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## Economic Growth and Foreign Direct Investment Inflows: The Case of Qatar

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### Abstract

Recently, Qatar, a well-known oil production country, has been convinced as a successful case in attracting foreign direct investment (FDI) as a smaller economy. This paper aims to investigate how FDI inflows affect Qatar's business cycles. Time-series data was selected from 1990 to 2010 as available. The VAR Impulse Responses and the Granger Causality test were mainly employed by using EViews. The derived result shows that the FDI inflows and the economic growth in Qatar interact with each other in a relatively long term.

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### 1. Introduction

Under globalization, the relationship between foreign direct investment (FDI) inflows and economic growth has been extensively investigated in academic field. In the theoretical side, FDI is widely believed to be most crucial to economic growth enhancement (Hansen & Rand, 2006) as it brings capital, technology and know-how into the host country. FDI is supposed to increase the existing stock of knowledge by transferring knowledge (Karimi, et al. 2009) into the host countries through labour training, transfer of skills, and transfer of new managerial and organizational practice. FDI could promote the utilization of more advanced technologies in local firms through capital accumulation in the host economies (Barba and Venables, 2004). Moreover, FDI is thought to open up export markets (Ghironi and Melitz, 2004) and to promote domestic investments through the technological spillovers (Claudia and Lipponer, 2005) and the induced productivity increase.

In the empirical research, these relationships have been explored from four major directions such as the determinants of growth, the determinants of FDI, the role of multinational firms in host countries and the direction

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of causality between the two variables (Karimi et al., 2009). However, consensus has hardly been reached as to whether and how FDI inflows can promote economic growth in the host country. The reasons behind can be explained (Reyadh & Khalifa, 2009) by a number of issues that are related to the investigation process, including sample selection (e.g. developed versus less developed countries), the choice of the time period, the estimation methodology (i.e. time series versus cross-section), the choice of the estimation techniques (e.g. OLS, Granger Causality, Cointegration, Error correction models).

Given the complex of relationships between FDI and economic growth across countries, this paper mainly aims to test the pure bi-direction of causality between FDI inflows and economic growth in the case of Qatar. In recent years, Qatar has been seen a sizeable increase in foreign direct investment inflows, primarily in the sectors of enhanced oil recovery and production, and in the development of the gas industry. From 2003 to 2006, net FDI inflows almost tripled from US\$ 0.64 billion to US\$ 1.69 billion. The used annual data set covers from 1990 to 2010. In the following, a testable hypothesis based on literature review was formulated from visual investigation of the pictorial relationship between GDP and FDI inflows; then, empirical analysis was carried out to prove it with result discussions provided accordingly and conclusions drawn upon.

## 2. Literature Review

Theoretically, the neoclassical models of growth and the endogenous growth models, although from different perspectives (Karimi et al., 2009), provide the basis for most of the empirical work on the FDI-growth relationship. Solow-type standard neoclassical growth models suggest that FDI increases the capital stock and thus the growth of the host economy by financing capital formation (Brems and Hans, 1970). Admittedly, with diminishing returns to capital in neoclassical growth models, the impact of FDI on growth is identical to that of domestic investment and FDI has only a "short-run" growth effect as countries move towards a new steady state. However, in endogenous growth models, FDI is generally assumed to be more productive than the domestic investment, since FDI encourages the incorporation of new technologies in the production function of the host economy (Borensztein et al., 1998). In this view, FDI-related technological spill-over offsets the effects of diminishing returns to capital and keeps the economy on a long-term growth path. Moreover, endogenous growth models imply that FDI can promote long-run growth by augmenting the existing stock of knowledge in the host economy through labour training and skill acquisition (Hanson and Slaughter, 2003), as well as through the introduction of alternative management practices and organizational arrangements (De Mello and Jr Luiz, 1999). Thus, through capital accumulation and knowledge spillover (Niles, 2003), FDI plays an important role in host country's economic growth.

Thus, from a theoretical perspective, it is reasonable to assume that FDI inflows and the host country's economic growth are positively related. Moreover, empirical researches by using specific country data demonstrate more supportive evidences. Asheghian (2004) and Salehizadeh (2005) asserted the existence of a positive and significant relationship between FDI and the economic growth in the United States. According to Kornecki & Raghavan (2008), the Central and Eastern Europe (CEE) countries acknowledge FDI as an essential tool in the development and modernization of their economies. A number of studies find that FDI inflows have a strong and positive effect on economic growth in China (Tian et al., 2004). Fang & Liu (2007), Sharahili & Liu (2008) and Manal & Liu (2011) have, after empirically analysing Business Cycles and FDI through evidence from Chinese and Malaysia panel data, proved the bi-directional causality and long-run relationships between inward FDI and economic growth. Then how about Qatar? Shotar M Manhal (2005) supported that, the causal direction in Qatar runs from GDP to FDI which implies that economic growth is a prerequisite to attract FDI, during the period of 1980-2002. This paper resets the sample period from 1990-2010 and re-investigates the three types of causal relationship: i) there is a two-way causal link between FDI and economic growth or possibly no causality at all; ii) the growth of the host country attracts FDI inward, that is, growth-driven FDI; and iii) the FDI improves the growth rate of the host country, that is, FDI-led growth.

### 3. Hypothesis

Since related literature in Qatar case is limited, the research hypothesis in this study is going to be derived from the real economic data. Figure 1 a) shows the evolutions of the absolute values of FDI inflows and real GDP of Qatar during the last two decades. According to it, it is hardly to see any clear similar moving trend between the two. Over this period, Qatar had a consistent record of economic growth in GDP. However, its FDI experienced big ups and downs, especially in the last decade, mainly due to the turmoil of the international oil market and Qatar's openness is primarily in the sectors of enhanced oil recovery and production.

Investigating the relative values, i.e. the growth rate of inward FDI and GDP of Qatar within the same period, that the two curves moved at some similar pace. For example, during 1994-1998, both reached peak. The period between 1999 and 2008 convinced a relatively stable movement in both growth rate curves. Then from 2009 onward, both curves declined sharply. Thus, after the visual investigation from the absolute, especially the relative values, it could roughly hypothesize that Qatar's inward FDI and economic growth are significantly related in a long term. But how the interactions happen requires the following deeper inspection.

### 4. Methodology and Data

In this section, Granger Causality test and VAR Impulse Responses are deployed as methodology tools under this research. Briefly, the Granger causality test is a statistical hypothesis test to determine whether one time series is useful in forecasting another. Let X and Y be stationary time series. The null hypothesis is that X does not Granger-cause Y. If the time series X is said to Granger-cause Y, it shall be shown, usually through a series of t-tests and F-tests on lagged values of X (and with lagged values of Y also included), that those X values provide statistically significant information about future values of Y.

Mathematically, to test the null hypothesis, firstly proper lagged values of Y are included in a univariate autoregression of Y as:

$$Y_t = a_0 + a_1 Y_{t-1} + a_2 Y_{t-2} + \dots + a_m Y_{t-m} + Residual_t \dots \dots \dots (1)$$

Here  $Y_{t-j}$  is retained in the regression if and only if it has a significant t-statistic; m is the greatest lag length for which the lagged dependent variable is significant.

Next, the autoregression is augmented by including lagged values of X as:

$$Y_t = a_0 + a_1 Y_{t-1} + a_2 Y_{t-2} + \dots + a_m Y_{t-m} + b_p X_{t-p} + \dots + b_q X_{t-q} + Residual_t \dots \dots \dots (2)$$

One retains in this regression all lagged values of X that are individually significant according to their t-statistics, provided that collectively they add explanatory power to the regression according to an F-test (whose null hypothesis is no explanatory power jointly added by the x's). In the notation of the above augmented regression, p is the shortest, and q is the longest, lag length for which the lagged value of X is significant. The null hypothesis that X does not Granger-cause Y is accepted if and only if no lagged values of x are retained in the regression.

Next, Impulse response analysis is used widely in the empirical literature to uncover the dynamic relationship between macroeconomic variables within vector-autoregressive (VAR) models. It measures the time profile of the effect of a shock, or impulse, on the (expected) future values of a variable. By imposing specific restrictions on the parameters of the VAR model the shocks can be attributed an economic meaning (Watson, 1994).

The standard approach to identifying impulse responses imposes restrictions on a VAR model estimated in the (log) levels of the variables. It is known that if a nonstationary VAR model in levels is estimated, impulse responses are inconsistent at long horizons. More specifically, the impulse responses are inconsistent at long horizons as the horizon increases with the sample size; this is because the nonstationarity means the true impulse responses do not tend to zero as the horizon increases (Phillips, 1998).

The VAR impulse response functions used in this study is to produce the time path of the dependent variables in the VAR, to shocks from all the explanatory variables. If the system of equations is stable, any shock should decline to zero; or an unstable system would produce an explosive time path.

The data of GDP and FDI inflows in Qatar were taken from the United Nations Conference on Trade and Development (UNCTAD) and the World Bank’s World Development Indicators (WDI) & Global Development Financial (GDF) from World Bank website. Annual time series data covers the period 1990-2010 as available online.

**5. Models, Results and Discussion**

Firstly, Granger Causality test model is constructed to disclose the way how inward FDI and economic growth influence each other. As the time series of absolute economic data normally contains high-level instability which could seriously distort the empirical results, this paper, following the normal way of stabilizing treatment, logonized the absolute value of GDP and inward FDI, noted as  $\ln Y_t$  (LNGDP) and  $\ln F_t$  (LNFEDI) respectively. The models are as follows:

$$\begin{aligned}
 \text{M I } \square \ln Y_t &= a_0 + a_{11} \ln Y_{t-1} + a_{20} \ln F_t + a_{21} \ln F_{t-1} + \mu_1 t \\
 \text{M II } \square \ln F_t &= b_0 + b_{11} \ln F_{t-1} + b_{20} \ln Y_t + b_{21} \ln Y_{t-1} + \mu_2 t
 \end{aligned}$$

The NULL hypothesis of M I is  $H_0 \square a_{11} = a_{20} = a_{21} = 0$ , that is, the growth of inward FDI doesn't contribute to the increase of GDP; meanwhile, the NULL hypothesis of M II is  $H_0 \square b_{11} = b_{20} = b_{21} = 0$ , which means the growth of GDP is not the reason of the increase of Inward FDI.

Table 1. Granger Causality test of Inward FDI and GDP

M I				M II			
Variables	coefficient	T-value	Prob.	Variables	coefficient	T-value	Prob.
$a_0$	-0.362903	-0.529052	0.6040	$b_0$	-14.05680	-2.275001	0.0370
$\ln Y_{t-1}$	1.052576	12.87243	0.0000	$\ln F_{t-1}$	0.399913	1.436879	0.1700
$\ln F_t$	-0.026359	-1.125197	0.2771	$\ln Y_t$	-2.781867	-1.125197	0.2771
$\ln F_{t-1}$	-0.019873	-0.700871	0.4935	$\ln Y_{t-1}$	4.435692	1.703026	0.1079
$R^2$	0.989506			$R^2$	0.902206		
$ADR^2$	0.987539			$ADR^2$	0.883869		
DW-value	2.560424			DW-value	1.706248		
F-value	502.9100			F-value	49.20290		
Sample range	1990-2010			Sample range	1990-2010		

By operating EViews6.0, the OLS estimation results of the above models are as seen in Table 1. According to the results, F-value of M I comes to 502.9100. Given  $\alpha = 0.05$ , as F value  $\square F_{0.05}(3,16)$ , we can say under the significant level of 0.05, the testing result of Model I is robust, that is, the hypothesis  $H_0$  should be rejected with the significance of 95%. Thus, inward FDI could be regarded as the Granger Causality towards GDP. Meanwhile, as F-value of M II also exceeds  $F_{0.05}(3, 16)$ , GDP in turn contributes to be the Granger Causality towards FDI inflows. Therefore, it could be initially concluded that the growth of GDP and the growth of inward FDI have some Granger Causality relations between each other.

To further study the results from the T-values of each coefficient, for M1 the current-period and the former-period FDI inflows create negative influence on the current-period of GDP, while only the former-period GDP exerts positive impacts on the current-period of GDP. It indicates that the growth of Qatar economy is more contributed by its own former growth. For M II, the former-period inward FDI and the former-period GDP have positive impacts on the current-period inward FDI, while the former-period GDP pushes from the opposite direction. It implies that to attract FDI inflows the previous FDI inflow record and the previous economic performance are important indicators.

After examining the patterns of the interactions in the section above, the test of VAR Impulse Responses is conducted in the next step to study their responding sensitivities towards changes in a relatively longer term. Here, the growth rate values of GDP and inward FDI are used by differentiating the log-linearized values of GDP and inward FDI, noted as  $\Delta \ln Y_t$  (DLNGDP) and  $\Delta \ln F_t$  (DLNFDI) respectively. Since the time series of DLNGDP and DLNFDI has already been supposed to be stable, a corresponding VAR model is constructed following the theoretical principle of VAR Impulse Responses, with the maximum lagged period is 2 (AIC and SC) and the operating results from Eviews 6.0.

That the growth rate of Qatar GDP responds significantly and rapidly to the variance of inward FDI, for it starts responding from the first period until the fifth one and after the fifth period its response comes to be stable. But when the growth rate of Qatar GDP responds to its own variance, it takes six periods to come to be stable. The inward FDI in Qatar responds more significantly and continuously to its own variance than to the variance of GDP, as its responding to its own variance starts from the first period while to the variance of GDP starts from the second one, which means the inward FDI is more sensitive towards its own movements. Then, it suggests: i) The economic growth of Qatar is more sensitive to the fluctuation of FDI inflows, comparing with the fluctuation of the economic growth itself; ii) The FDI inflows of Qatar are more sensitive to its own fluctuation than to the fluctuation of the economic growth.

## 6. Conclusions

This paper has analysed the relationships between FDI inflows and economic growth by using Qatar data and statistics (1990–2010). The empirical findings have clearly proved the afore-formulated hypothesis that Qatar's inward FDI and economic growth are Granger Causally related in a long term. Moreover, the inward FDI is positively affected by the economic growth, but more sensitive to its own performance change than to the economy growth. The economic growth is negatively affected by the inward FDI, and more sensitive to the inward FDI change than to the economic growth itself. Thus, it implies that to attract FDI inflows to Qatar, the government should continue its efforts to create promising economic and investment environment; while to promote economic growth, it shall refer to other original momentum.

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