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THE DYNAMIC RELATIONSHIP BETWEEN STOCK PRICES AND EXCHANGE RATE – AN EGYPTIAN EXPERIENCE

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Abstract

The economy of a nation is driven by a robust securities market. The growth of a nation is indubitably based on the strength and stability of its secondary market systems and intermediaries. The mobilization of funds and its flow into diverse sectors of the economy in a regulated manner signifies dynamism and progress. The Egyptian economy has been in a trajectory of progress right since the establishment of its secondary market and its stock index EGX 30 in 2009. The Egyptian pound (EGP) has been focus of Egyptian monetary policy due to undue stress on the pound during the recent years. The Central Bank of Egypt (CBE) has been in the forefront of all monetary measures to stabilise the pound.

The growth and development of a nation is charted by the changing economic and business environment. Any change in the foreign exchange market is sure to leave its footprint in the secondary market. All researchers in the field of foreign exchange management have been intrigued by the relationship between secondary market and forex market. Many an investigation has been undertaken to find if there is a significant relation between stock prices and exchange rates. The recent transition in Egyptian economy to a floating rate mechanism and efforts to stabilize the pound have attracted researchers to find out the effects of such a monetary change. The relationship between securities market and forex market has to be given a serious thought before any decision pertaining to forex market policy and regulation. This study analyses the dynamic relationship between stock market and exchange rate in Egypt using Engle-Granger cointegration methodology and Granger causality test.

Keywords: Changes in Egyptian Economy; Exchange Rate; Stock Prices; Econometrics; Cointegration; Granger Causality.

1. Introduction

Egyptian economy stands tall in the African Continent. However exchange rate instability in the previous year has been is a matter of economic concern for all policy makers and citizens. The economy has witnessed dynamic changes in economic policies and processes. There were sudden strategic decisions by the government that took the Egyptians through a vortex of change.

The role of Capital Market in the development of a nation cannot undermined. Exchange rate movements have a significant role in determining the direction of growth of any country. These two important economic variables have been at the forefront of economic observation by researchers in all countries. This dynamic relationship has been utilised by policy makers, due to their predictive efficacy.

The recent exchange rate crisis in a few nations, have reiterated that the relationship between stock prices and exchange rates is a matter of contention even today. Empirical investigation into their relationship might lead to meaningful findings. This paper seeks to study the dynamic relationship between stock prices and exchange rate in Egypt. The context of the study is the instability of the Egyptian pound (EGP) in the recent years. The Egyptian Stock Index (EGX) has also experienced periods of volatility. Firstly unit root tests were employed to test stationarity of the given series. Secondly Cointegration was tested using and Engle – Granger's (1987) two – step methodology. A long-run relationship between stock market and forex market in Egypt was observed in this study. A unidirectional causality from forex market to stock market was also witnessed.

2. Literature Review

Academic research has been intrigued by the relation between exchange rates and stock prices. This interest spiked ever since nations have moved towards flexible exchange rate system. The researches have evolved around two theoretical models: flow-oriented and stock-oriented. The flow oriented models, reiterate that the stock prices and exchange rates are positively related since, exchange rate is determined by a country's current account and trade balance (Dornbusch and Fisher, 1980). While the stock-oriented models, hold that the stock prices push up interest rates and subsequently have a downward pressure on exchange rate since, capital account determines exchange rates (Branson, 1983, Gavin, 1989).

Few researches have indicated a relation between exchange rates and stock prices. Bahmani – Oskooe & Sohrabian (1992) found a bi-directional causality, even though there was no long-run relation using Granger concept of causality, Akaike's final prediction error conjecture and Chow test. Granger and others (2000) applied unit root and cointegration models to determine the appropriate Granger causality relation between stock prices and exchange rates during Asian crisis. The authors found positive correlations between exchange rates and stock prices from the data of Japan and Thailand. Whereas the data of Taiwan indicated negative correlation. Ramasamy and Yeung (2005) considered the causality between stock markets and exchange rates in nine east Asian economies and found that the direction of causality demonstrated a hit-and-run behaviour and switched according to the length of the period. Alagidede and others (2010) conducted three variations of Granger causality test and found out causality from exchange rates to stock prices for Canada, Switzerland and UK. A weak causality in the other direction was found only for Switzerland. Causality was observed from stock prices to exchange rates in Japan. Nieh and Lee (2001) found lack of long-run relationship between the stock prices and exchange rates.

There is not much empirical observation of the changing dynamics of the financial markets in Egypt. Thus this study explores the dynamic relationship between stock prices and exchange rate in Egypt.

3. Data and Methods

Stock prices data comprise of daily index rates of EGX 30 and Exchange rate data comprises of daily exchange rates of USD/EGP. The data have been collected from www.in.investing.com. The period of data ranges from January 2009 to December 2017. The year 2009 was chosen since it marks the commencement of EGX 30.

3.1. Unit Root Test

The unit root test of Dickey and Fuller (1981) has been employed. It is used to ensure that the data of a time series variable is non-stationary using an auto-regressive model. This test has been deployed to ensure that data is stationary and ensuring that all variables are I (1) as variables that are I (0) indicate an automatic long-run equilibrium correlation.

The Augmented Dickey Fuller (ADF) unit root test consists of estimating the following regression:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} Y_{t-1} + \varepsilon_t$$

The null of non-stationarity hypothesis is stated thus:

H_0: A unit root 'or' non-stationarity 'or' $\delta = 0$

H_a: No unit root 'or' stationarity 'or' $\delta < 0$, since $\delta = \varphi - 1$

The unit root tests were carried out on the stock index (LnEGX) and exchange rate (LnEGP). Then the series were tested for unit roots at the differenced series. First difference of level series were obtained using the following equation: $x = x - x\ (1)$

3.2. Engle – Granger Two-step Cointegration Test

Engle-Granger cointegration technique (1987) has been used to estimate the long-run equilibrium between stock prices and exchange rate.

The cointegration between LnEGX (Stock Price) as dependent variable with LnEGP (exchange rate) for Eygpt was done after ADF unit root tests of the two series.

The cointegrating regression is given as:

$$Y_t = \beta_1 + \beta_2 Z_t + u_t$$

$$LnEGX_t = \beta_1 + \beta_2\ LnEGP_t + u_t$$

Following this the residuals, u_t, were saved from the cointegrating equation and tested using ADF to see if they were I(0) under the following hypotheses:

H_0: A unit root in the cointegrating regression residuals, $\hat{u}_t \sim I(0)$

H_a: No unit root in the cointegrating regression residuals, $\hat{u}_t \sim I(0)$

If the residuals of cointegrating regression were I(0), it would indicate stationarity and the null would be rejected. Thus we could conclude that there is a cointegration in the regression, where the residuals of both LnEGX and LnEGP are stationary.

The next step involved the estimation of the Error Correction Model (ECM), the short-term model using the residuals, $\hat{u}_t$.

$$\hat{u}_t = LnEGX_t - \beta_1 - \beta_2\ LnEGP - \beta_3 t$$

$$\Delta LnEGX_t = \alpha_0 + \alpha_1\ \Delta LnEGP_t + \alpha_2 u_{t-1} + \varepsilon_t$$

3.3 Granger Causality

Granger Causality test was conducted to see if there is any predictive causality between the two variables LnEGX and LnEGP. The test involved estimating the following pair of regressions:

$$LnEGX_t = \sum_{i=1}^{m} \alpha_i \, LnEGP_{t-1} + \sum_{i=1}^{m} \beta_i \, LnEGX_{t-1} + u_{1t}$$

$$LnEGP_t = \sum_{i=1}^{m} \lambda_I \, LnEGP_{t-1} + \sum_{i=1}^{m} \delta_i \, LnEGX_{t-1} + u_{2t}$$

The null hypotheses of Granger causality:

H_{01}: LnEGX does not (Granger) cause LnEGP
H_{a1}: LnEGX does (Granger) cause LnEGP
H_{02}: LnEGP does not (Granger) cause LnEGX
H_{a2}: LnEGP does (Granger) cause LnEGX

3. Results

The Engle-Granger cointegration methodology stipulates that to examine the long run relationship between two variables, they both have to be integrated of the same order. Hence we need to find out if the variables in the study – LnEGX and LnEGP are integrated of the same order. An Augmented Dickey Fuller (ADF) test was employed to test for unit root in two time series of LnEGP and LnEGX. It was found that the level series, i.e. LnEGX I(0) and LnEGP I(0) are non-stationary. Next the ADF test was run on the two series after differencing them. It was found that the two series – LnEGX and LnEGP are integrated of the order 1, i.e. LnEGX I(1) and LnEGP I(1). Therefore, the basic condition for cointegration is satisfied. The results are presented in Table 1.

Table 1. Test for Unit Root using Augmented Dickey Fuller Test

Series	t statistic	p-value	Stationary/ Non-stationary
LnEGX	-0.9721	0.7611	Non-stationary
ΔLnEGX	-10.2314	<0.0001**	Stationary
LnEGP	-0.2343	0.9736	Non-stationary
ΔLnEGP	-10.6241	<0.0001**	Stationary

** Significant at 1% level

As seen from the above results, the ADF test revealed that both LnEGX and LnEGP were non-stationary since the p-value was not significant at 1% level. The null hypothesis was accepted.
After differencing the two series LnEGX and LnEGP, it was observed through the ADF test that the integrated series I(1) were stationary, since p-value was significant at 1% level and the null hypothesis was rejected.
The criteria for a cointegrating relationship as laid down by Engle and Granger has been fulfilled. Next it was examined whether there was a cointegrating relation between LnEGX and LnEGP.

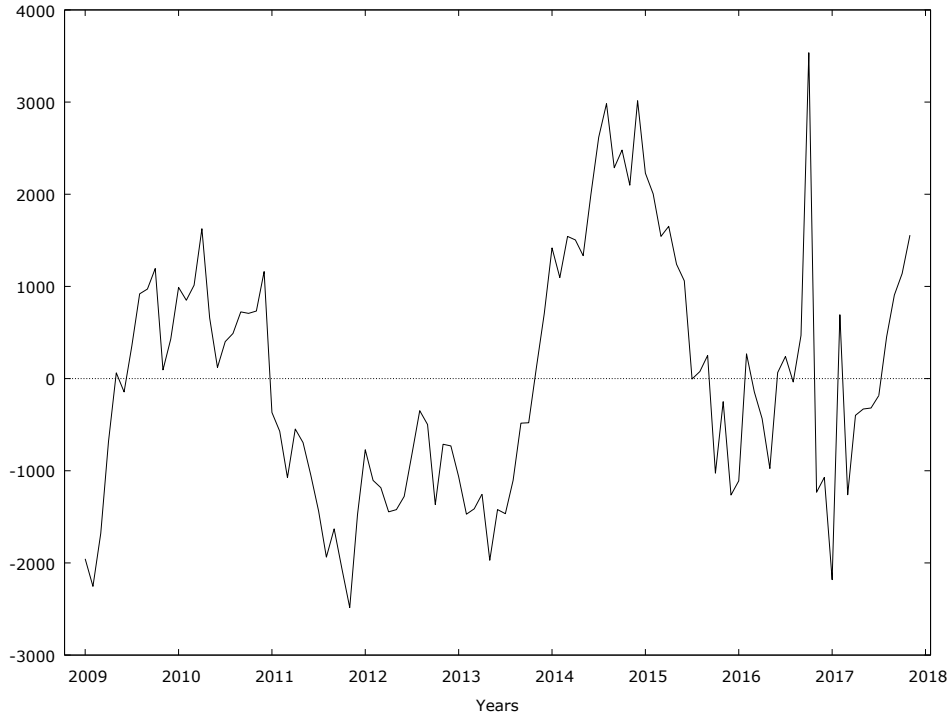
The estimates of the long run relationship - (cointegrating regression):

$$LnEGX = 7.2819 + 0.7798 \, LnEGP + u_t$$

t = 66.78 14.57
p-value = <0.0001 <0.0001

Where, u_t indicates residuals from the long run cointegrating regression depicted in Fig.1.

Fig. 1. Residual Plot of the Cointegrating Regression



In order to find out if the variables LnEGX and LnEGP have long run relationship, the residuals obtained from the above relationship were tested for stationarity using ADF test shown in Table 2.

Table 2. Testing for Stationarity of Residuals using Augmented Dickey Fuller Test

Series	t statistic	p-value	Stationary/ Non-stationary
u_t	-3.2011	0.0226*	Stationary

* Significant at 5% level

It was observed through the ADF test that the residuals were stationary, since p-value was significant at 5% level. Therefore, the null hypothesis was rejected. It could be concluded that the time series LnEGX and LnEGP have a cointegrating relationship indicating a long-term equilibrium.

It has been observed that LnEGX and LnEGP are cointegrated. There is a long-term relationship or equilibrium between Egyptian stock prices and Egyptian pound exchange rate. It implies that there may be disequilibrium in the short run. The error term in the above equation may be considered as "equilibrium error." This error term can be used to tie the short-term behaviour of LnEGX with its long-term value. The Error Correction Mechanism (ECM) was first used by Sargan and later popularised by Engle and Granger. The Granger Representation Theorem states that if two variables Y and X are cointegrated then the relationship between the two can be expressed as ECM (Gujarati & Porter, 2009).

The ECM equation for the study is given below:

$$\Delta LnEGX = 0.012 + 0.0643\ \Delta LnEGP - 0.1067\ u_{t-1}$$

t	=	1.381	0.5285	- 2.359
p-value	=	0.1702	0.5983	0.0202

The test for causality was done using Granger causality test. The null hypothesis tested was that stock prices do not (Granger) cause exchange rate and vice-versa. The results are shown in Table 3.

Table 3. Causality between EGX and EGP

Direction of causality	F value	p-value	Decsion
LnEGX → LnEGP	2.6568	0.0751	Accepted
LnEGP → LnEGX	9.9193	0.0001	Rejected

From the above it is evident that LnEGX (stock prices) does not (Granger) cause LnEGP (exchange rate). However it is proved that LnEGP (exchange rate) does (Granger) cause LnEGX (stock prices) in the context of Egypt.

4. Conclusion

A change in one macroeconomic variable is bound to impact the other variables as well. Any change in the foreign exchange market is sure to affect the secondary market. An analysis was undertaken to find out the dynamic relationship between stock prices and exchange rates with reference to Egypt. Utilising the data of Egyptian Stock Index (EGX) and the Exchange rate of the EGP/USD, from January 2009 to December 2017, it was observed that there was a long-term equilibrium between stock prices and exchange rate in Egypt, since the conditions of cointegration were fulfilled. The short-term equilibrium between the two variables was however not significant. There was unidirectional Granger causality. It was found that exchange rate (LnEGP) has a causal effect on the stock prices (LnEGX) in Egyptian economy.

The policy implication is that the government of a country should seriously consider the impact that the foreign exchange market has on the secondary market before any decision to alter fundamentals in the foreign exchange market. Any adjustment of the exchange rate has an altercating effect on the entire economy. The resultant effect of a systemic change in exchange rate on the macroeconomic indicators has to be assessed prior to any decision by the economic think-tank of a nation.

References

Alagidede P., Panagiotidis, T. & Zhang, X. (2010). Causal relationship between stock prices and exchange rates. *Stirling Economic Discussion Paper*, 2010-05. Retrieved from https://www.stir.ac.uk/research/hub/publication/233.

Bahmani-Oskooe, M. & Sohrabian, A. (1992). Stock prices and the effective exchange rate of the dollar. *Applied Economics*, 24(4), 459-465.

Branson, W.H. (1983) Macroeconomic determinants of real exchange rate risk. In Herring, R.J. (Ed.), *Managing Foreign Exchange Rate Risk*. Cambridge: Cambridge University Press.

Dickey, D.A. & Fuller, W.A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica*, 49(4), 1057-1073.

Dornbusch, R. & Fisher, S. (1980). Exchange rates and the current account. *American Economic Review*, 70, 960-97. Retrieved from http://www.mit.edu/~14.54/handouts/dornbusch80.pdf

Engle, R. & Granger, C. (1987). Co-integration and error correction representation, estimation and testing. *Econometrica*, 55, 251-267. Retrieved from Stable URL: http://www.jstor.org/stable/1913236.

Gavin, M. (1989). The stock market and exchange rate dynamics. *Journal of International Money and Finance*, 8, 181-200. Retrieved from https://www.sciencedirect.com/science/article/pii/0261560689900223.

Granger, C. W. J., Huang, B-N., & Yang, C.W. (2000). A bivariate causality between stock prices and exchange rates: Evidence from recent Asian flu. *The Quarterly Review of Economics and Finance* 40 (3), 337-354. Retrieved from https://www.sciencedirect.com/science/article/pii/S1062976900000429.

Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (5th ed.). Boston: McGraw-Hill.

Nieh, C-C. & Lee, C-F. (2001). Dynamic relationship between stock prices and exchange rates for G-7 countries. *The Quarterly Review of Economics and Finance* 41, 477–490.

Ramasamy, B. & Yeung, M.C.H. (2005). The causality between stock returns and exchange rates: revisited. *Australian Economic Papers*, 44, 162-169. doi:10.1111/j.1467-8454.2005.00257.x.