>
<tr>
<td>ΔGDP</td>
<td>-</td>
<td>F=0.39</td>
<td>F=7.02 ***</td>
<td>F=3.40</td>
</tr>
<tr>
<td>ΔFDI</td>
<td>F=4.60 ***</td>
<td>-</td>
<td>F=4.89 ***</td>
<td>F=6.72 ***</td>
</tr>
</tbody>
</table>

*** Significant at 1%  
** Significant at 5%

**4. Conclusion**

The objective of this study is to examine Granger causality between FDI and income for oil-exporting developing countries over the period 1970-2010. Oil exports are also included in the model along with these two variables. The panel integration and cointegration techniques are employed to investigate the relationship between the three variables: FDI, non-oil GDP, and oil exports. The empirical results indicate that we cannot find enough evidence against the null hypothesis of unit root. However, for the first difference of the variables, we rejected the null
hypothesis of unit root. It means that the variables are I(1). The results show that there is a long-run relationship between FDI and GDP. Utilizing Granger Causality within the framework of a panel cointegration model, the results suggest that there is strong causality running from GDP and oil revenue to FDI with no feedback effects from FDI to non-oil GDP for oil exporting countries. Moreover, FDI does not have significant effects on GDP even in short-run. It means that it is the oil and GDP that drives the FDI in mentioned countries, not vice versa. So the findings of this paper support the point of view that it is higher economic growth that leads to higher FDI. According to the results, it seems that oil revenues have mostly contributed to FDI and economic growth during the sample period. These results suggest that FDI and human capital have not been served to the process of non-oil capital formation and technological diffusion in these countries.

Acknowledgements
The authors would like to acknowledge the financial support of university of Tehran for this research under the grant number 4401012/1/21.

References


