

## A Panel Co-integration and Causality Analysis the Relationship between FDI, openness trade and Economic growth Several Middle Eastern and North African Countries -as a Sample-

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### Abstract:

This paper aims at analyzing the effect of Foreign Direct Investment (FDI) and trade openness on the economic growth of 11 developing countries (Algeria, Bahrain, Egypt, Iran, Jordan, Kuwait, Lebanon, Morocco, Oman, Saudi Arabia and Tunisia) based on annual panel data series from 1994 to 2017. This analysis was performed using fully modified OLS approaches (FMOLS) when the series of panels are co-integrated. Therefore, the relationship between Foreign Direct Investment (FDI) and trade openness to economic growth is too eminent in taking a great role within literature related to economics. The results clearly suggest that free trade and Foreign Direct Investment are a long-term source of gross domestic product growth in the countries of the Middle East and North Africa. Free trade is associated with a positive relationship with gross domestic product growth in (FMOLS) estimation, and a unidirectional causality in the sense of trade openness towards gross domestic product growth. Foreign Direct Investment is also associated with a positive relationship with the growth of gross domestic product in (FMOLS) estimation, which is a mutual causation, from Foreign Direct Investment towards the growth of gross domestic product and vice versa.

**Keywords:** panel co-integration; fully modified OLS estimator; Granger causality test; FDI; Openness trade

## **I-Introduction:**

One of the main goals of economists is always to explore and explain the factors influencing the economic growth. Among these factors is openness trade, whose major literature on growth and international trade assumes that trade stimulates economic growth in the long run. The prevailing theory is that open economies, which are more engaged in international trade, grow faster than closed economies (Grossman and Helpman 1991), International trade is an important and determinant among many factors that assist productivity and growth; therefore, its contribution depends on its weight in economic activity. Countries being active in the international market tend to be more productive than their relatively closed counterparts that produce only for their domestic market. Further, international trade contributes to the effective allocation of resources that leads to rapid growth and to a greater accumulation of factors aiding growth, especially for countries with a high level of technological and knowledge diffusion (Rivera-Batiz and Romer 1991).

Based on literature related to economic development, openness trade contributes to the possibility of economies of scale in production because expanding the market through trade must lead to a decrease in the real costs of production, moreover, the tide of economic globalization is gaining tremendous momentum in the current period for it is driven and supported by the most influential political, economic and financial powers in the main capital centers which lead to unique international market.

The issue of Foreign Direct Investment (FDI) and political attractiveness remain hot topics just as globalization which are adopted constantly in order to increase investment capabilities, influence positively the balance of payments, compensate for the lack of national savings and create new opportunities for quality jobs, better wages or working conditions Better, advanced and developed, thus, countries generally try to make Foreign Direct Investment as one of the strongest pillars of their development strategies.

The previous economic studies on this topic has identified several channels through which Foreign Direct Investment can positively affect economic performance in host countries (Azman-Saini, Law, and Ahmad 2010).

In general, Foreign Direct Investment can assist host countries by exploiting their natural wealth which provides opportunities for economic development and growth in case they are used efficiently.

Activities in the framework of Foreign Direct Investment usually include advanced and sophisticated technologies which are not available in all host countries, and as such, these countries can acquire these skills and benefit from them. The participation of multinational investors in these industrial processes leads to a transfer of technology and knowledge necessary to host countries that enable them to overcome technological barriers. Moreover, Foreign Direct Investment promotes economic development and growth by increasing exports and foreign currencies. In the same vein (Singh & Jun, 1995) argue that Foreign Direct Investment affects economic growth in the sense that it increases the stock of domestic capital and saves a host of other resources.

International trade policy and Foreign Direct Investment are within the limits of policymakers' ability. However, what is the relationship between them and economic

growth? Does encouraging Foreign Direct Investment and free trade stimulate or delay economic growth in the Middle East and North Africa countries?

The rest of the paper is organized as follows. Sections 2 discuss the Literature review, the Sections 3 presented the Data and Methodology framework: model, Data, methods respectively. Section 4 undertakes the unit root tests, Empirical estimates, results, and Causality test. The last section concludes.

## **II-Literature review :**

The relationship between trade openness, the flow of Foreign Direct Investment to host countries on economic growth has been profoundly studied for decades. From the theoretical aspect, the causal relationship between Foreign Direct Investment and GDP growth could go both ways.

On the one hand, according to “the hypothesis of growth driven by Foreign Investment, FDI inflows can stimulate growth in host countries by increasing capital, creating new jobs and facilitating technology transfer (Borensztein, De Gregorio, and Lee 1998) and De Mello(De Mello Jr 1997).

On the other hand, according to the "market size assumption", rapid GDP growth that creates new investment opportunities in the host country can also lead to larger inflows of Foreign Direct Investment (Mah 2010) and Rodrik(Rodrik 1999).

Although current studies generally suggest a positive effect of FDI on economic growth, FDI can also have negative effects on economic growth by competing with domestic investment (Aitken and Harrison 1999). It is also possible that there is no causal relationship between FDI and economic growth, which supports the so-called "neutrality assumption".

A pilot study was conducted to define the relationship between FDI and large-scale economic growth.

The work of (Herzer 2008) revealed that Foreign Direct Investment issued had long-term positive effects on gross domestic product in 14 industrialized countries during the period 1971 to 2005 using panel analysis. Thus, the results indicated that long-term causation is bidirectional between outward FDI and gross domestic product.

(Baharumshah and Thanoon 2006) is used as a dynamic panel model to examine the relationship between FDI and growth in the East Asian economies. The authors emphasized that FDI promotes growth and that its impact was perceived in the short and long term.

Based on co-integration testing and causality analysis, Basu(Basu, Chakraborty, and Reagle 2003) It has been found that there is a two-way causality between economic growth and Foreign Direct Investment in 23 developing countries between 1978 and 1996. The causality in closed economies extends mainly over the long term from growth to Foreign Direct Investment.

The relationship between trade openness and economic growth has been an issue that has been waged for many years. As openness (usually represented by the ratio of imports plus exports to GDP) is believed to be the motor - engine of growth in developing countries, it is recognized that trade openness is an important factor in contributing to economic

growth in developed countries (Dar and Amirkhalkhali 2003). Hence, the trend of causality between trade openness and economic growth is important for determining countries' growth rates, whether internal or external (Amadou 2013).

The causal trend of trade openness towards economic growth means that the remarkable growth and industrialization in these countries has been achieved in the form of external learning, along with that increase in exchanges. Thus, the premise of export-led growth in the neoclassical approach is valid. This result will be achieved by increasing productivity through exports, which increases economies of scale with greater openness that shows the trade dependence of countries. In addition, new investments are made and new jobs and real wages are created. In this case, it would be expected that countries that set growth rates externally would further open up by reducing barriers to exports and imports (Krueger 1985) and Amadou (Amadou 2013).

Causation can also be found from economic growth to trade openness because high productivity reduces unit costs which in turn leads to increased exports. Moreover, if domestic production increases beyond domestic demand, producers are expected to seek to place their goods on international markets (Liu, Song, and Romilly 1997). The causality from economic growth to trade openness means that the country's notable growth is being achieved internally. The internal economic growth rate is explained by investments in material and human capital as well as research and development efforts (Amadou 2013). Internally growing countries are required to use their scarce resources to increase their investment.

If these two conditions are taken into account, there is a two-way causal relationship (feedback) between exports and economic growth (Liu et al. 1997). Harrison (Harrison 1995) defended the two-way relationship with the idea that the more openness, the greater the growth; however, rapid growth nurtures open-oriented policies.

The term openness is defined as removing restrictions that prevent international exchanges of goods, services, employment and capital. According to the basic neoclassical growth model (Solow 1956), there is no relationship between openness and economic growth. Being the primary determinant of long-term economic growth, this model notes the change in the rate of technological and population growth and confirms that growth will not arise from relations between countries. Theories of internal growth (Romer 1990) argue that trade openness can increase growth through the influence of expansion or technology transfer.

Consequently, in an open economy for international trade, especially for export-oriented sectors, technological development must be preserved in order to compete in the quality and prices of foreign goods and services. Moreover, technology can also be developed by foreign goods, by doing this, underdeveloped countries with limited research and development facilities find an opportunity to acquire technology more rapidly by transcription. When examining empirical literature, it is noted that there are studies that illustrate a number of the effects of trade openness on the economy. According to (Esfahani 1991), foreign exchange obtained through trade openness helps the country reduce foreign exchange restrictions and helps intermediate goods, such as raw materials that cannot be produced locally. Likewise, the decrease in savings - investment and import - the export deficit can be maintained.

Trade openness provides the distribution of information between countries and increases production efficiency (Miller and Upadhyay 2000). In addition to these views, (Grossman and Helpman 1991) argued that developing countries can increase their growth by copying innovative inventions made by developed countries thanks to trade openness. (Rodriguez and Rodrik 2000) have argued that trade restrictions negatively affect growth, but they state that not enough results have been found for the fact that trade openness positively affects growth. On the other hand, they came to the conclusion that openness was beneficial in terms of technology transfer. There are many studies in the literature that concluded that openness positively affects economic growth (Dollar, 1992; Frankel et al., 1996; Edwards, 2001; Levine, 1997; Ben-David and Loewy, 1998; Gwartney et al., 2003).

**III-Data and Methodology :**  
**III-1 The Model :**

Mankiw(Mankiw, Romer, and Weil 1992) extension of basic Solow(1956) growth model where the neoclassical Cobb-Douglas production function has been augmented with shift variables is used in this empirical study. Thus, the basic production function with constant returns and Hicks- neutral technical progress, following (Rao, Takirua, and Takirua 2006) is:

$$Y_t = A_t K_t^\alpha L_t^{1-\alpha} \dots\dots\dots(1)$$

Where  $A_t$  present technology,  $K_t$  denotes capital,  $L_t$  is labor, and  $t$  is time. The Solow growth model assumes the technological evolution as:

$$A_t = A_0 e^{gT} \dots\dots\dots(2)$$

where, the initial knowledge stock is denoted by  $A_0$  . It is further assumed that:

$$A_t = f(\text{trade}, \text{Devf}, \text{fdi}) \dots\dots\dots(3)$$

Where, (trade) is open trade, (Devf) is financial development index and (fdi) is Foreign Direct Investment. The Rearrangement of equation (1) and (3) results:

$$Y_t = (fdi_t, Open_t, Devf_t) K_t^\alpha L_t^{1-\alpha} \dots\dots\dots(4).$$

**III-2. Data:**

In the empirical analysis, I use the new heterogeneous panel co-integration technique. I use the following model specification to investigate the long-run relationship between real (ppp) gross domestic product per capita based on purchasing power parity (PPP) obtained from World Bank national accounts data (2017), stock foreign direct investment inflow (fdi) obtained from the data base of United Nations Conference on Trade and Development CNUCED (UNCTAD.stat) 2017, open trade is the sum of exports and imports of goods and services measured as a share of gross domestic product (open), Gross capital formation (formerly gross domestic investment) (cfgf), Labor force comprises people ages 15 and older who supply labor for the production of goods and services during a specified period (pactv), and financial development is measured by Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler’s checks; and other securities

such as certificates of deposit and commercial paper (Devf). These four variables are obtained from World Bank national accounts data (2017), All the variables are expressed in natural logarithms so that elasticity can also be determined.

### III-3. Methods:

The choice of the appropriate technique is an important theoretical and empirical question in the analysis of the long-term relationship of the data panel. So co-integration is the most appropriate technique to study the long-term relationship between ((ppp) gross domestic product per capita, stock foreign direct investment inflow (fdi), open trade (open), financial development (Devf), Gross capital formation (cfgf), Labor force (pactv). All the variables are expressed in natural logarithms). The empirical strategy used in this article should follow four main steps. Unit root tests should be taken for panel series firstly. Second, if the panel series are integrated in the same order, the Co-integration tests are used. Thirdly, if the panel series are co-integrated, the vector of Co-integration in the long-term is estimated by using the methods Fully Modified OLS (FMOLS). Finally, the Granger causality test is taken.

### IV-Empirical results :

#### IV-1. Descriptive Statistics:

	LPPP	LFDI	LOPEN	LDEVF	LCFGF	LPACTV
Mean	9.649593	23.24803	4.350390	4.282174	23.38808	15.15612
Median	9.390233	23.55879	4.411865	4.245166	23.22405	15.05239
Maximum	11.42177	26.16786	5.256859	5.556176	26.21046	17.21586
Minimum	7.964245	18.27987	3.375135	3.325548	20.07586	12.42090
Std. Dev.	0.892070	1.449654	0.387832	0.491909	1.276994	1.291721
Observations	264	264	264	264	264	264

#### IV-2. Panel data unit root tests:

Unit root tests are traditionally used to test for the order of integration of the variables or to verify the stationarity that is essential to appropriate co-integration technique. In both cross-sections and panel data, I use modern techniques for testing unit root, such as those of Breitung(Breitung 2005), (LLC)(Levin, Lin, and Chu 2002), Im(Im, Pesaran, and Shin 2003), and the W-test (IPS), ADF-Fisher Chi-square test (ADF-Fisher) and PP Fisher Chi-Square test (PP-Fisher) (Maddala and Wu 1999).

I test the stationarity for the six variables of panel series (Lppp, Lfdi, Lopen, Ldevf ,Lcfgf and Lpactv ) in level for three models, (Non, Individual intercept, Individual intercept and trend), the result that all the variables of panel series are non- stationary Table (1) To (6) . In second test I take the first difference for all variables of the panel series for three models, (Non, Individual intercept, Individual intercept and trend), the results of the panel unit root testing are all the variables become stationary  $I(1)$  Table (1) To (6).

Table (1): Stationary Test of variable Lppp:

Variable: Lppp	** signification 5% , * signification 1%,	(P. value), [ratio student]
	Level(Lppp)	First Difference( $\Delta$ Lppp)

Methods	None	Individual intercept	Individual intercept and trend	None	Individual intercept	Individual intercept and trend
Levin, Lin & Chu	(1.0000)	(0.0013)*	(0.5881)	(0.0000)*	(0.0135)**	(0.0088)*
	[6.73706]	[-3.00663]	[0.22257]	[-4.2995]	[-2.21116]	[-2.3748]
Breitung t-stat			(0.7375)			(0.0000)*
			[0.63567]			[-4.84138]
Im,Pesaran and Shin W-stat		(0.8184)	(0.6089)		(0.0000)*	(0.0013)*
		[0.90932]	[0.27647]		[-4.36641]	[-3.00268]
ADF-Fisher Chi- Square	(1.0000)	(0.0120)	(0.4723)	(0.0000)*	(0.0000)*	(0.0020)*
	[1.42726]	[16.8787]	[21.7935]	[64.2560]	[59.1575]	[46.0428]
PP - Fisher Chi- Square	(1.0000)	(0.8047)	(0.9909)	(0.0000)*	(0.0000)*	(0.0000)*
	[0.49774]	[16.2217]	[9.41752]	[73.0896]	[89.4725]	[72.8372]
Process	/	/	/	I(1)	I(1)	I(1)
Status	No. Stationary			Stationary		
	The source : Doctoral student using the Eviews 10					

Table (2): Stationary Test of variable Lfdi:

Variable: Lfdi	** signification 5% , * signification 1%,			(P. value), [ratio student]		
	Level(Lfdi)			First Difference( $\Delta$ Lfdi)		
Methods	None	Individual intercept	Individual intercept and trend	None	Individual intercept	Individual intercept and trend
Levin, Lin & Chu	(1.0000)	(0.0132)**	(0.5776)	(0.0000)*	(0.0000)*	(0.0001)*
	[6.24686]	[-2.22026]	[0.19574]	[-7.5202]	[-6.2570]	[-3.71109]
Breitung t-stat			(0.4926)			(0.0008)*
			[-0.01862]			[-3.14558]
Im,Pesaran and Shin W-stat		(0.7847)	(0.8122)		(0.0000)*	(0.0000)*
		[0.78821]	[0.88605]		[-6.0842]	[-3.89899]
ADF-Fisher Chi-square	(1.0000)	(0.9498)	(0.3642)	(0.0000)*	(0.0000)*	(0.0001)*
	[1.58072]	[12.3482]	[23.6802]	[91.568]	[82.038]	[54.7527]
PP - Fisher Chi- square	(1.0000)	(0.0057)*	(0.9514)	(0.0000)*	(0.0000)*	(0.0000)*
	[0.13425]	[42.3010]	[12.2752]	[86.322]	[81.704]	[69.9877]
Process	/	/	/	I(1)	I(1)	I(1)
Status	No. Stationary			Stationary		
	The source : Doctoral student using the Eviews 10					

Table (3): Stationary Test of variable Lopen:

Variable: Lopen	** signification 5% , * signification 1%,			(P. value), [ratio student]		
	Level(Lopen)			First Difference( $\Delta$ Lopen)		
Methods	None	Individual intercept	Individual intercept and trend	None	Individual intercept	Individual intercept and trend
Levin, Lin & Chu	(0.7284)	(0.1988)	(0.7613)	(0.0000)*	(0.0000)*	(0.0000)*
	[0.60789]	[-0.84589]	[0.71036]	[-14.206]	[-12.1696]	[-9.36298]
Breitung t-stat			(0.4751)			(0.0000)*
			[-0.06250]			[-4.01697]
Im,Pesaran and Shin W-stat		(0.4701)	(0.9250)		(0.0000)*	(0.0000)*
		[-0.07504]	[1.43935]		[-10.4043]	[-7.53882]
ADF-Fisher Chi- square	(0.9967)	(0.7778)	(0.8842)	(0.0000)*	(0.0000)*	(0.0000)*
	[8.14710]	[16.7354]	[14.4637]	[197.96]	[132.230]	[89.5756]
PP - Fisher Chi- square	(0.9974)	(0.7408)	(0.9252)	(0.0000)*	(0.0000)*	(0.0000)*
	[7.92432]	[17.4020]	[13.2763]	[199.83]	[137.969]	[105.727]
Process	/	/	/	I(1)	I(1)	I(1)
Status	No. Stationary			Stationary		
	The source : Doctoral student using the Eviews 10					

Table (4): Stationary Test of variable Lcrgf:

Variable: Lcggf	** signification 5% , * signification 1%,			(P. value), [ratio student]		
	Level(Lcggf)			First Difference( $\Delta$ Lcggf)		
Methods	None	Individual intercept	Individual intercept and trend	None	Individual intercept	Individual intercept and trend
Levin, Lin & Chu	(1.0000)	(0.0053)	(0.9936)	(0.0000)*	(0.0000)*	(0.0000)*
	[5.65234]	[-2.55482]	[2.48956]	[-10.339]	[-8.8279]	[-6.81091]
Breitung t-stat			(0.9643)			(0.0001)*
			[1.80297]			[-3.82813]
Im,Pesaran and Shin W-stat		(0.7983)	(0.9751)		(0.0000)*	(0.0000)*
		[0.83547]	[1.96147]		[-8.4633]	[-5.83391]
ADF-Fisher Chi-square	(1.0000)	(0.8333)	(0.9866)	(0.0000)*	(0.0000)*	(0.0000)*
	[0.80559]	[15.6417]	[9.96809]	[141.988]	[107.184]	[74.2713]
PP - Fisher Chi-square	(1.0000)	(0.9850)	(0.9947)	(0.0000)*	(0.0000)*	(0.0000)*
	[0.50096]	[10.1359]	[8.71204]	[141.518]	[108.007]	[78.4931]
Process	/	/	/	I(1)	I(1)	I(1)
Status	No. Stationary			Stationary		
	The source : Doctoral student using the Eviews 10					

Table (5): Stationary Test of variable Ldevf:

Variable: Ldevf	** signification 5% , * signification 1%,			(P. value), [ratio student]		
	Level(Ldevf)			First Difference( $\Delta$ Ldevf)		
Methods	None	Individual intercept	Individual intercept and trend	None	Individual intercept	Individual intercept and trend
Levin, Lin & Chu	(1.0000)	(0.0174)**	(0.0450)**	(0.0000)*	(0.0000)*	(0.0000)*
	[4.13305]	[-2.11070]	[-1.69587]	[-12.509]	[-11.025]	[-8.33983]
Breitung t-stat			(0.6025)			(0.0001)*
			[0.25995]			[-7.19779]
Im,Pesaran and Shin W-stat		(0.6181)	(0.1479)		(0.0000)*	(0.0000)*
		[0.30043]	[-1.04527]		[-10.682]	[-9.09056]
ADF-Fisher Chi-Square	(1.0000)	(0.0985)	(0.0352)**	(0.0000)*	(0.0000)*	(0.0000)*
	[3.02945]	[30.8870]	[35.3998]	[177.220]	[139.038]	[109.778]
PP - Fisher Chi-square	(1.0000)	(0.7588)	(0.8489)	(0.0000)*	(0.0000)*	(0.0000)*
	[2.35497]	[17.0826]	[15.3030]	[188.895]	[163.258]	[212.237]
Process	/	/	/	I(1)	I(1)	I(1)
Status	No. Stationary			Stationary		
	The source : Doctoral student using the Eviews 10					



Table (6): Stationary Test of variable Lpactv:

Variable: Lpactv	** signification 5% , * signification 1%,			(P. value), [ratio student]		
	Level(Lpactv)			First Difference( $\Delta$ Lpactv)		
Methods	None	Individual intercept	Individual intercept and trend	None	Individual intercept	Individual intercept and trend
Levin, Lin & Chu	(1.0000)	(0.2015)	(0.0000)*	(0.0034)*	(0.0000)*	(0.0129)*
	[9.43376]	[-0.83616]	[-6.4693]	[-2.71002]	[-4.60017]	[-2.22776]
Breitung t-stat			(0.9955)			(0.0401)**
			[2.61218]			[-1.74936]
Im,Pesaran and Shin W-stat		(0.9812)	(0.0017)*		(0.0000)*	(0.0004)*
		[2.07969]	[-2.9372]		[-5.59914]	[-3.33184]
ADF-Fisher Chi-Square	(1.0000)	(0.9347)	(0.0000)*	(0.0617)	(0.0000)*	(0.0005)*
	[2.05516]	[12.9430]	[70.3649]	[33.0131]	[74.8570]	[50.4921]
PP - Fisher Chi-Square	(1.0000)	(0.1172)	(0.9950)	(0.0121)**	(0.0008)*	(0.0008)*
	[0.00239]	[30.0502]	[8.64101]	[39.5711]	[48.9019]	[49.0860]
Process	/	/	I(0)	I(1)	I(1)	I(1)
Status	No. Stationary			Stationary		
	The source : Doctoral student using the Eviews 10					

### IV-3. Co-integration Tests on Panel Data:

I have applied (Pedroni 2001) co-integration test after the identification of lag orders. This heterogeneous panel co-integration test like IPS test allows the cross sectional interdependence along with the individual effects of different nature. Following equation represents the Pedroni's co-integration test:

$$Lppp_{it} = \eta_i + \Gamma_{it} + \beta_1 Lfdi_{it-1} + \beta_2 Lopen_{it-1} + \beta_3 LDevf_{it-1} + \beta_4 Lcfcg_{it-1} + \beta_5 Lpactv_{it-1} + \epsilon_{it} \dots \dots (5)$$

where,  $i = 1, \dots, N$ , shows the number of countries. and  $t = 1, \dots, T$ , shows the time period.  $\eta_i$  and  $\Gamma_{it}$  are the effects of country and time fixed effects, represent the residual that are estimated showing deviations from long term relation. The estimated residuals are represented in the following equation.  $\epsilon_{it}$  is the residual that are estimated showing deviations from long term relation. The estimated residuals are represented in the following equation.  $\epsilon_{it} = \rho_i \epsilon_{it-1} + \mu_{it} \dots \dots \dots (6)$

To test co-integration on panel data, seven different statistics were proposed by Pedroni out of which four have pooling basis commonly referred to as "within" dimension whereas the last three are based on "between" dimensions.

Tables(7) show the statistics of the panel co-integration tests within and between dimensions. These statistics are based on the means of the individual autoregressive coefficients associated with the unit root tests of the residuals. These results suggest that the zero value of non-co-integration cannot be rejected at a significance level of 5%. In the model one of (Individual intercept) so in this case there is non-co-integration between the variables of panel series.

In model two of (Individual intercept and trend) Table(8) the probabilities of (Panel v-Statistic, Panel PP-Statistic, Panel ADF-Statistic) in within dimension is less than 5% which leads to rejecting the zero value, in the in between dimension the probability of (Group PP -Statistic, Group ADF-Statistic) is less than 5% which leads to rejecting the zero value. But the rest of the tests (Panel rho-Statistic) in the within dimension and the

test of the dimension between (Group rho-Statistic) their probabilities are greater than 5% which leads to accepting the zero value of non-co-integration, what I conclude in this case the variables are co-integrated. Thus, the evidence suggests that in all panel data there is a co-integration long run relationship between variables.

Table (7): Pedroni Residual Co-integration Test (with Individual intercept) :

<b>(Within-Dimension)</b>					
	Statistic	Prob.	<b>Weighted</b>	Statistic	Prob.
Panel v-Statistic	-0.534536	0.7035	Panel v-Statistic	-0.521522	0.6990
Panel rho-Statistic	2.214536	0.9866	Panel rho-Statistic	2.232069	0.9872
Panel PP-Statistic	-0.234932	0.4071	Panel PP-Statistic	-0.002481	0.4990
Panel ADF-Statistic	-0.454250	0.3248	Panel ADF- Statistic	-0.169963	0.4325
<b>(Between-Dimension)</b>					
	Statistic	Prob.			
Group rho-Statistic	-0.521522	0.6990			
Group PP-Statistic	2.232069	0.9872			
Group ADF-Statistic	-0.002481	0.4990			
* signification 1%	They are no co-integrating relationship between Variables.				
The source : Doctoral student using the Eviews 10					

Table (8): Pedroni Residual Co-integration Test (with Individual intercept and Individual Trend):

<b>(Within-Dimension)</b>					
	Statistic	Prob.	<b>Weighted</b>	Statistic	Prob.
Panel v-Statistic	4.084788	0.0000*	Panel v-Statistic	3.008349	.0013*
Panel rho-Statistic	1.455947	0.9273	Panel rho-Statistic	1.753506	0.9602
Panel PP-Statistic	-4.451371	0.0000*	Panel PP-Statistic	-3.274055	.0005*
Panel ADF-Statistic	-3.337848	0.0004*	Panel ADF- Statistic	-2.576757	.0050*
<b>(Between-Dimension)</b>					
	Statistic	Prob.			
Group rho-Statistic	3.113918	0.9991			
Group PP-Statistic	-5.929502	0.0000*			
Group ADF-Statistic	-3.007222	0.0013*			
* signification 1%	They are co-integrating relationship between Variables.				
The source : Doctoral student using the Eviews 10					

#### IV-4. OLS individual and panel estimation:

If I observe the values of F-statistic and there probability values that is significant as well as the values of R-adjusted table (9) in the individual estimation, it becomes clear to use this Ols model and it is valid. But if we take into account the probability values of Durbin-Watson statistic table(10), then we notice that most of them are located in the unspecified

region, except for the probability value of Lebanon's value, which is located in the acceptable region, and the model in this case does not suffer from the auto-correlation of errors. In the Ols panel estimation all the coefficient are significant accept the coefficient of (Lfdi) and the values of F-statistic and there probability values that is significant as well as the values of R-adjusted, it becomes clear to use this Ols model and it's valid. But if we take into account the probability values of Durbin-Watson statistic (0.11450) is less than 0.90 table(10) and which suggests that there is a positive auto-correlation of error, Otherwise, we cannot confirm, and from it Ols is an inconsistent and biased estimator when applied to co-integrated variables panel series.

Table(9): OLS individual and Panel Estimation

Dependent variable LPPP	Algeria	Bahrain	Egypt	Iran	Jordan	Kuwait
LFDI	-0.036841*	0.022111	-0.1022**	0.045717	0.199398*	-0.014976
LOPEN	0.232127	0.003636	0.136069*	0.066797	0.197403	0.323534
LDEVF	0.046316	-0.015203	0.022603	0.26719**	0.32581**	-0.19731*
LCFGF	0.051758	0.026264	0.172288*	0.156293*	-0.04684	0.287375*
LPACTV	0.257737	-0.26776*	0.375059*	0.38383	0.599108	-0.4915**
C	3.209705	12.6668*	-0.081161	-3.202651	-5.456002	10.9677**
@Trend	0.029338*	0.029759*	0.033903*	-0.002802	-0.019413	0.012524
Adj. R-sq	0.994	0.978	0.997	0.984	0.986	0.969
F-statistic	657.9609	174.9224	1403.147	240.6676	288.5934	124.6972
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Durbin-Watson stat	1.00867	0.90773	1.23311	1.91303	1.87667	2.54206
Dependent variable LPPP	Lebanon	Morocco	Oman	Saudi Arabic	Tunisia	Panel
LFDI	0.00383	0.046939	0.13185*	-0.076214	-0.054234	-0.023175*
LOPEN	0.052231	-0.062312	0.07018	-0.082607	-0.086867	-0.370124
LDEVF	0.263561	-0.017257	0.0806	-0.120078	0.070113	-0.438758*
LCFGF	0.287391*	0.148029*	-0.028999	0.247912*	0.385634*	0.779611*
LPACTV	-1.65488*	-0.21345	-0.53541*	0.791937*	-1.58791*	-1.011287*
C	23.85784*	7.233771	14.69284*	-5.262556	24.83754*	10.61286*
@Trend	0.064818*	0.038102*	0.033478*	-0.02122*	0.058727*	0.013749**
Adj. R-sq	0.989	0.995	0.962	0.985	0.995	0.777904
F-statistic	368.4810	871.7566	100.1591	253.6150	943.0084	154.5285
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Durbin-Watson stat	1.99658	2.21925	1.66040	1.41468	1.62868	0.11450
** signification 5% , * signification 1%						
The source : Doctoral student using the Eviews 10						

Table(10) :Durbin-Watson statistic									
Country's	0	d <sub>1</sub>	Doubt	d <sub>2</sub>	2	4-d <sub>2</sub>	Doubt	4-d <sub>1</sub>	4
	$\rho > 0 + AC$	0.9		1.92	$\rho = 0$ No AC	2.08		3.1	$\rho < 0 - AC$
Algeria			1.0086						
Bahrain			0.9077						
Egypt			1.2331						
Iran			1.9130						
Jordan			1.8766						
Kuwait							2.5420		
Lebanon					1.99658				
Morocco							2.2192		
Oman			1.6604						
Saudi Ar			1.4146						
Tunisia			1.6286						
Panel	0.1145								
(-AC) : Negative auto-coloration (+AC): Positive auto-coloration				The source : Doctoral student using the Eviews 10					

#### IV-5 Fully Modified OLS (FMOLS) Estimation:

While the variables are found to be co-integrated, then (Pedroni 2000) FMOLS estimator may be the best since it produces asymptotically unbiased estimates of long-term elasticity's and efficient and normally distributed standard errors. In addition, the FMOLS uses a semi-parametric correction for endogeneity and residual auto-correlation, and the FMOLS estimator is a group or between group mean estimators which allows a high degree of heterogeneity in the panel.

The results of FMOLS at (within), show that all coefficients are statistically significant and positive except development finance is not statistically significant and the population active is statistically significant and with negative sign. Results of FMOLS indicate that 1% increase in foreign direct investment, open trade and Gross capital formation increases GDP per capita by about 1.6%, 14.7% and 14.3%, respectively, but for the coefficient of active population Lowers GDP per capita by about 41.4%.

The results of FMOLS at (between) show that all coefficients are statistically significant and positive except population active is not statistically significant. Results of FMOLS indicate that 1% increase in foreign direct investment, open trade, development finance and Gross capital formation increases GDP per capita by about 14.3%, 23.5%, 16.2% and 12.7% respectively. Table (11)

Table(11):Estimation FMOLS of the long-run relation internship

Dependent variable(Lppp)	FMOLS (Within)	FMOLS (Between)
<b>Lfdi</b>	0.016503* (0.00349)	0.143469* (0.032561)
<b>Lopen</b>	0.147449* (0.010732)	0.235703* (0.074333)
<b>LDevf</b>	-0.01061 (0.013188)	0.162438** (0.072464)
<b>Lcggf</b>	0.143162* (0.006385)	0.127847* (0.029524)
<b>LPactv</b>	-0.414201* (0.02437)	0.090672 (0.053183)
<b>Adjusted R- squared</b>	0.997	/
** signification 5% , * signification 1%, (Error standard)		
The source : Doctoral student using the Eviews 10		

#### IV-6 Causality test:

After selecting the best slowdown period for both the variables by means of a test (Order Selection Criteria Schwarz, Akaike) Table (12), the causality test (Granger causality test) was performed, and the results were as follows Table (13).The bidirectional causality between gross domestic product growth and foreign direct investment, and a unidirectional causality from trade openness, Gross capital formation to gross domestic product growth.

Tabel (12)selecting the best slowdown period

VAR Lag Order Selection Criteria

Endogenous variables: LPPP

Exogenous variables: C LFDI LOPEN LDEVF LCFGF

LPACTV

Included observations: 176

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-70.04557	NA	0.138942	0.864154	0.972239	0.907993
1	346.2776	799.5298	0.001239	-3.855428	-3.729329	-3.804283
2	359.6684	25.56429	0.001076	-3.996232	-3.852119	-3.937781
3	360.7247	2.004504	0.001076	-3.996872	-3.834745	-3.931114
4	360.8591	0.253527	0.001087	-3.987035	-3.806894	-3.913971
5	368.2398	13.83882	0.001011	-4.059543	-3.861388	-3.979173
6	369.5805	2.498572	0.001007	-4.063415	-3.847246	-3.975738
7	373.9514	8.09604*	0.000969	-4.101720	-3.86753*	-4.00673*
8	375.3893	2.647067	0.00096*	-4.10669*	-3.854499	-4.004406

The source : Doctoral student using the Eviews 10

Table (13) panel granger causality test results lag 8:

	LPPP	LFDI	LOPEN	LDEVF	LCFGF	LPACTV
LPPP		0.0311 ↗			0.0207	0.0355
LFDI	0.0215 ↗			0.0003 ↗		
LOPEN	0.0397 ↗					
LDEVF			0.0409 ↗		0.0272 ↗	
LCFGF	0.0033 ↗		0.0183 ↗			
LPACTV			0.0056 ↗			

The source : Doctoral student using the Eviews 10

**V-Conclusion:**

The goal of this study is to investigate the long-term mutual relationship between Foreign Direct Investment, trade openness, and economic growth in some countries in the Middle East and North Africa. To assess this relationship, the study used the most recent data analysis technique which is the co-integration test approach (Pedroni 2001) and causality Granger tests. In order to apply this methodology, it was necessary to study the stability of the time series component of the cross sections after the tests of the stability of the series panel turned out to be unstable in the level, but when taking the first difference all of these series panel became stable in order  $I(1)$ , which gives way to the use of the methodology of co-integration and estimating the model by (FMOLS), which in this case is the most appropriate for the estimation.

The results indicate that free trade and Foreign Direct Investment are a long-term source of gross domestic product growth in the countries of the Middle East and North Africa. Free trade is associated with a positive relationship with gross domestic product growth in (FMOLS) estimation, and a unidirectional causality in the sense of trade openness towards gross domestic product growth. Foreign Direct Investment is also associated with a positive relationship with the growth of gross domestic product in (FMOLS) estimation, which is a mutual causation, from Foreign Direct Investment towards the growth of gross domestic product and vice versa.

## Reference

- Aitken, Brian J., and Ann E. Harrison. 1999. "Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela." *American Economic Review* 89(3):605–18.
- Amadou, Akilou. 2013. "Is There a Causal Relation between Trade Openness and Economic Growth in the WAEMU Countries?" *International Journal of Economics and Finance* 5(6):151–57.
- Azman-Saini, W. N. W., Siong Hook Law, and Abd Halim Ahmad. 2010. "FDI and Economic Growth: New Evidence on the Role of Financial Markets." *Economics Letters* 107(2):211–13.
- Baharumshah, Ahmad Zubaidi, and Marwan Abdul-Malik Thanoon. 2006. "Foreign Capital Flows and Economic Growth in East Asian Countries." *China Economic Review* 17(1):70–83.
- Basu, Parantap, Chandana Chakraborty, and Derrick Reagle. 2003. "Liberalization, FDI, and Growth in Developing Countries: A Panel Cointegration Approach." *Economic Inquiry* 41(3):510–16.
- Borensztein, Eduardo, Jose De Gregorio, and Jong-Wha Lee. 1998. "How Does Foreign Direct Investment Affect Economic Growth?" *Journal of International Economics* 45(1):115–35.
- Breitung, Jörg. 2005. *The Local Power of Some Unit Root Tests for Panel Data*. Humboldt-Universität zu Berlin, Wirtschaftswissenschaftliche Fakultät.
- Dar, Atul, and Sal Amirkhalkhali. 2003. "On the Impact of Trade Openness on Growth: Further Evidence from OECD Countries." *Applied Economics* 35(16):1761–66.
- Esfahani, Hadi Salehi. 1991. "Exports, Imports, and Economic Growth in Semi-Industrialized Countries." *Journal of Development Economics* 35(1):93–116.
- Grossman, Gene M., and Elhanan Helpman. 1991. *Innovation and Growth in the Global Economy*. MIT press.
- Harrison, Ann. 1995. *Openness and Growth: A Time-Series, Cross-Country Analysis for Developing Countries*. National Bureau of Economic Research.
- Herzer, Dierk. 2008. "The Long-Run Relationship between Outward FDI and Domestic Output: Evidence from Panel Data." *Economics Letters* 100(1):146–49.
- Im, Kyung So, M. Hashem Pesaran, and Yongcheol Shin. 2003. "Testing for Unit Roots in Heterogeneous Panels." *Journal of Econometrics* 115(1):53–74.
- Krueger, Anne O. 1985. "The Experience and Lessons of Asia's Super Exporters." *Export-Oriented Development Strategies: The Success of Five Newly Industrializing Countries* 187–212.
- Levin, Andrew, Chien-Fu Lin, and Chia-Shang James Chu. 2002. "Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties." *Journal of Econometrics*

108(1):1–24.

- Liu, Xiaming, Haiyan Song, and Peter Romilly. 1997. “An Empirical Investigation of the Causal Relationship between Openness and Economic Growth in China.” *Applied Economics* 29(12):1679–86.
- Maddala, Gangadharrao S., and Shaowen Wu. 1999. “A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test.” *Oxford Bulletin of Economics and Statistics* 61(S1):631–52.
- Mah, Jai S. 2010. “Foreign Direct Investment Inflows and Economic Growth of China.” *Journal of Policy Modeling* 32(1):155–58.
- Mankiw, N. Gregory, David Romer, and David N. Weil. 1992. “A Contribution to the Empirics of Economic Growth.” *The Quarterly Journal of Economics* 107(2):407–37.
- De Mello Jr, Luiz R. 1997. “Foreign Direct Investment in Developing Countries and Growth: A Selective Survey.” *The Journal of Development Studies* 34(1):1–34.
- Miller, Stephen M., and Mukti P. Upadhyay. 2000. “The Effects of Openness, Trade Orientation, and Human Capital on Total Factor Productivity.” *Journal of Development Economics* 63(2):399–423.
- Pedroni, Peter. 2000. “Fully Modified Ols for Heterogeneous Cointegrated Panels. In Nonstationary Panels, Panels Cointegration, and Dynamic Panels.” *Nonstationary Panels, Panel Cointegration and Dynamic Panels*, 15:93–130.
- Pedroni, Peter. 2001. “Purchasing Power Parity Tests in Cointegrated Panels.” *Review of Economics and Statistics* 83(4):727–31.
- Rao, B. Bhaskara, Toani Takirua, and Toani B. Takirua. 2006. “The Effects of Exports, Aid and Remittances on Output: The Case of Kiribati,” Working Paper.” in No. 31/2006, *School of Economics, University of the South Pacific*. Available from <http://econpapers.repec.org/paper/pramprapa/1548.htm>. Citeseer.
- Rivera-Batiz, Luis A., and Paul M. Romer. 1991. “Economic Integration and Endogenous Growth.” *The Quarterly Journal of Economics* 106(2):531–55.
- Rodriguez, Francisco, and Dani Rodrik. 2000. “Policy Skeptic’s Growth.” *NBER Macroeconomics Annual* 15:261–325.
- Rodrik, Dani. 1999. “The New Global Economy and Developing Countries: Making Openness Work.”
- Romer, Paul M. 1990. “Endogenous Technological Change.” *Journal of Political Economy* 98(5, Part 2):S71–102.
- Solow, Robert M. 1956. “A Contribution to the Theory of Economic Growth.” *The Quarterly Journal of Economics* 70(1):65–94.