



Macroeconomic determinants of economic growth using panel data analysis

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Abstract: This study aims to identify the most important determinants of economic growth in a sample of six countries from the Middle East and North Africa region. Two of which are from high-income countries, Bahrain and Saudi Arabia, and two of the highest middle-income countries, Jordan and Lebanon, and two from lower Middle income, namely Egypt and Morocco. They were chosen in addition to the classification of income groups, based on data available to sample countries during the period 2001-2017. Augmented-Dickey-Fuller, a test of stationarity of endogenous and exogenous variables, and Granger Causality Analysis were used to infer the causal relationship between these variables and economic growth. By applying Panel Data Analysis, according to Hausman Test, and by comparison between the fixed and random effect models, the results showed a preference for the random effect model. The results showed that the employment rate, foreign direct investment, gross national income, government expenditure, and inflation were among the most important in determining economic growth in the region during that period. All of them had a significant and positive impact on economic growth, except for the rate of growth in gross national income, which negatively affected the rate of economic growth. The pairwise Granger Causality showed that unidirectional causality is running from foreign direct investment Gross Domestic Product growth rates, from both Gross Capital Formation growth rates and Imports growth rates to Employment Ratio. Unidirectional causality also runs from both of Exports growth rates, Gross Capital Formation growth rates, Imports growth rates to Foreign Direct Investment as a percent of Gross Domestic Product. There is also unidirectional causality from foreign direct investment and imports to unemployment.

Keywords: *Economic growth; GDP; FDI; Exports; Labor force; government expenditures; Inflation; Panel Data Analysis; Unit root Test.*



1. Introduction

Despite the fact that the case of economic growth had been examined by various researchers. Besides, the determinants that increase or hinder economic growth between theoretical and empirical studies, but little consensus has been reached and argued. The impact of the same determinant could be positive or negative or even has no impact at all, depending on the difference in conditions or time or region. Region of the Middle East and North Africa, through the period 2001-2017, faced vital global and national conditions affected the economic performance. Since the September 11th attacks, 2001, energy crises 2003-2009, financial crises 2007-2009, oil prices bubble 2008, sub-prime mortgage 2007-2010, and Arab Spring 2011 revolutions. There are few studies of determinants of economic growth in the region through that period to the extent of our knowledge. This paper contributes to fill the gap in this period.

This subject is very important all over the world, especially the developing countries, and more especially the Middle East and North Africa (MENA) region. Achieving strong and sustainable economic growth plays an important role in reducing poverty, creating jobs, and improving standards of living. Those among reasons that caused the explosion of revolutions in the region. The contribution of this study, not only to explore major determinants of economic growth but also to find out causal relationships between those determinants and economic growth.

Although economic growth in the MENA region slowed down from 0.8 percent in 2018 to 0.1 percent in 2019, it is projected to increase to 2.4 percent in 2020. An increase in growth rates is expected to be affected by supporting higher investments and continued reforms efforts. However, challenges such as high unemployment and inflation

rates, political instability, global trade tensions and uncertainty, and many others, still need to be resolved by more sustained growth. (World Bank 2020).

To face these challenges, it is important to define major factors that contribute to economic growth. There are several studies in the era of economic growth either in a sample of countries such as (Dewan and Hussein, 2001, Makdisi et al., 2006; Kabir, 2003; Al-Iriani, 2007; Alguacil et al., 2011; Levina, 2011; Hossain, 2016; Sheshgelani and Badri, 2017), or in a single case country (Piazolo, 1996; Abou-Stait, 2005; Amin, 2011; Havi et al., 2013). Foreign Direct Investment, Exports, Gross Capital Formation, Labor Force, Inflation Rate, Government Expenditures, among most factors that included in those studies.

As economic performance varies across countries and regions, especially, the MENA region relative to the rest of the world (Makdisi et al., 2006). The main objective of this study is to discover the key determinants that maintain economic growth, in a sample of six countries from MENA region. Namely, Bahrain, Saudi, Jordan, Lebanon, Egypt and Morocco through the periods from 2001 until 2017. Choosing these countries from the region, due to data availability for all countries for all years.

In particular, this paper tries to empirically find out the determinants of economic growth and investigate the direct linkage between them. To achieve this object, the paper is structured as follows: in section 2, **the Review of Literature** has been introduced. Section 3 describes the **Data and Variables**. **The Research Methodology** are presented in section 4. In section 5, **the Results and Discussion** have been discussed. Finally, **the Conclusion and Policy Implications** has been introduced in section 6.

2. Review of Literatures

Among several type of research investigates determinants of economic growth within the frame of economic growth theory. This study limited the literature review by starting with some influential studies, then some of the major empirical studies focusing on developing countries especially, MENA region.

Within the framework of economic growth, two important theories include much of the studies argue the determinants of economic growth. These theories are the neoclassical theory (exogenous growth theory) and endogenous growth theory. Their main concentration was on factors such as physical and human capital accumulation (Solow 1956; Romer, 1986; Lucas, 1988 and others).

Solow, 1956, explained the economic growth by capital accumulation, human capital or population growth, and an increase in productivity. Its core was the neoclassical production function. Romer, 1986; specified a model of long-run growth in which knowledge is assumed to be an input in production that has increasing marginal productivity. His model was essential with endogenous technological change instead of that based on diminishing returns. Lucas (1988), Sergio, (1991), omitted technological change and replaced with investment in human capital, which has a spillover effect on the economy.

There is a vast empirical study on determining key macroeconomic factors of economic growth. Most econometric methodologies adopted on these studies include cross-country, panel data, and single-country regression analysis.

Study of Dollar (1992), covered the period 1976-1985 in 95 developing countries. Using a cross - sectional regression analysis, the study showed that key determinants with significant impact on growth include investment rate that is positively associated with economic growth, and real exchange rate that is negatively associated with economic growth.

Most and Van Den Berg (1996), examined empirical evidence for 11 Sub-Saharan African countries. They used a country-specific time series regression instead of cross- section. Analysis. They focused on the relation between economic growth and three sources of investments funds that are: foreign aids, foreign direct investments, and domestic savings. The study showed that, while foreign direct investment is positively and significantly associated with economic growth in Ivory Coast, Niger, Kenya and Togo; associated negatively and significantly in Mauritius and Rwanda. This mixture of results across the 11 countries, implying that it is not possible to rank one source of investment ahead of any other.

Piazolo (1996): aimed to determine factors of growth in Indonesia. Using time series analysis over 1965-1992 period. He investigated that human capital, investment, government consumption, imports and inflation, enhance economic performance in the long run, while in the short run, the effect of exports is strongly positive.

Barro (2003), studied 87 developing and developed countries through the period 1965-1995 and investigated from cross-country panel regression that the differences in per capita growth rates relate to a set of variables. For a given per capita GDP and human capital, growth depends positively on the rule of law and investment ratio. It depends negatively on the fertility rate, the ratio of government consumption to GDP, and the inflation rate. It also revealed that growth increases with favorable movements in terms of trade and with increased international openness.

Chang and Mendy (2012), examined the effects of trade policies on economic growth in Africa. Using panel fixed effect regression model of 36 African countries, covering the period 1980-2009, the results illustrates that openness in trade and investment are positively and significantly related to economic growth. However, foreign aid,

gross national savings and investments have negative impact on both Gross Domestic Product (GDP) growth. Their most important result to this study is that Middle East and North Africa, is the best one in generating positive GDP growth from Foreign Direct Investment (FDI), followed by Middle Africa, then East Africa, followed by West Africa, compete for the third and fourth position consequently.

Both exports and imports represent a degree of openness and Globalization indicator which has been a meaningful effect on economic growth in many studies. Several studies examined their influence on economic growth (Saaed and Hussain 2015; Sheshgelani and Badri, 2017).

Although exports play an important role in easing the pressure on balance of payment and creating job opportunities, and represent one of the most important sources of income and employment, its causality effect with economic growth has been subject to empirical researches. Abou-Stait (2005) examined the causal relation between exports, imports and GDP. Applying cointegration and causality analysis for Egypt over the period 1977-2003, the results supported that both exports, imports, and GDP, are not cointegrated and exports Granger cause GDP growth. But they don't support the Granger causality between exports and capital formation.

Although the study of Kabir (2003), used a panel of 95 countries and 8 MENA countries over the period 1980-2001, the results found that domestic and foreign investments, positively influence GDP growth, but, government expenditures, human capital, and inflation rate significantly negative at 0.1 percent. However, comparing the results of all countries in the study, GDP growth in MENA countries, was poorly explained by those factors.

Over the years, countries have been made a lot of economic reforms to diversify products and sources of income. Attracting FDI instead of discouraging it, was among these reforms. Many studies showed that FDI is more stable than other forms of capital flows, It helps in accumulating capital as a source of investments, creates jobs, increases competition and transfers technology to the host country, (Ajayi, 2006; Moussa et al, 2016).

Others examined the relation between FDI and economic growth (Kabir, 2003; Al-Iriani, 2007; Alguacil et al, 2011; Levina, 2011; Havi et al., 2013).

When Makdisi et al. (2006) studied the determinants of growth in MENA region through the period 1960-1998, they used cross- country regression analysis. They found that capital is less efficient, trade openness less beneficial to growth. That was because of economic growth pattern in MENA region, which referred to heavy reliance on oil, weak economic base, high population growth and unemployment rates, dominant of the state in the economic sector, low level of integration with the world, underdeveloped financial and capital markets, underdeveloped institutions, and low rates of returns on human and physical capital. They also concluded that the quality of institutions and human capital accounted for low economic performance of MENA countries.

Al-Iriani (2007), examined the causality relation between FDI and economic growth. Panel data of six countries comprising the Gulf Cooperation Council (GCC), is used, through the period from 1970 till 2004. The results revealed that there is a strong causal link from FDI to GDP and vice versa in the GCC. Thus, FDI enhances economic growth, and more economic growth leads to attracting more FDI inflows in Gulf Countries.

Levina (2011) and Alguacil et al., (2011), investigated the role of FDI in developing countries. Applying cross-country regression on a sample of 26 developing countries from Latin America and Asia, between 1976 and 2005, in the first study, and 52 developing countries, in the second study, including, Egypt, Bahrain, Jordan, and Morocco, from MENA region through the period 1995-2009. Both studies indicated positive relation between FDI and economic growth. However, the study of Alguacil et al., (2011), showed independent effect of FDI on economic growth in the lower income countries in the sample.

Although FDI continued to be an important subject for its positive role in economic growth (Hossain, 2016; Sheshgelani and Badri, 2017), benefits from FDI in the higher income countries, depend on considerations of macroeconomic and institutional environment, Havi et al, (2013). On the contrary, according to Bouchoucha and Bakari, 2019, domestic investment and foreign direct investment have a negative effect on economic growth in the long run. However, in the short run, only domestic investment causes economic growth.

Relation between government consumption expenditures and economic growth had a great deal of interest among researchers, not only for theoretical importance, but also for policy decisions (Piazolo, 1996; Dewan and Hussein, 2001; Amin, 2011; and Havi et al., 2013). However, the results are differed. Chimobi, 2009, suggested that relation runs from government consumption expenditures to income, depending on Keynesian theory and public expenditure. On the other hand, Amin, 2011; proposed that the relation runs from income to public expenditures.

Although the relation between inflation and economic growth is of great interest in macroeconomics, the exact relationship is not defined and still opened. In general, inflation has a negative effect on economic growth (Gillman and Harris, 2010; Baharumshah et al. 2016). In addition to this opinion, empirical findings provide three other insights in that matter. The first is that inflation doesn't have any influence on economic growth (Cameron et al., 1996). The second is that inflation has a positive effect on economic growth (Benhabib and Spiegel, 2009). The third type of relation reveals that inflation affects economic growth according to certain thresholds (Aydin et al., 2016; Vinayagathan, 2013; Tung and Thanh, 2015), or differentiate between developed and developing countries (Abbott and De Vita, 2011). Our study tries to investigate which type of relationship between inflation and economic growth, if any.

3. Data and Variables

The data used are extracted from the World Bank (world development indicators, database archives). The study covers the period 2001-2017 for six countries include Bahrain, Jordan, Egypt, Lebanon, Morocco, and Saudi Arabia. The availability of all data covering the whole period was among the important reasons for choosing these countries.

3.1 Economic Growth and other Variables

The study employs various variables that may influence economic growth. Real Gross Domestic Product (GDP) growth rates (Y1), and real GDP per capita growth rates (Y2) were used as dependent variables, reflecting annual growth rates between 2001 and 2017. Suggested independent variables, X1..., X10 have been chosen among the most important determinants of economic growth in most theoretical and empirical studies. Also, according to the availability of data through the period of study in all countries in the sample.

X1, (EMPL): Employment to Population Ratio. X2, (EX): Exports Growth Rates.

X3, (FDI): Foreign Direct Investment as a percent of GDP.

X4, (GGC): General Government Final Consumption Expenditures Growth Rates.

X5, (GNI): Gross National Income Growth Rates. X6, (GNI): Per Capita Growth Rates.

X7, (GCF): Gross Capital Formation Growth Rates. X8, (M): Imports Growth Rates.

X9, (INF): Inflation Rates Annually.

X10, (UNEMPL): Unemployment as a ratio of total labor force.

3.2 Descriptive of Variables

Table one shows the descriptive statistics of variables, and table two indicate the correlation among the variables.

Table one shows that average growth rates of GDP and GDP per capita are 4.2% and 1.1, respectively. Maximum and Minimum GDP growth rate among the samples through the period is 11.24% and -2.8% annually, respectively. However, that of GDP per capita are 8.5 and -5.4 %. The average mean of employment to population ratio is 47.2%, maximum and minimum are 71.7% and 33.3%. The mean of export growth rates through the period is 5.5%, ranging between 86% in its maximum level and -15% in the minim. Mean FDI to GDP ratio is 5.01%, while the maximum and minimum ratios are 23.5%, -0.32%. Mean growth rates of imports, and inflation and unemployment ratios are 6.5%, 4.5%, and 8%. Maximum and minimum for them are 52.5%, -20.3% for imports, 22.9, -16.9 for inflation, and 15.3, 0.8 for unemployment, respectively.

Table (1): Descriptive Statistics

	Y1	Y2	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
Mean	4.28	1.18	47.22	5.51	5.02	4.23	4.23	1.13	6.83	6.54	4.59	8.06
Median	3.96	1.22	44.00	3.42	3.85	3.48	3.74	1.21	6.21	4.47	3.17	8.73
Maximum	11.24	8.60	71.74	86.04	23.54	23.59	23.25	18.09	37.06	52.51	22.93	15.30
Minimum	-2.82	-5.49	33.34	-15.03	-.32	-17.39	-10.23	-14.56	-29.31	-20.33	-16.91	.84
Std. Dev.	2.60	3.11	10.83	12.40	4.50	6.03	4.06	4.40	11.93	11.53	6.70	4.21
Skewness	.19	.17	1.20	2.85	1.37	.33	.90	.30	.08	1.03	-.08	-.25
Kurtosis	3.26	2.74	3.36	18.88	5.07	5.36	8.75	6.11	3.11	5.24	4.58	2.14
Jarque-Bera	.89	.81	25.05	1208.76	50.19	25.47	154.18	42.56	.17	39.21	10.76	4.17
Probability	.64	.67	.00	.00	.00	.00	.00	.00	.92	.00	.00	.12
Sum	436.55	120.18	4816.47	561.89	511.59	431.61	431.51	115.68	696.84	667.14	467.95	821.75
Sum Sq. Dev.	682.96	976.43	11851.78	15521.03	2046.57	3669.12	1662.51	1954.62	14369.19	13424.39	4531.14	1788.68
Observations	102	102	102	102	102	102	102	102	102	102	102	102

From table two, there is a significantly positive correlation between GDP (Y1) and all the independent variables except employment ratios X1 and X10. While GDP per capita (Y2) significantly correlates positively with X2 (export growth rates), X5 (GNI growth rates), X6 (GNI per capita growth rates), X7 (Gross Capital Formation), X8 (imports growth rates) and X10 (unemployment ratio).

Table (2): Correlations Matrix

		Y1	Y2	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
Y1	Pearson Correlation	1	.822**	.013	.260**	.403**	.223*	.686**	.620**	.514**	.287**	.299**	.035
	Sig. (2-tailed)		.000	.895	.008	.000	.024	.000	.000	.000	.003	.002	.726
	N	102	102	102	102	102	102	102	102	102	102	102	102
Y2	Pearson Correlation	.822**	1	-.162	.303**	.184	.116	.594**	.765**	.392**	.311**	.185	.237*
	Sig. (2-tailed)	.000		.105	.002	.065	.247	.000	.000	.000	.001	.063	.016
	N	102	102	102	102	102	102	102	102	102	102	102	102
X1	Pearson Correlation	.013	-.162	1	-.065	-.184	.194	.007	-.115	.112	.037	-.081	-.896**
	Sig. (2-tailed)	.895	.105		.519	.064	.050	.944	.250	.262	.713	.420	.000
	N	102	102	102	102	102	102	102	102	102	102	102	102
X2	Pearson Correlation	.260**	.303**	-.065	1	.036	-.078	.191	.235*	.077	.661**	.243*	.093
	Sig. (2-tailed)	.008	.002	.519		.717	.435	.054	.017	.444	.000	.014	.351
	N	102	102	102	102	102	102	102	102	102	102	102	102
X3	Pearson Correlation	.403**	.184	-.184	.036	1	.097	.220*	.096	.280**	.096	.132	.097
	Sig. (2-tailed)	.000	.065	.064	.717		.334	.026	.340	.004	.336	.186	.333
	N	102	102	102	102	102	102	102	102	102	102	102	102
X4	Pearson Correlation	.223*	.116	.194	-.078	.097	1	.027	-.021	-.002	.173	.244*	-.157
	Sig. (2-tailed)	.024	.247	.050	.435	.334		.784	.834	.982	.082	.014	.115
	N	102	102	102	102	102	102	102	102	102	102	102	102
X5	Pearson Correlation	.686**	.594**	.007	.191	.220*	.027	1	.916**	.436**	.183	.122	.031
	Sig. (2-tailed)	.000	.000	.944	.054	.026	.784		.000	.000	.065	.223	.755
	N	102	102	102	102	102	102	102	102	102	102	102	102
X6	Pearson Correlation	.620**	.765**	-.115	.235*	.096	-.021	.916**	1	.370**	.218*	.067	.175
	Sig. (2-tailed)	.000	.000	.250	.017	.340	.834	.000		.000	.027	.506	.078
	N	102	102	102	102	102	102	102	102	102	102	102	102
X7	Pearson Correlation	.514**	.392**	.112	.077	.280**	-.002	.436**	.370**	1	.493**	.358**	-.113
	Sig. (2-tailed)	.000	.000	.262	.444	.004	.982	.000	.000		.000	.000	.258
	N	102	102	102	102	102	102	102	102	102	102	102	102
X8	Pearson Correlation	.287**	.311**	.037	.661**	.096	.173	.183	.218*	.493**	1	.444**	-.036
	Sig. (2-tailed)	.003	.001	.713	.000	.336	.082	.065	.027	.000		.000	.723
	N	102	102	102	102	102	102	102	102	102	102	102	102
X9	Pearson Correlation	.299**	.185	-.081	.243*	.132	.244*	.122	.067	.358**	.444**	1	.097
	Sig. (2-tailed)	.002	.063	.420	.014	.186	.014	.223	.506	.000	.000		.331
	N	102	102	102	102	102	102	102	102	102	102	102	102
X10	Pearson Correlation	.035	.237*	-.896**	.093	.097	-.157	.031	.175	-.113	-.036	.097	1
	Sig. (2-tailed)	.726	.016	.000	.351	.333	.115	.755	.078	.258	.723	.331	
	N	102	102	102	102	102	102	102	102	102	102	102	102

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

4. The Research Methodology

To analyze the empirical relationship between the (GDP) growth rates, real GDP per capita growth rates and the explaining variables the panel data approach is used. Panel data, sometimes referred to as longitudinal data, is data that contains observations about different cross-sections across time. Examples of groups that may make up panel data series include countries, firms, individuals, or demographic groups. Like time-series data, panel data contain observations collected at a regular frequency, chronologically. Like cross-sectional data, panel data contain observations across a collection of individuals. Panel data contain more information, more variability, and more efficiency than pure time-series data or cross-sectional data. It can detect and measure the statistical effects that pure time series or cross-sectional data can't. On the other hand, panel data can minimize estimation biases that may arise from aggregating groups into a single time series. Panel data can be balanced when all individuals are observed in all time periods or unbalanced when individuals are not observed in all time periods. Panel data can be used in economics, social sciences, medicine and epidemiology, finance, and the physical sciences. (Wooldridge, 2003).

4.1 Unit Root Test and Determination of Lag-Length

The classical regression model requires that the dependent and independent variables in a regression be stationary in order to avoid the problem of what is called "spurious regression". To avoid spurious regression, a test for stationarity of the endogenous and exogenous variables has been done using both Levin, Lin & Chu and Augmented Dickey Fuller (ADF). Table three clarifies ADF statistics and corresponding critical values in their levels. One of the most important issues in conducting the unit root test is to select the appropriate lag length. It is clear that X2, X4, X8 are stationary in their level. X1 is stationary in the first difference form. However, the rest of the variables are stationary in the first difference form. This means that all variables are stationary at five percent level of significance, but X2, X4, and X8, with no difference, X2, by taking the second difference. And the rest of the variables by taking the first difference.

Table (3): Unit Root Test

		Level		Difference		
		t-Statistic	Prob.	t-Statistic	Prob.	Degree
Y1	Levin, Lin & Chu ADF	-0.76942	0.2208	-4.81705	0.0000	First
		18.8628	0.0919	55.4691	0.0000	
Y2	Levin, Lin & Chu ADF	-1.13347	0.0414	-4.15469	0.0000	First
		21.6705		50.0306	0.0000	
X1	Levin, Lin & Chu ADF	-0.16180	0.4357	-5.40841	0.0000	Second
		6.44240	0.8922	52.1500	0.0000	
X2	Levin, Lin & Chu ADF	-4.21530	0.000			
		33.2514	0.0009			
X3	Levin, Lin & Chu ADF	-2.10048	0.0178	-4.37626	0.0000	First
		27.7523	0.0060	35.5422	0.0004	
X4	Levin, Lin & Chu ADF	-4.60075	0.0000			
		36.1154	0.0003			
X5	Levin, Lin & Chu ADF	-1.15790	0.1235	-4.73834	0.0000	First
		24.0979	0.0197	67.0154	0.0000	
X6	Levin, Lin & Chu ADF	-1.46575	0.0714	-4.21971	0.0000	First
		22.6243	0.0311	63.6091	0.0000	
X7	Levin, Lin & Chu ADF	-1.98470	0.0236	-5.94790	0.0000	First
		24.6150	0.0168	56.4015	0.0000	
X8	Levin, Lin & Chu ADF	-2.84996	0.0022			
		26.7729	0.0083			
X9	Levin, Lin & Chu ADF	-2.57996	0.0049	-5.09714	0.0000	First
		19.4791	0.0000	49.9326	0.0000	
X10	Levin, Lin & Chu ADF	-1.77062	0.0308	-2.87228	0.0020	First
		16.9964	0.1497	21.3133	0.0460	

4.2 Granger Causality Test

To examine the linear causality between variables, and determine its direction, the Granger Causality Test has been performed. The results of table four, indicate that Granger causality runs one-way only from Y1 to Y2. Unidirectional causality is running from X3 to Y1, both of X7 and X8 to X1, both of X2, X7, and X8 to X3. There is also unidirectional causality from X3 to X10, from X5 to X6, and from X8 to X10. This means that: FDI can cause real gross domestic product rates. Unidirectional causality running from both EX, GCF and M to FDI, and from FDI and M to UNEMP ratio. This refers to that although EX, GCF and M doesn't cause GDP directly, they can indirectly affect GDP through their impact on FDI, because of their Granger cause FDI. Hence, it is necessary for the countries in the region to support activities that leads to more capital formation and opening all over the world to increase its share from the world economy, and attract FDI to faster economic growth. However, forms of FDI to MENA region lead to an increase in imports and unemployment. This refers to the importance of concentrating on attracting forms of FDI that create more jobs, to benefit from labor power in the region. In the same time, it is necessary for labor to enhance their education, skills and training, to be able to deal with modern technological systems.

Table (4). Pairwise Granger Causality Tests

Prob.	F-Statistic	Obs	Null Hypothesis:
0.3591 6.E-06	1.03649 13.9908	90	Y2 does not Granger Cause Y1 Y1 does not Granger Cause Y2
0.8892 0.4738	0.11757 0.75366	90	X1 does not Granger Cause Y1 Y1 does not Granger Cause X1
0.4702 0.7792	0.76131 0.25018	90	X2 does not Granger Cause Y1 Y1 does not Granger Cause X2
0.0167 0.6501	4.29594 0.43276	90	X3 does not Granger Cause Y1 Y1 does not Granger Cause X3
0.2960 0.1642	1.23493 1.84568	90	X4 does not Granger Cause Y1 Y1 does not Granger Cause X4
0.6967 0.0608	0.36292 2.89364	90	X5 does not Granger Cause Y1 Y1 does not Granger Cause X5
0.4700 0.1082	0.76177 2.28324	90	X6 does not Granger Cause Y1 Y1 does not Granger Cause X6
0.1593 0.3831	1.87724 0.97035	90	X7 does not Granger Cause Y1 Y1 does not Granger Cause X7
0.3923 0.7844	0.94622 0.24351	90	X8 does not Granger Cause Y1 Y1 does not Granger Cause X8
0.6690 0.8630	0.40383 0.14765	90	X9 does not Granger Cause Y1 Y1 does not Granger Cause X9
0.7130 0.2213	0.33955 1.53535	90	X10 does not Granger Cause Y1 Y1 does not Granger Cause X10
0.5071 0.9437	0.68448 0.05796	90	X1 does not Granger Cause Y2 Y2 does not Granger Cause X1
0.6080 0.6811	0.50047 0.38585	90	X2 does not Granger Cause Y2 Y2 does not Granger Cause X2
0.0751 0.7372	2.67012 0.30594	90	X3 does not Granger Cause Y2 Y2 does not Granger Cause X3
0.3330 0.6927	1.11405 0.36878	90	X4 does not Granger Cause Y2 Y2 does not Granger Cause X4
0.0330 0.0432	3.55076 3.26055	90	X5 does not Granger Cause Y2 Y2 does not Granger Cause X5
0.6813 0.0047	0.38556 5.71447	90	X6 does not Granger Cause Y2 Y2 does not Granger Cause X6
0.5559 0.4960	0.59131 0.70703	90	X7 does not Granger Cause Y2 Y2 does not Granger Cause X7
0.3763 0.6904	0.98860 0.37216	90	X8 does not Granger Cause Y2 Y2 does not Granger Cause X8
0.2645	1.35097	90	X9 does not Granger Cause Y2

0.7947	0.23044	Y2 does not Granger Cause X9
0.5132	0.67230	90 X10 does not Granger Cause Y2
0.1950	1.66651	Y2 does not Granger Cause X10
0.5067	0.68531	90 X2 does not Granger Cause X1
0.4085	0.90473	X1 does not Granger Cause X2
0.0581	2.94314	90 X3 does not Granger Cause X1
0.5262	0.64685	X1 does not Granger Cause X3
0.1406	2.00778	90 X4 does not Granger Cause X1
0.0532	3.03663	X1 does not Granger Cause X4
0.4097	0.90171	90 X5 does not Granger Cause X1
0.7978	0.22652	X1 does not Granger Cause X5
0.7402	0.30184	90 X6 does not Granger Cause X1
0.7335	0.31107	X1 does not Granger Cause X6
0.0052	5.59186	90 X7 does not Granger Cause X1
0.6184	0.48333	X1 does not Granger Cause X7
0.0341	3.51650	90 X8 does not Granger Cause X1
0.4984	0.70219	X1 does not Granger Cause X8
0.7582	0.27773	90 X9 does not Granger Cause X1
0.6499	0.43309	X1 does not Granger Cause X9
0.0650	2.82269	90 X10 does not Granger Cause X1
0.4943	0.71039	X1 does not Granger Cause X10
0.1445	1.97947	90 X3 does not Granger Cause X2
0.0053	5.57118	X2 does not Granger Cause X3
0.9486	0.05278	90 X4 does not Granger Cause X2
0.6336	0.45876	X2 does not Granger Cause X4
0.4474	0.81186	90 X5 does not Granger Cause X2
0.4760	0.74882	X2 does not Granger Cause X5
0.9223	0.08100	90 X6 does not Granger Cause X2
0.4343	0.84233	X2 does not Granger Cause X6
0.8651	0.14521	90 X7 does not Granger Cause X2
0.2231	1.52698	X2 does not Granger Cause X7
0.1015	2.35038	90 X8 does not Granger Cause X2
0.3575	1.04106	X2 does not Granger Cause X8
0.7045	0.35178	90 X9 does not Granger Cause X2
0.9980	0.00198	X2 does not Granger Cause X9
0.3429	1.08400	90 X10 does not Granger Cause X2
0.3150	1.17108	X2 does not Granger Cause X10
0.6105	0.49637	90 X4 does not Granger Cause X3
0.5824	0.54407	X3 does not Granger Cause X4
0.0722	2.71056	90 X5 does not Granger Cause X3
0.0141	4.48434	X3 does not Granger Cause X5

0.1085	2.27985	90	X6 does not Granger Cause X3
0.1388	2.02116		X3 does not Granger Cause X6
0.0264	3.79301	90	X7 does not Granger Cause X3
0.0920	2.45396		X3 does not Granger Cause X7
0.0268	3.77919	90	X8 does not Granger Cause X3
0.1804	1.74749		X3 does not Granger Cause X8
0.7378	0.30517	90	X9 does not Granger Cause X3
0.9219	0.08145		X3 does not Granger Cause X9
0.4483	0.80995	90	X10 does not Granger Cause X3
0.0344	3.50827		X3 does not Granger Cause X10
0.3880	0.95748	90	X5 does not Granger Cause X4
0.3165	1.16618		X4 does not Granger Cause X5
0.8230	0.19530	90	X6 does not Granger Cause X4
0.3343	1.10998		X4 does not Granger Cause X6
0.2758	1.30774	90	X7 does not Granger Cause X4
0.4445	0.81848		X4 does not Granger Cause X7
0.1474	1.95819	90	X8 does not Granger Cause X4
0.8447	0.16905		X4 does not Granger Cause X8
0.0092	4.95193	90	X9 does not Granger Cause X4
0.1416	2.00043		X4 does not Granger Cause X9
0.3364	1.10347	90	X10 does not Granger Cause X4
0.8600	0.15110		X4 does not Granger Cause X10
0.2180	1.55073	90	X6 does not Granger Cause X5
4.E-05	11.3024		X5 does not Granger Cause X6
0.1618	1.86078	90	X7 does not Granger Cause X5
0.7195	0.33050		X5 does not Granger Cause X7
0.2622	1.35978	90	X8 does not Granger Cause X5
0.4724	0.75662		X5 does not Granger Cause X8
0.9661	0.03448	90	X9 does not Granger Cause X5
0.7733	0.25784		X5 does not Granger Cause X9
0.5815	0.54567	90	X10 does not Granger Cause X5
0.4586	0.78668		X5 does not Granger Cause X10
0.8662	0.14391	90	X7 does not Granger Cause X6
0.7023	0.35482		X6 does not Granger Cause X7
0.1966	1.65829	90	X8 does not Granger Cause X6
0.5830	0.54300		X6 does not Granger Cause X8
0.5890	0.53264	90	X9 does not Granger Cause X6
0.7873	0.23979		X6 does not Granger Cause X9
0.5629	0.57864	90	X10 does not Granger Cause X6
0.3727	0.99843		X6 does not Granger Cause X10
0.3254	1.13764	90	X8 does not Granger Cause X7
0.7005	0.35750		X7 does not Granger Cause X8

0.7027	0.35432	90	X9 does not Granger Cause X7
0.8004	0.22325		X7 does not Granger Cause X9
0.3890	0.95462	90	X10 does not Granger Cause X7
0.1238	2.14127		X7 does not Granger Cause X10
0.7628	0.27159	90	X9 does not Granger Cause X8
0.7482	0.29112		X8 does not Granger Cause X9
0.6473	0.43712	90	X10 does not Granger Cause X8
0.0215	4.01875		X8 does not Granger Cause X10
0.5710	0.56415	90	X10 does not Granger Cause X9
0.8277	0.18957		X9 does not Granger Cause X10

4.3 Panel Data Analysis

All the data are analyzed using EViews 9. Panel data analysis is used to get the fixed and random effects models where the sectors are the six countries.

Tables five and six, represent the fixed and random effect models for Y1 and Y2 as dependent variables, respectively. The models are taken after eliminating X7 since it is significantly correlated with other independent variables. To determine the right model between the fixed and random effects model, the Correlated Random effects-Hausman test is conducted.

Hausman test for the Exogeneity of the Unobserved Error Component If the unobserved effects are exogenous, the FE and RE are asymptotically equivalent. This suggests the null hypothesis for the Hausman test: $H_0: \hat{\beta}_{RE} = \hat{\beta}_{FE}$, where $\hat{\beta}_{RE}$ and $\hat{\beta}_{FE}$ are coefficient vectors for the time-varying explanatory variables, excluding the time variables. If the null hypothesis is rejected, we conclude that RE is inconsistent, and the FE model is preferred. If the null hypothesis cannot be rejected, random effects is preferred because it is a more efficient estimator.

Based on the results of table seven. According to the Hausman test, the probability value here is 1.0000 that is greater than 5% thereby we accept the null hypothesis and conclude that the random-effects model is appropriate.

The estimated model presented in equation (1.1) for Y1, then equation (1.2) for Y2.

$$Y_1 = -0.108 + 0.809X_1 + 0.013X_2 + 0.167X_3 + 0.021X_4 + 0.013X_5 + 0.279X_6 - 0.005X_8 + 0.073X_9 + 0.099X_{10} \tag{1.1}$$

The estimated model shows that X1, X3, X4, X6, X9, are playing an important role in determining Y1, since their values are significantly different from zero (the Prob.< 0.05).

With the increase in employment to population ratio, FDI to GDP ratio, and growth rates of both the government final consumption expenditures, gross national income per capita, and inflation. The gross domestic product real growth rates increase by 0.809, 0.167, 0.021, 0.279, and 0.073, respectively.

$$Y_2 = -0.106 + 0.779X_1 + 0.013X_2 + 0.158X_3 + 0.020X_4 - 0.949X_5 + 1.267X_6 - 0.005X_8 + 0.071X_9 + 0.089X_{10} \tag{1.2}$$

Equation 1.2 indicates that Y2 is affected significantly by both X1, X3, X4, X5, X6, X9. They all have a significant positive effect except GNI. This means that with an increase in them and a decrease in X5 by one unit, Y2 will increase by 0.78, 0.16, 0.02, 0.95, 1.27, and 0.07, respectively. It is clear that GNI per capita growth rates, followed by employment to population ratio, are among the most important factors that determine GDP per capita growth rates.

According to R-squared that determines the model fitness, it is suggested that model estimation of Y2 is more appropriate than Y1.

Table (5): The Fixed and Random Effect Parameters for Y1

Variable	Fixed effect equations				Random effect equations			
	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.048177	0.076989	-0.625761	0.5316	-0.108624	0.077135	-1.408226	0.1594
D(X1,2)	0.793448	0.108152	7.336416	0.0000	0.809928	0.109290	7.410835	0.0000
X2	0.012597	0.007092	1.776322	0.0760	0.013116	0.007135	1.838456	0.0663
D(X3)	0.170697	0.022862	7.466429	0.0000	0.166777	0.023138	7.208077	0.0000
D(X4)	0.021107	0.008160	2.586617	0.0098	0.020851	0.008200	2.542626	0.0111
D(X5)	0.014149	0.094690	0.149429	0.8812	0.013124	0.095139	0.137941	0.8903
D(X6)	0.279729	0.097142	2.879597	0.0041	0.279018	0.097601	2.858776	0.0043

X8	-0.009672	0.007212	-1.341190	0.1801	-0.005460	0.007839	-0.696506	0.4863
D(X9)	0.073823	0.008340	8.851229	0.0000	0.072908	0.008405	8.674568	0.0000
D(X10)	0.083008	0.115522	0.718550	0.4726	0.099462	0.116653	0.852634	0.3941
R-squared	0.479558				0.480531			
F-statistic	48.98092				109.9771			
Prob (F-statistic)	0.000000				0.000000			

Table (6): The Fixed and Random Effect Parameters for Y2

Variable	Fixed effect equations				Random effect equations			
	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.046954	0.074241	-0.632454	0.5272	-0.106550	0.074426	-1.431625	0.1525
D(X1,2)	0.763031	0.104357	7.311764	0.0000	0.779196	0.105451	7.389171	0.0000
X2	0.012004	0.006843	1.754257	0.0797	0.012514	0.006884	1.817789	0.0694
D(X3)	0.161853	0.022060	7.337078	0.0000	0.158008	0.022325	7.077679	0.0000
D(X4)	0.020314	0.007874	2.579960	0.0100	0.020062	0.007912	2.535563	0.0114
D(X5)	-0.948243	0.091367	-10.37836	0.0000	-0.949249	0.091797	-10.34070	0.0000
D(X6)	1.268603	0.093733	13.53425	0.0000	1.267906	0.094173	13.46364	0.0000
X8	-0.008975	0.006959	-1.289686	0.1974	-0.004842	0.007564	-0.640231	0.5222
D(X9)	0.072384	0.008048	8.994355	0.0000	0.071487	0.008110	8.815068	0.0000
D(X10)	0.072775	0.111468	0.652877	0.5140	0.088914	0.112556	0.789961	0.4297
R-squared	0.527767				0.528679			
F-statistic	59.39375				133.3571			
Prob(F-statistic)	0.000000				0.000000			

Table (7) : Results of Hausman Test for Estimating the Model

Prob.	Chi-Sq. d.f.	Chi-Sq. Statistic	Test Summary
1.0000	10	0.000000	Cross-section random

Pool: Untitled
Test cross-section random effects

Table (8): Inflation Rates in MENA Region 2001-2017

Country	BHR	EGY	JOR	LBN	MAR	SAU	Average
Series Name	Inflation, GDP deflator (annual %)	Inflation, GDP deflator (annual %)	Inflation, GDP deflator (annual %)	Inflation, GDP deflator (annual %)	Inflation, GDP deflator (annual %)	Inflation, GDP deflator (annual %)	Inflation, GDP deflator (annual %)
2001	-3.36388	1.8677	0.780561	-1.52515	0.652318	-1.64668	-0.53919
2002	3.564642	3.165579	0.922245	4.921188	1.208544	5.956874	3.289846
2003	8.444944	6.777494	2.148814	1.581252	1.062605	2.316559	3.721945
2004	10.99108	11.66991	3.091808	-0.94334	1.219221	11.05643	6.18085
2005	13.73499	6.21273	2.006611	-1.08953	1.190541	20.14964	7.034164
2006	8.842531	7.359978	10.65164	0.883365	1.548031	11.57239	6.809655
2007	8.435437	12.59574	5.050641	3.174304	3.595055	8.435381	6.881093
2008	11.36485	12.20398	19.8691	7.557046	4.530497	17.68983	12.20255
2009	-12.9938	11.18554	2.826198	10.29365	0.146912	-15.7132	-0.70911
2010	7.441015	10.10686	8.430456	0.237234	0.975622	17.19129	7.39708
2011	9.736422	11.66298	6.386513	3.361871	-0.69098	15.52939	7.664365
2012	3.010651	19.48288	4.500644	6.917134	0.369335	4.015515	6.382693
2013	0.384706	8.712675	5.599771	2.776972	1.307292	-1.21633	2.927513
2014	-1.67061	11.24762	3.444318	2.401874	0.37781	-2.27	2.25517

2015	-9.36838	9.93089	2.272429	2.605927	2.129048	-16.9085	-1.55644
2016	0.136394	6.245663	1.007518	1.388034	1.449833	-3.04643	1.196835
2017	5.842595	22.93255	1.654327	2.498198	0.787564	7.401725	6.852827

5. Results and Discussion:

The study examined macroeconomic determinants of economic growth in a sample of MENA region countries. Depending on the availability of data in all countries in the sample through the entire period of the study. Our findings provide a new vision through the conflict on the determinants of economic growth.

The study demonstrates the significant impact of human capital, foreign direct investment, general government final consumption expenditures, growth national income and inflation on economic growth. It is expressed by real gross domestic product per capita growth rates. This can be clarified as follows:

Firstly, the results support the influence of human capital and foreign direct investment on economic growth in the MENA region. This is in accordance with the traditional theory of growth and classical factors of production. It is also assured by the results of Kabir (2003), Sheshgelani and Badri, (2017), and Kabir, (2003).

Although Makdisi et al. (2006), showed that the least efficient investment and human capital in the MINA region have been accounted for the poor performance of economic growth in the region. Differences in results can be explained by differences in the periods covering both studies. Also, the reforms were taken by countries in the region to attract foreign direct investments instead of discouraging and over the year. Besides, the importance is given to human capital quantitatively and qualitatively. This suggests that success in attracting more inflows of foreign direct investment, and increasing the labor ratio and their training can generate and faster economic growth in the MENA region.

Secondly, the results obtained about general government consumption expenditures, show a different insight on economic growth. While some studies suggested that government consumption is among determinants of economic growth, and has a positive effect on economic growth, (Chimobi, 2009; Piazzolo, 1996; Havi et al. 2013, Anaman, 2006), others referred that its impact on economic growth is negative (Havi et al. 2013), and the others proposed that government consumption is a result of economic growth (Amin, 2011). Our study results showed that economic growth is positively influenced by the growth of government final consumption expenditures.

In addition, our estimates show that there is a significant positive relationship between inflation and economic growth. This is may be accordance with the view that the inflation rate has a positive impact on economic growth due to countries with low inflation rates. In contrast, to that, high inflation rates have a negative influence on economic growth. This is clarified from data of inflation rates in table (8). Average inflation rate through the whole period was between 12% in 2008, and -1.5 in 2015. Apart from these two years, inflation rates were low.

6. Conclusion and policy implications:

This paper examined the relationship between economic growth and macroeconomic economic determinants, in a sample of MENA region countries. The countries included in the sample are six countries. Two of them are from high-level income namely: Bahrain and Saudi Arabia. Two from upper middle income, Jordan and Lebanon. The two lower middle income namely Egypt and Morocco. Besides the income level classification, the availability of data among the whole sample was a determining factor in choosing the sample. The study covered the period 2001-2017, using panel Data technique in the analysis.

It is found that employment, foreign direct investment, government final consumption expenditures, gross national income, Gross National Income and inflation are among the most important explanatory factors of economic growth. The most important factors that influence economic growth are GNI per capita, and employment to population ratio. An increase in GNI per capita and employment by a unit increases GDP per capita growth rates by approximately 1.3%, and 0.78, respectively.

Increase in Foreign Direct Investment, Government Final Consumption, Inflation, and a decrease in Gross National Income, by one unit, will increase real Gross Domestic Product per capita growth rates by 0.16, 0.02, 0.95, 1.29, and 0.07, respectively.

Increasing Government final consumption growth rates by 1%, increases GDP per capita growth rates by 0.7%. Increasing exports and decreasing imports by 1%, increasing economic growth by 0.03%.

Results of Granger Causality Test indicates that Unidirectional causality is running from foreign direct investment to gross domestic product growth rates. This means that: foreign direct investment can cause real gross domestic product rates. The policy implication of this positive causation, is why governments in the region need to attract foreign direct investments to promote economic growth.

Unidirectional causality running from both exports, imports, and gross capital formation, to foreign direct investments. Hence, to promote foreign direct investments, it is necessary for governments in the region to enhance

policies increase its share of the world trade, and support activities that leads to more capital formation, to foster economic growth.

As there is unidirectional causality from foreign direct investment and imports to unemployment ratio, thus, the risk included in attracting certain forms of foreign direct investments, that increase imports, and unemployment. This refer to that governments in the region should give more attention for selecting forms of foreign direct investments that benefit from abundant labor in the region and create more jobs.

Since labor force had a significant positive impact on growth in real growth domestic product per capita, policies should be put in place to link corporate between educational institutions and foreign direct investments affiliates and investments authorities to know what they need in terms of labor force.

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