

# The Dynamic Effects of Capital Inflows on Economic Growth of the Mediterranean Countries: Panel Cointegration Approach

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## **Abstract**

*This paper investigate the dynamic relationship between foreign capital inflows on economic growth of Mediterranean countries<sup>2</sup> over the period 1980-2018 Foreign direct investment (FDI) and official development aid (ODA) were used as a main source of capital inflow in this study. A standard growth model are estimated using panel cointegration approach. In addition, both fixed-effects and random effects models were used to check for the significant of the parameters. Panel unit root are employed to check for the efficiency of the data. The long run relationship is estimated using fully modified OLS and: Panel Dynamic Least Squares (DOLS) methods.*

*The empirical results reveal that there exist a long run co-integrating relationship between foreign aid, FDI and economic growth in Mediterranean countries. The results of FMLOS and DOLS show that FDI ODA variables are positive and have significant impact on the long run growth of the Mediterranean economy..*

*Further, fixed –effects method is selected as random effect model is rejected based on Hausman test result. The results of fixed effect show that FDI and Foreign aid variables ate positive and statistically significant.*

*As a policy recommendation the study, suggest that proper absorptive capacity should be met in order to attract FDI and ODA such as sound macroeconomic policies, good institutions, deep financial institution, low inflation rate and supplementing public expenditures.*

**Keywords:** Capital inflow, FDI, ODA, MED Countries, Panel Cointegration

**JEL Classification Code:** C01, C51, C33, F21, F23, F43

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## **I. Introduction**

Capital inflow plays a vital role in the development process of any developing economy. Capital inflows contribute in filling the resource gap in countries where domestic savings are inadequate to finance the required investment. Low-income developing countries are thereby forced to depend upon foreign capital to break this capital constraint

Due to the wave of globalization in the late 1980s and 1990s, the whole world was integrated into a single global economy (Levine, R. (2001), The once-conservative developing nations, realizing the multifarious benefits of foreign direct investment (FDI), began encouraging entry of foreign firms, using various incentives, such as tax holidays, production subsidies, bank loans, and import tariffs exemptions. Gradually, FDI and foreign aid became two very important sources of foreign capital for these capital-constrained economies

The analysis of the dynamic effect of capital inflows on sustainable economic growth of Mediterranean counties appears to have particular interest. In the last decade, in fact, most of these countries have undergone profound economic and institutional reforms, aimed at improving macroeconomic stability, international openness and the development of the private sector. The signing of the Euro-Mediterranean partnership agreement, along with a progressive elimination of trade barriers, has positively affected international trade relations in the area. The countries highlighted the importance of creating an environment to attract foreign capital, which could lead to the transfer of technology and increase production and exports. This, in turn becomes the main engine of our motivation to investigate capital flows-economic growth nexus in the Mediterranean region.

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<sup>2</sup> Mediterranean countries used in this study includes, Algeria, Egypt, Morocco, Tunisia and Jordan

The objective of this paper is to analyze the dynamic effect of The relationship between capital inflows and economic growth using panel data for 5 Mediterranean countries. The capital-flows variables employed include ODA and foreign direct investment, net inflows. In addition to the capital-flows variables, the econometric specification used includes as explanatory variables other important determinants of growth rates. The rest of the paper is structured as follows. Section 2 highlight a brief review of the literature. Section 3, devoted to the empirics of capital inflows and growth Section 5, contains the main findings of the study, their analyses and assessments, and the final section offers some concluding remarks in the light of the previous analysis.

## **II. Literature Review**

Vast literature documented the relationship between capital inflow and economic growth over the world. However, through the survey of the literature appear two strands of literature on the role of foreign capital inflows on economic growth. The first strand of the economists and experts believe external capital inflow is necessary and sufficient for economic growth in developing countries (Gupta, 1970). They claim that there exists a positive relationship between capital inflows and economic growth because capital inflow complements domestic resources and supplements domestic savings. Furthermore, foreign inflows assists in closing the foreign exchange gap, provides access to modern technology and managerial skills, and allow for easier access to foreign market (Over, A.M, 1975). Boone (1996), Burnside and Dollar (2000) Hansen and Tarp (2001)

The second proponents believe that external capital inflow exerts significant negative effects on the economic growth of recipient countries. According to this view, foreign capital is fully consumed and substitutes rather than compliments domestic resources. Furthermore, foreign inflows assist to import inappropriate technology, distorts the domestic income distribution, and encourages a bigger, inefficient and corrupt government in developing countries. Easterly et al., (2004), Dalgaard et al. (2004), Rajan and Subramanian (2008)

Moreover, the literature show also mixed results on the effect of FDI and ODA on economic growth in developing countries. For example, the impact of foreign investment on economic growth of developing economies is a well-documented, albeit controversial, issue. Borensztein et al. [69] argue that FDI flows benefit developing countries with an educated workforce through significant technology spillovers, whereas Blomstrom et al. [1998] find no such evidence. However, they argue that FDI inflow does have a growth effect on the relatively richer developing countries. Alfaro and others' [2004] study reveals that FDI inflows benefit developing countries with sufficiently developed financial infrastructure, whereas Balasubramanyam et al. [1996] argue that trade, openness is crucial for reaping benefits from FDI inflow. So, there is mixed evidence of positive impact of FDI on economic growth of developing countries

The effect of foreign aid on economic growth, has drawn great attention for years, but the empirical results are mixed. Easterly [2001] believes that many developing countries has often been with harmful environment that discourages the inflow of foreign direct investment; thus, foreign aid plays crucially important role in contributing to economic growth and development in those developing countries. Hansen and Tarp [2004] find that foreign aid has not only led to an increase in aggregate savings and investment, but has also had a positive impact on economic growth even in countries hampered by an unfavorable policy environment. Moreira [(2005), and Ndambendia [2010)] also empirically prove the positive relationship between foreign aid and economic growth in developing countries while Fambon [2013] shows the case in Cameroon, stating that foreign direct investment (FDI) have positive and significant impacts on economic growth in the short and long terms. Karras (2006) investigates the correlation between foreign aid and growth in per capita GDP using annual data from the 1960 to 1997 for a sample of 71 aid-receiving developing countries. This paper concludes that the effect of foreign aid on economic growth is positive

On the other hand some studies found that that foreign aid have insignificant impact on growth. These studies also reveal that the foreign aid rather than complementing domestic savings is fully consumed and substituted, and bring some undesirable impacts on those countries, which include import inappropriate technology, distorts domestic income distribution, and encourages a bigger, inefficient and corrupt government in developing countries. (Griffin 1970; Griffin and Enos 1970; Weisskof 1972; Boone 1996; and Easterly 2003).

So for foreign aids to have and an effective role for economic development of the recipient country certain condition should be fulfilled. Such as good institutions and governance and proper fiscal and monetary policies. Burnside and Dollar (2000) demonstrate that foreign aid has a positive impact on economic growth in aid-recipient countries with good fiscal, monetary, and trade policies but little effect or no effect in the presence of poor policies. Moreover, Collier and Dollar (2002), by using a different data set, validated the findings of Burnside and Dollar (2000) and concluded that the effect of aid on poverty depends on the quality of policies. Authors argue that to increase growth and reduce poverty, it would be more effective and efficient to direct aid to countries that have good policies

### III. Model, Data Description and Methodology

#### 3.1 Model and Data Description

This study focuses mainly on the effects of capital flows on MED countries economic growth. The proposed model will base on model developed by Mankiw, Romer, and Weil (1992), Maxwell J. Fry (1997), and Burnside and Dollar (2000). The model will be constructed to test the effects of Foreign Direct Investment (FDI) and Foreign Aid in a cross country regression framework, utilizing data on capital flows from foreign countries to Major MED countries over the last two decades. However, the estimated model will be in the following functional form:

$$GDPGR_{it} = f(ODA_{it}, FDI_{it}, Z_{it})$$

Alternatively, the Regression model will look as follow:

$$GPGDP_{it} = \beta_{0i} + \beta_1 FDI_{it} + \beta_2 ODA_{it} + \beta_3 Z_{it} + \varepsilon_{it}$$

Where real Real GDP at constant 2011 national prices (in mil. 2011US\$) denoted as  $GDPGR_{it}$ , is a dependent variable, Foreign capital inflow which comprised of ODA and FDI are the main explanatory variables and  $Z_{it}$  is the matrix of control variables and  $\varepsilon_{it}$  is a white noise error term. (For more details and definition of variables, see Appendix 1).

### IV. Empirical Results

#### 4.1 Descriptive Analysis

The descriptive statistics, minimum, maximum, mean, and standard deviation (Std. Dev.) of these variables are recorded below in Table 1.

Over the period 1980–2018, Inflation has a maximum value (53.8) and high standard deviation (7.7)

**Table 1: Summary Statistics for the Model Variables**

Variable	Observations	Mean	Median	Max.	Min.	Std. Dev.
LNGDPGR	189	5.185506	5.147185	6.0569	4.334254	0.43635
LNFDI	189	8.549548	8.804739	10.064	3.000	1.11976
LNODA	189	8.900074	8.881887	9.966	7.516403	0.41002
INF	189	7.31104	5.351095	53.789	-11.1575	7.74275
GOVEX	189	17.08573	16.78762	31.504	8.351738	3.98329

Table 2 shows the correlation matrix. The correlation indicates a positive correlation between the LNFDI, and LNODA with .NGDPGR.

**Table 2: Correlation matrix**

Variable	LNGDPGR	LNFDISTOCK	LNODA	INF	GOVEX
LNGDPGR	1.000000				
LNFDI	0.279276	1.000000			
LNODA	0.068339	0.169561	1.000000		
INF	0.252081	-0.281204	-0.014175	1.000000	
GOVEX	-0.691893	-0.272231	-0.118571	-0.294351	1.000000

#### 4.2 Panel Unit Root Test

To determine the order of integration, the study uses four sets of unit root tests; as reported in Table 3. The results which reported in Table 3 show that all the variables except INF are non-stationary at levels. After taking the first difference the variables to perform stationarity all the variables were confirmed to be stationary. It is, therefore, worth concluding that the variable LNGDPGR, LNODA, LNFDI, INF and GOVEX used in this study are integrated of order one I(1). Therefore, the study move to check for co-integration by using three different tests as we shall see later.

**Table 3: Panel unit root test**

Variables	Levin, Lin & Chu t		Im, Pesaran and Shin W-stat		ADF - Fisher Chi-square		PP - Fisher Chi-square	
	Level p-value	First Difference p-value	Level p-value	First Difference p-value	Level p-value	First Difference p-value	Level p-value	First Difference p-value
LNGDPGR	0.2740	0.0000	0.9902	0.0000	0.2187	0.0000	0.8719	0.0000
LNODA	0.1917	0.0000	0.0869	0.0000	.1432	0.0000	0.0013	0.0000
LNFDI	0.0979	0.0000	0.6010	0.0000	.7964	0.0000	0.3932	0.0000
INFL	0.0391	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
GOVEX	0.0788	0.0000	0.2309	0.0000	0.2499	0.0000	0.6608	0.0000

Lag order selection criterion is provided in Table 4. With the exception of SC that called for two lags, all the other criteria including AIC, HQ, final prediction error (FPE) and Sequential likelihood ratio (LR) called for three lags. Hence, lag three is considered as optimum lag in our model.

Table 4. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2331.091	NA	36304.10	30.36482	30.50287	30.42090
1	-1381.099	1801.284	0.300936	18.66363	19.76797*	19.11221*
2	-1326.341	98.84908	0.280283*	18.58885*	20.65949	19.42994*
3	-1281.302	77.21030*	0.297875	18.64028	21.67723	19.87388
4	-1244.985	58.95589	0.357615	18.80500	22.80825	20.43111

\* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

### 4.3 Panel Cointegration Test

After determining the order of integration, the next step is to check the possibility of long-run relationship between variables. So, Kao (1999), Pedroni (1999) and Johansen cointegration tests are applied to check for cointegration. The null hypothesis for all three tests is that there is no cointegration in the series, and the alternative hypothesis is that there is cointegration in the series. The results of the panel cointegration tests are presented in Table 5, 6 and 7.

The result of Kao (1999) as presented in Table 5 showed that the p-values is less than 5% therefore we can reject the null hypothesis of no cointegration, and accept the alternative hypothesis of cointegration

**Table 5: Results of Kao's Residual Cointegration Test**

	t-Statistic	Prob.
ADF	-3.575893	0.0002
Residual variance	0.008319	
HAC variance	0.008114	

The results of Pedroni (1999) test are reported in Table 6. Since the majority the coefficients are statistically significant at 5% level percent, we can reject the null hypothesis of no Cointegration, and accept the alternative hypothesis of cointegration

**Table 6: Results of Pedroni's Residual Cointegration Test**

	No deterministic trend		Deterministic intercept and trend		No deterministic intercept or trend	
Alternative hypothesis: common AR coefs.	(within-dimension)					
Test Method	Statistic (Prob.)	Weighted Statistic (Prob.)	Statistic (Prob.)	Weighted Statistic (Prob.)	Statistic (Prob.)	Weighted Statistic (Prob.)
Panel v-Statistic	1.814828 (0.0348)	-0.695928 (0.7568)	2.458032 (0.0070)	4.813385 (0.0000)	-0.23789 (0.5940)	-1.74638 (0.9596)
Panel rho-Statistic	-2.646054 (0.0041)	-0.520240 (0.3014)	-3.006084 (0.0013)	-1.975826 (0.0241)	-1.88013 (0.0300)	-0.01667 (0.4934)
Panel PP-Statistic	-8.976346 (0.0000)	-4.272094 (0.0000)	-14.25036 (0.0000)	-9.684587 (0.0000)	-5.68713 (0.0000)	-1.79314 (0.0365)
Panel ADF-Statistic	0.298424 (0.6173)	-0.383411 (0.3507)	1.196596 (0.8843)	2.811043 (0.9975)	-5.66623 (0.0000)	-1.85080 (0.0321)
Alternative hypothesis: individual AR coefs.	(between-dimension)					
Group rho-Statistic	-0.632649 (0.2635)		-0.159772 (0.4365)		-0.72139 (0.2353)	
Group PP-Statistic	-6.027359 (0.0000)		-6.987473 (0.0000)		-5.16897 (0.0000)	
Group ADF-Statistic	0.145909 (0.5580)		1.834623 (0.9667)		-5.98079 (0.0000)	

Table 7 below show the results of Johansen cointegration test. The trace test indicates four cointegrating equations while max-eigen test have three cointegrating equations at the 0.05 level

**Table 7: Johansen Cointegration Test**

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	93.25	0.0000	44.68	0.0000
At most 1	53.31	0.0000	20.89	0.0219
At most 2	35.10	0.0001	18.37	0.0491
At most 3	20.59	0.0241	13.10	0.2180
At most 4	12.55	0.2498	11.48	0.3214
At most 5	7.453	0.6821	5.788	0.8327
At most 6	13.12	0.2171	13.12	0.2171

To conclude the results of all test of Pedroni's, Johansen's test and Kao's test agree. Thus, it can be concluded that the all variables have robust long-run association in GCC countries.

#### 4.5. FMOLS and DOLS results

Based on the results of cointegration obtained from the three tests above and the confirmation of the long-run association between variables we can proceed further to estimate the magnitude of the long run relationship between the variables by applying panel Fully Modified Ordinary Least Squares (FMOLS) and panel Dynamic Ordinary Least Squares (DOLS) estimators. Table 8 and 9.

**Table 8: Results Panel Fully Modified Least Squares (FMOLS)**

Dependent Variable: LNGDPGR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI	0.176677	0.048397	3.650587	0.0003
LNODA	0.459406	0.060949	7.537516	0.0000
INF	0.029012	0.007330	3.957724	0.0001
GOVEX	-0.036532	0.013113	-2.785907	0.0059

R-squared	0.843509	Mean dependent var	5.189591
Adjusted R-squared	0.628742	S.D. dependent var	0.425124
S.E. of regression	0.396816	Sum squared resid	27.39854
Durbin-Watson stat	0.438186	Long-run variance	0.432049

**Table 9:** Results of Panel Dynamic Least Squares (DOLS)

Dependent Variable: LNGDPGR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI	0.193432	0.053997	3.582277	0.0005
LNODA	0.409535	0.068815	5.951233	0.0000
INF	0.044254	0.008925	4.958585	0.0000
GOVEX	-0.021941	0.014076	-1.558788	0.1217
R-squared	0.726553	Mean dependent var	5.185506	
Adjusted R-squared	0.575141	S.D. dependent var	0.436345	
S.E. of regression	0.284415	Sum squared resid	9.787931	
Long-run variance	0.162952			

The results of both FMOLS and DOLS are reported in Table 8 and 9. The results of both method show that FDI and ODA have positive and long run significant effect on growth of MED countries. With regard to policy, variable mixed results were obtained. General government final consumption expenditure as percent of GDP) is found to have negative and significant impact on the long run growth of the economy. Inflation as an indicator for economic stability is found to have positive and significant impact on the long run growth of the economy

#### 4.6 Fixed Effect VS Random Effects Model

In the following section we employ the panel fixed effect or random effect model. The choice of the method is based on the result of **Hausman test** where the null hypothesis is that the random effect model is more appropriate vs. the alternative hypothesis the fixed effect model is more appropriate. After conducting Hausman test the result of test show that the p-value < 0.05 then Ho is rejected, as a result we select the fixed effect model (FEM).

**Table 10.** Hausman Test Result

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	484.499994	4	0.0000

Since the results of Hausman test came in favor of fixed effect model, we run regression for panel fixed effect and the results are given in Table 11. The results show significant and positive effect of FDI and ODA variables on economic growth of Mediterranean countries. For policy variables, inflation is significant but with positive sign and this represent an ambiguous result. Government spending variable came with the correct expected negative and significant value.

**Table 11:** Fixed Effect Results

Dependent Variable: LNGDPGR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
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LNFDI	0.139674	0.028134	4.964564	0.0000
LNODA	0.509221	0.035708	14.26076	0.0000
INF	0.015622	0.004150	3.764499	0.0002
GOVEX	-0.038930	0.007605	-5.119263	0.0000
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R-squared	0.669818	Mean dependent var	5.185506	
Adjusted R-squared	0.456356	S.D. dependent var	0.436345	
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## V. Conclusion and Policy Implications

The paper is concerned with the growth impact of foreign capital inflow in mediterranean countries By employing a panel data methodology for the period of 1980–2018 the study investigates whether the FDI and foreign aid have a positive effect on receiving Mediterranean countries. For initial check of the series, the study employ four panel unit root test and the results show that all series are integrated of order one after the first difference.

Panel cointegration methodology is used to test for the existence of a long relationship between the variable. Three tests, Kao (1999), Pedroni (1999) and Johansen cointegration tests are applied to check for cointegration. The results of the three tests reveal that there exist a long run co-integrating relationship between foreign aid, FDI and economic growth in Mediterranean countries. To test the magnitude of the long relationship among variables fully modified least square (FMLS) and dynamic ordinary least square (DOLS) were used. The results show that FDI and Foreign aid variables are positive and have significant impact on the long run growth of the economy..

Further, fixed –effects method is selected as random effect model is rejected based on Hausman test result. The results of fixed effect show that FDI and Foreign aid variables are positive and statistically significant.

With regard to policy, variable mixed results were obtained. General government final consumption expenditure as percent of GDP) is found to have negative and significant impact on the long run growth of the economy. Inflation as an indicator for economic stability is found to have positive and significant impact on the long run growth of the Mediterranean economy

As a policy recommendation the study suggest that proper absorptive capacity should be met in order to attract FDI and ODA such as sound macroeconomic policies, good institutions, deep financial institution, low inflation rate , and supplementing public expenditures.

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## APPNDEX 1

**Table 1: Variables Codes and Expected Signs**

Variable	Codes of Variable	Expected sign	Source
Real GDP at constant 2011 national prices (in mil. 2011US\$)	GDPGR		Penn Table 9.1*
Foreign direct investment, net inflows (BoP, current US\$)	FDI	+	WDI, 2018
Net official development assistance and official aid received (constant 2015 US\$)	ODA	+	WDI, 2018
Inflation, GDP deflator (annual %)	INF	-	WDI, 2018
General government final consumption expenditure (% of GDP)	GOVEX	-	WDI, 2018

\*Source: The data are extracted from Penn World Table, version 9.1. Description is at the reference: Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2015), "The Next Generation of the Penn World Table" American Economic Review, 105(10), 3150-3182, available for download at [www.ggdc.net/pwt](http://www.ggdc.net/pwt).

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