
The Causality Between Stock Market Development and Economic Growth: Evidence from Arab Countries

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Abstract: The interaction between the stock market and the real economy is important in the various channels through which financial markets contribute to economic growth. This paper examines the nexus between stock market development and economic growth for three Arab countries namely Egypt, Morocco and Tunisia. This study uses linear and nonlinear causality tests to investigate the relationship between stock market development and economic growth. The findings of the linear model show unidirectional causation between economic growth and market capitalization for Tunisia. Concerning Egypt and Morocco, there is a bidirectional causality between market capitalization and economic growth. The nonlinear causality test findings confirm the results of linear test. A significant bidirectional nonlinear causality between the two variables is detected for the three countries under investigation. This results indicates that stock market development improves economic growth in these countries. As a result, the governments of these countries should develop their stock markets by simplifying procedures and removing restrictions on the introduction of new firms to the stock exchange. Such a move might increase the size, liquidity, and activity of the stock market, so stimulating growth in the region.

Keywords: Stock Market Development, Economic Growth, Nonlinear Causality, Arab Countries

1. Introduction

The link between economic growth and financial sector development has attracted the attention of academics, portfolio managers and economic makers. This attention has substantially increased with the fast development of stock markets in emerging countries. Therefore, some researchers have attempted the last few years to test the role of stock market as a stimulator for economic growth. More precisely, to verify whether stock market development might promote and boost the economic growth in both developed and emerging countries.

Theoretically, some studies have established a relationship between financial development and economic growth. Gurely and Shaw [28] point out that financial sector development enhances economic growth through the canal of physical capital, in other words by the improvement of physical capital accumulation. Shaw [63] suggests that the stock market development plays an important role in economic growth. This role is greater during the early stages of development. McKinnon [43] develops a model based on the

link between the deposit rate and investment. The author emphasizes that a stable and developed financial system drives a faster economic development.

Empirically, the relationship between stock market development and economic growth has often investigated by several previous studies. These studies have applied different econometric methodologies and proxy measures for different countries, regions and periods. However, empirical results of the existing literature are varied and sometimes inconclusive. Furthermore, some policy recommendations and economic implications are provided from the empirical outcomes as well for developed countries as for emerging economies.

This paper contributes to the related literature in two aspects. First, we study the relationship between economic growth and stock markets in three North African countries namely Tunisia, Egypt and Morocco. While some previous studies focus on the Sub-Saharan countries and Southern Africa region, we interest in this paper to Northern Africa countries sharing a common characteristics such as foreign direct investment, economic development, and stock market characteristics. In addition, the examination of the role of

stock market development on the economic growth process is more relevant for emerging economies such as African countries which have experienced a great increase in their stock market activities in the last two decades.

Second, the existing studies have only used the linear test and neglected nonlinear effect. We examine the role of stock market on economic development expansion using linear and nonlinear Granger causality tests. The main objective is to verify whether stock market has stimulated the economic growth in the three considered emerging countries.

The rest of the paper is organized as follows. Section 2 presents a short overview of the major studies in the related literature. Section 3 describes the econometric methodology. Section 4 presents the data and descriptive statistics. Section 5 reports and discusses the empirical results. Section 6 concludes the paper.

2. Literature Review

Since the pioneer seminal research of Gurley and Shaw [28], some studies have attempted to elucidate the nexus between different financial development variables and economic growth (see eg. King and Levine [33]; Levine and Zervos [37]; Luintel and Khan [37]; Zang and Kim [68]; Gries et al [27]; Masih et al. [41]). More recently, the interest has focused on the role of stock market development on the economic growth. Marques et al. [40] test the relationship between stock market and economic growth for Portugal which is a small open economy dependent on bank financing during the period 1993-2011. Using the Granger causality test and VAR model, they find, on the one hand bidirectional causality between the stock market and economic growth. On the other hand, they reveal the absence of causality running from bank sector to economic growth.

Ngare et al. [45] examine the role of stock market development in economic growth process for African countries. More specifically, they use data from 36 countries of which 18 have stock market over the period ranging from 1980 to 2010. They conclude that stock market development has a positive and significant effect on economic growth. More interestingly, countries with stock markets have realized a faster growth compared to countries without stock market. In addition, the economic growth is more important for small countries compared to countries relatively developed. In the same vein, Pradhan et al. [56] employ the Granger causality test for a sample of 26 Asian countries. Their result reveals the existence of unidirectional causality running from the stock market development to economic growth.

Ben Naceur and Ghazouani [14] use data for 11 MENA region countries over the period 1980-2003. Their empirical results show no significant relationship between the stock market development and GDP growth. The authors explain the lack of the relationship by the underdeveloped of financial systems namely the banking sector and stock markets in the MENA region. Cooray [21] uses annual data for 35 developing countries which cover the period 1992-

2003. The stock market development is measured through three variables, namely the market capitalization, the market liquidity and the turnover ratio. Empirical results show that the estimation coefficients of the three proxies for stock market are positive and highly significant suggesting that stock markets promote economic growth in these developing countries.

Nieuwerburgh et al. [46] examine the long-run link between financial market development and economic growth in Belgium. Using the total market capitalization on the Brussels stock exchange, they suggest that stock market development causes economic growth in the considered country. Enisan and Olufisayo [24] investigate the long-run and short-run relationship between stock market development and economic growth for the sub-Saharan Africa region. The authors apply the Granger causality test and the VEC model for seven countries namely Cote d'Ivoire, Egypt, Kenya, Morocco, Nigeria, South Africa and Zimbabwe for the period 1980-2004. Their results point out that stock market Granger causes economic growth in Egypt and South Africa. However, a bidirectional relationship between the two variables is observed for Cote d'Ivoire, Kenya, Morocco and Zimbabwe. Carp [18] suggests the absence of a direct long-term causal relationship between the economic growth and stock equity development measured by market capitalization and stock value traded in Romania. Nevertheless, results indicate the existence of bidirectional correlation between GDP growth rates and turnover ratio.

Yu et al. [67] investigate the role of financial development and stock market maturity in providing economic growth across geographic regions and income groups. They conclude that the causal links between the three variables differ in direction, timing and strength across regions. Based on dynamic panel model, Naik and Padhi [44] test the relationship between stock market development and real GDP for 27 emerging economies over the period 1995-2012. They reveal that the real GDP exhibits a significant relationship with the trade value and the turnover ratio as a proxy for financial development for the sample as a whole. The econometric relationships derived in this study suggest that future enhance in the stock market activity contributes to economic growth.

Nyasha and Odhiambo [50] and Nurudeen [49] employ different estimation techniques to examine the causal relationships between stock market development and economic growth for South Africa and for Nigeria, respectively. They report evidence of a significant unidirectional causality running from stock market development to economic growth. In the same vein, Nyasha and Odhiambo [51] find similar results for the relationship between the two variables in Kenya.

In a more recent research, Pan and Mishra [55] adopt the Autoregressive distributed lag (ARDL) approach to examine the nexus between stock market development proxies and economic growth in China over the period 1999-2015. Their empirical findings reveal a small influence of stock market on real economy. According to the authors, the reason of the

little impact is due to the large size of the country, and the stock market represents only a small fraction of the entire economy. Therefore, the stock market cannot have a substantial effect on the overall economic development of the country.

Table 1 provides a comprehensive literature survey. As can be seen in Panel A, a large body of the empirical studies on the links between stock market development and economic growth is conducted in emerging countries and used different financial measures proxy. Nevertheless, the results provided by the most studies suggest that stock market development plays a significant role in the economic growth of developing countries. For example, Shahbaz et al. [62] find a significant impact of stock market development for Pakistan, Hou and Cheng [31] for Taiwan, Bayar et al. [11] for Turkey and Bist

[15] for Nepal. This result is confirmed by the studies that analyzed the relationship for a group of countries. Masoud and Hardaker [42] develop an endogenous growth economic model to investigate the correlation between stock market development and economic growth for some emerging countries. The authors use three measures for stock market development namely the market capitalization, value traded and turnover ratio. They conclude that stock market has a significant role in the development of emerging economies. More precisely, the three stock market indicators are positively and statistically correlated with the real GDP suggesting that financial sector development in emerging economies is significant in its process of economic growth. Using a panel-VAR model, Azam et al. [9] find similar results for Asian countries over the period 1961-2012.

Table 1. Summary of the existing empirical studies.

Study	Countries	Methodology	Results
<i>Panel A: country-specific studies</i>			
Dritsaki and Dritsaki-Bargiota (2005)	Greece1988-2002	Vector autoregressive model	A unidirectional causality between the economic growth and stock market development.
Neuwerburgh et al. (2006)	Belgium1830-2000	Cointegration approach Granger causality tests	Stock market development causes economic growth.
N'Zué (2006)	Côte d'Ivoire	Vector error-correction model Granger causality tests	A unidirectional causality running from the stock market development variables to real GDP.
Agrawalla and Tuteja (2007)	India1990-2002	Cointegration approach Trivariate causality tests	A stable long run equilibrium relationship between stock market developments and economic growth.
Ibrahim (2007)	Malaysia1985-2003	Cointegration approach Vector error-correction model	Financial market development is positively related to real output in the long-run. The development of financial markets promotes economic growth.
Liu and Sinclair (2008)	China1992-2003	Vector error-correction model	A unidirectional causal link running from GDP to the stock prices exists in the long-run A unidirectional causation from the stock prices to GDP growth in the short-run.
Chakraborty (2008)	India1996-2005	Cointegration approach	A stable long-run relationship between stock market capitalization and real GDP
Shahbaz et al. (2008)	Pakistan1971-2006	Autoregressive distributed lag (ARDL)	Significant bidirectional causality between stock market development and economic growth.
Nowbusting and Odit (2009)	Mauritius1989-2006	Vector error-correction model	Stock market development positively affects economic growth both in the short-run and long-run.
Nurudeen (2009)	Nigeria1961-2007	Vector error-correction model	Stock market development improves economic growth
Hou and Cheng (2010)	Taiwan1971-2007	Vector error-correction model Granger causality tests	Bidirectional causal relation between financial development and economic growth
Zivengwa et al. (2011)	Zimbabwe1980-2008	Vector autoregressive model Granger causality tests	A unidirectional causal link that runs from stock market development to economic growth
Carp (2012)	Romania1995-2010	Vector Autoregressive model Granger causality	Bidirectional causality between GDP growth and turnover ratio.
Kolapo and Adaramola (2012)	Nigeria1998-2010	Cointegration approach Granger causality tests	A long-run relationship between stock market and economic growth A unidirectional causality from market capitalization to GDP.
Ho and Odhiambo (2012)	Hong Kong1980-2010	Autoregressive distributed lag (ARDL)	A unidirectional causal runs from market capitalization to economic growth without any feed back A bidirectional relationship between stock market turnover and economic growth.
Kirankabes and Basarir (2012)	Turkey1998-2010	Cointegration approach Granger causality tests	A long-run relationship between economic growth and stock market activity in turkey A one-way causality relationship from the stock market to economic growth.
Marques et al. (2013)	Portugal1993-2011	Vector autoregressive model	Strong bidirectional causality between the stock market and economic growth.
Tang (2013)	Australia1960-2008	Cointegration approach Granger causality tests	A unidirectional causality running from stock prices to economic growth.
Bayar et al. (2014)	Turkey1999-2013	Cointegration approach Granger causality tests	A long-run relationship between economic growth and stock market development A unidirectional causality from stock market development indicators to economic growth.
Alshammary (2014)	Saudi Arabia1993-2009	Vector error-correction model Granger causality tests	A significant long-term causal relationship between economic growth and the stock market development A weak bidirectional causal relationship.

Study	Countries	Methodology	Results
Badr (2015)	Egypt2002-2013	Vector error-correction model Granger causality tests	No cointegration relationship between the two variables in the long-run. No clear evidence in short-run.
Niranjala (2016)	Sri Lanka1990-2013	Vector autoregressive model Granger causality tests	Stock market performance plays an important role in economic growth in Sri Lanka
Oumoriyi and Osaretin (2015)	Nigeria1980-2011	Cointegration approach Granger causality tests	Bidirectional relationship between stock market development and economic growth.
Nyasha and Odhiambo (2015)	South Africa1980-2012	Autoregressive distributed lag (ARDL)	A short-run and long-run unidirectional causal flow from stock market development to economic growth.
Nyasha and Odhiambo (2017)	Kenya1980-2012	Autoregressive distributed lag (ARDL)	Stock market development has a positive impact on economic growth both in short-run and long-run.
Bist (2017)	Nepal1993-2014	Autoregressive distributed lag (ARDL)	Stock market development is positively associated with economic growth.
<i>Panel B: multi-country studies</i>			
Rousseau and Wachtel (2000)	47 countries1980-1995	Vector autoregressive model	Stock markets promote economic growth
Arestis et al. (2001)	five developed economies1972-1998	Vector error-correction model	Stock market development stimulates economic growth
Beck and Levine (2001)	40 countries1976-1998	Panel data-GMM	Stock market has a significant and positive impact on economic growth.
Durham (2002)	64 countries1981-1998	Panel data-GMM	Stock market development has a positive influence on economic activities. A unidirectional causality running from market capitalization to GDP growth in four cases (Chile, Greece, Malaysia and Philippines) Turnover ratio causes economic growth in five cases (Chile, Greece, Korea, Malaysia and Philippines).
Caporale et al. (2004)	seven emerging countries1977-1998	Toda-Yamamoto approach	
Beck and Levine (2004)	40 countries1976-1998	Panel data-GMM	Stock markets positively and significantly influence economic growth
Adjasi and Biekpe (2006)	14 African countries1975-2001	Panel data- GMM	A positive relationship between stock market development and economic growth.
Ben Naceur and Ghazouani (2007)	MENA region1980-1990	Panel data- GMM	No significant relationship between Stock market development and economic growth. Stock market development Granger causes economic growth in Egypt and South Africa in the long-run Bidirectional relationship between stock market development and economic growth for Cote D'Ivoire, Kenya and Morocco in the short-run.
Enisan and Olufisayo (2009)	sub-Sahara African countries1980-2004	Vector error-correction model Granger causality tests	
Saci et al. (2009)	30 developing countries1988-2001	Panel data- GMM	The stock market variables are positively and significantly related to economic growth.
Colombage (2009)	5 industrialized countries1995-2007	Vector error-correction model	A unidirectional causality running from financial market development to economic growth.
Cooray (2010)	35 developing countries1992-2003	Panel data-GMM	The stock market is an important variable in determining the long-run growth in the considered countries.
Boubakari and Jin (2010)	5 European countries1995-2008	Vector autoregressive model Granger causality tests	A positive links between the stock market and economic growth for some countries Stock market capitalization and liquidity indicators have positive long-run effects on economic development Stock market liquidity has a negative short-term influence on economic growth.
Wu et al. (2010)	13 European countries1976-2005	Vector error-correction model	
Tachiwou (2010)	West African monetary union1995-2006	Vector error-correction model	Stock market development positively affects GDP both in short run and long run.
Masoud and Hardaker (2012)	42 emerging markets1995-2006	Endogenous growth model	The market capitalization is positively and statistically correlated with real per-capita GDP growth rate A long-term equilibrium relationship between the development of the stock market and the evolvement of the economy.
Yu et al. (2012)	172 countries1980-2009	Panel data-GMM Granger causality tests	The direction and the extent of the causal links between stock market development and economics differ across regions.
Pradhan et al. (2013)	16 Asian countries1988-2012	Vector autoregressive model	Stock market development accelerates the pace of economic performance.
Ngare et al. (2014)	36 African countries1980-2010	Panel data-GMM Granger causality test	Stock market development has a positive effect on economic growth.
Pradhan et al. (2014)	26 Asian countries1961-2012	Cointegration approach Granger causality tests	Stock market is matter in the determination of economic growth.
Pradhan et al. (2015)	OCED countries1960-2012	Cointegration approach Granger causality tests	Long run equilibrium relationship between economic growth and stock market development indicators. Bidirectional causality between stock market and economic growth in most cases.
Naik and Padhi (2015)	27 emerging economies1995-	Panel data-GMM	Stock market development contributes to the economic growth.

Study	Countries	Methodology	Results
Al Nasser (2015)	2012 14 Latin American countries1978-2011	Vector error-correction model Granger causality tests	Bidirectional causality between stock market development and economic growth
Azam el al. (2016)	Asia-4 Countries1971-2012	Autoregressive distributed lag (ARDL)	Stock market is positively and significantly correlated with economic growth in India and China.
Osakwe and Ananwude (2017)	Nigeria and South Africa1981-2015	Autoregressive distributed lag (ARDL)	Long-run equilibrium relationship between stock market development and economic growth in Nigeria. Market capitalization has a significant impact on economic growth in south Africa.
Fufa and Kim (2018)	64 countries1989-2012	Panel data-GMM	The link between stock market development and economic growth depends on the stages of economic growth of the countries.

3. Methodology

3.1. Granger Causality Test

The short-run relationship between stock market development and economic growth is analyzed using the Granger causality test. According to the Granger's [69] definition for causality: stock market development causes economic growth, if economic growth is better explained by using historical values of development market than by using only past values of economic growth. In the same way, economic growth causes stock market development, if the past values of economic growth are able to explain stock market development. On the practical level, we test the causal relationship between equity market development and economic growth through the following bivariate auto-regression:

$$YGD P_{it} = \alpha_0 + \sum_{k=1}^T \alpha_k YGD P_{it-k} + \sum_{k=1}^T \beta_k SMD_{it-k} + \varepsilon_t \quad (1)$$

$$SMD_{it} = \varphi_0 + \sum_{k=1}^T \alpha_k YGD P_{it-k} + \sum_{k=1}^T \beta_k SMD_{it-k} + \zeta_t \quad (2)$$

Where α_0 and φ_0 are constants, α_k and β_k are the estimated coefficients. $YGD P$ and SMD are respectively the growth of real GDP and stock market development indicator.

3.2. Non Linear Kyrtsou-Labys Test

To test the nonlinear relationship between variables, we employ the Kyrtsou and Labys's [36] causality test which introduces a bivariate noisy Mackey-Glass model. This model is defined as follows:

$$YGD P_t = \alpha_{11} \frac{YGD P_t - \tau_1}{1 + YGD P_{t-\tau_1}^{c_1}} - \beta_{11} YGD P_{t-1} + \alpha_{12} \frac{SMD_t - \tau_2}{1 + SMD_{t-\tau_2}^{c_2}} - \beta_{12} SMD_{t-1} + \varepsilon_{1t} \quad (3)$$

$$SMD_t = \alpha_{21} \frac{YGD P_t - \tau_1}{1 + YGD P_{t-\tau_1}^{c_1}} - \beta_{21} YGD P_{t-1} + \alpha_{22} \frac{SMD_t - \tau_2}{1 + SMD_{t-\tau_2}^{c_2}} - \beta_{22} SMD_{t-1} + \varepsilon_{2t} \quad (4)$$

Where $\varepsilon_{1,t}$ and $\varepsilon_{2,t} \sim N(0,1)$, $t = \tau, \dots, N$, $\tau = \max(\tau_1, \tau_2)$. α_{ij} and β_{ij} explore the nonlinear and linear effects of the independent variables on the dependent variable, respectively. C_i is the constant which can be defined via prior selection. τ_i is the integer delays, with the optimal lag length is selected using the Schwartz information criterion and the likelihood ratio tests. Finally, the nonlinear Kyrtsou and Labys causality test is similar to the linear Granger causality test, except that the models applied to series are Mackey-Glass processes. Practically, the test statistic follows a Fisher distribution defined as:

$$S_F = \frac{(S_c - S_u) / n_c}{S_u / (T - n_u - 1)} \rightarrow F(n_c, T - n_u - 1) \quad (5)$$

Where S_F is the test statistic.

4. Data and Preliminary Analysis

The main objective of the paper is to check the causality relationship between stock market development and

economic growth for tree North African countries. We exclude Algeria and Libya given that these two African countries have established stock market only in the past few years and data on stock market is not available for the whole considered period. We employ annual data for economic growth and stock market indicators over the period 1988 to 2017. The economic growth is measured by the annual percentage growth rate of real GDP per capita. However, market capitalization of listed companies (percent of GDP) and stock traded, turnover ratio (percent) have been used as proxies for the stock market development. These variables are collected from the World Bank's African Development Indicators (ADI), Financial Development and Structure Database, Reuter's services and individual country's financial data base.

Figure 1 Presents the evolution of stock market indicators (market capitalization and turnover ratio) and economic growth for the three considered countries (Tunisia, Egypt, Morocco). We observe that the three countries experienced an unstable economic growth rate during the period under study. More interestingly, the GDP growth for Tunisia and Egypt has fallen significantly after the Arab spring. For

example, the GDP growth drops from 2.36% in 2010 to -3.02% in 2011 for Tunisia. Henceforth, it resumes an increasing trend. For Egypt, the drop of the economic growth is more persistent and continues until 2013.

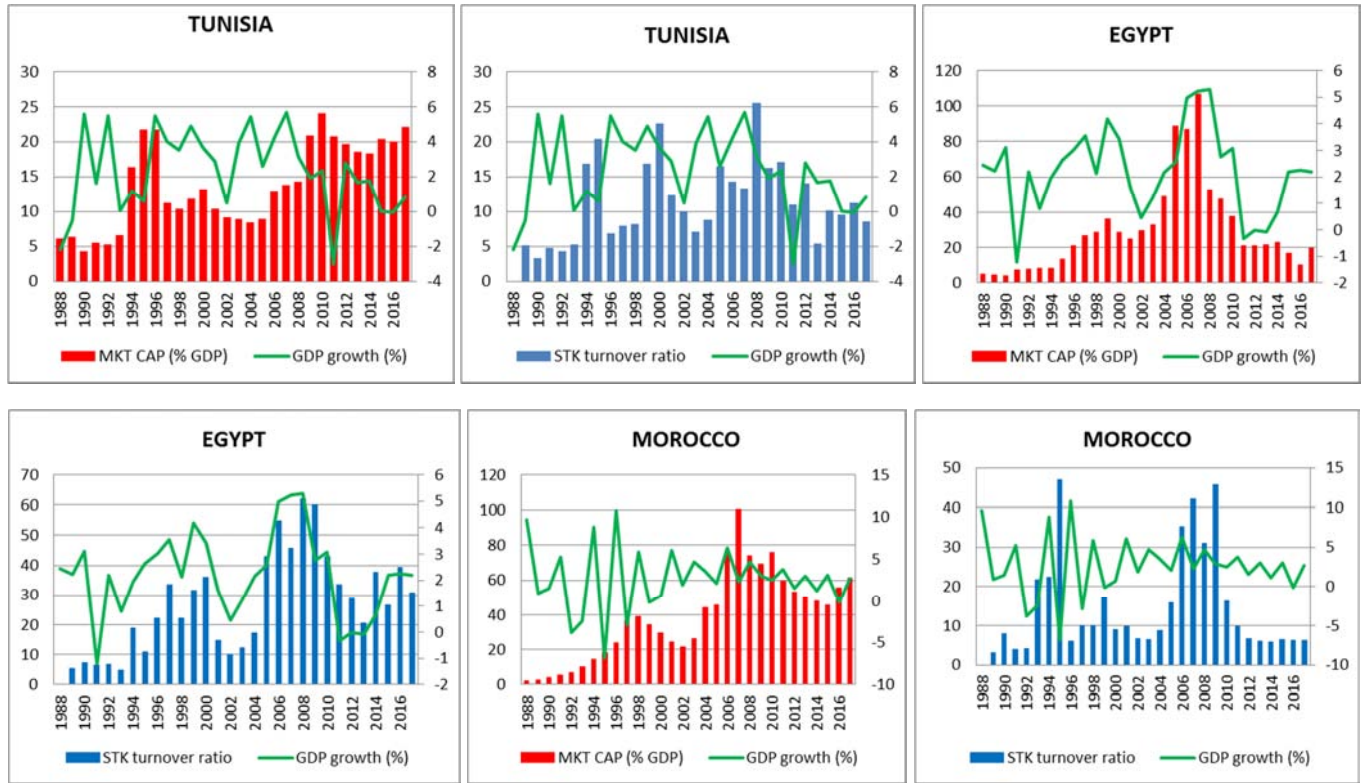


Figure 1. Evolution of stock market indicators (market capitalization and turnover ratio) and economic growth for the three considered countries.

Moreover, the stock market development level varies through countries with some resemblance between the two indicators. The two indicators reach their maximum values between 2006 and 2008 for the three considered countries. This evolution is not surprising as the number of listed firms has increased significantly during the period under study. The number of companies rises from 13 and 483 in 1990 to 50 and 744 in 2007 for Tunisia and Egypt, respectively.

Table 2 presents descriptive statistics of variables. There is some similarity between the three countries in the GDP rate

growth. The average value ranges between 2.225% for Egypt and 2.652% for Morocco. However, there is a wide variation of stock market development across countries. While, Morocco has a market capitalization of 38.57% of GDP in 1988-2017, Tunisia has a market capitalization of only 13.752% of GDP during the period 1988-2017. The turnover ratio, measure of stock market liquidity, has an average of 11.503% for Tunisia and 14.725% for Morocco suggesting the low liquidity levels in the North African stock exchanges.

Table 2. Summary statistics 1988-2017.

	Tunisia			Egypt			Morocco		
	GDP (%)	MKT Cap	Turn ratio	GDP (%)	MKT Cap	Turn ratio	GDP (%)	MKT Cap	Turn ratio
Mean	2.336	13.752	11.503	2.225	29.651	27.089	2.652	38.570	14.725
Maximum	5.653	24.070	25.483	5.282	106.75	61.853	10.776	100.36	46.965
Minimum	-3.024	4.336	3.245	-1.227	4.081	4.809	-6.847	2.009	2.998
SD	2.319	6.171	5.747	1.593	25.705	16.660	3.821	25.841	13.070

Note: GDP (%) is the growth rate of the GDP per capita. MKT Cap and Turn ratio are the market capitalization of listed companies (percent of GDP) and stock traded, turnover ratio (percent), respectively. SD is the standard deviation.

5. Empirical Results

5.1. Results from the Linear Granger Causality Analysis

In first step, we employ the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to check the stationarity in levels and first differences of the economic growth and

each stock market development indicator. The results of the two tests are reported in table 3. As shown, all the variables are non-stationary in levels. However, when the first differences of the variable series are considered, the ADF and PP reject the null hypothesis of a unit root at 5% level. All the series are therefore stationary and suitable for further statistical analysis.

Table 3. Unit root test results.

Country		Economic growth		MK capitalization		turnover ratio	
		ADF	PP	ADF	PP	ADF	PP
Tunisia	Level	-0.5780	-0.5698	-1.5053	-1.3328	-2.5433	-2.8015
	first diff.	-4.6883	-4.6923**	-4.3911**	-5.2429**	-6.3004**	-7.7291**
Egypt	Level	-0.2676	0.2789	-1.6687	-1.7155	-2.1091	-2.1086
	first diff.	-3.9031**	-2.6180**	-5.0160**	-5.0160**	-5.6657**	-5.6657**
Morocco	Level	0.0280	1.6318	-1.4123	-1.2121	-2.9265	-2.8868
	first diff.	-4.5636**	-7.9312**	-4.3666**	-4.3545**	-6.9188**	-6.8891**

Notes: ** denotes rejection of the null hypothesis at the 5% level. ADF and PP are the empirical statistics of the Augmented Dickey–Fuller and Phillips–Perron unit-root tests. First diff is the first difference of series.

In second step, we study the relationship between stock market development and economic growth for the three considered countries. We check whether stock market Granger causes economic growth and economic growth Granger causes stock market development. The results of the linear causality test are displayed in table 4. For Tunisia, the estimated coefficient of the Wald test is highly significant for the relationship between economic growth and market capitalization. More precisely, a positive unidirectional causality running from economic growth to market capitalization is detected suggesting that economic growth leads to improve the stock market development in Tunisia. However, there is weak causality running from stock market development to economic growth. The lack of a significant result can be explained by the weak stock capitalization of the Tunisian market and the low number of listed companies. The number of listed firms is 44 in 2000 and has faintly increased to reach 81 in 2017. Hence, the Tunisian government should encourage domestic companies to be listed on the domestic stock exchanges which expected to enhance the performance of the economy. This result is consistent with Dritsaki and Dritsaki-Bargiota [22] in which they find evidence of a unidirectional causal relationship between economic growth and functions of stock market for Greece. This implies that economic activity induced stock market development in this country.

Turning to the two other countries, our empirical results

show significant bidirectional causality between market capitalization as a proxy for stock market development and economic growth. This suggests that stock market development improves economic growth. Ngare et al. [45] find similar results for some African countries. They argue that stock market development promotes economic growth in the African region. According to the authors, a well-developed financial market enhances the accessibility to funds to support domestic investors which channel these funds to high return projects. In the same vein, Enisan and Olufisayo [24] point out that short-run changes in the financial development variables are in part responsible for future variations in the growth rate. More precisely, a faster rate of stock market evolution stimulates economic growth in major sub-Sahara African countries. Results displayed in table 4 also show that economic growth leads to the development of stock market. This finding is consistent with those of Akinlo and Egbetunde [5] and Caporale et al [17].

As regards to market turnover, Egypt and Morocco show significant unidirectional causality between development stock market indicator measured by the turnover ratio and economic growth. This relationship runs from the former variable to the latter. This result confirms the role of stock market as a stimulator for economic development. However, the Wald test parameters show no causality running from economic growth to stock market turnover for Tunisia context.

Table 4. Granger causality test results.

Relation (A⇒B)	MKCAP⇒GDP	GDP⇒MKCAP	TUR⇒GDP	GDP⇒TUR
Tunisia	1.3791 [0.2719]	3.5247** [0.0462]	0.6519 [0.5308]	1.8089 [0.1874]
Egypt	5.7643** [0.0097]	4.6866** [0.0202]	4.3722** [0.0252]	2.4448 [0.1100]
Morocco	4.9505** [0.0163]	3.6913** [0.0415]	2.4101* [0.1131]	1.3487 [0.2802]

Notes: The table presents the statistics of the Granger causality test. We consider the null hypothesis that A does not cause B. ** and * denote rejection of the null hypothesis at the 5% and 10% level, respectively. p-values are presented in brackets.

5.2. Results of Non-linear Granger Causality

Some previous studies focusing on the causality between financial and economic variables have suggested that data for these variables are characterized by nonlinearities (Ajimi et al., [4]; Saafi et al., [60]; Ajimi et al., [3]). Moreover, the traditional linear Granger causality test has low ability to detect certain propriety of nonlinear relationships (Hiemstra and Jones, [29]). To overcome this problem, we use the

nonlinear Granger causality test developed by Kyrtsou and Labys [36] in order to perform our analysis in exploring the causality relationship between the stock market development and economic growth. The empirical results are reported in table 5. As shown, the results of this test confirm these reported above. More interestingly, a significant bidirectional nonlinear causality between the stock market capitalization and economic growth is detected for the three countries under investigation. However, this relation is weaker for Tunisian market. These results are consistent with the

findings of Ngare et al. [45], Marques et al. [40], Boubakri and Jin (2010) and Shahbaz et al. [62]. Marques et al. [40], test the relationship between stock market and economic growth for Portugal. Their results detect bidirectional causality between the two variables. Similar findings are provided by Adjasi and Biekpe [1] and Ngare et al. [45] for some African and Asian countries, respectively. According to the authors, stock market development is an important factor to promote economic growth. Shahbaz et al. [62] find a strong causality relationship between the two variables for

Pakistan. They conclude that stock markets play an important role in allocation of capital to corporate sector that in turn stimulate real economic activity.

On the whole, the governments of North African countries should develop their stock markets by the alleviation of the procedures and the removal of the restrictions to the introduction of firms in the stock exchange. A well-developed stock market will increase the use of debts and equity capital for investments and will enhance foreign direct investment, thereby stimulating economic growth in the region.

Table 5. Nonlinear causality test results.

Relation (A⇒B)	MKCAP⇒GDP	GDP⇒MKCAP	TUR⇒GDP	GDP⇒TUR
Tunisia	2.8877 [0.0761]	4.1855** [0.0282]	1.0984 [0.3510]	2.8574* [0.0789]
Egypt	6.5825** [0.0055]	4.2626** [0.0273]	4.4909** [0.0231]	4.3168** [0.0262]
Morocco	4.4974** [0.0230]	2.6332* [0.0943]	3.7699** [0.0391]	2.3559 [0.1183]

Notes: The table presents the Fisher test statistics, we consider the null hypothesis that A does not cause B. ** and * denote rejection of the null hypothesis at the 5% and 10% levels, respectively. p-values are presented in brackets.

6. Conclusion and Economic Implications

This study examines the role of stock market development on economic growth in three North African countries (Tunisia, Egypt and Morocco). Results show significant bidirectional causality between the two variables for Egypt and Morocco. This suggests that stock market plays an important role for economic growth in these countries. More precisely, stock market development promotes economic growth and contributes to the improvement of the economic development. Hence, policy makers in these countries should enhance capital market activity and efficiency of equity market by the remove of barriers to stock market operation and the introduction of the appropriate regulatory policies in order to enhance economic growth.

Finally, empirical evidence reveals a strong unidirectional causality running from economic growth to market capitalization and a low relationship in the opposite direction in the case of Tunisia. However, the Tunisian government should highlight policies that enhance growth which will in turn improve the stock market development and consequently financial sector. Simultaneously, the government should removal legislative barriers that constrain the development of Tunisian stock exchange. This decision could improve the size, liquidity and activity of stock exchange which in turn could stimulate economic growth.

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