Studying the Validity of the Efficient Market Hypothesis (EMH) in the Egyptian Exchange (EGX) after the 25th of January Revolution

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23 March 2014

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23rd of March 2014

Abstract

There is no doubt that the close of the *Egyptian Exchange* (EGX) during the period 28/1- 22/3/2011 in the wake of 25th of January Revolution has a consequence on the efficiency of the stock market. This paper assesses the '*close-open-effect*' on the main price indices. The results indicate the absence of unit roots in the main price indices before and after the revolution. This implies the rejection of *weak-form efficiency*. The estimation of the (EGARCH model) reflects information asymmetry after the revolution with bad news affecting the investors' expectations more rapidly. In addition, a negative and significant '*close-open-effect*' on the returns of the main price index is evident in the results.

***Key Words*:** The Egyptian Exchange (EGX), the Efficient Market Hypothesis (EMH).
JEL Classification: G1, G14.

1. Introduction:

In his seminal work (Fama, 1970) highlighted the importance of the efficient market concept. He defined a market in which prices at any time *fully reflect* available information as an efficient. In this setting, (Pearce, 1987) demonstrated that the investors could not gain economic profits given the existing information. Thus, the current market price could be considered as the *best estimate* of the future price (Figlewski, 1978) or of the equilibrium price (Fama, 1965). This concept was coined later in the literature as *informational efficiency*. Furthermore, (Fielitz, 1971) suggested a link between efficiency and competitive securities markets where prices would *adjust immediately* to new information. Nevertheless, in reality prices would not react simultaneously to news. Therefore, the speed of the price reaction could be a feasible measure of market efficiency (Busse and Green, 2001). In order to test stock market efficiency (Fama, 1970) introduced three versions of the *Efficient Market*

Hypothesis (EMH, *hereafter*) that could be classified depending on the type of information. Firstly, the *weak-form* efficiency which implied that price responded to historical prices. Secondly, the *semistrong-form* of EMH which reflected price changes due to the publicly available information (e.g. annual reports). Thirdly, the *strong-form* which ascribed price adjustments to all observed information including what the firm's insiders obtained.

Taking into consideration the progress of the Egyptian Exchange (EGX, *hereafter*) during the last two decades, one could consider it as a competitive securities market and claim the appropriateness to test the weak-version of the EMH. In addition, the political and economic circumstances that Egypt has faced during the last two years had affected the performance of the EGX in a negative way. A protective decision of closing the EGX had been taken by the authorities during the period 28/1- 22/3/2011 in the wake of 25^{th} of January Revolution. The main index (EGX 30) dropped significantly by almost 16% from 6723.2 points (on 24^{th} of January) to 5646.5 points (on 27^{th} of January, before closing the EGX). The share-traded value decreased by around LE 794.4 million and the trading volume by LE 97.1 million (according to the data released on the EGX's official website). This was attributed to the enormous sale of shares from the side of both Arab and foreign investors during the peak of the political events and portfolio investment outflows.

Consequently, it was essential to re-investigate the validity of the EMH using recent data sample to assess the '*close-open-effect*' on the stock prices. For this purpose, two samples were collected - on daily basis - that covered the main price indices in the EGX in order to capture two scenarios. The first reflected a period featured by stock market stability before the EGX close. The second represented a period of political insatiability and uncertain conditions surrounding the stock market after the EGX openness. A comparison between the two samples would enable the paper to test the EMH and determine the impact of the close decision on the market's performance and the investors' expectation.

The structure of the paper was as follows; section 2 highlighted the relevant literature. Section 3 illustrated the used methodology. Section 4 focused on the data sources and the main results. Finally, section 5 concluded.

2. *Literature Review*:

2.1 The Conceptual Framework:

The EMH became widely accepted in academic circles since the late 1950's and early 1960's. This was attributed to the evolvement of the *'theory of random walks'* in the finance literature and the '*rational expectations theory*' in economics (Jensen, 1978). In this regard, (Fama, 1965; Malkiel, 2003) associated EMH with the idea of *random walk process* in stock price series where all subsequent price changes were represented as random and independent departures from previous prices (Alexander, 1961). Alternatively, (Samuelson, 1965) was the first to provide a formal economic argument for efficient markets through his focus on the concept of a *martingale*, rather than a *random walk* (Guerrien and Gun, 2011). In this context, (Sewell, 2012) defined a *martingale* as a sequence of random variables for which, at a specific point of time, the expectation of the next value would be equal to the present observed value even given knowledge of all prior actual values. These developments paved the way towards substantial research on the possibility of predicting various variables in the stock market (e.g. Lo and MacKinlay, 1988; Fama and French, 1988; Granger, 1992; Timmermann, and Granger, 2004).

Moreover, *rationality* could be regarded as one important factor of efficiency (Jain, 2012). Risk aversion, unbiased forecasts, and instantaneous response to new information were highlighted by (Hassan et al., 2003) as other key features of an efficient market where prices react linearly to information. Thus, in *informational efficient markets* all market participants would use the available information to end up with *rational expectations forecasts* of future security returns. These *homogeneous expectations*, in turn, would be fully reflected in the prices prevailing in the market (Fama, 1970 & 1991; Shostak, 1997). On the contrary, (Grossman, 1976; Grossman and Stiglitz, 1980) argued the impossibility of *a perfectly informational efficient market* because it implied no sufficient profit opportunities to compensate investors against the costs of collecting information. In this situation, there would be no incentive to trade and markets eventually would collapse (Lo, 2005). The concept of *relative efficiency* was addressed by (Gilson and Kraakman, 1984) as a measure of the speed with which new information is reflected in prices. (Fama, 1991) explained the deviations from *perfect informational efficiency* as a result from the existence of information and trading costs. Additionally, (Figlewski, 1978) mentioned that the difference in the traders' characteristics and their *heterogeneous expectations* would be sources for *relative efficiency*.

Despite the fact that *relative efficiency* was a real-world phenomenon; *inefficiency* could happen. This would be a consequence of non-linear feeding-back mechanism in price responses to new information, market imperfections, and the microstructure of the stock market (Hassan et al., 2003).

Another point of view to explain *market inefficiency* was raised by a novel stream in the literature which reconciled traditional finance with behavioral finance (e.g. Farmer, 2002; Shiller, 2003; Lo, 2005). Accordingly, *market inefficiency* was a result of *irrational* investors. In the same context, the *Adaptive Markets Hypothesis* (AMH) was introduced by (Lo, 2004) as a new version of the EMH to reflect the misconduct of traders in the stock market. The AMH was derived from the evolutionary principles and the markets' complex dynamics where the EMH could be viewed as the frictionless model.

2.2 The Testability of the EMH:

Concerning the empirical evidence of testing of the EMH in the literature, one could find massive investigation (e.g. Hassan et al., 2003; Worthington and Higgs, 2004; Marashdeh and Shrestha, 2008; Lagoarde-Segot and Lucey, 2008; Afego, 2012). For instance, (Worthington and Higgs, 2004) examined the *weak-form* of the EMH in twenty European equity markets, of which sixteen were developed and the remainder were emerging. The authors obtained mixed results with a conclusion that institutionally mature markets were *weak-efficient*.

(Hassan et al., 2003) found that the Kuwait Stock Exchange was *weak-form* efficient. Marashdeh and Shrestha (2008) showed that the Emirates Securities Market data contained unit root and followed a random walk, which suggested *weak-form* market efficiency. Lagoarde-Segot and Lucey (2008) investigated the efficiency in seven emerging markets (i.e. Egypt, Morocco, Tunisia, Jordan, Lebanon, Israel and Turkey). Their results highlighted heterogeneous levels of efficiency in the stock markets as a result of differences market depth and corporate governance factors.

In addition, event studies were used in the finance literature to test EMH at specific points of time (Seiler and Rom, 1997; Fama, 1998) such as *calendar anomalies or effects*. This type of research was relevant to the EMH because changes in asset prices would respond only to the unexpected part of any news, while the expected part was already incorporated in observed prices (Shostak, 1997).

(Aly et al., 2004) applied this type of research in Egypt. They examined daily stock market anomalies in the Egyptian stock market using the *Capital Market Authority Index* (CMA). Their results were consistent with *weak-form efficiency*.

(Jefferis and Smith, 2005) had explored the evolving efficiency in seven African countries using the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model. Their results for Egypt implied evolving movements towards *weak-form efficiency*.

Recently, the global financial crisis had casted doubts on market efficiency (Ball, 2009) and resulted in studies that investigated the solidity of EMH (e.g. Ali and Afzal, 2012; Elshareif et al., 2012).

Based on the literature review, there was no investigation of the influence of the EGX close after the 25th of January Revolution on market efficiency. This paper would fill-in this research gap.

3. Methodology:

Depending on (e.g. Granger, 1992; Brooks, 2002; Gujarati, 2003; Worthington and Higgs, 2006; Marashdeh and Shrestha, 2008; Afego, 2012) market efficiency was captured by a stock price series that would follow a random walk process as in equation (1).

$p_t = p_{t-1} + \beta_1 + \varepsilon_t$ **------------- (1)**, *which could be re-written as follows:*

$r_t = \Delta p_t = \beta_1 + \varepsilon_t$

Where: p_t and p_{t-1} were interpreted as the stock price index at time t and $t-1$, respectively. A drift parameter was denoted by β_1.

The return series or the change in the price index was denoted by r_t. The random process ε_t had a zero mean, a constant variance, and was serially uncorrelated (i.e. $E(\varepsilon_t) = 0$, $V(\varepsilon_t) = \sigma$ and $E(\varepsilon_t, \varepsilon_{t-g}) = 0$, $g \neq 0$, for all t).

The Augmented Dickey-Fuller (ADF) test was used to determine whether the price index series was difference or trend nonstationary as a necessary condition for the existence of random walk. This was tested through equation (2).

$$r_t = \Delta p_t = \beta_1 + \beta_2 t + \delta \ p_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta p_{t-i} + \varepsilon_t \quad \text{-------------} \ \mathbf{(2)},$$

Where: t indicated the trend variable. The lagged term was denoted by m. The autoregressive term $\sum_{i=1}^{m} \alpha_i \Delta p_{t-i}$ ensured no correlation in the error term. In order to investigate the *weak-form efficiency* in EGX, the following null hypothesis was tested:

H_o: *The EGX price index would follow a random walk process (i.e.* δ =0).

Against the alternative that:

H_1: *The EGX price index would not follow a random walk process (i.e.* $\delta \neq 0$).

Baring in mind that the main objective of the paper - in hands - was to assess the '*close-open-effect*' on the EGX prices after the revolution, two samples were collected to cover the following scenarios:

1- The first one covered a period featured by stock market stability that spanned from 24/6/2008 to 27/1/2011 (i.e. before the date of EGX close).
2- The second sample represented a period of political insatiability and uncertain conditions surrounding the stock market from 24/3/2011 to 6/11/2013 (i.e. after the openness of EGX).

Nevertheless, the unit root test could be considered as weak technique to determine the market efficiency (Jefferis and Smith, 2005). Also, an inefficient market could imply a nonlinear reaction of returns to news. Therefore, the methodology was extended to estimate the Autoregressive Conditional Heteroskedasticity (ARCH) and the Generalized ARCH (GARCH) models as in (Bollerslev, 1986 ; Depken, 2001; Elshareif et al., 2012). These methods were used to investigate the '*close-open-effect*' on the variance of the Egyptian stock returns.

Following (Brooks, 2002 and Tsay, 2005) the starting point to perform the analysis was the conditional mean and conditional variance equations of the following form:

$$r_t = \alpha + \beta_1 X' + \varepsilon_t \quad \text{-------------} \ \mathbf{(3)},$$

$$\sigma^2 t = \gamma + \sum_{j=1}^{P} \theta \varepsilon^2_{t-j} + \sum_{i=1}^{q} \ \delta \sigma^2_{t-i} \quad \text{-----------} \ \mathbf{(4)},$$

Stock returns in equation (3) were written as a function of a vector of exogenous variables X' and an error term ε_t. In equation (4) the one-period ahead forecast variance

σ^2_t (i.e. the conditional variance) was based on past information. It showed how the investor could predict this period's variance by forming a weighted average of a long-term average (the constant term), the forecasted variance from last period (i.e. the GARCH term, σ^2_{t-1}), and information about volatility in returns observed in the previous period (i.e. the ARCH term, ε^2_{t-1}). The lags *p* and *q* were chosen for the ARCH and GARCH terms, respectively. If the asset return was unexpectedly large in either the upward or the downward direction, then the trader would increase his expectations regarding the variance for the next period. In addition, the methodology depended on a recent the paper by (Ali and Afzal, 2012). They used the Exponential GARCH (EGARCH) Model that was proposed by Nelson (1991) to analyze the impact of global financial crisis on the stock returns in Pakistan and India and allow for negative values for the conditional variance. A modified version of their model was estimated as follows:

$$r_t = \alpha + \beta_1 \sigma_t GARH(p,q) + \varphi \, \mathrm{Re}volution\_Dummy + \varepsilon_t \quad \text{-------------} \ \mathbf{(5)},$$

In equation (5) a dummy variable that captured the '*close-open effect of the EGX*' was incorporated. It toke the value of zero during the period (24/6/2008 to 27/1/2011) and a value of one afterwards.

$$\log(\sigma^2 t) = \gamma + \sum_{j=1}^{q} \delta_j \log(\sigma^2_{t-j}) + \sum_{j=1}^{p} \theta_j \left| \frac{\varepsilon_{t-i}}{\sigma_{t-i}} \right| + \sum_{k=1}^{r} \lambda_k \frac{\varepsilon_{t-k}}{\sigma_{t-k}} + \varphi \mathrm{Revolution\_Dummy} \quad \text{--------} \ \mathbf{(6)},$$

The logarithmic transformation of the conditional variance was the dependent variable in the (EGARCH) Model. This implied that the leverage effect was exponential, rather than quadratic. The λ coefficient showed the leverage impact of unexpected information. If the sign of this coefficient was negative and significant then a negative shock was more apparent than the positive shock. On the contrary, the positive sign reflected that the impact of good news was more relevant than negative news. The φ coefficient would assess the effect of the close of the EGX on the conditional variance of the stock returns.

4. Data Sources and Results:

Daily frequency was collected for the main price indices in the Egyptian stock market (e.g. EGX 30, EGX 70, and EGX 100 in table (1)).

Table (1): Main Variables

The Index	***Definition***
EGX 30 index	CASE 30 index was renamed EGX 30. It included the top 30 companies in terms of liquidity and activity.
EGX 70 index	Introduced as of March 2009 to cover 70 companies other than the 30 constituent companies of EGX 30.
EGX 100 index	Encompassed the constituent companies of EGX 30 and EGX 70, as of August 2009.

Source: The official website of the Egyptian Exchange: http://www.egx.com.eg/

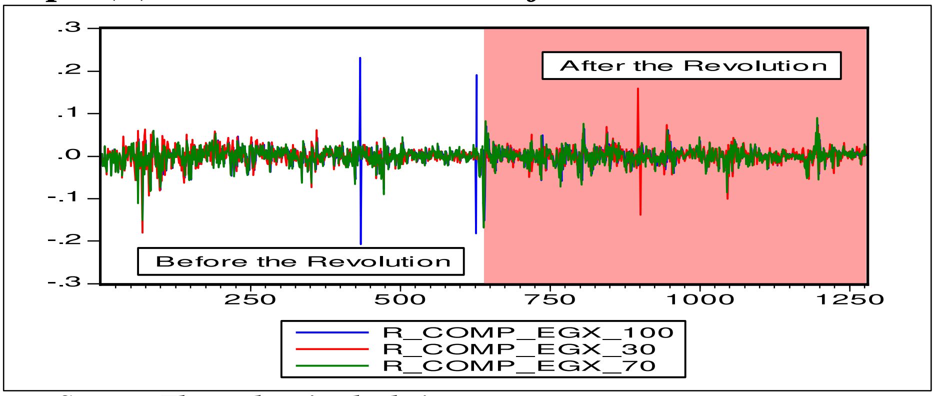
The natural logarithm of successive points of the stock price index series was computed to produce a new series of returns as in equation (7). Dividends were neglected to simplify the analysis.

$r_t = \log(p_t / p_{t-1})$ **------------- (7)**, *which could be re-written as follows*:

$r_t = [\log(p_t) - \log(p_{t-1})\,]$

The graphical illustration of the three price indices (in graph (1)) reflected that the three series were nonstationary. EGX 100 jumped before the revolution but EGX 30 exhibited an obvious peak after it. This implied the sensitivity of the two indices to uncertain conditions with a need for further exploration of the variance of the two series. In other word, it was essential to study how new news could affect the expectations of investors.

Graph (1): The Return Series of the Main Price Indices



Source: The authors' calculations.

The unit root test was performed on the level of the logarithmic transformation of each price index using equation (2). The estimated equation included an intercept and a linear trend. The lag length was determined using Schwartz criterion. Test critical values used to determine the rejection of the null hypothesis was at 5% significance level. The null hypothesis was that the dependent variable had a unit root. The results in (Table: 2) led to the rejection of *weak-form efficiency* before and after the revolution.

Table (2): The Augmented Dickey-Fuller (ADF) test

1- The Index before the Revolution

EGX 30		t-Statistic	Prob.
Augmented Dickey-Fuller test statistic		-20.32317	0.0000
Test critical values:	1% level	-3.972526	
	5% level	-3.416888	
	10% level	-3.130803	

EGX 70		t-Statistic	Prob.
Augmented Dickey-Fuller test statistic		-19.07759	0.0000
Test critical values:	1% level	-3.972526	
	5% level	-3.416888	
	10% level	-3.130803	

EGX 100		t-Statistic	Prob.
Augmented Dickey-Fuller test statistic		-25.97970	0.0000
Test critical values:	1% level	-3.972503	
	5% level	-3.416877	
	10% level	-3.130796	

2- The Index after the Revolution

EGX 30		t-Statistic	Prob.
Augmented Dickey-Fuller test statistic		-23.35623	0.0000
Test critical values:	1% level	-3.972549	
	5% level	-3.416900	
	10% level	-3.130809	

EGX 70		t-Statistic	Prob.
Augmented Dickey-Fuller test statistic		-21.01646	0.0000
Test critical values:	1% level	-3.972572	
	5% level	-3.416911	
	10% level	-3.130816	

EGX 100		t-Statistic	Prob.
Augmented Dickey-Fuller test statistic		-21.16392	0.0000
Test critical values:	1% level	-3.972572	
	5% level	-3.416911	
	10% level	-3.130816	

Source: The authors' calculations.

The ARCH effect was estimated using 1277 observations that covered the whole period (i.e. from 24/6/2008 to 6/11/2013). Table (3) demonstrated that both the F-statistic and the LM-statistic which followed the Chi-square distribution with one lag were very significant. The null hypothesis of no impact of previous volatility of stock returns on the investors' expectations was rejected.

Table (3): The ARCH Effect Results

1- EGX 30 ARCH Test:

F-statistic	27.25552	Prob. F(1,1273)	0.000000
Obs*R-squared	26.72612	Prob. Chi-Square(1)	0.000000

2- **EGX 70 ARCH Test**:

F-statistic	115.2450	Prob. F(1,1272)	0.000000
Obs*R-squared	105.8372	Prob. Chi-Square(1)	0.000000

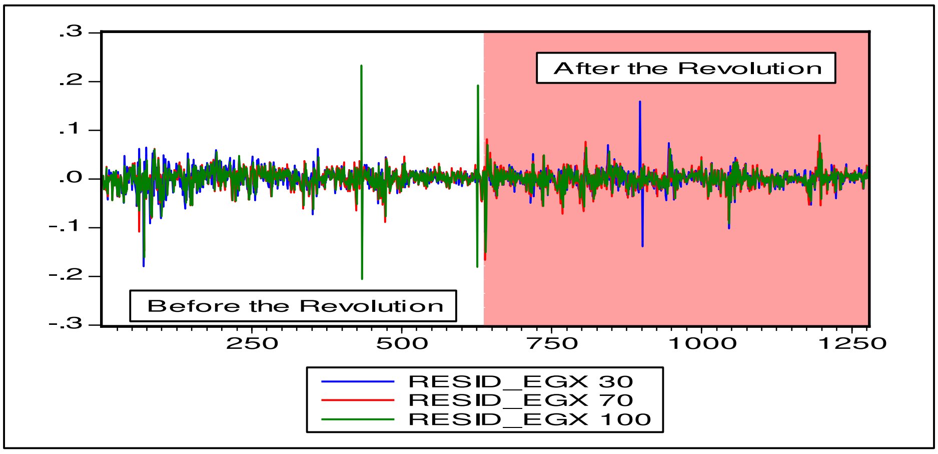
3- EGX 100 ARCH Test:

F-statistic	293.9643	Prob. F(1,1273)	0.000000
Obs*R-squared	239.1915	Prob. Chi-Square(1)	0.000000

Source: The authors' calculations.

Graph (2) depicted that both EGX 100 and EGX 30 exhibited obvious hikes during the whole sample. This was consistent with graph (1).

Graph (2): Information about Volatility in Returns



Source: The authors' calculations.

The extension of the analysis was the estimation of the GARCH(1,1) with one lag for both ε^2_{t-1} and $\sigma^2{}_{t-1}$. It was chosen depending on the correlogram graphical inspection.

Table (4) showed the (EGARCH) results of equations (5) and (6) using the first difference of returns from the EGX 30 index since the results obtained from (graphs (1) and (2)) pointed out to a peak after the revolution and results in table (1) presented the monstationarity of the series.

Table (4): The (EGARCH) Effect Results

Dependent Variable: D(R_COMP_EGX_30)
Method: ML - ARCH (Marquardt) - Student's t distribution
Sample (adjusted): 3 1277
Included observations: 1275 after adjustments
Convergence achieved after 300 iterations
Variance backcast: ON
LOG(GARCH) = C(4) + C(5)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(6)*RESID(-1)/@SQRT(GARCH(-1)) + C(7)*LOG(GARCH(-1)) + C(8)*Revolution_DUMMY

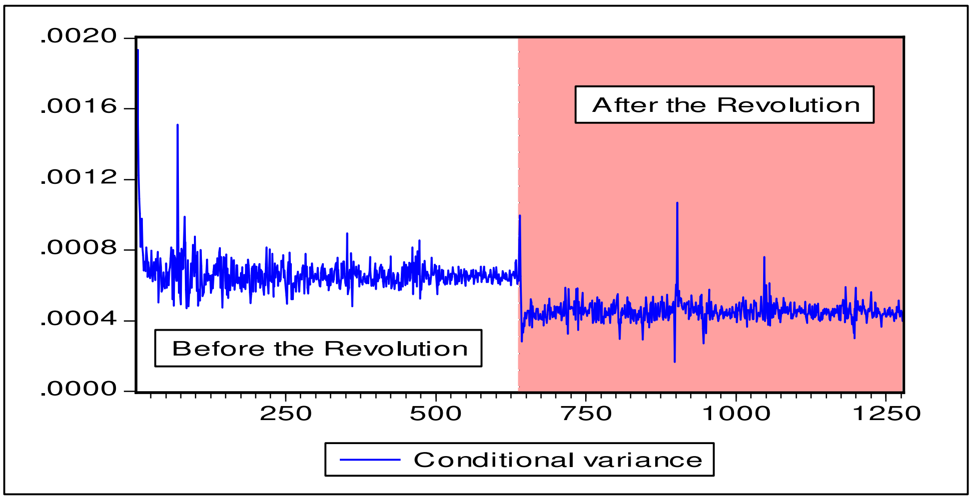
	Coefficient	Std. Error	z-Statistic	Prob.
@SQRT(GARCH)	11.57814	1.194036	9.696636	0.0000
C	-0.295958	0.027573	-10.73369	0.0000
Revolution_DUMMY	0.049847	0.015347	3.248008	0.0012
Variance Equation				
C(4)	-5.699051	0.150112	-37.96525	0.0000
C(5)	-0.005304	0.001648	-3.218545	0.0013
C(6)	-0.121558	0.012170	-9.988159	0.0000
C(7)	0.222759	0.011341	19.64249	0.0000
C(8)	-0.286814	0.083331	-3.441872	0.0006
T-DIST. DOF	3.062449	0.322213	9.504421	0.0000

R-squared	0.370488	Mean dependent var	7.16E-06
Adjusted R-squared	0.366510	S.D. dependent var	0.026820
S.E. of regression	0.021346	Akaike info criterion	-5.094925
Sum squared resid	0.576870	Schwarz criterion	-5.058568
Log likelihood	3257.015	F-statistic	93.13511
Durbin-Watson stat	2.115512	Prob(F-statistic)	0.000000

Source: The authors' calculations.

In equation (6), the value of λ was significant and had a negative sign with a value of (-0.12). This offered an outcome of information asymmetry in the Egyptian stock market after the revolution. The negative shock of the bad news (i.e. the decision of closing the stock market) had a strong impact on the volatility of returns. The coefficient φ attached to the dummy variable reflected a negative and significant '*close-open-effect*' on the returns of the main price index.

Graph (3): The Conditional Variance



***Source: The authors' calculations*.**

In table (4) the conditional variance term included in the mean equation was significant and had a positive value of 11.58. This coincided with graph (3) where the magnitude of the change in the conditional variance was lower after the revolution. Accordingly, the market-wide risk was formed in the investor's expectations more rapidly after the revolution compared with the period before the stock close. This was intuitive since such a political event would affect the attitude of investors to respond quickly and significantly to previous information.

5. Concluding Remarks:

The Egyptian Stock Exchange (EGX) witnessed a critical decision of a sudden close as a consequence of the 25^{th} of January Revolution. This paper studied the impact of this bad information on market efficiency as well as the volatility of returns computed from the main price indices in the EGX. The results led to the rejection of *weak-form efficiency* before and after the revolution. Additionally, information asymmetry in the EGX after the revolution was an outcome of this decision. The negative shock of the bad news (i.e. the stock market close) had a strong impact on the volatility of returns. The announcement of the EGX close was reflected more rapidly in the returns after the revolution compared to the period before the revolution. The estimations clarified a negative and significant '*close-open-effect*' on the returns of the main price index.

As a consequence of the above results it was important to end-up with some recommendations:

1- Given the sensitivity of EGX 30 index to bad news after the revolution, a frequent revision of the included companies in the index would be important. This was due to the fact that not all the companies in the index work in the same sector or industry. The response of individual company to market risk and unexpected events would differ.
2- Gaining and maintaining market efficiency would require regular modifications of the legal and the institutional frameworks of the stock market.
3- Adapting features from similar emerging stock markets in the region would lead to a better performance of the Egyptian stock.

References:

- Afego, P. (2012), "Weak Form Efficiency of the Nigerian Stock Market: An Empirical Analysis (1984 – 2009)", *International Journal of Economics and Financial Issues*, 2 (3) pp. 340-347.
- Alexander, S. (1961), "Price Movements in Speculative Markets: Trends or Random Walks", *Industrial management Review*, 2, pp. 7-26.
- Ali, R. and Afzal, M. (2012), "Impact of Global Financial Crisis on Stock Markets: Evidence from Pakistan and India", *E3 Journal of Business Management and Economics*, 3(7). pp. 275-282.
- Aly, H., Mehdian S., and Perry M., J. (2004), "An Analysis of Day-of-the-Week Effects in the Egyptian Stock Market", *International Journal of Business*, 9(3), pp. 301-308.
- Ball, R. (2009), "Global Financial Crisis and the Efficient Market Hypothesis: What Have We Learned?", *Journal of Applied Corporate Finance*, 21(4), pp. 8-16.
- Bollerslev, T. (1986), "Generalized Autoregressive Conditional Heteroskedasticity", *Journal of Econometrics*, 31, pp. 307-327.
- Brooks, C. (2002), "Introductory Econometrics for Finance", Cambridge University Press.
- Busse, J. A. and Green, T. C. (2002),"Market Efficiency in Real Time", *Journal of Financial Economics*, 65, pp. 415–437.
- Depken II, C. A. (2001),"Good News, Bad News and GARCH Effects in Stock Return Data", *Journal of Applied Economics, 2, pp. 313-327.*

- Elshareif E. E., Tan, H. and, Wong M. (2012), "Unexpected Volatility Shifts and Efficiency of Emerging Stock Market: the Case of Malaysia, *Business Management Dynamics*, 1 (10), pp.58-66
- Fama, E. F. (1965), "Random Walks in Stock Market Prices", *Financial Analysis Journal*, 21(5), pp.55-59.
- Fama E. F. (1970), "Efficient Capital Markets: A Review of Theory and Empirical Work", *Journal of Finance*, 25 (2), pp. 383-417.
- Fama, E. F. (1991), "Efficient Capital Markets II", *Journal of Finance*, 46, pp. 1575-1617.
- Fama, E. F. (1998), "Market Efficiency, Long-term Returns, and Behavioral Finance", *Journal of Financial Economics,* 49 (3), pp. 283–306.
- Fama, E. and French, K. R. (1988), "Permanent and Temporary Components of Stock Prices", *Journal of Political Economy*, 96 (2), pp. 246-273.
- Farmer, D. (2002), "Market Force, Ecology and Evolution", *Industrial and Corporate Change,* 11 (5), pp. 895-953.
- Fielitz, B. D. (1971), "On the Random Walk Hypothesis", *The American Economist*, 15 (1), pp. 105-107.
- Figlewski, S. (1978), "Market Efficiency in A Market with Heterogeneous Information", *Journal of Political Economy*, 86, (4), pp. 581-597.
- Gilson, R. J. and Kraakman, R. H. (1984), "The Mechanisms of Market Efficiency", *Virginia Law Review*, 70 (4), pp. 549-644.
- Granger, C.W.J. (1992), "Forecasting stock market prices: Lessons for forecasters", *International Journal of Forecasting*, 8, pp. 3-13.
- Grossman, S. (1976), "On the Efficiency of Competitive Stock Markets Where Trades Have Diverse Information", *The Journal of Finance*, 31(2), pp. 573-585.
- Grossman, S. and Stiglitz, J. (1980), "On the Impossibility of Informationally Efficient Markets", *American Economic Review,* 70, pp. 393-408.
- Guerrien, B. and Gun, O. (2011), "Efficient Markets Hypothesis: What Are We Talking About?", *Real-world Economics Review*, 56, pp. 19-30.
- Gujarati, D., N. (2003), "Basic Econometrics", 4th edition, McGraw-Hill Irwin.
- Hassan, K. M., Al-Sultan, W. S., and Al-Saleem, J. A. (2003), "Stock Market Efficiency in the Gulf Cooperation Council Countries (GCC): The Case of Kuwait Stock Exchange", *Scientific Journal of Administrative Development*, 1(1), pp. 1-21.

- Jain, V. (2012),"An Insight into Behavioral Finance Models, Efficient market Hypothesis and Its Anomalies", *Journal of Arts, Science & Commerce*, pp. 16-25.
- Jefferis, K. and Smith, G. (2005),"The Changing Efficiency of African Stock Markets", *South African Journal of Economics*, 73(1), pp. 54-67.
- Jensen, M. (1978), "Some Anomalous Evidence Regarding Market Efficiency", *Journal of Financial Economics*, 6, pp. 95- 101.
- Lagoarde-Segot T. and Lucey, B. M. (2008) "Efficiency in Emerging Markets-Evidence from the MENA Region", *Journal of International Financial Markets, Institutions & Money*, 18, pp. 94-105.
- Lo, A. (2004), "The Adaptive Markets Hypothesis: Market Efficiency from an Evolutionary Perspective" *Journal of Portfolio Management* 30, pp. 15-29.
- Lo, A. (2005),"Reconciling Efficient Markets with Behavioral Finance: The Adaptive Market Hypothesis", *Journal of Investment Consulting,* 7 (2), pp. 21-44.
- Lo, A. and MacKinlay, A.C. (1988),"Stock Market Prices Do Not Follow Random Walks: Evidence from A Simple Specification Test", *Review of Financial Studies*, 1(1), pp. 41-66.
- Malkiel, G. B. (2003), "The Efficient Market Hypothesis and Its Critics", *Journal of Economic Perspectives*, 17 (1), pp. 59-82.
- Marashdeh, H. and Shrestha, M. B. (2008),"Efficiency in Emerging Markets - Evidence from the Emirates Securities Market", *European Journal of Economics, Finance and Administrative Sciences*, 12, pp. 143-150.
- Michael, J. S. and Walter R. (1997), "A Historical Analysis of Market Efficiency: Do Historical Returns Follow A Random Walk?", *Journal of Financial and Strategic Decisions,* 10 (2), pp. 49- 57.
- Samuelson P.A. (1965),"Proof That Properly Anticipated Prices Fluctuate Randomly", *Industrial Management Review*, 6, pp.41-50.
- Timmermann, A. and Granger, C. W. J. (2004), "Efficient Market Hypothesis and Forecasting", *International Journal of Forecasting*, 20(1), pp. 15–27.
- Tsay, R. S. (2005), "Analysis of Financial Time Series", John Wiley and Sons Inc. Publication.
- Worthington, A.C., Higgs, H. (2004), "Random Walks and Market Efficiency in European Equity Markets", *Global Journal of Finance and Economics*, 1(1), pp. 59-78.