The Causality Relationship between FDI and Economic Growth in MENA Region

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Abstract  
This paper investigates the causal relationship between Foreign Direct Investment (FDI) and GDP for Middle East and North Africa (MENA) region countries by using panel unit root tests and panel cointegration analysis for the period 1970-2010. The results show a strong causality from economic growth to FDI in these countries. Yet, FDI does not have any significant effects on GDP in short- and long-run with no growth benefit for the recipient country. It means that it is the GDP that drives FDI in mentioned countries, not vice versa. According to the results, decision makings should be employed to exploit FDI more efficiently and achieve a higher growth rate through improving financial systems, financial market regulations, infrastructures, skills, macroeconomic stability and sound institutions.

Keywords: Panel Unit Root, Panel Cointegration, Granger Causality, Foreign Direct Investment (FDI), MENA region countries

JEL classifications: F39, O40

1. Introduction

FDI is generally accepted as a machine for country’s economic growth. The importance of FDI is, in fact, much higher in the developing countries. This is because of their inability to generate internal savings in reply to their investment needs. It is much true that FDI is one of the most effective methods by which developing economies are integrated with rest of the world, as it provides not only capital but also knowledge and management know-how necessary for restructuring the firms in the host countries (Pradhan, 2006; Borensztein et al., 1998; Chao and Yu, 1994; Grossman and Helpman, 1991; Barro and Sala-I-Martin, 1995). The growth model is related to characteristics of countries such as economic base, population growth, unemployment rate, and investment in physical and human capital, flow of foreign investment, inflation, industrial growth, and development of financial institutions. Recent literature includes military expenditures, foreign aid in the context of developing countries (Benoit, 1973, 1978; Ball, 1983; Joerding, 1986; Chowdhury, 1991; Looney, 1991; Madden and Haslehurst, 1995). Information and communication knowledge (ICT) is essential to growth, essential to develop a country’s productive capacity in all parts of the economy, and links a country with the global economy and ensures competitiveness. It is seminal to invention,
innovation, and wealth creation. ICT contributes to poverty reduction by increasing productivity
and providing new opportunities, offers opportunities for global integration while retaining the
identity of traditional societies, enhance the effectiveness, efficiency and transparency of the
public sector.

The new growth theory in 1980s endogenous technological progress and FDI has been considered
to have permanent growth effect in the host country. Hence, the flow of FDI is expected to
increase the growth rate of the economy. The New Theory of Economic Growth showed that FDI
may affect not only the level of output per capita but also its rate of growth. This literature has
developed various influences that explain why FDI may potentially enhance the growth rate of per
capita income in the host country, the identified channels to boost economic growth include
increased capital accumulation in the recipient economy, improved efficiency of locally owned
host country firms via contract and demonstration effects, and their exposure to fierce competition,
technological change, and human capital augmentation and increased exports. However, the extent
to which FDI contributes to growth depends on the economic and social condition or in short, the
quality of environment of the recipient country (Buckley, et al. 2002).

The focus of the paper is, therefore, to examine the relationship between FDI and economic
growth in Middle East and North Africa (MENA) region 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

Export expansion leads to increase of productivity in economies with larger scales. Endogenous
growth theory shows that the impact of export growth on economic growth is significant, and
export may increase long-run growth by innovation growth in research and development. But the
question is that whether it is only export which has impact on economic growth or other variables
such as foreign investment can also be effective on FDI. Trade freedom not only can be the cause
of trade expansion, but also can enhance foreign investment in a given country. When the level of
export reaches the considered threshold in a given country, export leads to FDI in the target
market. This transformation aims at utilizing some special privileges of the host country such as
its natural resources or is an effort to give a better response to the market’s needs. In this case, FDI
means expansion of export markets (Purvis, 1972). There are number of ways through which Trade
flows and FDI can be related. Goldberg and Klein, (1998) showed that FDI may encourage export
promotion, import substitution, or greater trade in intermediate inputs which often exist between
parent and affiliate producers. The orientation of most investments by multinational firms is
towards exports and this may most likely serve as a catalyst for the integration of the FDI host
economy to a global production network in sectors in which it may formerly have had no
industrial experience (OECD, 1998).

FDI helps in improving productivity of labour force by providing training to the local workforce
and upgrading technical and managerial skills. These activities benefit the country’s exports
through improvement in productivity of the labor force. This is especially true for export-oriented
investments in progressive technological capabilities. FDI has both direct and indirect impact on
host country’s exports. The direct effects refer to exports by foreign affiliates themselves. The
indirect effect includes spillover effect of MNCs on local firms’ export activities (UNCTAD,
2002).

Soto (2000) studied the growth impact of various categories of private capital flows, showing that
FDI significantly increased per capita income growth in the Host country after a one-year lag. A
10% rise in the FDI/GNP ratio increased the long-run steady-state income level by 3% and the
short-term per capita income by 1%. Zhang (2001), who explored the causal pattern between FDI
and economic growth, found that the extent to which FDI was growth-enhancing was conditional
on country-specific characteristics, including the trade regime. Although there were cross-country
variations, FDI generally promoted economic growth when countries adopted liberalized trade
regimes, improved education, encouraged export-oriented FDI and maintained macroeconomic
stability. In his research, FDI boosted economic growth in Hong Kong, Indonesia, Singapore,
Taiwan and Mexico. Balasubramanayam et al. (1996) found that growth-enhancing effects of FDI
were stronger in countries with an export-promoting trade policy than in those with an import-
substituting trade policy. Shan (2002) used a VAR approach to analyze the interrelationships
between Chinese quarterly FDI flows and other economic variables. He showed that a two-way-causality between FDI and output growth existed, though the effect of FDI on output growth was weaker than that of output growth on FDI. Output growth was also more sensitive to shocks in its own past values and to energy consumption than to shocks in FDI. Muhammad (2012) studied is to the long run relationship among Foreign Direct Investment, Trade and Economic growth for Pakistan over the period of 1965 to 2005. The results show that there are two long run relationships exist between GDP, Imports and Exports and FDI. First long run relationship shows that both imports and exports affect GDP but FDI has insignificant effect on GDP. In second long run relationship shows that both imports and exports affect FDI but GDP is not significantly affecting FDI. It means that FDI and GDP have no effect on the each other in long run.

3. Data and empirical results

We apply a two variable model to examine the causal relationship between FDI and GDP. Data used in the analysis are annual time series during the period 1970-2010 on (logarithm of) real foreign direct investment (FDI) and real GDP (GDP) in constant 2005 prices in local currency units for Middle East and North Africa (MENA) region countries. The MENA countries covered in this study are Egypt, Iran, Jordan, Saudi Arabia, Morocco, Tunisia, Turkey and Yemen. The data were obtained from World Development Indicators (WDI) 2010, published by the World Bank and UNCTAD (2010). 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 variables of FDI and GDP. Prompted by the existence of unit roots in the time series, we test for long run cointegrating relation between 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 of the variables of FDI and GDP. 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 and GDP 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 series in levels are invalid. The last rows report the panel unit root statistics for first differences of FDI and GDP. 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 variables of FDI and GDP are unit root variables of order one, or, I (1) for short.

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<tbody>
<tr>
<td>FDI</td>
<td>0.45</td>
<td>-0.34</td>
<td>-0.71</td>
<td>-1.66</td>
</tr>
<tr>
<td>GDP</td>
<td>-1.12</td>
<td>-1.18</td>
<td>-1.25</td>
<td>-0.54</td>
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<tr>
<td>ΔFDI</td>
<td>-11.43 ***</td>
<td>-8.77 ***</td>
<td>-7.02 ***</td>
<td>-16.19 ***</td>
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<tr>
<td>ΔGDP</td>
<td>-11.67 ***</td>
<td>-7.84 ***</td>
<td>-9.83 ***</td>
<td>-18.52 ***</td>
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</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 and GDP 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. The cointegration relationship we estimate is specified as follows:

\[ FDI_t = \alpha_i + \delta_t + \beta GDP_t + \varepsilon_t \]  

(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 variables FDI and GDP are cointegrated in the long run.

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<tbody>
<tr>
<td></td>
<td>8.24***</td>
<td>-1.23</td>
<td>-6.21***</td>
<td>-1.98**</td>
<td>-1.12</td>
<td>-8.43***</td>
<td>-6.98***</td>
</tr>
<tr>
<td>**Significant at 1%</td>
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<tr>
<td>**Significant at 5%</td>
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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 and GDP, 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 \( ECT_t \), the dynamic error correction model of our interest is specified as follows:

\[ \Delta GDP_t = \alpha + \beta ECT_{r-1} + \gamma \Delta FDI_{r-1} + \gamma \Delta FDI_{r-1} + \delta \Delta GDP_{r-1} + \delta \Delta GDP_{r-1} + \varepsilon_t \]  

(2)

\[ \Delta FDI_t = \alpha + \beta ECT_{r-1} + \gamma \Delta FDI_{r-1} + \gamma \Delta FDI_{r-1} + \delta \Delta GDP_{r-1} + \delta \Delta GDP_{r-1} + \varepsilon_t \]  

(3)
Where $\Delta$ is a difference operator; ECT is the lagged error-correction term derived from the long-run cointegrating relationship; the $\beta^y_i$ and $\beta^h_i$ are adjustment coefficients and the $e^y_{sit}$ and $e^h_{sit}$ 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 $H_0: \gamma^y_{iyi} = \gamma^y_{iyi} = 0$ for all i in Eq. (2) or $H_0: \delta^h_{hil} = \delta^h_{hil} = 0$ 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, $\beta^y_i$ is zero, then GDP does not respond to a deviation from the long run equilibrium in the previous period. Indeed $\beta^y_i = 0$ or $\beta^h_i = 0$ 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 $H_0: \beta^y_i = 0$ and $\gamma^y_{iyi} = \gamma^y_{iyi} = 0$ for all i in Eq. (2) or $H_0: \beta^h_i = 0$ and $\delta^h_{hil} = \delta^h_{hil} = 0$ 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 and GDP are significant in the FDI equation which indicates that long-run and short-run causality run from GDP to FDI. So, GDP is strongly Granger-causes FDI. Weak exogeneity of GDP 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 to FDI in the long-run and short-run, while FDI have a neutral effect on GDP in both the short- and long-run. In other words, GDP is strongly exogenous and whenever a shock occurs in the system, FDI 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>( \Delta GDP )</td>
<td>( \Delta FDI )</td>
<td>ECT(-1)</td>
<td>( \Delta GDP, ECT(-1) )</td>
</tr>
<tr>
<td>( \Delta GDP )</td>
<td>-</td>
<td>F=0.3**</td>
<td>F=0.51</td>
<td>-</td>
</tr>
<tr>
<td>( \Delta FDI )</td>
<td>F=6.32**</td>
<td>-</td>
<td>F=7.52*</td>
<td>F=7.89**</td>
</tr>
</tbody>
</table>

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

### 4. Conclusion

The objective of this study is to examine Granger causality between Foreign Direct Investment (FDI) and income for MENA region countries over the period 1970-2010. The panel integration and cointegration techniques are employed to investigate the relationship between the variables: FDI and GDP. 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 to FDI with no feedback effects from FDI to GDP MENA region countries. It means that it is the 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, policymakers should take a way to exploit FDI more efficiently through improving investment climate, political stability and trade reforms.

References


