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The impact of Treasury bill rate and interest rate on the stock market returns in Egypt

Abdelmonem Lotfy Mohamed Kamal *

Faculty of Economic Studies and Political Science, Beni-Suef University, Egypt

Abstract

The literature has concluded that the Stock Market returns are affected by the macroeconomic variables performance. Treasury bill rate was taken as a proxy and a measure of interest rate. The study examines the joint impact of interest rates and Treasury bill rate on stock market returns on Egyptian Stock Exchange over the period between November 2004 and November 2017. The study used econometric models to investigate the relationship between Treasury bill rate, interest rate, and Egyptian Stock Market returns. Results showed that there is a negative relationship between Treasury bill rate, interest rate, and Egyptian Stock Market returns. Moreover, the econometric analysis showed co-integration between these three variables which means that there is a long run relationship. Therefore, the study concluded that both interest rate and Treasury bill rate have a joint impact on Egyptian stock market returns in the long run. Finally, it is important to policy makers in the Egyptian Financial Sector, investors, mutual fund and portfolio managers to understand the effects of both Treasury bill rate and interest rate dynamics on Egyptian stock market returns in order to take optimal investment decisions.

Keywords: Treasury Bill; Egyptian Stock Market; Interest Rates; Stock Market Returns; Egx–30; Egyptian Financial Sector; Egyptian Financial Policy

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* Corresponding author. *E-mail address:* aLotfy@eps.bsu.edu.eg

1. Introduction

Most studies approved that macroeconomic performance has an assured impact on the stock market returns. In Egypt, maintaining macroeconomic stability is considered one of the essential targets facing the Egyptian government. Several researchers have examined the relationship between the stock market returns and interest rate since it has a crucial impact on the process of economic development at any country (Aydemir and Demirhan, 2009). In general, monetary authorities, mostly the Central Bank, determines the interest rate according to the economic situation. Consequently, interest rates' changes affect the value of stocks of companies. Therefore, these changes have similar effect on stock returns.

According to (French et al., 1987), stock prices and interest rates are negatively correlated. The rational for the relationship between stock returns and interest rates can be expressed as high interest rates are considered one of the main obstacles towards achieving higher economic growth. On the other hand, lower interest rates raise stock prices.

During periods of contractionary monetary policy, the Central Bank increases interest rates in order to absorb liquidity, reduce money supply, and to control inflation. As a result, high interest rates reduce the value of equity and give more attraction towards investing in fixed income securities as alternative to purchasing stocks. In addition, it increases the cost of capital invested in doing business that decreases profits. Also, it may lower the tendency of investors towards borrowing and investing in equities. Consequently, stock market returns are negatively affected.

In contrast, during periods of expansionary monetary policy, the Central Bank lowers interest rates to increase liquidity, raise money supply, and boost economic growth. Therefore, expansionary monetary policy causes an enhancement for the stock market that positively affect stock market returns (Fama, 1981) and (Cheung, 1998).

Several research papers have been conducted to test the effects of macroeconomic variables on stock market returns. It was necessary to investigate the relationship between economic growth and development in one side, and factors such as money supply, interest rates, Treasury bill rate, stock market capitalization rate, exchange rate, and the degree of financial sector development on the other hand. At any economy, the Stock Market is considered the most important market to accumulate massive capital formation that would be allocated into economic development processes (Addo and Sunzuoye, 2013).

In Egypt, interest rates and Treasury bill rate have been increasing rapidly since 2008, in the aftermath of the global financial crisis. Several studies have been done to test how monetary policy and inflation rate affect the Egyptian Stock Market performance. Nor did these studies investigate the impact of Treasury bill rate and interest rate on the Stock Market returns in Egypt. This study can be considered the first trial to investigate such a relationship.

During the last three years, the Egyptian government implemented several economic reforms in order to solve complicated, interlinked, and old existed macroeconomic problems that the economy has been suffering from for a long. The Egyptian recent economic reform was based on the following three pillars.

First, the fiscal policy reforms that was implemented through tax reform, subsidies reform, and the public goods pricing reform. The main target for the fiscal policy reform was lowering the Egyptian budget deficit as a percentage of GDP.

Second, the Exchange Rate reform which was implemented through devaluating the Egyptian Pound against foreign currencies and applying free floating exchange rate regime in the Egyptian Foreign Exchange Market. Noting that the Egyptian Pound lost around 50% of its value because of this devaluation[1].

Third, to defend the Egyptian Pound after this crucial devaluation, the Central Bank of Egypt was obligated to implement a contractionary monetary policy by raising all types of interest rates. Consequently, discount rate, lending rate, interbank rate, and others were all raised to reach historical records. For example, the overnight deposit rate reached to 18.75%, the overnight lending rate reached to 19.75%, the discount rate reached to 19.25%, and the average overnight Egyptian interbank rate reached to 18.86% in December 2017[2]. Also, the average interest rate on deposits for 3-month reached 12.4% in July 2017[3]. Moreover, these rises in several types of interest rates were extended to hit the Treasury bill rate where the interest on 91- day T-bills reached to 19.17% in December 2017.

Therefore, these developments in interest rates and Treasury bill markets formulate to economists to study the implications of these developments on the Egyptian economy as a whole and on the Egyptian Stock returns in specific.

Of course, the study will test the impact of increasing the average interest rate on deposits for 3 – month and the interest on 91- day T-bills reached on the Egyptian Stock Market returns using econometric analysis.

The paper is planned as follows. Second section discusses the literature review for testing the implications for rising interest rates on stock market performance. Third section describes the methodologies used to test this relationship empirically. The study will choose the most appropriate methodology to be applied for Egyptian case. Fourth section illustrates an explanation to the research results. Finally, in section 5, the paper will provide financial policy recommendations to the Egyptian government to enhance both the financial sector and Stock Market performance in Egypt.

2. Literature review

According to the literature, several studies have been made to investigate how macroeconomic variables impact stock market returns. The study of Fama (1981) was the pioneer to study empirically the relationship between stock returns and macroeconomic variables in a developed economy using Arbitrage Pricing Theory (APT). It was based on the study of Ross (1976) which was the founder of APT theory that assumes returns are generated by a number of macroeconomic factors. These studies were followed by other studies to test

[1] The Egyptian Pound was 8.88 LE against one US Dollar in November 2016, after devaluation it becomes 17.6 LE against one US Dollar in December 2017.
[2] The Central Bank of Egypt official website http://www.cbe.org.eg/en/Pages/default.aspx.
[3] Egyptian Ministry of Finance, the Financial Monthly, September 2017.

the same relationship in developed countries using APT models such as Mukherjee and Naka (1995), Pill (1997), Harasty and Roulet (2000), and Humpe and Macmillan (2007). These studies found a significant relationship between stock returns and macroeconomic variables in developed countries.

Research was extended to include testing the relationship the relationship between stock returns and macroeconomic variables using APT models in developing countries and emerging markets as well. Such research was conducted by Landi and Saracoglu (1983), Masih and Masih (1996), Kwon et al. (1997), Maysami and Sims (2002a, 2002b, 2001a, 2001b), Aydemir and Demirhan (2009), Mahmood and Dinniah (2009), Gazi and Hisham (2010), and Addo and Sunzuoye (2013).

Final conclusions for these papers in developing countries suggest that results for one country cannot be used to forecast results for the other. Consequently, certain macroeconomic variables affecting stock returns in a country may not have the same impact on another country's stock returns (Addo and Sunzuoye, 2013).

2.1. Literature survey for Egypt

With regard to Egypt, we found this literature started with Mauro and Sourial (1999) that examines the behavior of stock returns in the Egyptian Stock Exchange, market efficiency in pricing according to information which affects stocks market value, and the relationship between returns and conditional volatility. Therefore, it is noted that the relationship between stock returns and interest rates was not tested at this study.

So, we can consider the study of Sourial (2000) as the first attempt to identify the impact of monetary policy on the stock market returns. For empirical analysis, it used Bayesian VAR models consisting of four endogenous variables with four lags and a constant. It tested the relationship between Egyptian Stock Market returns, inflation rate, and credit to private sector as representative to monetary stance. The results proved that monetary aggregates didn't have a significant impact on the stock market performance prior January 1998. However, post December 1997, the estimation results provided new evidence of interrelation between stock market returns and monetary policy in Egypt.

Generally, the insignificance of some of the estimated parameters is similar to several papers that tested the same relation on emerging markets such as Erb et al. (1995), Handy and Subramanian (1997), and Mauro and Sourial (1999). The price adjustment to monetary shocks appears after time lag.

Another paper addressing the same issue in Egypt is Omran and Pointon (2001) that examined the impact of the inflation rate on the Egyptian Stock Market performance. It used co-integration analysis through error correction mechanism (ECM). The results showed a significant relationship between inflation rate and the Egyptian stock market performance in both short-run and long-run. It implies that the inflation rate has had an impact on the Egyptian stock market performance in general.

On the same track, Omran (2003) is found as a time series analysis to investigate the impact of real interest rates on stock market activity and liquidity in Egypt through the period from 1980/1981 to 1997/1998. Annual data for real interest rate and five main stock market activity variables were used in the econometric analysis. These five stock market variables were: the value of trade, the volume of trade, the

number of transactions, the number of traded companies, and the value of new issues (including capital increases). In addition, to represent market liquidity, the volume of shares traded to volume of shares listed and the total value traded to market capitalization have been included to the analysis. However, Omran (2003) did not include stock prices and returns in the analysis since a stock market index in Egypt was not developed until the end of 1993.

With regard to econometric analysis, it used co-integration and error correction model approach (ECM) that provided significant short-run and long-run relationships between these variables. It concludes that real interest rates have an impact on the Egyptian stock market performance.

Of course, it is noted that a crucial gap in the literature of this topic have existed in the Egyptian case since 2003. Therefore, this paper tries to fill this gap in the literature. The target in the paper will be to benefit from the papers previously described in investigating the relationship between stock market returns, Treasury bill rate, and interest rates in Egypt during the era November 2004 until November 2017. Finally, the study will end up with implications and policy recommendations to policy makers, investors, and portfolio managers in Egypt.

3. Research methodology

3.1. Variables and data

In contrast to Omran (2003) that used CASE-30 index data to express the stock market returns, the Egyptian Stock Market index EGX-30 will be used in this paper to represent the Egyptian stock market returns. For interest rate, as in Al-Sharkas (2004) and Adam and Tweneboah (2008), Treasury bill rate for 91 days is taken to express one type of opportunity cost of capital, especially for institutional investors. However, this study sees that using only Treasury bill rate to represent interest rate is not sufficient since it may not give a complete representation to investment opportunity costs. Both institutional and individual investors sometimes borrow at the lending rate to invest in the stock market (Addo and Sunzuoye, 2013). Therefore, this study uses the average interest rate on loans (a year and less) is included as a proxy for lending interest rate. In addition, the average interest rate on deposits for three months is examined as a proxy for interest rates on deposits which is considered an alternative to invest in stock market.

The data set for this paper covers monthly data for 13 years from November 2004 until November 2017. Data for EGX-30 index, which started on 2nd of February 2003, is downloaded from the Egyptian stock market official website. The Egyptian Ministry of Finance is the source for Treasury bill rate, lending interest rate, and deposit interest rate data through The Financial Monthly.

3.2. Empirical model

In order to investigate long-run adjustments and short-run dynamics between stock market returns and interest rates, this study uses co-integration analysis developed by Banerjee et al. (1986), Engle and Granger

(1987), Gelb (1989), Spiro (1990), Holden and Thompson (1992), Charemza and Deadman (1992), Ploeg (1996), Thomas (1997), Nasseh and Strauss (2000) and Omran (2003).

3.3. Unit Root Test for Variables

First, all time series data being empirically analysed have to be stationary. Therefore, the study used unit root tests for every variable on its original data. To reach stationarity, every data set has been first differenced, second differenced and so on. To test the order of integration, it is recommended to use the Augmented Dickey – Fuller (ADF) test provided in (Dickey and Fuller, 1981). The ADF test solves the problem of the possibility of autocorrelation in the error process since it reduces autocorrelation of the residuals in the original Dickey – Fuller test. The ADF test can be represented as follows;

$$\Delta Yt = \Phi . Yt\text{-}1 + {}^{k}\Sigma_{i=1} \Phi i . \Delta Yt\text{-}i + \varepsilon t \qquad (1)$$

Where k represents the number for lags for ΔYt-i that has to be in a level which saves the degrees of freedom and allow for the presence of autocorrelation in ε t.

In this context, the autoregressive coefficient α 0 is as follows;

$$Yt = \alpha 0\, Yt\text{-}1 + \varepsilon t$$

It can be adjusted to;

$$\Delta Yt = (\alpha 0 - 1)\, Yt\text{-}1 + \varepsilon t$$

If α 0 is less than 1, then Yt is integrated of order zero. If not, then we test;

$$\Delta\Delta Yt = (\alpha 1 - 1)\, \Delta Yt\text{-}1 + \varepsilon t$$

If α 1 is less than 1, then Yt is integrated of order one. This process is continued until stationarity is reached.

Using E-views 7, the study found that the four variables are not integrated from order zero. And so, these variables need to be first differenced. Results showed that the four variables are integrated of order two I(2). Consequently, it follows that co-integration among these variables has to be tested.

3.4. The Co-integration Using Error Correction Model (ECM)

Following (Engle and Granger, 1987) and (Dolado, et. Al, 1990), the co-integration analysis is done through two stages. First, the study performs the ordinary least squares (OLS) regressions between stock market returns and these three interest rates. It will be as follows;

$$Yt = \alpha + \beta 1\, Xt + vt \qquad (2)$$

Where Yt is the Egyptian stock market returns calculated using the monthly index price as follows;

$$Yt = (Pt - Pt\text{-}1) * 100 / Pt\text{-}1$$

Where, Yt = market return at period t; Pt = EGX-30 Index Price at period t; Pt-1 = EGX-30 Index Price at period t-1. Yt is integrated from order two. Xt is the independent variables which are the three interest rates

integrated of order two. Vt is the estimated error in the equation that refers to the deviation of the dependent variable from its long term path. Vt reflects the error correction mechanism (ECM). Following (Omran, 2003), the general model for the ECM is based on the lagged residual and a first differenced Autoregressive Distributed Lag (ADL) model. According to (Thomas, 1997), the EC model takes the form;

$$\Delta Yt = \pi 0 + \pi 1 \Delta Yt\text{-}1 + \pi 2 \Delta Yt\text{-}2 + \pi 3 \Delta Yt\text{-}3 + \pi 4 \Delta Xt + \pi 5 \Delta Xt\text{-}1 + \pi 6 \Delta Xt\text{-}2 + \pi 7 \Delta Yt\text{-}3 + \pi 8 ECM\ t\text{-}1 + \varepsilon t \quad (3)$$

Where ΔYt , $\Delta Yt\text{-}1$, $\Delta Yt\text{-}2$, $\Delta Yt\text{-}3$ are the first differenced dependent variable that are lagged zero, one, two, and three year respectively. Also ΔXt , $\Delta Xt\text{-}1$, $\Delta Xt\text{-}2$, $\Delta Xt\text{-}3$ are the first differenced independent variable that are lagged zero, one, two, and three year respectively. ECM t-1 is the disequilibrium error from the static long-rum equation; and so it is the error correction mechanism. Finally, εt is the disturbance term. This general model can be reduced using a two-tailed T-test with a ten percent significance level in order to eliminate non-significant variables. After this reduction process, we reach to a "right-hand side" of the EC model that includes on differenced independent variable and the lagged ECM, which is the basic form of the EC model. With regard to each bivariate relationship in this model, after specifying the final form of the EC models, the Autoregressive Conditional Heteroscedasticity (ARCH) diagnostic test is run in order to test for the power of the models.

4. Empirical results

Table 1. ADF unit root test results for EGX-30 returns and The three interest rates variables

1	ADF statistics		
2 Variables	3 Levels form	4 First differenced	5 Second Differenced
6 EGX-30 Returns	7 2.215	8 1.561	9 -8.959
10 T-bill Rate	11 2.342	12 0.865	13 -11.972
14 3-Months Deposit	15 4.965	16 1.801	17 -11.369
18 Lending Rate	19 2.521	20 1.326	21 -9.729

From table 1, it is noted that integration of orders zero and one are not existed for these four variables. Therefore, first and second differences have been taken in order to reach stationarity for these variables. This means that the alternative hypothesis is rejected which indicates that these variables are integrated of order higher than one. Consequently, when second differences were taken for these variables, the null hypothesis that $\alpha 1 = 1$ is rejected for all of them which indicates that these variables are integrated of order two I (2).

Table 2. Co-integration Analysis among Variables

Sample (adjusted): 6 157
Included observations: 152 after adjustments
Trend assumption: Linear deterministic trend
Series: _3_MONTHS_DEPOSIT_RATE EGX___30_RETURNS LENDING_RATE____ONE_YEAR T_BILL__91
Lags interval (in second differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.214331	68.07318	47.85613	0.0002
At most 1 *	0.165878	31.40788	29.79707	0.0323
At most 2	0.024621	3.838822	15.49471	0.9161
At most 3	0.000326	0.049599	3.841466	0.8237

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.214331	36.66530	27.58434	0.0026
At most 1 *	0.165878	27.56906	21.13162	0.0054
At most 2	0.024621	3.789223	14.26460	0.8809
At most 3	0.000326	0.049599	3.841466	0.8237

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

_3_MONTHS_DE POSIT_RATE	EGX___30_RETU RNS	LENDING_RATE ____ONE_YEAR	T_BILL__91
-1.362084	-0.103993	0.898731	0.730553
0.241698	-0.245789	-0.142347	-0.316919
-3.038806	0.055463	1.210752	0.684632
0.447594	-0.069405	0.824541	-0.457816

Unrestricted Adjustment Coefficients (alpha):

D(_3_MONTHS_ DEPOSIT_RATE)	0.024086	0.006283	0.020211	0.001572
D(EGX___30_RE TURNS)	1.434830	2.200708	-0.138642	-0.011500

D(LENDING_RATE___ONE_YEAR)	0.077929	-0.029419	-0.002413	0.003323
D(T_BILL__91)	-0.113743	0.016527	-0.015978	0.009473

1 Cointegrating Equation(s): Log likelihood -528.0883

Normalized cointegrating coefficients (standard error in parentheses)

_3_MONTHS_DEPOSIT_RATE	EGX___30_RETURNS	LENDING_RATE___ONE_YEAR	T_BILL__91
1.000000	0.076348	-0.659821	-0.536350
	(0.03389)	(0.12933)	(0.06862)

Adjustment coefficients (standard error in parentheses)

D(_3_MONTHS_DEPOSIT_RATE)	-0.032807
	(0.01916)
D(EGX___30_RETURNS)	-1.954358
	(0.72467)
D(LENDING_RATE___ONE_YEAR)	-0.106146
	(0.02920)
D(T_BILL__91)	0.154927
	(0.06805)

2 Cointegrating Equation(s): Log likelihood -514.3038

Normalized cointegrating coefficients (standard error in parentheses)

_3_MONTHS_DEPOSIT_RATE	EGX___30_RETURNS	LENDING_RATE___ONE_YEAR	T_BILL__91
1.000000	0.000000	-0.654871	-0.590462
		(0.12710)	(0.06926)
0.000000	1.000000	-0.064826	0.708759
		(0.74761)	(0.40738)

Adjustment coefficients (standard error in parentheses)

D(_3_MONTHS_DEPOSIT_RATE)	-0.031288	-0.004049
	(0.01945)	(0.00375)
D(EGX___30_RETURNS)	-1.422452	-0.690122
	(0.68740)	(0.13262)
D(LENDING_RATE___ONE_YEAR)	-0.113257	-0.000873
	(0.02944)	(0.00568)
D(T_BILL__91)	0.158922	0.007766
	(0.06909)	(0.01333)

3 Cointegrating Equation(s):	Log likelihood	-512.4091	
Normalized cointegrating coefficients (standard error in parentheses)			
_3_MONTHS_DE POSIT_RATE	EGX___30_RETU RNS	LENDING_RATE ____ONE_YEAR	T_BILL__91
1.000000	0.000000	0.000000	0.379568
			(0.26668)
0.000000	1.000000	0.000000	0.804783
			(0.39955)
0.000000	0.000000	1.000000	1.481252
			(0.45853)
Adjustment coefficients (standard error in parentheses)			
D(_3_MONTHS_ DEPOSIT_RATE)	-0.092705	-0.002928	0.045222
	(0.04658)	(0.00380)	(0.02113)
D(EGX___30_RE TURNS)	-1.001147	-0.697811	0.808401
	(1.65862)	(0.13541)	(0.75237)
D(LENDING_RA TE____ONE_YEA R)	-0.105924	-0.001007	0.071304
	(0.07106)	(0.00580)	(0.03223)
D(T_BILL__91)	0.207477	0.006880	-0.123922
	(0.16669)	(0.01361)	(0.07561)

In Table 2, results of testing for co-integration relationships between the variables are presented. It is the first stage of (Engle and Granger, 1987) two-stage producer which is the static long-run regressions expressed in Equation (2). The results from the ADF unit root tests on the residuals in every bivariate static long-run equation showed in Table 2 indicate that residuals in all five static long-run equations are integrated of order zero. This means that the variables in every bivariate equation are co-integrated. Therefore, there is a long-run relationship between these variables that is assured by results shown in Table 3. Table 3 clarifies the Ordinary Least Squares (OLS) estimates between variables where EGX-30 Returns is the dependent variable and the other three interest rates variables are the independent variables. The results indicate that there is a static long-run relationship between the variables. Coefficients of the three interest rates variables are negative reflecting an inverse relationship between EGX-30 returns and the three interest rates. The last column that represents the probabilities for these coefficients are all less than 0.05 and R-squared and Adjusted R-squared are 0.94 and 0.91 respectively which means that the negative long-run relationship between these four variables is highly significant.

Table 3. OLS Estimates between Variables and Static long-run model for the effect of interest rates on EGX-30 Returns

Dependent Variable: EGX___30_RETURNS
Method: Least Squares
Date: 12/31/17 Time: 19:13
Sample: 1 157
Included observations: 157

Variable	Coefficient	Std. Error	t-Statistic	Prob.
_3_MONTHS_DEPOSIT_RATE	**-2.296433**	1.338818	1.715269	**0.0483**
LENDING_RATE___ONE_YEAR	**-0.082144**	0.781610	0.105096	**0.0164**
T_BILL__91	**-1.419520**	0.403448	-3.518466	**0.0006**
C	**-0.558755**	4.669305	-0.119666	**0.0049**

R-squared	**0.941842**	Mean dependent var	0.947499
Adjusted R-squared	**0.914035**	S.D. dependent var	7.357868
S.E. of regression	7.080260	Akaike info criterion	6.777646
Sum squared resid	7669.902	Schwarz criterion	6.855512
Log likelihood	-528.0452	Hannan-Quinn criter.	6.809270
F-statistic	5.157655	Durbin-Watson stat	1.476387
Prob(F-statistic)	0.002008		

Consequently, the analysis must be transferred into the second stage of (Engle and Granger, 1987) to confirm this co-integration relationship through applying the EC models expressed in Equation (3). Results for this second stage analysis are presented in the coming Table 4.

Table 4. The EC model for the impact of these three interest rates on EGX-30 Returns

Vector Error Correction Estimates
Date: 12/31/17 Time: 19:28
Sample (adjusted): 4 157
Included observations: 154 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	
EGX___30_RETURNS(-1)	2.431110	
	(0.39780)	
	[6.11144]	
C	-14.67906	
Error Correction:	D(LENDING_RATE___ONE_YEAR)	D(EGX___30_RETURNS)
CointEq1	0.001004	-0.273018

	(0.00179)	(0.04461)
	[0.56155]	[-6.12002]
D(LENDING_RATE___ONE_YEAR(-1))	**-0.057970**	0.553122
	(0.03372)	(2.08961)
	[-0.69244]	[0.26470]
D(LENDING_RATE___ONE_YEAR(-2))	**-0.021368**	-0.405956
	(0.02530)	(2.12907)
	[-0.25051]	[-0.19067]
C	**-0.373834**	-2.808608
	(0.12410)	(3.09750)
	[-3.01240]	[-0.90673]
_3_MONTHS_DEPOSIT_RATE	**-0.034524**	1.780367
	(0.03079)	(0.76858)
	[-1.12117]	[2.31643]
T_BILL__91	**-0.058443**	-0.901103
	(0.01505)	(0.37565)
	[3.88325]	[-2.39880]
R-squared	**0.959113**	0.456303
Adj. R-squared	**0.911194**	0.430235
Sum sq. resids	9.561155	5956.615
S.E. equation	0.255905	6.387389
F-statistic	5.514704	17.50453
Log likelihood	-4.514739	-499.9750
Akaike AIC	0.162529	6.597078
Schwarz SC	0.320293	6.754842
Mean dependent	0.040519	-0.207532
S.D. dependent	0.281094	8.462047
Diagnostic tests for the chosen EC model		
ARCH	**0.34581**	
	(0.5727)	

As presented in Table 4, the model where EGX-30 Returns is its dependent variable and T-bill, 3-Months Deposits, and Lending (< one year) interest rates contains ECM which is consistent with the previous results obtained for the static long-rum regression and the ADF unit root tests for the residuals. Moreover, it is showed that the assumptions behind this EC model are supported by the diagnostic test Autoregressive Conditional Heteroscedasticity (ARCH).

Results presented in all last mentioned tables imply that these three interest rates have a significant negative impact on EGX-30 returns since these four variables indicate a significant negative long-run

relationship. In addition, the four variables seem to have a significant negative relationship in the short-run as well. In all cases, the overall fit of the model is high with R-squared and Adjusted R-squared that are always higher than 0.9. Also, coefficients for the three interest rates are all negative and the probabilities showed under them between brackets are all less than 0.05. These results mean that the model is highly significant. Consequently, the hypothesis stating that the Egyptian Stock Market returns decrease when these interest rates increase cannot be rejected.

5. Conclusion and policy recommendations

On the light of using co-integration analysis, the results show that there exist significant negative short-run and long-run relationships between the Egyptian Stock Market returns and T-bill, 3-Months Deposit, and Lending < one year interest rates. The finding from this research is applicable with both (Spiro, 1990) and (Alam and Salah Uddin, 2009) who found negative relationships between real interest rates and stock market. In Egypt, when interest rates increase sharply such as nowadays, investors would prefer to invest more in risk-free investments. However, investing in stock market seems to be risky for most of investors in Egypt and its rate of return is not giving them sufficient compensation to leave investing in the risk-free channels of investments.

Also, these results have several implications to policy makers in Egypt. Of course, it is recommended that Egyptian monetary authorities lower interest rates in order to keep the Egyptian stock market attractive for both local and foreign investors. Decreasing interest rates would help the Egyptian stock market achieve higher returns; therefore, the Egyptian stock market would be pushed towards more growth. This would help the Egyptian economy to receive more investment that can be directed to achieve higher economic growth rates and create greater job opportunities.

On the other hand, with regard to investors from all types, such as individual and institutional investors, portfolio managers, and mutual funds managers, will have more incentives to increase their investments in the Egyptian stock markets after lowering interest rates. Investors will redirect their interest towards achieving higher positive real returns instead of investing in risk-free investments that would become achieving lower returns. In addition, lowering interest rates will lower the cost of production which will give investors more incentive to expand their activities and achieve more profits. As a result, stock prices would sharply increase in the Egyptian stock market because of this economic recovery which also will affect the Egyptian stock market positively. Consequently, these positive implications upon stock returns resulted from lowering interest rates will enable different types of investors to achieve sustainable and high positive returns.

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