

The role of technical progress in promoting economic growth in the MENA region

Amira T. Eltayb ¹*

Abstract

This study aims at the determination of the main sources of economic growth, while focusing on the role of technical progress in promoting sustainable economic growth in the MENA region during the period 1991-2014. In order to achieve its goal, this study has been divided into two stages. In the first stage, the determination of the main sources of economic growth is carried out through the estimation of the contribution of the various production factors by using the Cobb-Douglas production function and the fixed effects model and relying on Hausman test. The first stage revealed that capital contributes a ratio of about 35.88% of economic growth, while the remaining ratio or 64.12% represents the contribution of the labor factor. The contribution of the total factor productivity (TFP) was also estimated and amounted to approximately 100% or more in some of the MENA region countries such as Iran. In this study, total factor productivity (TFP) was chosen to reflect technical progress.

¹ Dr. Amira Tohamy Eltayb is an Economics Lecturer at the Faculty of Commerce, Zagazig University, Arab Republic of Egypt

In the second stage, the study aimed at the determination of the main factors influencing total factor productivity as the revealed principal source of economic growth, while focusing on the role of political stability in realizing sustainable growth. The results of the first stage- consisting of the time series of the disembodied factors and the total factor productivity figures obtained through the estimation of the residuals of the above-mentioned regression function- were used in the second-stage analysis. The study revealed that political stability had a strong significant positive effect on total factor productivity; and the open-door trading policy had a similar effect. The human resource development index, direct foreign investment, government spending and fixed capital formation showed also positive significant effects while price instability had an insignificant effect on total factor productivity during the study period.

Key expressions: Total factor productivity, Sources of economic growth, Political stability, Fixed Effects Model.

Prelude

The economic theory of markets has been the basis for interpreting economic growth since Adam Smith and until the present time. It has developed through three stages: The classical theory, the modern classical theory with its growth model developed by the economist Solow (Solow, 1956)² and the modern theory of international marketing.³

Despite the fact that the MENA region countries⁴ contain at present more than one-third of the ascertained World oil reserves and represent more than 30% of the actual World production, during the last fifteen years or so, the performance of economic growth in those countries taken as a whole, was disappointing. Thus their gross domestic product (GDP) was estimated at 2.743 trillion US dollars in 2010, rose to 3.537 trillion US dollars in 2014 then declined to 3.141 trillion US dollars in 2015. In comparison, GDP in Europe and Central Asia group of countries was 20.89 trillion, 23.439 trillion and 20.077 trillion US dollars in those three years respectively. Meanwhile the rate of economic growth in the MENA region registered 10.915% in 1969, rose to about 15.1% in 1972, declined to 4% in 1977, became negative in 1978 amounting to – 2.7%

²Solow, R.M., (1956), "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics*, 70, 65-94.

³See: Sengupta, J., (2011), "Understanding Economic Growth: Modern Theory and Experience," Springer, North Hall, 2024, pp. 9-15.

⁴The study sample includes the following group of countries: Algeria, Bahrain, Egypt, Iran, Israel, Jordan, Libya, Saudi Arabia, Sudan, Syria, Mauritania, Morocco, Tunisia, The Arab Emirates, Kuwait, Yemen, and Oman.

approximately, kept being negative and reached -0.34% in 1984, recorded a spectacular rise to 11.3% in 1990, then started to decline and kept declining until it reached about 3.03% and 3.08% in 2014 and 2015 respectively. (www.worldbank.org)

Table (A) in the study Appendix shows the historical development (1991-2014) of the Real GDP per Worker⁵ in each country of the MENA region countries, expressed in local currency.

Table (B) shows the historical development (1991-2014) of the Real GDP per Worker in US dollars. We note from that Table the low level of GDP per Worker in the countries under study, with the highest figures being those of Kuwait, followed by The Arab Emirates, Bahrain and Saudi Arabia, which are the petroleum countries. The lowest figure was that of Mauritania.

Table (B) also presents the historical development (1992-2014) of the change rate of total investment per worker in all the countries under study. Graph (A) illustrates that among the petroleum countries, The Arab Emirates recorded the highest figures, followed by Saudi Arabia, Oman, Kuwait and Bahrain successively. Graph (B) shows that among the second group of the MENA countries, Tunisia came first, followed by Morocco, then Egypt and last Algeria. Graph (C) tackles the third group of countries and shows that Libya had the highest score, followed

⁵Real GDP per worker was calculated by dividing GDP by the labor force after adjusting it by the unemployment ratio in every year of the study period.

by Jordan, then Israel, and last Iran. The fourth group of countries is illustrated in Graph (D) showing that Yemen came first, followed by Syria, then Sudan, and last Mauritania.

These results shed the light on the problem which this study is trying to address: *How would it be possible to raise the rates of economic growth in the MENA region and keep them those rates at a high level? In other words, how to achieve sustainable economic growth?*

Therefore, this study aims at the determination of the main sources of economic growth, while focusing on total factor productivity and the principal factors influencing it. In order to achieve this goal, the study has been designed as follows: Part 2 reviews the previous main studies on the sources of economic growth; and Part 3 divides the analysis into two stages.

- In the first stage, the sources of economic growth are determined, the study model, the methodology and the used econometric model are described, the results of the regression are analyzed, then the method for calculating the contribution of total factor productivity (TFP) in economic growth is presented and the TFP contribution ratio is deduced.
- In the second stage, the main factors influencing total factor productivity are determined, while concentrating on the role of political stability in realizing sustainable economic growth. The analysis of the second stage is based on results of the first stage consisting of the time series of the disembodied factors and the total factor productivity figures obtained from

the estimation of the residuals of the regression used in the first stage. Then the study model, the methodology and the used econometric model are described and the results of the regression are analyzed.

In Part 4, the Conclusion is presented, followed by the References and the Appendix.

Part 2: Previous literature

There is a shortage in economic literature of the studies concerned with the relation between economic growth and total factor productivity and focusing on the role of political stability in realizing sustainable growth in the Middle East and North Africa (MENA) region as a whole. We now briefly review the main studies carried out on this subject.

Two studies tackled the above-mentioned subject but reached results that contradicted the theoretical background which saw in technological progress the main engine and determinant of economic growth. Those two studies are the following:

- ***Kheir-EIDin, H. and Moursi, T., 2006:*** The study aimed at the determination of the main factors driving economic growth in Egypt during the period (1960-1996). The study covered two stages. In the first stage, the contribution of each of the physical factors of production (labor and capital) to economic growth was determined as well as the contribution of total factor productivity. In the second stage, the effect of a group of aggregate economic variables on total factor

productivity was measured. The study revealed that the chosen economic variables had a significant effect on TFP, and concluded that since 1960 and until the end of 1980, capital formation had represented the main engine of economic growth in Egypt, with a contribution ratio of 65%.

- **Bosworth, S. and Collins, 1998:** The study covered 88 countries during four time periods within the time span (1960-1986). The study revealed that the miraculous growth realized by the East-Asian countries during the (1970-1980) and (1980-1986) periods was due to the increase in the savings and capital formation ratios.
- However, if in the long-run those countries continue to depend on increasing capital formation to realize high rates of economic growth, the law of diminishing returns will set in, and will gradually pull down the rate of economic growth until it completely vanishes, as explained by **Young, A., 1995.**
- **M. Adak, 2009,** underlined the significant linear relationship between total factor productivity and economic growth in Turkey during the 20-years period (1987-2007).
- **Baier, S. L. et al., 2002:** The study sample included 145 countries. The contribution of total factor productivity to economic growth ranged from 3% to 20% in three regions, and from 0% to 10% in three other regions. Moreover, the rate of growth of total factor productivity was found negative on average in all the regions.
- **Prescott, E. C., 1997:** The study revealed that total factor productivity differed across countries and time.

Part 3: After reviewing the above-mentioned theoretical framework, we now turn to the applied part of the present study.

The first stage: The main sources of economic growth in the MENA region

1. The study model and data description

In order to achieve the study objective, namely the determination of the main sources of economic growth in the MENA region as a whole (including Egypt) the applied study depended on the panel data of the MENA countries during the period (1991-2014). The study model was formulated on the basis of the Cobb-Douglas function as follows: (*Romer, D., 1996*)⁶

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

Where Y_t represents real income, K is for capital and L expresses labor. The coefficient α represents capital contribution to national income, and $0 < \alpha < 1$. A_t expresses total factor productivity. By dividing the two sides of Equation (1) by L and taking the natural logarithm of the change rate of the two sides of that Equation, we obtain *the production function per worker*, as follows:

⁶ See: Acemoglu, D.: Introduction to Modern Economic Growth, Version 1.1: April 2007, pp. 37-92.

$$y^*_t = \alpha k^*_t + a^*_t \quad (2)$$

Where y^*_t , k^*_t represent the natural logarithm of the growth rate of real income (dy) and capital (dk) per worker, respectively given that: $y = \ln(Y/L)$ and $k = \ln(K/L)$. a is an unnoticed index expressing technical progress (TFPG) or dA/A ; and $a = \ln A$.

We can obtain the total factor productivity figures as the residuals of Function (2) after its reformulation as follows:

$$a^*_t = y^*_t - \alpha k^*_t \quad (3)$$

Where t expresses the years of the study period ($t = 1, 2, 3, \dots, T$).

We obtained y_t by dividing the real gross domestic product (GDP) by the labor force, and we obtained k_t by dividing total investment (expressing capital) by the labor force, in every year. The labor force L_t is the total labor force reduced by the unemployment ratio in every year of the study period.

The data for total investment and GDP at fixed prices were taken from the International Monetary Fund (IMF) database from the link: "International Financial Statistics." The data of the total labor force and the unemployment ratio were extracted from the World Bank website.

Table 1 shows the descriptive statistics of the variables used in Section 1 of the applied study.

Table 1: Descriptive statistics of the variables

Variable	Observed value	Mean	Standard Deviation	Max Value	Min Value
LnY	401	-11.67	2.41	-4.87	-15.55
LnX	401	-8.66	2.61	-0.027	-17.35

2. Methodology and econometric results

This study uses the econometric package E-Views 9.0 to analyze the panel data and deduce the most important source of economic growth via the following procedure:

2.1. *Testing the stationary state of the used variables*

The first step in this analysis consists in checking the stationary state of the variables used in the model and the order of integration of each series in the model in order to avoid a spurious regression and to determine the adequate econometric approach. If all the variables of our model are stationary at the level, the Random or Fixed Effects Model or the Pooled OLS Effects Model may be used. However, if all the variables are stationary at the first difference, then the co-integration method of Johansen can be applied. But if some variables are stationary at the level while others are stationary at the first difference, then we can use the co-integration method by applying ARDL.

The *Unit Root Test* is one of the best known methods for verifying the stationary state of the time series. In this study, the Fisher Chi-square and Hadri Z-statistic tests were chosen among many others to carry out the Unit Root Test.

Table 2: Unit Root Test results

Test Variable	PP – Fisher Chi-square		Hadri Z-stat	
	Intercept	Intercept and trend	Intercept	Intercept and trend
<i>LnY</i>		45.64 (0.087)**	10.25 (0.000)***	
<i>LnX</i>	59.21 (0.004)***		13.13 (0.001)***	

Note: - ***, **, * indicate significance at 1%, 5% and 10% respectively.

The results in Table 2 indicate that all the variables of the model are stationary at the level, i.e. that they are integrated of the I(0) order at the 1% and 5% significance levels respectively. Therefore, the Random Effects Model, the Fixed Effects Model or the Pooled OLS Model should be applied to continue the analysis.

2.2. Analyzing the regression

The Fixed Effects Model was applied in this analysis while relying on the Hausman Test.⁷

The Robust Standard Errors command (HAC) was also used to overcome the problems of heteroscedasticity and serial correlation between residuals.

Table 3 presents the results of this test.

Table 3: Fixed Effects Model results [Robust (HAC) standard errors]

Variable	Coefficient	Std error	t-statistic	Probability
Constant	10.02	0.1338	75.59	0.0000***
LnX	0.358829	0.015384	23.3248	0.0000***
LSDV R-squared	0.98834	Within R-squared	Within R-squared	0.9878
F-statistics	1909.728	Durbin-Watson	Durbin-Watson	0.202
“Between” statistics			55-368	0.005***
Breusch-Pagan Test			0.0723	0.788
Hausman test			161.73	0.0000***

Note: - ***, **, * indicate significance at 1%, 5% and 10% respectively.

⁷The test revealed the significance of the relationship; this means that the null hypothesis is rejected and the alternative hypothesis is accepted. This result requires the application of the fixed effects model instead of the random effects model.

The results displayed in Table 3 confirm the strength and validity of the used model, according to statistical, economic and econometric standards. Hence, P-value (Prob.) was found greater than all the significance levels in all the test results. This means that the estimated models are free from serial correlation between the residuals and from the heteroscedasticity problem. This also means that the residuals are normally distributed (Normality test) and that the models are adequately described (Validity of the functional form).

Moreover, the key regression statistics reveal the high value of the coefficient of determination given that the independent variables explain 98.83% of the changes in **GDP growth** while the remaining ratio is attributed to all the other factors. Similarly, the adjusted coefficient of determination (R^2) acquires a high value denoting that 98.78% of the changes in GDP growth are explained by the model. In addition, the Durbin-Watson statistic is found equal to 0.2 thus confirming the absence of serial correlation between the residuals. We note that the variables were significant at the 1% level.

The coefficient of the LnX variable indicates that the material factors (capital) contribute about 35.88% of economic growth which is in line with the results of other studies⁸.

⁸ Collins, S. and Bosworth, B., 1996: "Economic Growth in East Asia: Accumulation versus Assimilation," *Brookings Papers in Economic Activity*, p.157.

The remaining ratio or about 64.12% represents labor contribution.

Based on the above-mentioned estimations, we may now calculate the contribution of technical progress, as represented by TFP.

3. Contribution of Total Factor Productivity to economic growth

3.1. Estimation of Total Factor Productivity

The rate of growth of Total Factor Productivity was calculated through the estimation of the residuals (TFP) by using the command: *[Actual-Fitted- Residual Table]* after applying the *Fixed Effects Model* in order to deduce TFP contribution to economic growth, and as a first step towards estimating the relationship between total factor productivity and a group of variables including political stability. The results are displayed in Tables (D), (E) ,(F) and (G), and illustrated in Graphs E and F in the Appendix.

3.2. Calculation of TFP contribution

Table 4 shows the contribution of TFP to economic growth, which has been calculated based on the results of the above-mentioned model and the estimated residuals. We notice the high value of TFP contribution, ranging from 0.89 in Bahrain and rising in the other countries to reach its highest value of 2.5 in Iran.

Table 4: Sources of Growth in the MENA region by country

Country	Growth of Output per worker ^a	Contribution	By	Component	Annual Average Growth of TFP ^e	TFP Share ^r
		Capital ^b	Labor ^c	TFP ^d		
Algeria	4.464219	0.065203	0.001316	4.3977	-0.00851	-0.9851
Bahrain	0.770019	0.020775	0.06142	-0.687824	-0.00219	0.8932
Egypt	0.856767	0.032919	0.046835	0.777013	-0.00131	0.9069
Iran	0.033574	0.080749	0.038077	-0.08525	-0.02103	2.5392
Israel	4.545717	0.031037	0.017182	4.497499	0.011128	0.9893
Jordan	3.14341	0.028003	0.033445	3.081962	0.004246	0.9804
Kuwait	-6.60418	0.000372	0.163723	6.76828	0.036758	1.0248
Libya	-1.35335	0.10494	0.027581	1.48588	-0.02572	1.979
Mauritania	2.496669	0.097093	0.017542	2.382034	-0.00493	0.9540
Morocco	1.229124	0.014437	0.03043	1.184257	-0.00204	0.9634
Oman	-1.89663	0.02826	0.060774	1.98567	-0.00867	1.0469
Saudi Arabia	0.586391	0.027709	0.036462	0.52222	-0.00293	0.8905
Sudan	5.435461	0.153781	0.03216	5.24952	-0.00651	0.9657
Syria	3.742371	0.061915	0.037561	3.642894	-0.0043	0.9734
Tunisia	3.800059	0.030429	0.015326	3.754304	0.010839	0.9879
U. A. Emirates	-2.27352	0.013029	0.111134	-2.397	-0.01837	1.054
Yemen	-1.46727	0.04901	0.0612	-1.58	-0.01804	1.075

^a The average of the annual growth rate of real GDP per worker

^b The contribution of physical capital per worker is its growth rate multiplied by capital's production share ($\alpha = 0.35$).

^c The contribution of labor is the growth rate of the Human Development Index (HDI) multiplied by labor's production share ($1 - \alpha = 0.65$).

^d The contribution of TFP is the difference between the growth rate of output per worker and the summed contributions of physical capital per worker and annual average growth of the workers.

^e Taken from the residuals' estimation

^f The share of TFP was calculated by dividing ^d by ^a. It is obvious that TPF contributes a high ratio to economic growth. Therefore, the research was completed according to the following procedure.

The second stage: The main factors influencing technical progress (TFP) with a focus on the role of political stability in realizing sustainable growth in the MENA region

After determining the main sources of economic growth, and proving that Total Factor Productivity is responsible for the greater part thereof, we had to ask the next crucial question: *What are the main factors influencing TFP and consequently, the ability to realize sustainable economic growth?*

In order to answer this question, the following steps were carried out:

1. The Model and Data Description

In view of achieving the second goal of this study, namely, the determination of the main factors influencing Total Factor Productivity in the MENA region countries, including Egypt, the study relied on the *Unbalanced Panel Data* of those countries during the study period (1991-2014).

Modern studies assure that the principal sources of economic growth are the following: The role of the Government in realizing economic growth; the extent of the open-door

policy application to foreign trade; local investments; direct foreign investment; the investment environment; the factors of human development, such as health =care, education, etc.; and economic stability as reflected by the general price level stability.

The Model for the Mena region was formulated as follows:

$$TFP_{it} = \beta_0 + \beta_1 GS_{it} + \beta_2 OPEN_{it} + \beta_3 FIX_{it} + \beta_4 FDI_{it} + \beta_5 PS_{it} + \beta_6 HDI_{it} + \beta_7 INF_{it} + u_{it}$$

Where TFP is the dependent factor representing the annual growth rate of Total Factor Productivity; β_0 is the constant of the function; $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ are the coefficients of the independent economic variables, L denotes the study period (1991-2014) and i expresses the panel data number.

GS, OPEN, FIX, FDI, PS, HDI, and INF represent respectively: Government Spending as a ratio of Gross Domestic Product, the sum of total exports and imports as a ratio of GDP (to represent the application of the open-door policy in foreign trade), fixed capital formation as a ratio of GDP (to express local investments), foreign investments, the political stability and absence of violence/terrorism estimate (to represent the investment environment), the human development index (HDI), and the inflation rate (to reflect the extent of price stability); and u_{it} is the random error term.

The study relied on the *International Financial Statistics of the World Bank data, Human Development reports, and the World*

Bank database concerning all the relevant indexes of all the countries under study including Egypt.

Table 5 presents a general statistical description of the study variables, and their correlation matrix.

Table 5: Descriptive statistics of the variables

	Obs.	Mean	St. Dev.	Max.	Min.
TFP	171	-0.00588	0.1849	0.709	-0.430880
GS	171	31.4	7.193	52.012	14.536
OPEN	171	85.32	27.755	164.11	29.22
FIX	171	23.91	6.8455	58.95	-8.94
FDI	171	1.79	3.784	33.566	-10.359
PS	171	-0.00529	0.646	0.919	-1.96
HDI	171	0.6777	0.119	0.9002	-0.3384
INF	171	5.296	5.8954	30.733	9.797

2. Methodology and econometric results

In analyzing the panel data, the study relied on the econometric package E-Views 9.0 in order to deduce the most important factors influencing Total Factor Productivity, according to the following procedure.

2.1 Testing the stationary state of the variables

The *PP- Fisher Chi-square test* was used to verify the stationary state of the variables. Table 6 shows the results of that test. We note that all the variables are stationary at the level; i.e., they are integrated of the I(0) order at both the 1% and 5% significance levels. Therefore, the Pooled OLS method, the Fixed Effects Model or the Random Effects Model may be used.

Table 6: Unit Root Test (PP- Fisher Chi-Square) Results

Variable	Level	Level	1 st difference	1 st difference	Results
	Intercept	Intercept & trend	Intercept	Intercept & trend	
TFP		46.85 (0.05) **			I(0)
GS	129.6 (0.0000)***				I(0)
OPEN		51.39 (0.028) **			I(0)
FIX	63.7 (0.0015) ***				I(0)
FDI	101.82 (0.0000)***				I(0)
PS	67.27 (0.0006)***				I(0)
HDI	91.23 (0.0000)***				I(0)
INF	92.33 (0.0000)***				I(0)

Note: - ***, **, * indicate the level of significance at 1%, 5% and 10% respectively.

2.2 Regression analysis

The Fixed Effects Model was applied while relying on Hausman test and using the Robust Standard Errors (HAC) command in order to overcome the problems of heteroscedasticity and serial correlation between the residuals.

Table 7 displays the results of the test.

Table 7: Fixed Effects (GLS) results [Robust (HAC) standard errors]

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GS	0.012398	0.003648	3.398768	0.0077***
OPEN	0.004593	0.001568	2.929276	0.0256**
FIX	0.010022	0.003413	2.936539	0.0347**
FDI	0.010474	0.004285	2.444439	0.0307**
PS	0.191467	0.043909	4.360483	0.0000***
HDI	1.617072	0.577781	2.798761	0.0058***
INF	0.000827	0.003572	0.231568	0.8172
Constant	1.3733	0.3460	3.9689	0.00001***
LSDV R-squared	0.4154		Within R-squared	0.341056
F-statistics	5.587	Durbin-Watson	0.5	
Prop.	0.00000			
Between" " variance			55.368	0.0000***
Breusch-Pagan test			0.0723	0.78855
Hausman test			27.22	0.00003***

Note: - ***, **, * indicate significance at 1%, 5% and 10% respectively.

The results displayed in Table 7 denote the strength and validity of the Model according to statistical, economic and econometric standards. The P-value (Probability) was found greater than the significance levels in all the results of the tests, thus indicating

that the estimated econometric models are free from the problems of serial correlation between the residuals and heteroscedasticity. Moreover, these results confirm that the residuals follow a normal distribution (Normality test) and that the models are adequately described (The functional form is correct).

In addition, the key regression statistics show that the coefficient of determination has a high value reflecting that the independent variables explain 41.54% of the changes in Total Factor Productivity (TPF) while the remaining ratio is attributed to the other factors. Similarly, the adjusted coefficient of determination (R^2) has a high value indicating that the Model explains 34.1% of the changes in TPF.

The variables appear significant at both the 1% and 5% levels with the exception of the inflation rate (x_7) which has no significant effect on TPF.

The above-mentioned results are compatible with the economic theory rules.

- When Government Spending as a ratio of GDP increases, TPF increases.
- Many researchers believe that when a country becomes more open to the outside world, it becomes easier for that country to obtain and apply modern technologies in production domains, thus leading to higher production efficiency. [*Fisher, S., (1993); Tomas, V. and Wang, Y., (1997); Collins, S. and Bosworth, B. (1997)*]. Hence, we note in the

study model a direct relation between the open-door policy and TFP. The extent of the adoption of an open-door policy in a given country is measured by the ratio of the sum of its total exports and total imports to GDP.

- Fixed capital formation (representing local investments) as a ratio of GDP has a positive coefficient indicating a direct relation with TFP.
- Foreign investment: The inflow of foreign investment may be accompanied by trained foreign technical labor who could help increase the experience of local labor via training on the job, in addition to bringing in modern technology whether in a physical form such as tools and machinery, or a non-physical form such as new ideas and modern working systems, in addition to advanced managerial skills. [*Sadik, A. and Bolbol, A., (2001)*]. The study revealed the existence of a direct relation between the flow of direct foreign investments (measured by the ratio of direct foreign investments to GDP) and TFP.
- Governments can play a crucial role in providing an adequate investment environment and consequently, increasing the rate of growth of TFP and realizing sustainable growth. Several indexes⁹ may be used to reflect an attractive investment environment such as: Political stability and absence of terrorism/violence estimates.
- The State can also play a critical role in human development through investing in education which is considered one of the most important factors for increasing knowledge and skills, and

⁹ Such as: Control of corruption, Government effectiveness, Political stability and absence of violence / terrorism, Regulatory quality, Rule of Law, and Voice and accountability.

hence raising production efficiency. Investing in health care is another aspect of human development, leading to increased production efficiency.

Therefore, in our models, the Human Development Index had a positive effect on TFP.

Conclusion

This study had a dual objective. The first target was the determination of the most important source of economic growth. The second target was to find out the main factors influencing that source -with a focus on the role of political stability in helping to realize sustainable economic growth.

Concerning the first goal, the study revealed that material factors (capital) contributed 35.88% of economic growth while labor contributed the rest or 64.12%.

The study also showed that Total Factor Productivity (TFP) contributed more than 100% of economic growth in some countries such as Iran. Therefore, in the long-run, it is essential to upgrade the applied technologies in order to realize sustainable growth.

Regarding the second goal, the study analyzed several economic factors influencing Total Factor Productivity, namely: Government Spending, adopting an Open-Door Policy, Fixed Capital Formation, Direct Foreign Investment, and Investing in Human development. Moreover, Political Stability greatly influenced TFP in the MENA region countries during the study period (1991-2014). Securing political stability is therefore highly required to realize sustainable economic growth in this region.

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Appendix

Table(A): Real GDP Per Worker In Mena Region countries (1991-2014)LCU

	Algeria	Bahrain	Egypt	Islamic Re/Israel	Jordan	Kuwait	Libya	Mauritani	Morocco	Oman	Saudi Aral	Sudan	Syria	Tunisia	United Ar	Yemen	
1991	2.53249E-05	4.02E-06	4.23E-06	0.006486	2.01E-05	2.87E-07	7.39E-06	1.44E-06	1.26E-06	5.36E-05	2.53E-06	3.64E-05	1.93E-07	2.01E-05	4.91E-07	0.000138	4.22E-06
1992	2.20078E-05	3.79E-06	4.52E-06	0.005921	1.94E-05	2.66E-07		1.34E-06	1.24E-06	4.87E-05	2.62E-06	4.03E-05	1.82E-07	2.12E-05	5.5E-07	0.000132	4.72E-06
1993	2.04497E-05	3.62E-06	3.71E-06	0.005859	2.15E-05	2.25E-07		1.23E-06	1.27E-06	4.51E-05	2.64E-06	3.95E-05	1.86E-07	2.81E-05	5.9E-07	0.000119	5.12E-06
1994	1.84522E-05	4.63E-06	3.66E-06	0.005773	2.82E-05	2.35E-07		1.2E-06	1.2E-06	4.61E-05	2.6E-06	4.68E-05	1.8E-07	2.81E-05	5.64E-07	0.000185	4.24E-06
1995	1.60152E-05	4.23E-06	3.71E-06	0.005855	3.36E-05	2.93E-07	3.6E-05	1.01E-06	1.28E-06	4.02E-05	2.57E-06	4.17E-05	1.76E-07	2.89E-05	5.96E-07	0.000205	4.42E-06
1996	1.54975E-05	4.56E-06	4.79E-06	0.005514	3.59E-05	3.08E-07	3.54E-05	9.73E-07	1.32E-06	4.18E-05	2.53E-06	3.76E-05	1.81E-07	2.19E-05	5.9E-07	0.000141	4.61E-06
1997	1.72808E-05	4.2E-06	5.35E-06	0.006079	3.18E-05	3.6E-07	3.48E-05	9.23E-07	1.22E-06	3.79E-05	2.58E-06	3.62E-05	2.77E-07	2.1E-05	5.81E-07	0.00015	4.25E-06
1998	1.76929E-05	4.59E-06	5.8E-06	0.005626	2.92E-05	3.43E-07	3.43E-05	8.75E-07	1.22E-06	3.73E-05	2.54E-06	3.56E-05	3.36E-07	2.84E-05	5.5E-07	0.000115	3.93E-06
1999	1.78029E-05	4.7E-06	5.87E-06	0.005853	2.79E-05	3.79E-07	3.2E-05	8.42E-07	1.28E-06	4.34E-05	2.47E-06	5.04E-05	3.99E-07	2.54E-05	6.19E-07	0.000113	4.33E-06
2000	1.53753E-05	4.2E-06	5.45E-06	0.005552	2.96E-05	3.27E-07	2.8E-05	8.41E-07	1.26E-06	4.32E-05	2.54E-06	4.74E-05	4.79E-07	2.03E-05	6.47E-07	0.000161	3.73E-06
2001	1.68341E-05	4.34E-06	5.31E-06	0.005059	2.73E-05	2.92E-07	2.7E-05	7.97E-07	1.31E-06	4.84E-05	2.6E-06	4.53E-05	5.09E-07	1.7E-05	6.95E-07	0.000109	4.29E-06
2002	1.82824E-05	4.48E-06	4.97E-06	0.005173	2.42E-05	2.98E-07	1.96E-05	7.61E-07	1.31E-06	5.14E-05	2.52E-06	3.71E-05	5.22E-07	1.76E-05	6.87E-07	0.000104	4.27E-06
2003	2.09275E-05	4.4E-06	4.79E-06	0.005584	2.3E-05	3.23E-07	1.87E-05	8.34E-07	1.33E-06	5.1E-05	2.39E-06	3.43E-05	5.48E-07	1.92E-05	7.53E-07	0.000123	4.17E-06
2004	2.51135E-05	3.93E-06	4.61E-06	0.006549	2.41E-05	4.27E-07	1.53E-05	8.49E-07	1.36E-06	5.66E-05	2.35E-06	3.5E-05	5.66E-07	2.15E-05	8.21E-07	0.000105	4.18E-06
2005	3.4126E-05	4E-06	4.4E-06	0.00552	2.84E-05	3.67E-07	1.38E-05	9.29E-07	1.49E-06	5.52E-05	2.31E-06	3.52E-05	5.55E-07	2.41E-05	8.26E-07	9.6E-05	3.73E-06
2006	4.22469E-05	4.04E-06	4.96E-06	0.006088	3.12E-05	4.07E-07	2.15E-05	9.75E-07	1.78E-06	6.59E-05	2.3E-06	3.23E-05	5.82E-07	2.78E-05	9.69E-07	8.44E-05	3.78E-06
2007	3.80672E-05	2.82E-06	6.05E-06	0.007279	3.7E-05	4.34E-07	1.85E-05	1.02E-06	1.83E-06	6.46E-05	2.29E-06	3.5E-05	6.17E-07	2.77E-05	1.02E-06	7.15E-05	3.83E-06
2008	4.67073E-05	4.04E-06	6.45E-06	0.007656	4.66E-05	4.6E-07	1.48E-05	1.05E-06	1.84E-06	6.76E-05	2.37E-06	4.02E-05	6.12E-07	2.16E-05	1.04E-06	5.38E-05	3.88E-06
2009	5.14291E-05	3.48E-06	6.09E-06	0.006686	3.56E-05	4.46E-07	1.43E-05	1.03E-06	1.82E-06	7.14E-05	2.32E-06	3.61E-05	6.3E-07	3.09E-05	9.81E-07	4.29E-05	3.96E-06
2010	5.2957E-05	3.76E-06	6.52E-06	0.006186	4.17E-05	4.58E-07	1.16E-05	1.08E-06	1.89E-06	7.18E-05	2.22E-06	3.63E-05	6.3E-07	3.01E-05	1.01E-06	3.97E-05	3.36E-06
2011	5.32234E-05	3.35E-06	4.85E-06	0.006369	5.07E-05	4.41E-07	6.06E-06	4.29E-07	1.94E-06	7.5E-05	2.04E-06	3.59E-05	6.06E-07		6.93E-07	4.05E-05	2.85E-06
2012	4.88317E-05	3.7E-06	4.59E-06	0.005922	3.73E-05	4.68E-07	6.5E-06	8.15E-07	2.01E-06	7.42E-05	1.88E-06	3.77E-05	5.69E-07		9.28E-07	4.31E-05	2.79E-06
2013	5.5198E-05	3.89E-06	4.42E-06	0.005788	4.21E-05	4.47E-07	6.54E-06	7.1E-07	2.09E-06	7.36E-05	1.71E-06	3.51E-05	5.83E-07		9.89E-07	4.68E-05	2.81E-06
2014	5.78292E-05	3.85E-06	4.43E-06	0.005977	4.44E-05	5.05E-07	6.69E-06	5.43E-07	2.17E-06	6.6E-05	1.6E-06	3.58E-05	5.68E-07		1E-06	5.03E-05	2.75E-06

Table B: Real GDP Per Worker in Mena Region(1991-2014)

	Algeria	Bahrain	Egypt	Islamic Re/Israel	Jordan	Kuwait	Libya	Mauritani	Morocco	Oman	Saudi Aral/Sudan	Syria	Tunisia	United Ar/Yemen			
1991	1.37093E-06	1.06858E-05	1.34643E-06	9.6E-05	8.8E-06	4.22E-07	2.6E-05	5.12E-06	1.54E-08	6.16E-06	6.57E-06	9.72E-06	2.77941E-05	1.79E-06	5.31E-07	3.75E-05	3.52E-07
1992	1.00786E-06	1.03917E-05	1.36223E-06	9.03E-05	7.91E-06	3.91E-07		4.76E-06	1.42E-08	5.7E-06	6.83E-06	1.08E-05	1.8694E-06	1.89E-06	6.22E-07	3.6E-05	3.93E-07
1993	8.75964E-07	9.6396E-06	1.1055E-06	4.62E-06	7.59E-06	3.25E-07		4.04E-06	1.05E-08	4.85E-06	6.87E-06	1.05E-05	1.16958E-06	2.5E-06	5.88E-07	3.24E-05	4.26E-07
1994	5.26325E-07	1.23128E-05	1.08017E-06	3.3E-06	9.37E-06	3.36E-07		3.44E-06	9.74E-09	5.01E-06	6.77E-06	1.25E-05	6.22721E-07	2.5E-06	5.57E-07	5.03E-05	3.53E-07
1995	3.36011E-07	1.12425E-05	1.09302E-06	3.35E-06	1.12E-05	4.18E-07	0.000121	2.4E-06	9.83E-09	4.71E-06	6.67E-06	1.11E-05	3.03839E-07	2.57E-06	6.3E-07	5.57E-05	1.08E-07
1996	2.83064E-07	1.21391E-05	1.41373E-06	3.15E-06	1.13E-05	4.34E-07	0.000118	2.23E-06	9.6E-09	4.8E-06	6.57E-06	1E-05	1.44406E-07	1.95E-06	6.06E-07	3.84E-05	4.9E-08
1997	2.99455E-07	1.11646E-05	1.57881E-06	3.47E-06	9.23E-06	5.07E-07	0.000115	2E-06	8.04E-09	3.98E-06	6.71E-06	9.65E-06	1.75564E-07	1.87E-06	5.25E-07	4.08E-05	3.29E-08
1998	3.01213E-07	1.21984E-05	1.71122E-06	3.21E-06	7.69E-06	4.84E-07	0.000113	1.87E-06	6.48E-09	3.89E-06	6.61E-06	9.5E-06	1.67559E-07	2.53E-06	4.83E-07	3.13E-05	2.89E-08
1999	2.67416E-07	1.24934E-05	1.72926E-06	3.34E-06	6.73E-06	5.35E-07	0.000105	1.82E-06	6.1E-09	4.43E-06	6.43E-06	1.34E-05	1.58041E-07	2.26E-06	5.21E-07	3.07E-05	2.78E-08
2000	2.04296E-07	1.11661E-05	1.57084E-06	3.15E-06	7.26E-06	4.61E-07	9.12E-05	1.64E-06	5.29E-09	4.07E-06	6.61E-06	1.26E-05	1.86429E-07	1.81E-06	4.72E-07	4.38E-05	2.31E-08
2001	2.18016E-07	1.15445E-05	1.33635E-06	2.88E-06	6.49E-06	4.12E-07	8.81E-05	1.32E-06	5.14E-09	4.28E-06	6.76E-06	1.21E-05	1.96622E-07	1.51E-06	4.83E-07	2.97E-05	2.54E-08
2002	2.29443E-07	1.19142E-05	1.10401E-06	7.49E-07	5.11E-06	4.2E-07	6.43E-05	5.99E-07	4.83E-09	4.67E-06	6.57E-06	9.88E-06	1.9835E-07	1.56E-06	4.83E-07	2.82E-05	2.43E-08
2003	2.70398E-07	1.17012E-05	8.18202E-07	6.81E-07	5.04E-06	4.56E-07	6.29E-05	6.45E-07	5.06E-09	5.33E-06	6.22E-06	9.15E-06	2.09802E-07	1.71E-06	5.85E-07	3.34E-05	2.27E-08
2004	3.48506E-07	1.04469E-05	7.43819E-07	7.6E-07	5.38E-06	6.02E-07	5.2E-05	6.51E-07		6.38E-06	6.11E-06	9.35E-06	2.19596E-07	1.92E-06	6.6E-07	2.85E-05	2.26E-08
2005	4.65717E-07	1.06405E-05	7.62228E-07	6.16E-07	6.32E-06	5.18E-07	4.72E-05	7.1E-07	5.62E-09	6.22E-06	6.02E-06	9.4E-06	2.27949E-07	2.15E-06	6.36E-07	2.61E-05	1.95E-08
2006	5.8154E-07	1.07332E-05	8.65863E-07	6.64E-07	7.01E-06	5.73E-07	7.4E-05	7.43E-07	6.63E-09	7.49E-06	5.99E-06	8.63E-06	2.68145E-07	2.48E-06	7.28E-07	2.3E-05	1.92E-08
2007	5.49371E-07	7.49565E-06	1.07323E-06	7.84E-07	9E-06	6.12E-07	6.5E-05	8.1E-07	7.07E-09	7.89E-06	5.95E-06	9.33E-06	3.06056E-07	2.47E-06	7.93E-07	1.95E-05	1.93E-08
2008	7.23216E-07	1.0735E-05	1.18662E-06	8.12E-07	1.24E-05	6.48E-07	5.49E-05	8.55E-07	7.72E-09	8.72E-06	6.17E-06	1.07E-05	2.92978E-07	1.92E-06	8.45E-07	1.47E-05	1.94E-08
2009	7.07928E-07	9.25008E-06	1.09866E-06	6.78E-07	9.06E-06	6.28E-07	4.99E-05	8.25E-07	6.92E-09	8.87E-06	6.04E-06	9.62E-06	2.73859E-07	2.76E-06	7.27E-07	1.17E-05	1.95E-08
2010	7.11921E-07	1.00332E-05	1.15974E-06	6.03E-07	1.11E-05	6.45E-07	4.06E-05	8.55E-07	6.85E-09	8.53E-06	5.78E-06	9.69E-06	2.73255E-07	2.69E-06	7.07E-07	1.08E-05	1.53E-08
2011	7.29708E-07	8.89865E-06	8.18315E-07	6E-07	1.42E-05	6.22E-07	2.2E-05	3.51E-07	6.89E-09	9.27E-06	5.3E-06	9.56E-06	2.27156E-07		4.92E-07	1.1E-05	1.33E-08
2012	6.29794E-07	9.8323E-06	7.57419E-07	4.86E-07	9.68E-06	6.6E-07	2.32E-05	6.46E-07	6.78E-09	8.6E-06	4.89E-06	1E-05	1.59215E-07		5.94E-07	1.17E-05	1.3E-08
2013	6.95465E-07	1.03366E-05	6.43715E-07	3.14E-07	1.17E-05	6.3E-07	2.31E-05	5.58E-07	6.95E-09	8.76E-06	4.45E-06	9.36E-06	1.22574E-07		6.09E-07	1.27E-05	1.31E-08
2014	7.17671E-07	1.02292E-05	6.25373E-07	2.3E-07	1.24E-05	7.11E-07	2.35E-05	4.27E-07	7.16E-09	7.86E-06	4.16E-06	9.56E-06	9.89693E-08		5.89E-07	1.37E-05	1.28E-08

Source: Calculated By Excel Program , Data From WWW.Worldbank.org

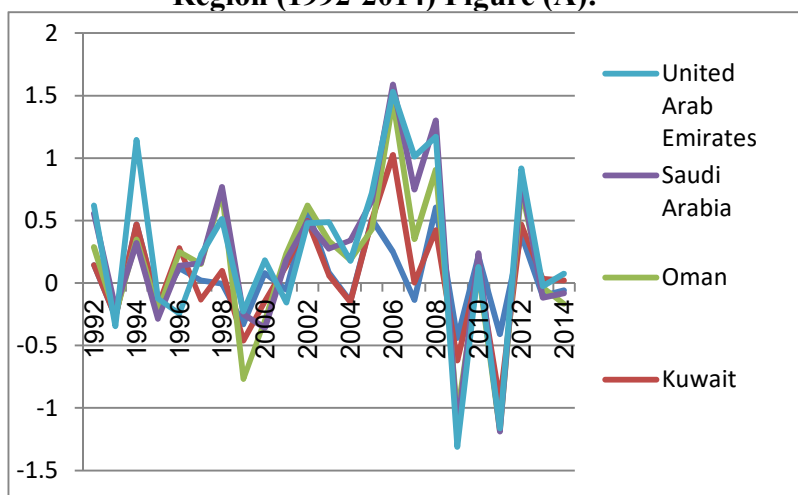
Table (C):Changes Rate of Total Investment Per Worker in Mena Region (1992-2014)

	Algeria	Bahrain	Egypt	Islamic Republic of Iran	Israel	Jordan	Kuwait	Libya	Mauritania	Morocco	Oman	Saudi Arabia	Sudan	Syria	Tunisia	United Arab Emirates	Yemen
1992	0.00053	0.142591	0.14714	0.160226	0.090503	0.325397	-0.13512	0.246564	-0.0469	0.144989	0.26807	1.764747	0.558039	0.337584	0.063685	0.826925	
1993	-0.08402	-0.27073	-0.19773	-0.01698	0.24229	-0.04686	0.114469	-0.20298	-0.07353	0.020418	0.051059	1.478098	0.87954	0.122015	-0.14609	0.168253	
1994	0.394996	0.468529	0.076887	-0.10781	0.452393	0.014793	0.021504	2.596472	-0.01527	-0.11979	-0.02823	1.152623	0.337701	-0.1597	0.824838	0.035659	
1995	0.15278	-0.18438	0.171307	0.992862	0.350724	0.257786	-0.60908	-0.54782	-0.09708	-0.04354	-0.05937	0.920407	0.0002	0.105528	0.162235	0.727307	
1996	0.048528	0.117439	0.338667	0.54728	0.173322	-0.00835	0.161697	0.697866	-0.08952	-0.00791	-0.03122	-0.11038	0.698326	-0.2287	0.049249	-0.38328	0.512575
1997	0.011379	0.021112	0.412929	0.238055	-0.07667	-0.00231	-0.15355	-0.2776	-0.10814	-0.03085	0.284467	0.007375	0.85087	-0.075	0.106967	0.064748	0.115359
1998	0.199813	-0.00584	0.211968	-0.02363	-0.08623	-0.14287	0.104767	-0.18161	0.093907	0.062725	0.634481	0.035872	0.376516	0.339745	-0.00556	-0.25747	-0.18602
1999	0.183656	-0.32945	-0.00355	0.350323	0.032893	0.089422	-0.1311	0.049614	0.40379	0.111689	-0.30788	0.517083	0.051803	-0.12789	0.148677	0.024605	0.162739
2000	-0.07997	0.080611	-0.0841	0.283349	0.050511	-0.1111	-0.22742	0.595191	0.210304	0.016215	-0.14887	-0.06242	0.230764	-0.20552	0.139974	0.539681	0.076777
2001	0.165502	-0.06317	-0.07384	0.050675	-0.07429	-0.15159	0.194677	3.834636	0.245358	0.15765	0.091819	-0.04498	0.024529	0.020965	0.118358	-0.34425	0.218617
2002	0.266939	0.585991	0.098043	0.453021	-0.145	-0.01807	-0.08891	0.356524	-0.33158	0.067511	0.123633	-0.13049	0.233239	0.021633	-0.08427	-0.01064	0.023377
2003	0.221225	0.08428	-0.00141	0.316732	-0.11047	0.149686	-0.02312	0.041933	0.963904	0.057465	0.275197	-0.06216	0.186391	0.340337	0.095052	0.212251	0.213242
2004	0.478789	-0.1434	0.068093	0.468613	0.065035	0.788148	-0.00865	-0.1282	1.06344	0.193539	0.337079	0.155634	0.318463	-0.05528	0.128721	-0.16481	0.11927
2005	0.484614	0.50957	0.121448	-0.16468	0.237016	0.094701	-0.00594	0.310121	0.559651	-0.0246	-0.07476	0.226382	0.114361	0.309071	-0.03058	0.062852	-0.03363
2006	0.303346	0.247941	0.318287	0.250381	0.11252	0.017476	0.778424	-0.10206	-0.29067	0.241217	0.434182	0.127979	0.216482	0.356148	0.313127	-0.05919	0.018992
2007	0.102187	-0.13506	0.633438	0.490059	0.235954	0.19701	0.136957	0.524698	0.093451	0.223498	0.34955	0.397421	0.112485	0.4762	0.086653	0.262265	0.179297
2008	0.541463	0.605803	0.238384	0.312001	0.16275	0.254381	-0.18258	0.543166	0.44433	0.260544	0.484585	0.393641	0.071804	0.055772	0.170885	-0.13145	0.092521
2009	0.229496	-0.43907	-0.19246	-0.12841	-0.2421	-0.12247	-0.18005	-0.16114	-0.16514	-0.05078	-0.43307	-0.12073	0.054352	0.347491	-0.05733	-0.13736	-0.18108
2010	0.077612	0.212493	0.146372	0.032579	0.198328	0.079812	-0.11507	0.136969	0.390512	-0.01307	-0.00349	0.144971	0.153785	-0.07177	0.116921	-0.11147	-0.09693
2011	0.071607	-0.41005	-0.33305	0.227179	0.367813	-0.06623	-0.53647	-0.84814	0.317348	0.08945	-0.23471	-0.00673	0.104624	-0.35683	0.025932	-0.5271	
2012	0.053478	0.389045	0.007188	0.234705	-0.20342	0.036588	0.079643	1.891805	0.420364	-0.02876	0.284579	0.074745	0.195853	0.488014	0.088593	0.638563	
2013	0.239811	-0.10294	-0.06977	0.102776	0.081905	-0.03645	0.135449	0.210332	-0.01205	7.79E-05	-0.06741	-0.08318	0.462785	0.034177	0.092985	0.025242	
2014	0.115873	-0.05957	0.075974	0.106918	0.073746	0.196183	0.080947	-0.1584	-0.07756	-0.16736	-0.18868	0.08465	0.084437	0.082953	0.156562	0.011971	

Source: Calculated By Excel Program , Data From WWW.IMF.org

Changes Rate of Total Investment Per Worker in Mena

Region (1992-2014) Figure (A):



Changes Rate of Total Investment Per Worker in Mena Region (1992-2014) Figure (B):

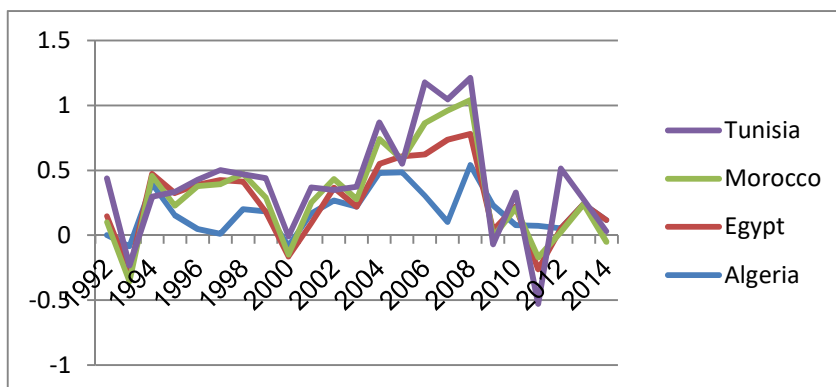
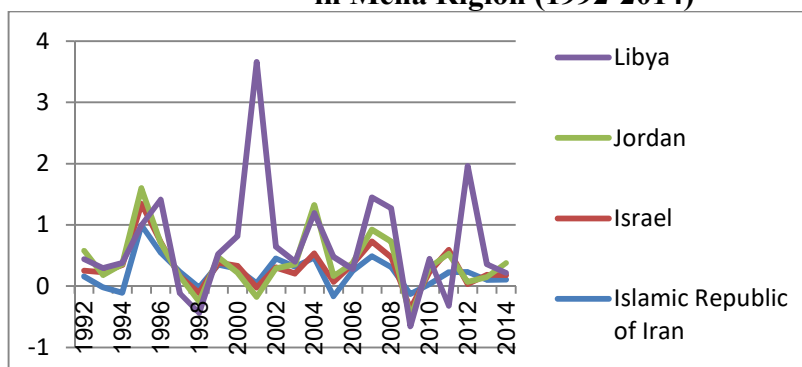
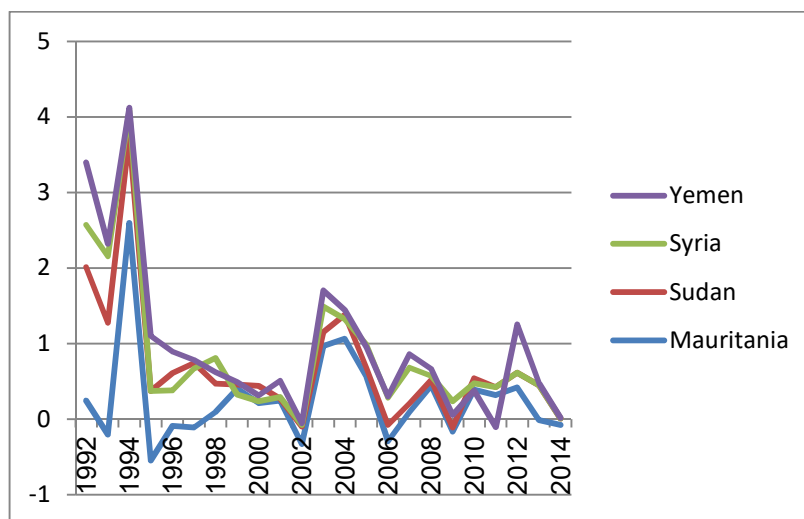


Figure (C): Changes Rate of Total Investment Per Worker in Mena Region (1992-2014)



**Changes Rate of Total Investment Per Worker in Mena
Figure (D): Region (1992-2014)**



**Table(D):Changes Rate Of Total Factor Productivity
(Residuals)(1991-2014)**

	Algeria	Bahrain	Egypt	Iran
				0.483618
	0.195828	0.050332	0.030184	0.366034
	0.055339	-0.03071	0.074209	0.35852
	-0.00239	-0.02008	-0.086	0.364142
1991	-0.16471	0.155958	-0.11274	0.254915
1992	-0.33178	0.101468	-0.1271	0.116905
1993	-0.37312	0.158341	0.077811	0.176163
1994	-0.26622	0.070918	0.125627	0.103072
1995	-0.27523	0.160529	0.17156	0.088869
1996	-0.29918	0.255893	0.184824	-0.00855
1997	-0.43088	0.129709	0.126814	-0.11032
1998	-0.36762	0.172805	0.11364	-0.15496
1999	-0.3274	0.121852	0.030408	-0.12765
2000	-0.22802	0.089345	-0.00635	-0.03696
2001	-0.11564	0.003634	-0.05609	-0.17581
2002	0.120352	-0.05165	-0.12188	-0.11773
2003	0.286445	-0.08258	-0.05175	-0.01033
2004	0.164867	-0.41566	0.058012	-0.00841
2005	0.29203	-0.14117	0.083537	-0.11942
2006	0.351387	-0.18665	0.065165	-0.21019
2007	0.367295	-0.14283	0.108703	-0.32076
2008	0.359945	-0.16547	-0.11375	-0.36112
2009	0.26451	-0.12446	-0.1718	-0.34722
2010	0.348616	-0.05502	-0.19538	
2011	0.375578	-0.05448	-0.20766	

Source: out puts of E-Views Program

**Table (E): Changes Rate Of Total Factor Productivity
(Residuals) (1991-2014)**

	Israel	Jordon	Kwait	Libya
	-0.25594	-0.09767	-0.73516	0.591554
	-0.30253	-0.22498		0.547367
	-0.2417	-0.38346		0.443361
1991	-0.03597	-0.34243		0.411696
1992	0.085047	-0.1627	0.749469	0.405462
1993	0.123816	-0.11302	0.705069	0.278237
1994	0.016404	0.043695	0.718959	0.283375
1995	-0.05247	0.023681	0.686796	0.265406
1996	-0.10624	0.109234	0.642094	0.218751
1997	-0.05497	-0.01943	0.553976	0.133505
1998	-0.12133	-0.10194	0.487231	-0.20178
1999	-0.21476	-0.0795	0.180483	-0.30182
2000	-0.24546	-0.0225	0.142589	-0.21839
2001	-0.20838	0.15147	-0.05678	-0.17519
2002	-0.08435	-0.01507	-0.16168	-0.13428
2003	-0.00633	0.084355	0.177653	-0.06585
2004	0.124386	0.116913	0.005018	-0.09379
2005	0.283936	0.134186	-0.18295	-0.14914
2006	0.110164	0.127173	-0.17652	-0.12922
2007	0.233941	0.139551	-0.36495	-0.10587
2008	0.373344	0.11576	-0.87848	-0.69419
2009	0.108232	0.168665	-0.82215	-0.2424
2010	0.215935	0.129525	-0.83951	-0.415
2011	0.255232	0.218497	-0.83116	-0.65179

Source: out puts of E-Views Program

**Table(F): Changes Rate Of Total Factor Productivity
(Residuals)(1991-2014)**

	Mauritania	Moroco	Oman	Saudia
	0.113492	0.046842	0.199397	0.067453
	0.055879	-0.04175	0.213696	0.126552
	0.12366	-0.10461	0.216688	0.097082
1991	-0.16216	-0.07988	0.224189	0.270323
1992	0.037499	-0.19827	0.218156	0.167005
1993	0.087177	-0.15685	0.208667	0.083782
1994	0.031159	-0.25069	0.184813	0.044717
1995	0.015818	-0.2763	0.081125	0.023124
1996	0.000276	-0.14494	0.119322	0.294646
1997	-0.04473	-0.15149	0.176793	0.245548
1998	-0.04545	-0.06495	0.182549	0.208644
1999	0.0255	-0.01584	0.133203	0.032402
2000	-0.08174	-0.03413	0.034851	-0.03294
2001	-0.18661	0.038089	-0.03344	-0.03798
2002	-0.1762	0.017592	-0.03583	-0.06946
2003	0.062705	0.156421	-0.10425	-0.1764
2004	0.073239	0.101033	-0.16458	-0.15795
2005	0.012894	0.103995	-0.19913	-0.07889
2006	0.032332	0.16891	-0.11862	-0.16365
2007	0.012824	0.176523	-0.16268	-0.17999
2008	-0.01106	0.205039	-0.20203	-0.19236
2009	-0.03619	0.198807	-0.32745	-0.15595
2010	0.004747	0.190979	-0.40767	-0.21123
2011	0.054937	0.115462	-0.43776	-0.20448

Source: out puts of E-Views Program

**Table(G): Changes Rate Of Total Factor Productivity
(Residuals)(1991-2014)**

Year	Sudan	Syrian	Tunisia	Emarates	Yeman
	0.149792	0.081608	-0.24929	0.422465	0.415023
	-0.09168	0.054122	-0.18681	0.37005	0.41885
	-0.23121	0.221303	-0.13788	0.294449	0.471229
	-0.40096	0.169852	-0.15188	0.626001	0.276494
1991	-0.53925	0.197546	-0.11463	0.701848	0.22054
1992	-0.61084	-0.03401	-0.13324	0.415263	0.189555
1993	-0.29461	-0.0612	-0.16653	0.465984	0.087648
1994	-0.156	0.189121	-0.22013	0.254272	0.046395
1995	0.005775	0.100355	-0.12773	0.230525	0.11609
1996	0.151784	-0.08134	-0.107	0.509213	-0.04479
1997	0.206807	-0.26264	-0.05424	0.195576	0.057618
1998	0.195705	-0.23346	-0.05056	0.146601	0.049642
1999	0.212498	-0.19552	0.025522	0.280754	-0.00955
2000	0.196731	-0.07303	0.09028	0.15582	-0.02724
2001	0.157661	-0.00642	0.101012	0.056404	-0.13511
2002	0.170072	0.080609	0.2125	-0.06167	-0.12399
2003	0.208984	0.007144	0.245512	-0.26928	-0.14017
2004	0.188989	-0.25232	0.240837	-0.52719	-0.14382
2005	0.208375	0.055318	0.1926	-0.72754	-0.0874
2006	0.182525	0.042955	0.203435	-0.78407	-0.23337
2007	0.12526		-0.09666	-0.7691	-0.26348
2008	0.030476		0.124164	-0.72163	-0.37408
2009	-0.01291		0.181993	-0.65595	-0.37053
2010	-0.05397		0.178739	-0.60879	-0.39555

Source: out puts of E-Views Program

Figure (E):Residuals

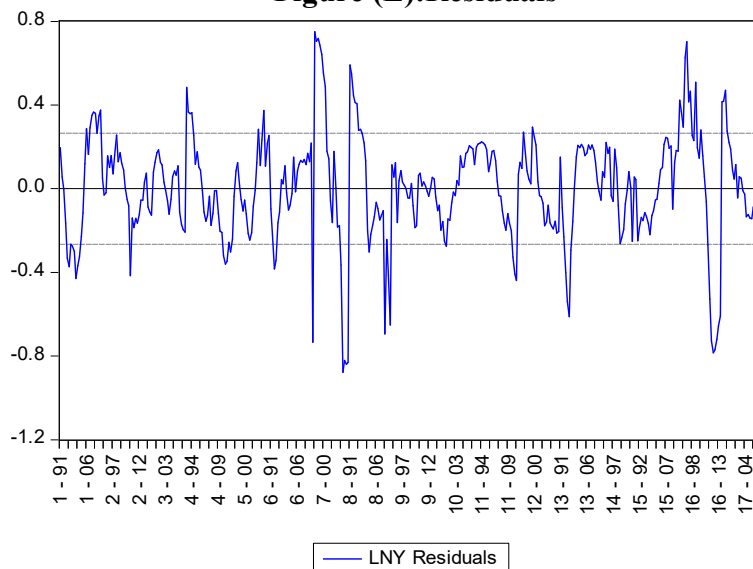


Figure (F): Standardized Residuals

