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# The Impact of Arab Spring on Stock Market Performance

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## Author's contribution

*The only author performed the whole research work. Author HHA wrote the first draft of the paper. Author HHA read and approved the final manuscript.*

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## ABSTRACT

No doubt that the revolutions of the Arab Spring in Tunisia, Egypt, Libya, Yemen and Syria affect macroeconomic variables and stock markets in the national economy. The revolution in Egypt began by a series of popular movements on Tuesday, January 25, 2011. This paper investigates the impact of political instability, economic instability and external events associated with the Egyptian revolution that started on 25<sup>th</sup> January, 2011 on the stock market performance. The findings state the correlation between the number of participants sit-in protests, number of participants sit-in factional demands and exchange rate between the Egyptian pound and US\$ and the main stock market indexes, EGX30 and EGX70. To achieve the objectives of this paper, the author employ the recently developed techniques of time series data cointegration; Vector Error Correction Model (VECM). The empirical investigations start by examining the basic series properties to the data: structural break, stationarity, cointegration, then constructing the VEC model. The results lend support to the view that political instability plays an important role in effecting the stock markets' function. However, economic instability came in the second rank.

*Keywords: Arab spring; stock market performance; vector error correction model (VECM); Egypt.*

## 1. INTRODUCTION

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Financial markets are now widely seen as essential to propel economic growth. Political instability strongly affects both overall economic development and financial markets. Causality relationship between financial market performance and economic outcome are detected in many studies in finance and economic literature. Financial markets constitute an interesting environment to study the economic effects of political instability, because investors trading in such markets are generally sensitive to news regarding the future prospects of the economies that are of some importance for the trading assets. Political risk refers to the complications businesses that governments may face as a result of political decisions or events related to political instability such as terrorism, riots, coups, civil war and insurrections. There are two levels of political risk; macro-level and micro-level. The first affects all participants in a given country [1].

No doubt that the waves of the Arab Spring in Tunisia, Egypt, Libya, Yemen and Syria, and any other country that may follow, has an effect on macroeconomic variables and stock markets in the national economy. The revolution in Egypt began by a series of popular movements on Tuesday, January 25, 2011 [2]. In Egypt, Engineer Adel Al Mozi, Commissioner-General of the public business sector companies declared that the cost of responding to factional demands from January 25, 2011 until June 12, 2011 amounted to 1.5 billion pound, and that may increase more. He also said that the net profits of the companies in that sector declined by 36% during the period from January 2011 to March 31 of the same year, compared to the net profit of the same period for the previous year. In a statement to Al-Ahram newspaper, the Minister of Transport, Atif Abdul Hameed, said that during the five months of the revolution, the total railway losses due to rioting, hooliganism and factional demands amounted to 95 million pounds, and the rates of regular train movement have decreased by 20 % mostly in Upper Egypt. He also said that this period witnessed 125 cases of demonstrations on the tracks, resulting in the delay of 860 trains to leave and reach destinations on time, the average percentage of delay per train reached 50 minutes which resulted in the loss of more than 1,160 travel hours in addition to the cancellation of nearly 9,000 train trips. Also, in its monthly statement, Earth Human Rights Center admitted that labor protests have fallen relatively as a result of the strike banning law. The month of July recorded 75 protests, compared to 97 protests in June at a decline rate of 22%. There were 22 sit-in protests, 19 strikes, 20 demonstrations, 10 standing protests and 3 gatherings. Workers were affected by 3 suicide cases after their inability to provide the day-to-day requirements for their families, the displacement of 2,400 workers and epilepsy of 4 workers as a result of poor working conditions and lack of means of industrial safety and occupational health.

The period between the Egyptian revolution on 25<sup>th</sup> January, 2011 and the announcement of the parliamentary elections' results on 30<sup>th</sup> November in the same year witnessed lots of political events such as protests, sit-in protests, riots, strikes, and others. It is not a secret that these events affected the national economy as a whole through affecting the output, employment, income and investment decisions either in real assets or in financial assets on the Egyptian stock market. These effects may lead to some reasonable questions like; how much did these events affect the Egyptian stock market performance? Are different events, political, economic, and social ones, having the same effect on the stock market performance? The novelty of this current paper is that it seeks to answer these important questions and therefore shed some light on the policy ramifications with regards to fiscal and monetary policies for the Egyptian economy.

The main objectives of this paper are to estimate the impact of political instability, economic instability and external events on the stock market performance and to examine the relative

strength of each variable in explaining the changes in stock market performance. The rest of the paper is organized in six sections. Section two focuses on the literature review. In section three, the author discusses the influence of the Egyptian revolution on the Egyptian stock market during the period March, 2011–November, 2011. Section four focuses on data and methodology. Section five presents the empirical results and finally section six is devoted to the conclusions and policy implications.

## **2. LITERATURE REVIEW**

The effects of political instability on the stock market performance have received widespread attention. [3,4] find a negative relationship between political instability and investments. [5,6] investigate the reaction of oil and stock prices to war-related news using prediction markets. They report that the S&P 500 index fell 1.5% due to a 10% increase in the probability of war with Iraq. [7,8,9] investigate macroeconomic instability, political instability, external borrowing and financial development, as main factors effecting capital flight. No doubt that the political instability negatively effects on economic growth in the national economy. [10] lends support to the view that there is a close relationship between democracy and development using “before-after” approach. [11] study the reaction of US financial indicators to war risk between January 2003 and March 2003, when the second Iraqi war became imminent. They have highlighted that US stock markets would be prone to decline as a results of uncertainty caused by the impending risk of political conflict. The results state that increases of war risk caused a rise in oil price, a fall in Treasury yields and equity prices, a widening of corporate yield spreads, and a decline in the dollar. [12] finds that publishing news about the peace between Israel and the Arab countries increases volatility in the Tel Aviv Stock Exchange. Using GARCH (1,1) model, [13] calculate the impact of war and some international conflicts on stock markets. The main finding of the paper is that war rallies will be much rarer to observe in stock markets of a country or region that is a direct victim of a military confrontation. [14,15,16] state the negative impact of the events of September 11<sup>th</sup> on stock indices all over the world. [17] conduct a study to assess the impact of political events on the financial markets of some economies. They tested many hypotheses to investigate the relationship between some political conflicts and financial markets by using time series data. The main results of the paper are that stock market reactions to the international crises were most often negative. The only notable exception was how Wall Street reacted to conflict in the Gulf. [18] apply the event study methodology to investigate the relationship between the onset of conflict and investors’ perceptions as measured by asset market reaction in the US market. The main findings are; first, the US market tends to systematically react positively to the onset of conflicts. Second, international conflicts have a stronger impact on stock market indices than internal ones. Third, commodity prices are quite reactive to events in the Middle East specially, oil futures. Fourth, conflict onset is generally associated with a depreciation of the US dollar vis-à-vis other currencies. A more recent study on the relationship between political events and the stock market, [19] investigate the stock market reactions to announcements of political appointments from the private sector and corporate appointments of former government officials. Existing studies conducted on the Egyptian stock market performance mainly focus on the determinants of the performance and to the best of the author’s knowledge, no empirical studies have been conducted on the link between political instabilities and stock market performance in Egypt.

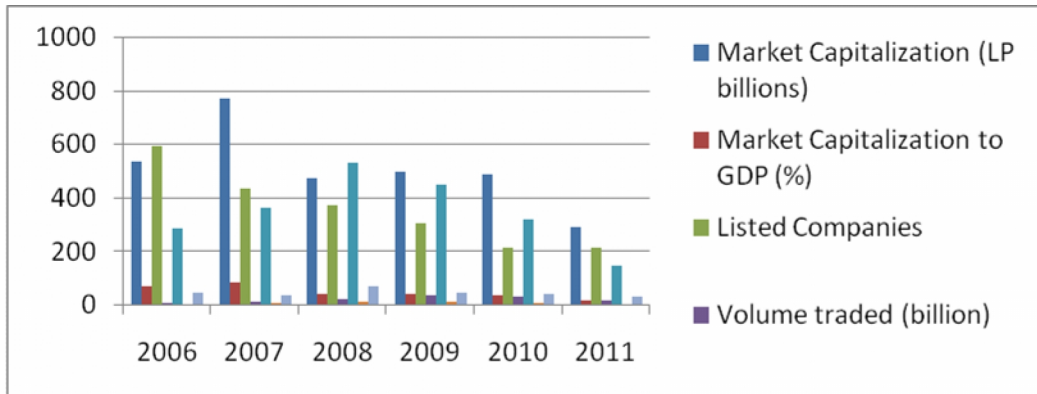
### **3. THE EGYPTIAN REVOLUTION AND THE STOCK MARKET**

The Egyptian stock market has witnessed a decline during trading in March 2011<sup>1</sup>, where index EGX30 fell during month trading to close at 5464 points, a drop of 3.24%, while on the side of medium equity has tended to rise as the EGX70 index rose by 7.04% closing at 575 points, while the EGX100 index showed a growth by 4.47% to close at 924 points. The total value of stock traded during the said month reached about 13.8 billion pounds, while the trading volume was around 972 million paper executed over 209 thousand transactions, the Nile stock Exchange has recorded transactions value of 25.1 million pounds and volume traded 0.7 million paper executed over 154 transactions during the month, the stocks acquired 52.35% of the total value of trade inside the chamber, while the bonds turnover accounted for about 47.65% during the month. Fig. 1 explains the effect of the Egyptian revolution on the Egyptian stock market where the market capitalization declined from LP 534 billion in 2006 to 294 billion in 2011, the market capitalization to GDP ratio also declined from 72% in 2006 to 21% in the revolution year. The value traded recorded LP 287 billion in 2006 increased to LP 321 billion in 2010 then declined to LP 148 billion in the revolution year.

The Foreign Direct Investment continued to decline dropping 72% annually during the first quarter of 2012 after declining by 68% in 2011 due to the fear of foreign investor from the situation in Egypt so far. Also, the devaluation of the Egyptian pound is an important factor that led to the withdrawal of billions of dollar by foreign investors from the Egyptian stock market after the Egyptian economy witnessed a large influx of foreign stocks into the Egyptian market in 2009 and 2010. In general, the data indicate a decline in net foreign direct investment in Egypt from \$6758.2 billion in the fiscal year 2009/2010 to \$ 2188.6 billion in the revolution year [20]. The impact on the Foreign Indirect Investment could be indicated through monitoring the buying and selling foreign transactions in the stock market during the period of unrest. The performance of foreign investors was significantly influenced by the successive events that reflected instability, where their investments recorded a net selling of about 4 billion pound in 2011, although those sales did not represent more than half of the investment which entered the Egyptian market in 2010. As for the Arab Investors, they finished 2011 with a net buying estimated at 197 million pounds. Data from the central bank of Egypt reflect a decline in the net investment of securities portfolio in Egypt from \$ 7879.3 billion in the previous fiscal year of the revolution to - \$ 2550.9 billion in the revolution year [20].

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<sup>1</sup> Due to the revolution, The Egyptian stock market shut down for 55 days from Friday January 28<sup>th</sup> 2011 until March 22<sup>nd</sup> of the same year to resume business on Wednesday March 23<sup>rd</sup> 2011



**Fig. 1. The impact of the Egyptian revolution on the Egyptian stock market**

*Source: the central bank of Egypt, 2011*

It will be worthy dividing the period of the political unrest and its effects on the stock market into two periods: the period from January to May, 2011, and the period from June to November, 2011 as follows:

### 3.1 The Period from January to May, 2011

With the beginning of the Revolution's demonstrations, the stock exchange indexes fell by high rates, the main index, EGX30, lost about 16% during the sessions of 26 and 27 January, likewise, indexes EGX70 and EGX100 fell about 24% and 22% respectively. With the continuing events, the deterioration of the security situation and the stoppage of banks work, a decision were made to halt trading in the stock market until the situation stabilizes, the decision took effect as of Friday, January 28, 2011. Trading was resumed again on Wednesday, March 23, 2011, where indices recorded a sharp decline in the first two sessions, but after that, the market turn to stabilize amid a state of confidence and optimism among investors attributed to relative stability of the political situation and the referendum on constitutional amendments, which had a positive impact on market indexes. The market indices continued to rise until the end of May 2011, where EGX30 index rose by about 7%, and the EGX70 and EGX100 both rose by 32% and 25% respectively [2].

### 3.2 The Period from June to November, 2011

The Egyptian Stock Exchange turn to decline during the third quarter of 2011 due to many internal and external reasons including: 1- Talk about imposing taxes on capital gains, which has had a significant negative impact on market performance that continued until idea of imposing such taxes was withdrawn. 2- Start of trial of the key figures of the former regime. 3 – The European and U.S debt crisis. The last external factor had a negative impact where the stock indexes began to decline beginning of the month of August; EGX30 index dropped by about 30% and the EGX70 and EGX100 indices dropped by about 35% and 33% respectively. However with the parliamentary elections, market indices resumed to rise during the election week by about 11% for the EGX30, 19% for the EGX70 and 15% for the EGX100, but political instability halted the rise amid a sharp decline in trading, and the market closed the revolution year plunging 49% for EGX30 index and 43% and 45% for the EGX70 and the EGX100 respectively.

## 4. DATA AND METHODOLOGY

The paper seeks to investigate the impact of political, factional demands and external events attributable to the 25 January revolution on the stock market in Egypt. The data related to the revolution events are retrieved from the two daily newspapers; [21] and [22]. For this purpose, we consider the definition of a political event report as: a statement describes a political event; where a political event is an action taken by rebels at a given point of time to advance their political interests. In specific words a political event in our paper is an action related to the Egyptian rebellion's objectives through the period of 25/1/2011 to 30/11/2011. The factional events are the actions of person, group or groups whose demand for personal benefit(s) such as sit-in which mean staying in a place for a period of time to put pressure to gain some benefit(s). We are not interested in "latent" or "potential" event(s) instead we are interested in actual event(s). We ignore the vogue reports like "sustained public roads activity was reported yesterday" this report is incomplete. Consistence with the study conducted by [23], the events are assigned the date on which they are reported to have occurred, not the day on which they are reported. In some cases, a precise date is impossible to assign, in these cases we record as much information about the date as we can. The main problem during collecting data is that some events are reported with terms like "several", "hundred", "score" and other terms. In these situations, we assign the following values to these terms: 2 for couples 3 for few or some; 5 for several or many; 15 for numerous; 36 for dozens; 60 for score; 25 for tens; 250 for hundreds; 2,500 for thousands. We take in our mind the multiple events, groups, and locations. For instance, teacher strike for 50 days; university students, university workers and university professors' strike; workers strike in five cities, But for *Tahrir* square, we consider 70 for tens, 700 for hundred, 7,000 for thousands, 70,000 for ten thousands, and 700,000 for hundred thousands. For *Al Kaaed Ebrahim* Hall in Alexandria, we consider 500 for hundred, 5,000 for thousands, and 50,000 for ten thousands.

### 4.1 Dependent Variable

The Egyptian stock market has several indexes that track its performance, EGX30, EGX70, EGX 100, Dow Jones EGX Egypt Titan 20 index, and S&P/ESG index. EGX30 index, previously named CASE30 index, is the most popular benchmark free-float capitalization weighted index of the 30 most highly capitalized and liquid stocks traded on the Egyptian exchange. The index was developed in 1998 with a base level of 1000. EGX70 is a weighted index of the 70 most highly capitalized and liquid stocks in the market. This study uses the main indexes i.e. EGX30 and EGX70 indexes as dependent variables for our two models respectively. The dataset of daily Egyptian stock indexes are obtained from the official web site of the Egyptian exchange [24] and from [21]. The data consist of 253 observations covering the period from March 23, 2011 until 30<sup>th</sup> November of the same year. The reason behind choosing this period is that, the Egyptian Stock Exchange was reopened on 23 March 2011 on the one hand, and the results of the parliamentary elections were announced at the end of November of the same year as a beginning of the democratic state.

### 4.2 Independent Variables

From the above discussion, the main factors effects on the Egyptian stock market during the political unrest are political events, factional demands' events and external events. In this paper, the author will use the number of participants in sit-in protests to reflect the effect of political events i.e. the political instability, the number of participants in sit-in factional

demands to assess the factional demands' events i.e. economic instability, and the exchange rate of the Egyptian pound in US dollar to find out the effect of the external events. To achieve the objectives of the paper, we employ the recently developed techniques of time series data cointegration. The empirical investigations start by examining the basic series properties to the data. [25] states that classical regression techniques become invalid, if applied to variables that do not meet the definition of stationarity. Consequently, using daily data through the period 23 March, 2011 to 30 November, 2011, we, first, will identify the structure break (s), then test to determine if the series are non-stationary, by employing Augmented Dicker-Fuller (ADF) and Phillips-Perron (PP) Tests, where the null hypothesis is that a series has a unit-root. If all of the series are stationary then model them in level form. However, if more than one series are non-stationary then the author will test to determine if the non-stationary series are integrated by applying the Trace and Johansen-Juselius maximum likelihood method of cointegration [26,27]. If they are not found to be so, then model them in differenced form. However, if the non-stationary series are cointegrated then the author will model them in the ECM form. Finally, Variance Decomposition (VD) and Impulse Response Functions (IRFs) will be employed to assess the short-run dynamic between the stock market indexes and political, factional and international events. To investigate the impact of the independent variables on the dependent ones, the following two models are used:

$$EGX30 = \beta_0 + \beta_1 POLROS + \beta_2 CATROS + \beta_3 EXRATE + \xi_t \quad (1)$$

$$EGX70 = \beta_0 + \beta_1 POLROS + \beta_2 CATROS + \beta_3 EXRATE + \xi_t \quad (2)$$

Empirical approach in this paper is based on methods of cointegration and Vector Auto-Regression Model (VAR). In matrix notation, the VAR model for m variables can be expressed by the following:

$$Y_t = A_1 Y_{t-1} + \dots \dots \dots A_s Y_{t-s} + U_t \quad (3)$$

Where,  $Y_t = (Y_{1t} Y_{2t} \dots \dots \dots Y_{mt})$  and  $A_1, A_2, \dots \dots \dots A_s$  are  $m \times m$  matrix,  $U_t =$  a m-dimensional vector of errors with  $E(U_t) = 0$ . In reducing form, the VAR model expressed as follows:

$$A(L) Y_t = U_t \quad (4)$$

Where,  $L =$  the lag operator,  $Y =$  a vector consisting of appropriately transformed variables, and  $U =$  a vector of innovations of these variables.

## 5. THE EMPIRICAL RESULTS

### 5.1 Testing for Structural Stability

Structural break refers to structural changes in overall time series. This may happen due to change in government policies, government change in regulations, and / or change in economic variable behavior. Since the considered study period has undergone significant changes and events due to the revolution, we perform within-series parameter stability tests which are an important issue. To test for a structure breakpoint, the author conduct the Quandt-Andrews Breakpoint Test [28,29] to find out if one or more unknown structure breakpoints may exist in independent variables. Table 1 reports that the null hypothesis of

“no breakpoints” cannot be rejected within 15% trimmed data. This result may be due to two reasons: first, the highest changes for a period were during and immediately after the revolution that started on 25<sup>th</sup> January, 2011 and lasted for 18 days. The stock market, as mentioned above, had been shut down for 55 days from Friday January 28<sup>th</sup> 2011 until March 22<sup>nd</sup> of the same year. Second, in the case of any structural changes that happened during the considered study period, the government usually took a decision of shutting down the stock market with any structural changes. Consequently, our sample includes nothing of data related to these changes.

**Table 1. Quandt-Andrews unknown breakpoint test results**

Quandt-Andrews unknown breakpoint test		
Null Hypothesis: No breakpoints within 49% trimmed data		
Statistic	Value	Prob.
Maximum LR F-statistic (7/25/2011)	1.8917	1.0000
Maximum Wald F-statistic (7/25/2011)	2.6751	1.0000
Exp LR F-statistic	3.17570	1.0000
Exp Wald F-statistic	2.3226	1.0000
Ave LR F-statistic	4.9666	0.9998
Ave Wald F-statistic	3.8997	1.0000

Note: probabilities calculated using Hansen's (1997) method

## 5.2 Testing for Stationarity

Using the VAR model to investigate the impact of the independent variables on the stock market indexes requires that the time-series analyzed be stationary. Table 2 reports the unit root tests based on the commonly Augmented Dickey Fuller and Phillips-Perron (PP) procedures. The lag length for each variable is presented for both indexes. The tests are conducted with and without time-trend. The tests' results show that we cannot reject the null hypothesis of presence of a unit root for all variables, implying non-stationarity in the level for some variables. However, we strongly reject the null hypothesis for the existence of a unit root for the first difference series indicating stationarity. The two models are therefore integrated of order 1, I(1).

**Table 2. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests results**

Variables	Level			First Difference		
	Lag length	ADF	PP	Lag length	ADF	PP
EGX30	0	-2.152907	-0.808395**	0	-14.40609***	-14.56930***
POLROS	7	-3.582987**	-3.294978***	6	-5.173631***	-20.90018***
CATROS	1	-5.913545***	-8.334275***	1	-15.83218***	-15.79134***
EXRATE	0	-3.512285**	1.262146	1	-14.09959***	-30.54100***
EGX70	1	-1.280347	-1.048701	0	-19.65071***	-20.51030***

Note: \*\*\* and \*\* denote significance at the 1% level and 5% respectively.

The lag lengths included in the models are based on the Akaike information criteria (AIC). The tests of ADF (Augmented Dickey-Fuller) and PP (Phillips-Perron) are based on the two models: (1) with constant and trend; and (2) without constant and trend.



### 5.3 Cointegration Analysis

Having concluded that each of the series is stationary at first difference, the Johansen cointegration tests at the chosen lag level is conducted to examine whether a long-run equilibrium exists amongst the independent variables and stock market indices for the two models. If the series are cointegrated, this would imply that the series share a common stochastic trend and any deviations from long-run equilibrium is likely to lead to short-run adjustment or realignment of the series to restore equilibrium. Comparing trace and eigenvalue statistics to the critical values at 5% suggests that trace and max-eigenvalue tests indicate 1 cointegrating eqn(s) at the 5% level for both models as shown in Table 3.

**Table 3. Cointegration test results**

<b>Unrestricted cointegration rank</b>								
<b>Hypothesized Model 1</b>				<b>Model 2</b>				
<b>No. of CE(s)</b>	<b>Test (Trace)</b>		<b>Test (Maximum eigenvalue)</b>		<b>Test (Trace)</b>		<b>Test (Maximum eigenvalue)</b>	
	Statistic	Prob.*	Statistic	Prob.*	Statistic	Prob.*	Statistic	Prob.*
None	56.66035	0.0060	34.37716	0.0058	60.27938	0.0022	36.19651	0.0031
At most 1	22.28319	0.2831	12.12861	0.5350	24.08287	0.1970	14.91096	0.2952
At most 2	10.15458	0.2690	7.538901	0.4275	9.171903	0.3497	8.616926	0.3194
At most 3	2.615684	0.1058	2.615684	0.1058	0.554978	0.4563	0.554978	0.4563

\*MacKinnon-Haug-Michelis (1999) p-values

**Trace and Max-eigenvalue tests indicate 1 cointegrating eqn(s) at the 0.05 level for both models**

<b>Critical values for cointegration Test at 5%</b>		
<b>Null-hypothesis</b>	<b>Trace statistic</b>	<b>Max-eigen statistic</b>
None	47.85613	27.58434
At most 1	29.79707	21.13162
At most 2	15.49471	14.26460
At most 3	3.841466	3.841466

### 5.4 Vector Error Correction Model (VECM)

The presence of cointegration amongst the variables rejects the non-causality amongst them. This means that at least one of the variables reacts to deviations from the long-run relationship. Consequently, an investigation as to whether the co-movements amongst the variables correct for disequilibrium is needed. The Vector Error Correction Model (VECM) allows distinguishing between the short-run and long-run forms of causality. Thus, a VEC model is implemented as follows [26] and [30]:

$$\Delta y_t = \alpha_0 + \sum_{i=1}^k \beta_i \Delta y_{t-i} + \sum_{i=1}^k \delta_i \Delta x_{t-i} + \rho_i ECM_{t-1} + \xi_i \tag{5}$$

$$\Delta x_t = \alpha_0 + \sum_{i=1}^k \beta_i \Delta y_{t-i} + \sum_{i=1}^k \delta_i \Delta x_{t-i} + \rho_i ECM_{t-1} + \xi_i \tag{6}$$

Where  $\Delta$  is the difference operator,  $\alpha_0$  is a constant,  $\beta_i$  and  $\delta_i$  are regression coefficients, *ECM* is error-correction mechanism, derived from the cointegration regression, and  $\xi_j$  is the error term.

The main feature of the ECM is that all terms in the model are stationary, so standard regression techniques are valid. In addition, it provides a useful and meaningful link between the long-run and the short-run approach to economic modeling. The ECM equation should be negatively signed, indicating movement towards equilibrium; positive sign indicates movement away from equilibrium. The coefficient value should lie between 0 and 1; where 0 suggests no adjustment one time period later and 1 reflects full adjustment.

**Table 4. VECM estimation**

<b>Model 1</b>				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
DPOLROS (-1)	-0.001843	0.00167	-1.10144	0.0014
DCATROS (-1)	0.004861	0.01518	0.32030	0.5701
DEXRATE (-1)	-602.0060	1.0232	-0.60200	0.4217
<b>ECM1(-1)</b>	<b>-0.00335</b>	<b>0.00097</b>	<b>0.34446</b>	<b>0.50120</b>
C	- 0.736673	4.64327	- 0.15865	0.4162
R-squared		0.308568	Adjusted R-squared	0.281975
F-statistic		11.60314	Prob. (F-statistic)	0.003014
<b>Model 2</b>				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DPOLROS (-1)	-0.000510	0.00037	-1.39623	0.0270
DCATROS (-1)	0.001035	0.00332	0.31202	0.9087
DEXRATE (-1)	-74.17520	0.3680	-0.31515	0.032
<b>ECM2 (-1)</b>	<b>-0.00233</b>	<b>0.00054</b>	<b>-0.42813</b>	<b>0.0321</b>
C	- 0.008991	1.04003	-0.00865	0.9431
R-squared		0.477391	Adjusted R-squared	0.457711
F-statistic		12.381451	Prob. (F-statistic)	0.002179

The error-correction carries a negative sign for the two models and one is insignificant for both models. The signs of the coefficients are as expected except for the number of protesters in sit-in factional demands. The estimation explains about 31% and 48% of the variation in the Egyptian stock market indexes, EGX30 and EGX70, for the two models respectively. The negative sign of the coefficient of the error correction term states that the models are stable. The coefficients of (-0.00335) and (-0.00233), suggest that 0.34% and 0.23% is a movement back towards equilibrium following a shock to the two models, in the next period (Table 4).

The relatively high numeric of the F-statistic indicates that there is a relatively strong feedback effect or the presence of Granger bi-directional causality between the variables. For instance, a unidirectional causality is traced between the exchange rate and the Egyptian stock market indexes during the considered study period. In general, the two VEC models show that a long-run equilibrium relationship exists between POLROS, CATROS, EXRATE and the stock market indexes for the largest 30 companies' stocks and 70 medium and small companies' stocks in the Egyptian stock market. Stability of the VEC model is an important issue because if it is unstable, certain results, such as impulse response standard errors, will be invalid making the model results and conclusions suspect. To test the VEC

models' stability, the test of inverse roots of the AR characteristic polynomial is conducted (Fig. 2). As can be seen in Fig. 2, all reported inverse roots of the AR polynomial have roots with modulus less than one and lie inside the unit circle. This indicates that the estimated VEC models are stable (stationary).

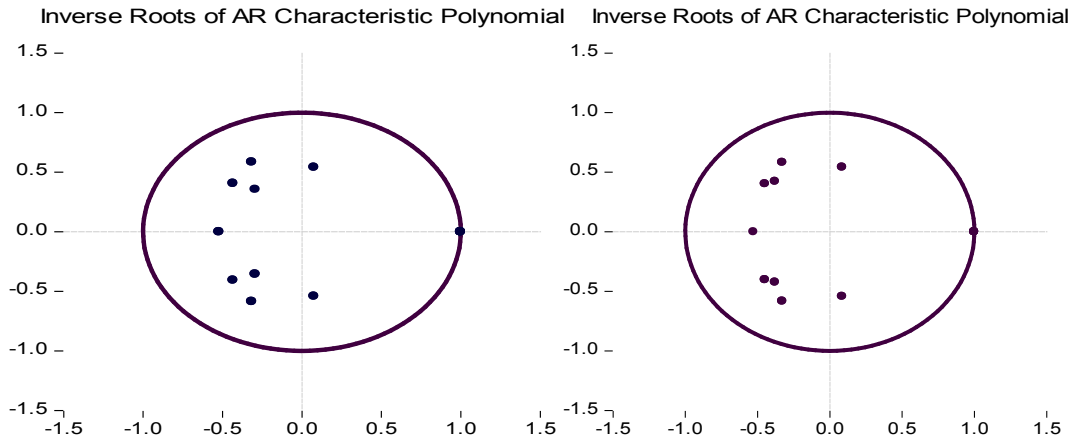


Fig. 2. VEC stability test of EGX30 and EGX70

### 5.5 VEC Variance Decomposition and Impulse Response Functions

One of our objectives is to examine the relative strength of each variable in explaining the changes in the dependent variable. Variance Decomposition (VD) and Impulse Response Functions (IRFs) can help in this matter. Here, we implement a VEC model. From the model, we generate VD and IRFs to capture the relative importance of different shocks and their impact on stock market indexes. Table 5 provides VD for the horizon of 1-10 days. Cholesky decomposition test is sensitive to the ordering of the selected variables but the various ordering of our variables have been tested and almost the same results obtained.

**Table 5. VEC variance decomposition results**

<b>Variance decomposition of DEG3:</b>					
<b>Period</b>	<b>S.E.</b>	<b>DEGX3</b>	<b>DPOLROS</b>	<b>DCATROS</b>	<b>DEXRATE</b>
1	72.51538	100.0000	0.000000	0.000000	0.000000
2	78.37094	99.47989	0.460416	0.025550	0.034147
3	88.45727	99.02831	0.848026	0.023538	0.100123
4	98.06528	99.00781	0.804779	0.105254	0.082162
5	105.8256	99.14599	0.692078	0.091362	0.070566
6	113.1891	99.21927	0.612384	0.083894	0.084449
7	120.2413	99.28945	0.546627	0.087073	0.076850
8	126.8555	99.35268	0.491495	0.083900	0.071922
9	133.0726	99.40495	0.446648	0.079771	0.068627
10	139.0788	99.44676	0.409168	0.081057	0.063014

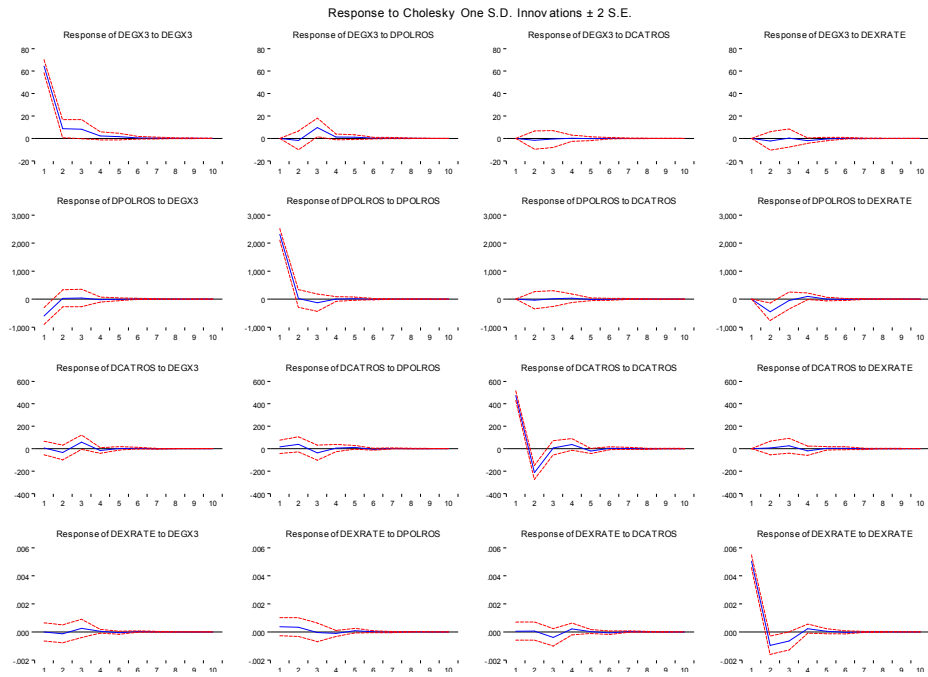
<b>Variance decomposition of DEG7:</b>					
<b>Period</b>	<b>S.E.</b>	<b>DEGX7</b>	<b>DPOLROS</b>	<b>DCATROS</b>	<b>DEXRATE</b>
1	16.40946	100.0000	0.000000	0.000000	0.000000
2	16.67246	99.19284	0.748479	0.045334	0.013348
3	18.77567	98.82168	0.789812	0.045985	0.342520
4	20.53588	98.83803	0.785734	0.057700	0.318533
5	21.54445	98.86384	0.763432	0.052455	0.320271
6	22.98287	98.94077	0.671590	0.046207	0.341431
7	24.14434	98.99006	0.647836	0.052505	0.309594
8	25.25901	99.03939	0.606118	0.048067	0.306428
9	26.36313	99.09443	0.563134	0.044683	0.297752
10	27.39624	99.13802	0.536163	0.043760	0.282056

The table reports that the variance decomposition of the Egyptian stock index, EGX30, shows that apart from innovation to the index itself, political events relatively contribute to the variations in the index in all period of time except the second one. The variance decomposition reports that in a 10-days horizon, political events account for 0.41% of the shocks in the main stock market, EGX30, compared to the contributions of factional demands' events (0.08%) and exchange rate (0.06%). For the second model, the table shows that in a 10-days horizon, political events account for 0.54% of the shocks in the main stock market, EGX70, compared to the contributions of factional demands' events (0.04%) and exchange rate (0.28%).

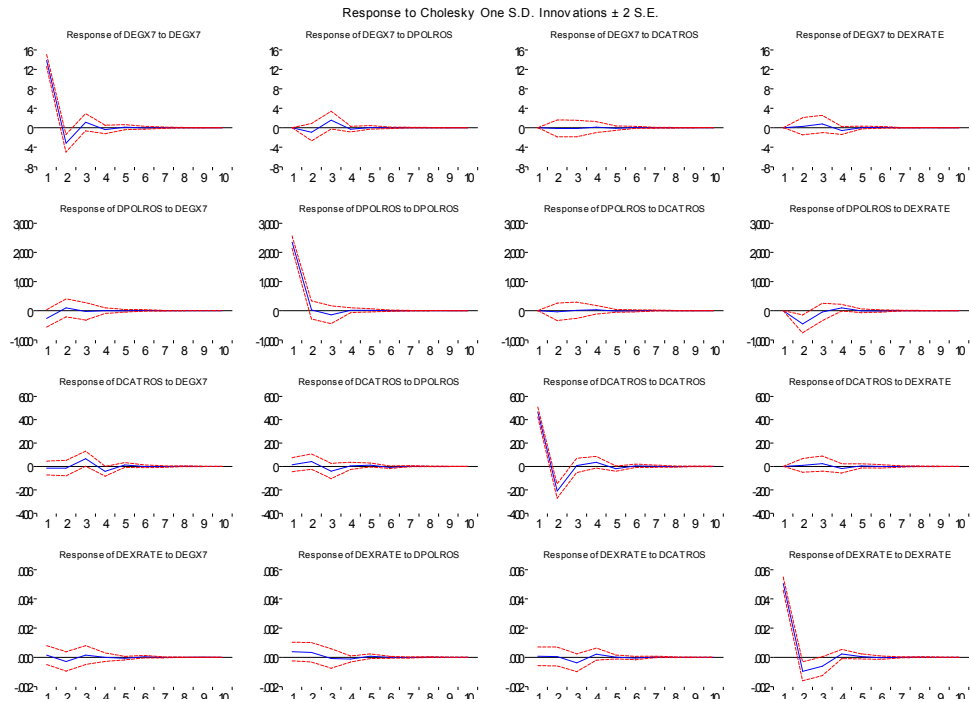
In sum, the political events have a relatively highly influence on the main index of the Egyptian stock market during the considered study period. Whereas, the market index for the 70 medium and small companies' stocks is affected by both political events and external events during the study period. To conclude, the volatility of the Egyptian stock market performance is mainly fed by its own variation.

We further generate the IRFs to complete our analysis based on VD above. Generally, findings appear to reaffirm our previous findings. There is a lagged positive response of 2 days of EGX30 to shocks in sit-in protests. This lagged response on EGX70 appears between 3-4 days. The findings report that the response of the main Egyptian stock market index to shocks in economic stability and the external events are insignificant. However, the response of the market index for medium and small stocks to shocks in external events is significant (Fig. 3).

**Model 1**



**Model 2**



**Fig. 3. VEC Impulse Respond (Cholesky TEST)**

## 5.6 VEC Granger Causality with the MWald Test

The concept of Granger causality is based on the idea that an effect should take place, then its causes come after. More clearer, variable X is said to Granger-cause variable Y if the current value of Y ( $y_t$ ) is conditional on the past values of X ( $x_{t-1}, x_{t-2}, \dots, x_0$ ) and thus the history of X can help in predicting Y. The existence of a long-run relationship between two variables means that both variables are causally related at least on direction. But, whether change in a variable is causing change in the second variable is still unknown. To determine the direction of the effect, Granger causality test should be conducted. Failing to reject the null hypothesis of "X does not Granger-cause Y" and reject the null hypothesis of "Y does not Granger-cause X" means that X changes are Granger-caused by a change in Y. Therefore, the test involves the examination of the statistical significance of the parameters of X in equation (7) and those of Y in equation (8), where a general specification of the Granger causality test in a bivariate (X, Y) context can be expressed as follows:

$$y_t = a_0 + a_1 y_{t-1} + a_2 y_{t-2} + \dots + a_m y_{t-m} + b_p x_{t-1} + \dots + b_q x_{t-q} + \zeta_t \quad (7)$$

$$x_t = a_0 + a_1 x_{t-1} + a_2 x_{t-2} + \dots + a_m x_{t-m} + b_p y_{t-1} + \dots + b_q y_{t-q} + \zeta_t \quad (8)$$

To verify the existence of a long-run relationship between each two of our variables, VEC Granger causality test with the MWald test is implemented (Table 5). The study uses chi-square statistic and probability to measure causality between the stock market indexes, political stability, economic stability, and external events.

**Table 6. VEC pair-wise granger causality / block exogeneity Wald tests results**

<b>VEC granger causality / block exogeneity wald tests of EGX30</b>				
<b>Variables</b>	<b>D(DEGX3)</b>	<b>D(DPOLROS)</b>	<b>D(DCATROS)</b>	<b>D(DEXRATE)</b>
D(DEGX3)		6.35070 (1.0000)	2.074455 (0.3544)	2.863649 (0.2389)
D(DPOLROS)	4.837814 (0.0890)		10.13541 (0.0063)	1.055638 (0.5899)
D(DCATROS)	0.081779 (0.9599)	0.243330 (0.8854)		19.20433 (0.0001)
D(DEXRATE)	0.072358 (0.9645)	8.437742 (0.0147)	58.16985 (0.0000)	
All	5.428043 (0.4902)	10.42442 (0.1079)	67.35232 (0.0000)	24.88286 (0.0004)

<b>VEC granger causality / block exogeneity wald tests of EGX70</b>				
<b>Variables</b>	<b>D(DEGX7)</b>	<b>D(DPOLROS)</b>	<b>D(DCATROS)</b>	<b>D(DEXRATE)</b>
D(DEGX7)		0.450396 (0.7984)	5.088049 (0.0785)	0.777739 (0.6778)
D(DPOLROS)	2.790472 (0.2478)		9.069740 (0.0107)	1.007256 (0.6043)
D(DCATROS)	3.412103 (0.0796)	0.085826 (0.9580)		23.22820 (0.0000)
D(DEXRATE)	0.820109 (0.6636)	7.289467 (0.0261)	58.18265 (0.0000)	
All	4.584596 (0.5981)	10.30004 (0.1126)	68.79246 (0.0000)	26.75735 (0.0002)

Note that values are for Chi-square,  $df = 2$ , and values between ( ) are the probability values.

Table 6 points out that political stability have Granger causality with the change in the main Egyptian stock market index and economic stability in model 1 and have Granger causality with economic stability in model 2. Economic stability has Granger causality with the external events (exchange rate) through the two models. External events have Granger causality with both political and economic stabilities for the two models. Verifying the results above, the main Egyptian stock market index has an exogenous relationship with political stability. However, the market index for the medium and small companies has an exogenous relationship with economic stability. Similarly, external events have an exogenous relationship with economic stability through both models.

## **6. CONCLUSIONS AND POLICY IMPLICATIONS**

This paper investigates the impact of political instability, economic instability and external events associated with the Egyptian revolution that started on 25<sup>th</sup> January, 2011 on stock market performance. Our findings state the correlation between the number of participants sit-in protests, number of participants sit-in factional demands and exchange rate between the Egyptian pound and US\$ and the Egyptian stock market indexes, EGX30 and EGX70. The findings derived from analyzing variance decomposition, Impulse Response Function and Granger causality report that the number of participants sit-in protest is a more effective factor in the market indexes compared with the effect of the number of participants sit-in factional demands and the exchange rate. The study results are consistent with the daily reports of the stock market indexes during the considered study period where the indexes are affected by the main protests conducted nearly every Friday in *Tahrir* square and in the other squares in main cities all over Egypt during weekdays and results lend support to the view that political instability plays an important role in effecting the stock markets' function. The economic instability, represented by the factional demands' events, came in the second rank in this role. The policy implications of this study can be summarized in the following points. First, there is a long-run link between instabilities in the Egyptian economy and the stock market performance. The government should utilize from this correlation in drawing the proper policies to push the stock market and its role in the national economy. Second, political instability is an important factor in explaining the variation in stock market performance. External factors affect the Egyptian economy via the stock market function. The government should take this issue into consideration in drawing the Egyptian monetary and fiscal policies. Third, the results provide valuable information about the short-run and long-run relationships between stabilities / instabilities and the Egyptian stock market performance that benefit both the lender and the borrower in the stock market. This will support their transactions to be more efficient. Finally, the current study is not free from limitations. For instance, the study uses a single variable for each type of instability. Multiple indicators would be useful for a detailed study of each type and would generate valuable results. Another example of limitations is the study does not include the financial instability in the analysis, so further researches may include it in the analysis to find out its effect on the Egyptian stock market performance.

## **COMPETING INTERESTS**

The author declares that no competing interests exist.

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