

# The Granger Causality Relationship between Foreign Direct Investment (FDI) and Economic Development in the State of Qatar

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**Abstract:** In this study, we investigate the causality relationship between the inflows of foreign direct investment and economic development as measured by Gross Domestic Product (GDP) per capita in the State of Qatar during the period 1970 - 2010. It also investigates the direction of the relation between the two variables using several tests: Augmented Dickey-Fuller (ADF), Johansen cointegration and Granger Causality tests. Robust empirical findings drawn from the Johansen cointegration analysis suggest the existence of such long-run equilibrium relationship between FDI and GDP. Furthermore, causality test indicates that there is a bi-directional causality on the FDI-GDP relationship for one, two and three year lags that imply, strongly indicating that foreign capital penetration Granger-causes economic growth in Qatar. The test results show that foreign direct investment in the short-run is affected mainly by gross domestic product and government spending which implies that the government should continue its efforts to create the economic environment which is attractive to foreign direct investment. The findings confirm the strong and positive relationship between economic growth of Qatar and FDI inflows.

**Keywords:** Economic of Qatar, Foreign Direct Investment, Gross Domestic Product, Cointegration, and Granger Causality

## 1 Introduction

Qatar is relatively a small country in size occupying around 11,437 km square. It has a population of 1.68 million. More than 85% of Qatar population lives within 20 km radius of Doha. In Qatar, there are around 100 different nationalities working in different economic sectors. The State of Qatar has witnessed a rapid economic growth over the last decade. The national economic policy focuses on increasing private and foreign investment in non-energy sectors given that oil and gas contribute for around 50% of GDP and 85% of export revenues. Qatar has unemployment rate of 0.5% (2009). Qatar is going to host the compact FIFA World Cup for 2022. Qatar would be the first nation in the Middle East to stage the FIFA World Cup in history. Qatar has already staged other major international sport events for instant Asian Games in 2006 and Asian Football Cup in 2011 (Qatar Bid Evaluation Report for 2022 FIFA World Cup).

In Qatar, Gross Domestic Product, GDP growth has an increasing pattern during the impressive economic development the country witnessed through the last

decade. In 2010, GDP of Qatar reached around QR 470 billion. It recorded a nominal growth of 30.8% and CPI inflation was -2.4%. In the same year, the growth was evenly distributed between Oil and Gas and the Non-oil and Gas Sectors. The banking system in Qatar maintained adequate liquidity and comfortable capital position along with high margins during 2010. There were 43 listed companies across four major segments registered in Qatar exchange by the end of Dec 2010. [9].

Due to financial stability the State of Qatar witnessed, foreign direct investment is expected to be boosted due to increasing attraction from foreign investors by which greater economic diversification is expected. The foreign trade conditions were improved during 2010 with high growth in exports and a high surplus. The foreign trade exhibited a growth of 30.1%, i.e. QR 346.87 billion. On the other

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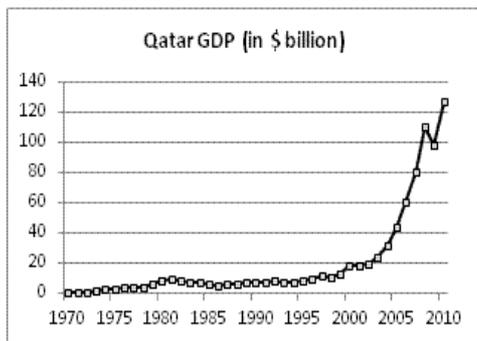


Fig. 1: Qatar GDP (1970 to 210).

hand, the indicator of openness declined comparing to 2009. Export of goods had an upward growth of 49.2%, i.e. QR 262.28 billion and downward growth of 6.7% of imported goods stood at QR 84.59 billion comparing to 2009. Exports had 75.6% of foreign trade with an increase of 9.6% comparing to 2009.

Qatar's imports are divided into four geographical groups: European, Asian, Arab and American countries. European countries take the largest share of import of goods forming 34% of overall imports coming from all countries, i.e. QR 28.75 billion. Asian import of goods take the second share with 30.4% (i.e. QR 25.75 billion), imports from Arab countries take a share of 18.4% (QR 15.55 billion) and American countries have a share of 15.1% (QR 12.75 billion) of total imports [9].

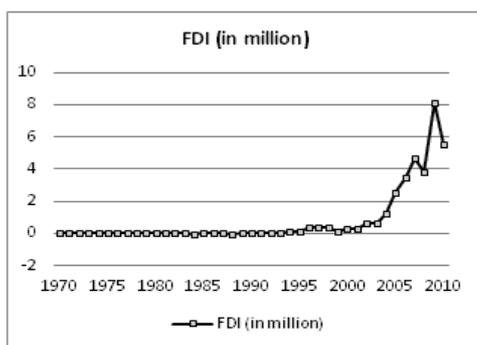


Fig. 2: Qatar FDI (1970 to 210).

The objective of this paper is to study the presence of interdependence between GDP and FDI for the State of Qatar. Qatar's government has targeted foreign direct investment as a crucial element of its 2030 strategy for economic growth and development. Foreign direct investment enhances the rate of technology transfer. Furthermore, it better integrates the country into the world economy and gives access to global markets. The flow of FDI to developing countries has shifted from market-seeking and resource-seeking FDI to more

efficiency-seeking FDI. However, the inflow of foreign direct investment to Qatar could be characterized as resource-seeking due to the fact that the greatest share of foreign direct investment is in the internationally traded petroleum and liquefied natural gas (LNG) products. Hence the growth rate in exports of oil and LNG should be positively correlated with FDI. The size of the host country is an important factor that attracts FDI, especially flows to developing countries. In most studies market size is approximated GDP, population, GDP per capita and GDP growth rate. For the purpose of this study we will use GDP. This direction of causality supports the growth-driven FDI hypothesis, which stresses that the market size of the host country, represented by GDP, rises with economic growth, and hence, can attract foreign investment. To capture the impact of globalization on FDI, the degree of openness is introduced as an explanatory variable approximated by the ratio of exports and imports to GDP. Moreover, the existence of advanced infrastructure makes the country more attractive to foreign investors.

Relevant Literature Review will be introduced in Section 2. The rest of the paper is organized as follows. In Section 3 we present our methodology in this paper. The Analysis and Results of the study are in Section 4. We conclude our paper in Section 5.

## 2 Literature Review

During the last decade a number of interesting studies of the role of foreign direct investment in stimulating economic growth has appeared. A study, done by Andreas G. Georgantopoulos and Anastasios D. Tsamis, on "The Causal Links between FDI and Economic Development: Evidence from Greece" in 2011 [3], aimed to investigate the causal relationship between GDP per capital and foreign direct investment in Greece during the period 1970 - 2009. The study concluded that there is existence of a long-run equilibrium relationship and uni-directional causality running from GDP to FDI. The same authors of previous study had conducted similar study, on "The Triangular Causal Links between Economic Development, FDI and Exports: Evidence from Turkey" in 2011 [4], aimed to investigate the causal relationship foreign capital and foreign trade for Turkey during the period 1970 - 2009. Similarly, the study concluded that there was long-run relationship and there was uni-directional from FDI to GDP, exports to GDP, and exports to FDI.

Moreover, another study done by Frimpong Joseph Magnus and Oteng-Abayie Eric Fosu, on "Bivariate Causality Analysis between FDI Inflows and Economic Growth in Ghana" in 2008 [6]. The objective for their study was to explore the causal link between FDI and GDP growth for Ghana during the period 1970-2002. The study concluded that no causality between FDI and growth for the total sample period and the pre-SAP

period; However, FDI caused GDP during the post-SAP period. Abdus Samad [1] had investigated the causal link between FDI and Economic Growth of ten countries of Latin America, on his study of "FDI and Economic Growth: Evidence from Latin America". The study concluded that there were five countries, named (Argentina, Bolivia, Brazil, Columbia, El-Salvado), have long-run relationships and uni-directional, and bi-directional causality between GDP growth and FDI; on the other hand, four other countries, named (Chile, Ecuador, Guatemala, Mexico), have short-run relationship and mixed causal link between GDP growth and FDI.

Furthermore, a group of researchers, Muhammad Irfan Javaid Attari, Dr. Yasir Kamal, and Sumayya Nasim Attari [7], conducted a study of "The Causal Link between Foreign Direct Investment and Economic Growth in Pakistan Economy". The study aimed to examine the relationship between Foreign Direct Investment and Economic Growth of Pakistan during the period between 1981 and 2009. The study concluded that there is long-run relationship between the macroeconomic variables and there is bi-directional causality for GDP and exports, and FDI and exports. Chakraborty and Basu (2002) [5] examine the causality between FDI and output growth in India. Utilizing annual data from 1974-1996, they find that the real GDP in India is not Granger-caused by FDI and the causality runs more from real GDP to FDI.

Moreover, there was a study, entitled "The Attractiveness of Qatar to Foreign Direct Investment, 1980-2002", conducted by Shotar M, Manhal [8], in which the researcher aimed to the factors that determine the inflow of FDI to Qatar and the attractiveness of Qatar to FDI. He concluded that there were short-run in FDI and affected by government spending and GDP.

Finally, Mahmoud Al-Iriani and Fatima Al-Shami [2] conducted a study in 2007 testing for the relationship between FDI and growth in the six countries comprising the Gulf Cooperation and using heterogeneous panel analysis methods indicate a bi-directional causality. Their results support the endogenous growth hypothesis for this group of countries.

### 3 Methodology

The objective of this study is to empirically establish the impact FDI has on economic growth of Qatar and explore if bi-directional causality exists. To fulfil the study objective, different approaches are used. The proposed empirical technique is time-series analysis. The model has two variables - growth rate of real GDP and real FDI inflows as a percentage of GDP. The purpose is to see whether there exists a long-run stable relationship between the two variables. Hence cointegration exercise is conducted. But before doing the cointegration test, the following intermediate steps need to be carried out: scatter-plots of the above variables for possible

relationship; Pearson's correlation (coefficient  $r$ ) while testing for its assumptions - absence of outliers; absence of non-homogenous groups; normality and linearity. Further, Jarque-Bera normality tests are also performed. These tests are based on sample skewness and kurtosis. This is followed by tests for autocorrelation (Ljung-Box portmanteau tests) and heteroskedasticity. The last intermediate step is test for unit root in time-series of the variables using Phillips and Perron (1988) tests. If the series show presence of unit root (ie. Non-stationary but integrated of order 1), then cointegration becomes an econometric and conceptual possibility.

Furthermore, Augmented Dickey-Fuller (ADF) test has been used to test unit roots of FDI and GDP time series. This can be done by taking the first difference for series of lag one as following formula:

$$\Delta y_t = \alpha_1 \cdot y_{t-1} + \sum_{i=1}^{p_i} \beta_{ij} \cdot \Delta y_{t-j} + x_{it} \delta + \varepsilon_t \quad (1)$$

Finally, Johansen's test of cointegration is conducted to find out whether a long-run relationship exists between FDI and GDP. The Johansen's technique is based on maximum likelihood estimation. The Granger causality test was used to explore the existence of a bi-directional causality between GDP and FDI for Qatar for the proposed study period. If FDI can help to forecast GDP, then we can say that FDI Granger-causes GDP. However, if FDI causes GDP and not versa vice, then we say there is unidirectional causality exists from FDI and GDP. The Granger approach answers the question whether GDP causes FDI by finding how much of the current value of GDP can be explained by past values of GDP and lagged values of FDI. Thus, to test for causality between GDP and FDI, we shall estimate the following regression equations:

$$GDP_t = \gamma + \sum_{i=1}^k \alpha_i \cdot GDP_{t-i} + \sum_{i=1}^k \beta_i \cdot FDI_{t-i} + \mu_t \quad (2)$$

$$FDI_t = \phi + \sum_{i=1}^k \delta_i \cdot GDP_{t-i} + \sum_{i=1}^k \lambda_i \cdot FDI_{t-i} + \eta_t \quad (3)$$

where  $GDP_t$  and  $FDI_t$  are stationary time series sequences,  $\mu_t$  and  $\eta_t$  are the respective intercepts, and are white noise error terms, and  $k$  is the maximum lag length used in each time series (decided by Akaike Information Criterion (AIC) or Bayesian Information Criterion (BIC)). FDI is said to Granger cause GDP if the  $\beta_i$  coefficients are jointly significantly different from zero. Similarly, GDP is said to Granger cause FDI if the  $\delta_i$  coefficients are jointly significantly different from zero

### 4 Analysis and Results

The study uses data that consists of annual records of FDI and GDP of the State of Qatar from 1970 to 2010. This

period is important for a variety of reasons and includes certain major local, regional and global events that affected Qatar- inflows of FDI and domestic economic reforms. FDI data obtained from the World Bank database and GDP data obtained from the Qatar Statistics Authority (QSA). FDI recorded as US dollar; however, GDP recorded as Qatari Riyal. For converting GDP to US dollar, currency rate of 3.65 was used. Table 1 reports the descriptive statistics for the sample of the two variables. Overall, calculations indicate that GDP and FDI are not normally distributed and skewed.

**Table 1:** Descriptive statistics for GDP and FDI

Measures	FDI (in billion)	GDP (in billion)
Mean	0.799826	19.69917
Median	0.027340	7.374451
Maximum	8.124736	126.9841
Minimum	-0.020630	0.301791
Std. Dev.	1.789616	30.84778
Skewness	2.632599	2.322828
Kurtosis	9.401439	7.292541
Jarque-Bera	117.3637	68.34704
Probability	0.000000	0.000000

**Table 2:** Augmented Dickey-Fuller Unit Root Test for Log(FDI).

	Test1		Test2		Test3	
	Levels	D <sup>3</sup>	Levels	D <sup>3</sup>	Levels	D <sup>3</sup>
The first autocorrelation	0.01 <sup>1</sup>	0.104	0.040	0.955	0.003	0.03
Intercept	0.69	0.362	0.369	0.181	-	-
Trend	- <sup>2</sup>	-	0.267	0.102	-	-

<sup>1</sup> P-value. Test1 = with intercept

<sup>2</sup> Not in the equation. Test2 = with intercept and trend

<sup>3</sup> 1<sup>st</sup> Differences Test3 = with no intercept or trend

Table 2 shows the outcomes of the Augmented Dickey-Fuller unit root test in levels and in first differences of Log(FDI) in terms with an intercept, with an intercept and trend and with no intercept or trend and similarly to Table 3 for Log(GDP). This test is one of require steps to identify the existence of unit root and

**Table 3:** Unit Root Test for Log(GDP).

	Test1		Test2		Test3	
	Levels	D <sup>3</sup>	Levels	D <sup>3</sup>	Levels	D <sup>3</sup>
The first autocorrelation	0.018	0.174	0.160	0.000	0.002	0.39
Intercept	0.590	0.258	0.493	0.113	-	-
Trend	-	-	0.048	0.003	-	-

<sup>1</sup> P-value. Test1 = with intercept

<sup>2</sup> Not in the equation. Test2 = with intercept and trend

<sup>3</sup> 1<sup>st</sup> Differences Test3 = with no intercept or trend

**Table 4:** Johansen Cointegration Test Results.

Null Hypothesis	T <sup>0</sup>	Trace		Maximum Eigenvalue		
		5% <sup>1</sup>	P <sup>4</sup>	MES <sup>3</sup>	5% <sup>1</sup>	P <sup>4</sup>
r <sup>2</sup> =0	18.29	15.5	0.019	14.61	14.27	0.044
r ≤ 0	3.685	3.85	0.055	3.685	3.84	0.055

<sup>0</sup> Trace Statistic. <sup>1</sup> 5% Critical Value.

<sup>3</sup> Maximum Eigenvalue Statistic.

<sup>4</sup> P-value.

**Table 5:** Granger Causality Test Results.

Null Hypothesis		Lag 1	Lag 2	Lag 3	Lag 4
FDI does not Granger-cause GDP	F-Statistics	24.035	30.071	14.476	13.503
	P-value	0.0001	9.E-06	0.0004	0.001
GDP does not Granger-cause FDI	F-Statistics	79.931	7.5317	5.0165	1.7359
	P-value	8.E-08	0.0060	0.0197	0.2348

have been performed under 5% significant level. According to Table 2, null hypothesis cannot reject in first differences for terms with an intercept, and with an intercept and trend, which means that FDI is not stationary. In addition, Table 3 shows the GDP is stationary in levels in terms with an intercept, and with no

intercept or trend and in first differences in term with an intercept and trend. So, both variables are not integrated in any order.

Table 4 Shows the outcomes of Johansen cointegration test among the data sets, were both maximum eigenvalue and trace test reject the null hypothesis of no cointegration at 5% significance level according to critical value estimates. Therefore, the number of statistically significant cointegration vectors is equal to one.

Finally, after determining the variables are cointegrated, we go head to analysis the causal links between the variables using the Granger-causality test and testing the p-value of F-statistic used. Table 5 shows the outcomes of Granger-causality tests, were the null hypothesis of "FDI does not Granger-cause GDP" is strongly rejected at 5% significance level for the tested 1, 2, 3, and 4 year lags. However, the null hypothesis of "GDP does not Granger-cause FDI" is strongly rejected t 5% significance level for the tested 1, 2, and 3 year lags.

## 5 Conclusion

This paper intends to examine whether FDI does play an important role in economic growth of Qatar. The results can form a basis of ongoing emphasis of Qatar government on promoting foreign investment. The test results show that foreign direct investment in the short-run is affected mainly by gross domestic product and government spending which implies that the government should continue its efforts to create the economic environment which is attractive to foreign direct investment. The findings confirm the strong and positive relationship between economic growth of Qatar and FDI inflows. Furthermore, Granger causality test indicates that there is a bi-directional causality on the FDI-GDP relationship for one, two and three year lags that imply, strongly indicating that foreign capital penetration Granger-causes economic growth in Qatar.

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