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THE IMPACT OF FDI AND EXCHANGE RATE ON GDP IN MENA COUNTRIES : EVIDENCE FROM THE PANEL APPROACH

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Abstract

This article empirically discusses the possible interactions between the rate of economic growth, the rate of change in inflows of foreign direct investment (FDI) and the rate of real equilibrium real exchange, in MENA countries (18 countries) for the period 2000 -2019. The result suggests that there is a positive relationship between financial development and economic growth. The study also documents that inflation and government expenditure have negative impact on economic growth for those selected MENA countries. The paper ends with some policy implications and potential limitations.

Keywords: GDP, FDI, Exchange rate, Dynamic Panel Modeling.
JEL Codes: C32, O47, F17, F31.

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1. Introduction

Empirical analysis of interactions is understood to mean the following: we will account for the linear relationships, past and present, between the three variables. Specifically, we will show how each of the three variables is determined by the other two (contemporary and structural relationships) by its past and the past of the other two (dynamic and autoregressive relationships), as the evolutionary aspect is decisive, Rey & Jaussaud (2012) for this analysis, we will begin by reporting in the first section the empirical trends declined in the following questions: What was the evolution of GDP and what were the different macroeconomic policies that were carried out for? What are the factors of attractiveness of FDI, and what is the reality of foreign direct investment in Algeria? What has been the evolution of the exchange rate and what have been the exchange policies adopted?

2. Literature review:

Recently, most studies have focused on the VAR, the cointégration approach and the causality test, our review of the literature is limited to studies that focus on the joint GDP, FDI and exchange rate on economic growth, which are highlighted in the table below

Table.1 Previous studies of the relationship between economic growth and trade openness ratio

Author(s)	Time Period	Country	Method	Outcome
WIJEWEERA, Albertand MOUNTER, Stuart(2008)	1950-2004	Sri lanka	VAR	GDP, exchange rates, interest rates, and the level of external trade.
Alex EHIMARE Omankhan(2011	1972-2006	Nigeria	OLS	positively to GDP when the contribution of.FDI
Abas et al (2011)	1996-2010	SAARC Countries	PANEL	a positive and significant relationship between GDP and FDI while an insignificant relationship between GDP and inflation.
Nabi and Malarvizhi(2014)	1991-2012	Malaysia	OLS	the Malaysian Foreign Direct Investment,

Sasi L (2016)	1971-2010	124 cross-country	Linear Panel	overall effects of FDI are positively associated with growth
Yu Z and Sufang Z(2018)	1982-2016	China	ARDL , VAR	the impacts of both services trade and exchange rate on China's carbon emissions were negative, the impacts of FDI inflows were positive.
Azzouzi and Bousselhami(2019)	1990-2017	Turkey and Morocco	ARDL, GARCH-M	a positive effect on FDI flows is only perceptible in Morocco. In addition, the series of structural reforms in Turkey
Umaru et al (2019)	1980-2017 (panel data)	West African speaking English	Panel	The findings of this study will help the countries under review and other nations in general to improve on monetary policy;

Abdul Mansoor, Taskeen Bibi(2019)	1980-2016	Pakistan	ARDL	both log run and short run relationship. In short run relationship the GDP is positively influences with the dependent variables.

Source : Author

3. Data

We consider the annual data covering the period 2000-2018 according to a sample of 18 countries of the MENA: these countries were selected on the basis of the available data in order to have a cy To reiterate, we used pooled cross-section and time-series data. As the study period covers 20 years and 13 cross-sectional units (countries), the total number of observations should be 360 year country observations (20 × 18). However, due to missing data for some of the cross-sectional units, the number of observations for each country is not identical. Therefore, this results in an unbalanced panel. Using panel data techniques have several advantages, for example, it gives "more informative data, more variability, less co-linearity among the variables, more degrees of freedom and more efficiency panel, in order to investigate the possibility of panel cointegration, it is first necessary to determine the order of integration before using cointegration techniques. For this purpose; we used Im,Pesaran and Shin test, which is being used intensively in panel unit root tests studies. IPS allows for heterogeneity both in intercept and slope terms for the cross section units and solves the serial correlation problem. Although the IPS test requires a balanced panel.

4. Result & Discussion

In this section, we propose to test our theoretical result: FDI and RER destabilize GDP in the MENA economies, with regard to the availability of data, we use panel data techniques to estimate the models. As we mentioned above, with nonstationary time series, the model needs to be a cointegrated relation, therefore, before estimating these relationships, we perform panel unit root testing and testing of existence of the cointegration relationship.

4.1 Panel root and cointegration tests

Panel unit roots are used to examine the degree of integration between three variables growth foreign direct investment real exchange rate by unit root panel testing. We are suggested as alternative tests to analyze the causal relationship between GDP , FDI and RER. In the panel structure as these tests capture country-specific effects as well as allowing heterogeneity in direction and in the magnitude of the parameters. To study the existence of unit roots in our series, we use three different unit root panel tests including

LEVIN, LIN and CHU (LLC); IM, PESARAN and SHIN (IPS), MADDALA and WU, and CHOI, for each technique, we test the presence of the unit root in panel using two types of models. The first model contains a constant while the second integrates the constant and the trend he most widely used LLC (2002) test is based on the Augmented DICKEY FULLER (ADF) test and is based on the assumption of panel homogeneity, the IPS test (2003) is an extension of the LLC test (2002). This test relaxes the hypothesis of panel homogeneity by allowing heterogeneity in autoregressive coefficients for all panel members. However, these two tests assume independence in cross section between the elements of the panel. However, to take into account possible correlations between countries in our sample, we used the MADDALA and WU (1999) and CHOI (2001) tests. In our sample, transverse dependence is clearly present because of the common membership of certain countries in economic unions and monetary. Thus, the MADDALA and WU (1999) and CHOI (2001) test appears to be superior to the IPS test, it is a non-parametric test based on the Fisher test and relaxing the hypothesis of the unit root process common to all members. of the panel. Furthermore, the result obtained on the basis of this test does not depend on the different delays in ADF regressions. Table 1 presents the unit root results under the assumption of independence between the members of the panel. Table no. 2 presents the results of the unit root test under the hypothesis of dependence between members of the panel. an analysis of these results, it appears that the variables gross domestic product and FDI and RER measured by the value of US Dollar are stationary at level in the model with individual constancy while in the model with individual constant and trend this variables are stationary at level ,the other variables are stationary in difference whatever the model considered, in conclusion, all the variables in our study being stationary, we can explore the cointegration relationship between financial this variables in economies of MENA countries.

Table 2. Unit Root Test Results (2nd Generation Tests)

PES–CADF

Variable	Constant	Constant and trend	Variable	Constant	Constant and trend
GDP	−1.478	0.128	**ΔGDP**	−12.467*	−12.004*
FDI	−0.671	0.784	**ΔFDI**	−11.638*	−11.453*
RER	−0.703	−1.085	**ΔRER**	−07.749*	−08.715*

CIPS

Variable	Constant	Constant and trend	Variable	Constant	Constant and trend
GDP	−1.577	−2.256	**ΔGDP**	−5.988	−4.847
FDI	−1.0847	−2.159	**ΔFDI**	−5.375	−4.957
RER	−1.667	−1.996	**ΔRER**	−5.482	−5.315

Notes: H_0: homogeneous non-stationary; general to particular based on F joint test; critical values, CIPS with constant: 10 % (−2.03), 5 % (−2.11), 1 % (−2.25); critical values CIPS with constant and trend: 10 % (−2.54), 5 % (2.62), 1 % (−2.76); * indicates significance at the 1 % level

Table 3. Westerlund's Cointegration Test Results

Test	Statistic	Z-value	P-value	Robust P-value
G_t	−3.247	−5.506	0.047	0.039
G_a	−1.549	−8.304	0.019	0.018
P_t	−5.889	−6.687	0.018	0.023
P_a	−7.168	−9.044	0.034	0.018

Notes: H_0: no cointegration; lags and lead automatically selected by AIC criterion with Bartlett-Kernel window width set according to $4(T/100)^{2/9} \approx 3$; robust *p*-value controls for cross-section dependence

4.2 Pedroni Test and Johansen Fisher Panel Cointegration Test

To determine whether a cointegrating relationship exits, the recently developed methodology proposed by Pedroni (2001) and Johansen Fisher panel cointegration are employed. Firstly we used four panel statistics which are v-statistic, p statistic, PP-statistic and ADF-statistic (within dimension) and three group panel statistics which are group p-statistic, group PP-statistic and group ADF-statistic (between dimension) to test the null hypothesis of no cointegration against the alternative hypothesis of cointegration. These

statistics are distributed asymptotically as standard normal. Secondly, we also conduct the Johansen fisher test to confirm that the existence of co integration between variables. The results are reported in Tables no. 2 and no. 3.

Table. 4 Pedroni panel cointegration test

Pedroni cointegration result test

Within dimension test statistic					Between dimension test statistic		
	stat	P-value	stat	p-value		stat	P-value
Panel v-statistic	1.28945	0.1134	0.0167	0.5467	Group rho-statistic	0.7832	0.3754
Panel rho-statistic	-0.7689	0.1937	-0.5715	0.2689	Group PP-statistic	-2.8954	0.0062
Panel PP-statistic	-2.4478	0.0054	-2.6854	0.0011	Group ADF-statistic	-3.5546	0.0002
Panel ADF-statistic	-2.4188	0.0043	-3.7893	0.0023			

Table .5 Johansen Fisher Panel Cointegration Test

No of CE(s)	Trace stat	P-value	Max eigen value	P-value
None	48.83	0.000	48.83	0.000
At most 1	26.76	0.345	26.76	0.345

Table 4 reports both the within and between dimension panel cointegration test statistics for each panel data set. These statistics are based on averages of the individual autoregressive coefficients associated with the unit root tests of the residuals for each country in the panel. The majority of all seven panel cointegration tests reject the null hypothesis of no cointegration at the 5% significance level for the panel. Consequently, the evidence suggests that in both panel data sets there is a long run equilibrium relationship between oil production variable and economic growth. The result of coitegration test in table no 5 indicates that all variables are cointegated. Johancen fisher panel cointegration test results confirmed that there is a long run cointegration relationship among the panel variables.

4.3 Panel cointegration modeling

The second step in our empirical work is to involve the investigating of the long-term relationship between the tree variables , analysis of the relationship our variables in MENA countries has been the subject of several studies (Table6) , first we propose to use the fully modified ordinary least squares (FMOLS) and dynamique least squares (DOLS),

by these two methods we can estimate a Panel A. With this in mind, we propose to use the Pooled Mean Group (PMG) method, the principle of which we outline before explaining the actual implementation. In addition, in order to confirm our choice, we compare the results of this method with those obtained by two alternative methods, notably those of the Mean Group (MG) and Dynamic Fixed Effects. (DFE) , Panel B depends these tree methods, so PMG estimates will not be consistent while MG estimates will give consistent estimates of the average of long-term coefficients among countries. To ensure that the estimation is consistent and efficient, the Hausman test is applied because for (PESARAN and SMITH, 1999), imposing an invalid restriction on the parameters in dynamic models generally results in underestimating the speed of adjustment. In our study, the Hausman test shows us that the PMG estimate is the most appropriate therefore we introduce a subgroup of long-term homogeneity restrictions. the empirical results are obtained by assuming that the residuals are normal and therefore, the likelihood model in panel is obtained as the product of the likelihood of each country, maximizing this likelihood simultaneously estimates the long-term and adjustment coefficients for each country, the maximum likelihood method allows us to have, from long-term coefficients, short coefficients term country by country as well as their error variances. Table 3 presents the results of the estimation of the long-term coefficients stemming from the stacked regressions of the effect of FDI and RER in the MENA country.

Table. 6 Panel estimation FMOLS, DOLS results

Panel A			
Panel Fully Modified Least Squares (FMOLS)		Panel Dynamic Least Squares (DOLS)	
Dependent variable is GDP		Dependent variable is GDP	
FDI	0.4431*	FDI	0.4669*
T-stat	6.5687	T-stat	6.7583
p-value	0.0000	p-value	0.0000
RER	*-0.3683***	RER	-0.3401**
T-stat	5.1465	T-stat	5.6645
p-value	0.023	p-value	0.021
R^2	**0.9515**	**R^2**	**0.9604**

Source: author. the values in brackets are significant at 1%, 5% and 10% respectively (***), (**) and (*)

FMOLS and DOLS estimates illustrate that GDP and inflation are significant at 5% and have the expected sign, while the interest rate is positive and significant. The results show the effect of FDI and RER has a positive and significant effect on demand for money in the strict sense. The results of the Hausman test confirm that the hypothesis of homogeneity of long-term coefficients cannot be rejected. Considering the GDP , the estimated average coefficient relating to the error correction term is negative and significant.

Table. 7 Results of dynamic panel modeling data

Long-term coefficients Panel B	method		
	PMG	MG	DFE
GDP	3.665*** (0.000)	2.339* (0.007)	0.586*** (0.000)
FDI	-6.118*** (0.000)	-3.411 (0.218)	3.223** (0.01)
RER	0.653 (0.112)	-1.397 (0.493)	-1.415** (0.03)
ECT (-1)	-0.341*** (0.000)	-0.231*** (0.000)	-0.176*** (0.000)
Hausman test	1.365 (0.177)	----	1.996 (0.882)
Obs	360	360	360

Source: author . the values in brackets are significant at 1%, 5% and 10% respectively (***), (**) and (*)

This analysis of the effect of FDI and RER on GDP the results of PMG, however those from the MG and DFE estimators are useful for comparison purposes ,the main results obtained are following:

PMG estimates illustrate that GDP, FDI and RER are significant at 5% and have the expected sign.. the results of Hausman test confirm that the assumption of homogeneity of long-term coefficients cannot be rejected regarding the relationship. Likewise in this case, the results of the Hausman test confirm that the assumption of homogeneity of long-term coefficients cannot be rejected concerning the relationship between the variables, there by confirming the long-term or equilibrium relationship between GDP and its determinants.

5. Conclusion

Our analysis of the possible interactions between the three macroeconomic aggregates that are GDP, FDI and the Exchange Rate, both contemporary and structural, aimed to empirically verify whether, in the MENA countries case, the FDI and foreign exchange policy efforts have produced the expected effects on economic growth. We were able to identify the following empirical results. First, we note that the MENA 's current level of economic growth is determined by previously adopted FDI and exchange rate policies, which the exchange rate turns out to be a key variable FDI flows, and that the exchange rate is only determined by the exchange policies undertaken in the past, secondly, in terms of FDI, there is an ambiguity between the theoretical lessons and the empirically obtained results. It appeared to us that an increase in FDI flows contributes initially negatively to growth, which is hardly sustainable economically, because even if it is made by foreigners, FDI like any other investment should contribute to growth. Thirdly, we also managed to verify that according to our empirical results the exchange rate is a positive function of the previous values of the growth rate and the rate of change of FDI. Furthermore, by performing a modeling in which the variable of FDI rates is an explanatory variable of the

endogenous variables GDP rate and Exchange Rate, we obtained very statistical results, which means that FDI take on an exogenous aspect compared to GDP and FDI.

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