The Impact of Exchange Rate on Stock Market: The Case of Egypt

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ABSTRACT

This thesis has investigated the impact of exchange rate on stock market for the case of Egypt over the 1976-2020 period. Economic growth, inflation and interest rate have been added to the model as control variables, to reduce the potential for omitted-variable bias. All the data have been sourced from the World Development Indicators of the World Bank. Both the Augmented Dickey-Fuller and Phillips-Perron unit root tests showed that all the variables are integrated of order one. Johansen cointegration test revealed a long-run equilibrium relationship between the variables. The vector error-correction model estimated the long-run coefficients of the variables which indicate that currency exchange rate has a statistically-significant positive impact on stock market in Egypt. The impact of economic growth on stock market was found to be negative, while interest rate and inflation have no statistically-significant impacts on stock market. The annual speed of adjustment of stock market towards its long-run equilibrium value, following a short-run shock, was found to be 68.6%. Granger causality tests revealed that none of the variables Granger-causes another in both the long run and short run.

Keywords: Exchange rate; Stock market; Johansen cointegration; VECM; Granger causality; Egypt

ÖZ

Bu tez, 1976-2020 dönemi için Mısır örneğinde döviz kurunun borsa üzerindeki etkisini araştırmıştır. İhmal edilen değişken yanlılığı potansiyelini azaltmak için modele kontrol değişkenleri olarak ekonomik büyüme, enflasyon ve faiz oranı eklenmiştir. Tüm veriler Dünya Bankası'nın Dünya Kalkınma Göstergelerinden alınmıştır. Hem Augmented Dickey-Fuller hem de Phillips-Perron birim kök testleri, tüm değişkenlerin birinci dereceden entegre olduğunu gösterdi. Johansen eşbütünleşme testi, değişkenler arasında uzun dönemli bir denge ilişkisi olduğunu ortaya koymuştur. Vektör hata düzeltme modeli, döviz kurunun Mısır borsası üzerinde istatistiksel olarak anlamlı bir pozitif etkiye sahip olduğunu gösteren değişkenlerin uzun vadeli katsayılarını tahmin etmiştir. Ekonomik büyümenin hisse senedi piyasası üzerindeki etkisinin negatif olduğu, faiz oranı ve enflasyonun ise hisse senedi piyasası üzerinde istatistiksel olarak anlamlı bir etkisinin olmadığı tespit edilmiştir. Hisse senedi piyasasının kısa dönem şok sonrası uzun dönem denge değerine doğru yıllık uyum hızı %68,6 olarak bulunmuştur. Granger nedensellik testleri, Granger değişkenlerinden hiçbirinin hem uzun dönemde hem de kısa dönemde bir başkasına neden olmadığını ortaya koydu.

Anahtar Kelimeler: Döviz kuru; Borsa; Johansen eşbütünleşme; VECM; Granger nedenselliği; Mısır.

DEDICATION

I dedicate this thesis to the people who have supported me throughout my education.

Thanks for making me see this adventure through to the end.

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller Unit Root Test
AIC	Akaike Information Criterion
AR	Autoregressive
CPI	Consume Price Index
ECT	Error Correction Term
ER	Exchange Rate
GDP	Gross Domestic Product
HQ	Hannan-Quinn Information Criterion
IR	Interest Rate
JB	Jarque-Bera
OLS	Ordinary Least Squares
PP	Phillips-Perron Unit Root Test
SC	Schwarz Information Criterion
SP	Stock Price
SD	Standard Deviation
VAR	Vector Autoregression
VEC	Vector Error Correction
VECM	Vector Error Correction Model

Chapter 1

INTRODUCTION

1.1 Background

Publicly-traded companies are listed on stock exchanges. The stocks of these publicly-traded companies are given prices which reflect the current value of the stocks to market participants – buyers and sellers. The stock prices can also be used to ascertain the overall value of the company via its market capitalization. The stock prices are determined by the buy-sell interactions in the market. Thus, stock prices are related to financial market (stock market) development.

Exchange rates are an important macroeconomic determinant of stock prices and, hence, stock market development. According to Obadan (2006), an exchange rate shows how much units of local (domestic) currency is needed to exchange for one unit of foreign currency. Intuitively, one will expect a high exchange rate to positively impact stock market development of domestic country. This is because the domestic currency is relatively weaker, thereby making the domestic country cheaper for foreign investors. Foreign investors will, hence, be attracted.

1.2 Problem Statement

The stock prices of corporations in a country can also be affected by exchange rate fluctuations. For instance, depreciation or devaluation of a country's currency will likely increase the stock prices. This is due to the appeal of the home nation to foreign investors; and this increased foreign demand will push the prices up. It is therefore

incumbent on researchers to extensively conduct research on the exchange-rate-stock-price nexus. If this critical issue is not addressed, then corporations will remain ignorant of the potential impact of currency exchange rate on the market prices of their stocks.

1.3 Research Aim

The Egyptian Central Bank can influence the EGP / USD currency exchange rate and prevent full adjustment of the exchange rate by making regular FX market interventions such as changing interest rates and / or buying and selling the EGP (the Egyptian Pound). This thesis aims to examine if such actions have any significant effect on the stock prices in Egypt.

Using a time series approach, this thesis will provide empirical evidence of the impact of the EGP / USD currency exchange rate on stock prices for the case of Egypt over the 1976-2020 period. The inductive approach of this research will be based on achieving this overarching research aim.

1.4 Significance of the Thesis

The relevance of this thesis cannot be over-emphasized. Firstly, this thesis will significantly add to the existing body of research both on the determinants of stock prices and the role of currency exchange rates. The research will inform the Egyptian government and corporations in Egypt of the potential impact of the EGP / USD currency exchange rate on stock prices in the country.

Secondly, depending on how the EGP / USD currency exchange rate affects Egypt's stock prices, the Egyptian government will be informed of what exchange rate regime (s) it can potentially consider in the future. Also, it will help the Egyptian government and Central Bank with respect to adopting appropriate fiscal and monetary policies.

For instance, if the impact of the EGP / USD currency exchange rate on Egypt's stock prices will be found to be positive, then the policy recommendation will be for the Egyptian government and Central Bank to devalue the Egyptian Pound (EGP) either by reducing interest rates in Egypt (expansionary monetary policy), selling EGP in the market in exchange for U.S. Dollar (USD), and / or increasing government spending and reducing taxation (expansionary fiscal policy) – so as to increase investment, income (according to Keynesian theory) and imports (thereby increasing the demand for foreign currency and causing the EGP to weaken).

Furthermore, this thesis will encourage and aid future related researches, as researchers, scholars and academicians will be able to draw from it.

Considering the rationale of the thesis, this research is worth conducting. The research is of academic and practical interest, and these have inspired me to carry on with the thesis.

1.5 Research Approach and Methodology

Both the inductive and deductive research approaches will be applied in the thesis, and the quantitative research method will be used to analyze the data that will be collected. With respect to the inductive research approach, the thesis will focus on achieving the overarching research aim. On the evidence of the existing literature and intuition, a priori expectations (research hypotheses) will be set. These a priori expectations (research hypotheses) will be tested against the actual empirical findings, and this will form the basis for the deductive approach of this thesis.

1.6 Thesis Outline

The next section of this thesis includes the review of the literature, followed by a description of the data and methodology in the third chapter, presentation and

analyses of results in chapter four, and then chapter five concludes the thesis and provides recommendations.

Chapter 2

LITERATURE REVIEW

Aliyu (2009) studied how stock prices interact with exchange rate in Nigeria over the 2001-2008 period. Cointegration tests revealed a negative connection. Saibu (2012) explored how exchange rate is linked to financial market development for the case of Nigeria over the 1970-2009 period. Quarterly data was relied upon in the study, and the VECM was applied. As per the results, it was shown empirically that exchange rate negatively impacts financial market development in Nigeria, while causality analysis revealed bi-directional causality.

Jawaid and Haq (2012) studied the exchange rate-stock price nexus for the case of Pakistan. Cointegration and causality methodologies were employed in the study. A statistically-significant positive connection was revealed. Causality analysis revealed bi-directional causality. The results were proven to be robust by sensitivity analysis.

Gadanecz and Mehrotra (2013) explored the links between exchange rates and financial markets in a sample of emerging countries. No statistically significant relationship was found.

Ayub and Masih (2013) examined the exchange rate-stock price nexus in the Islamic banking sector. The study relied on monthly data from 2008 to 2013 for 40 Islamic banks. Generalized Method of moments (GMM) and Granger causality

methodologies were employed in the study. A negative connection was revealed, in addition to bi-directional Granger causality.

Umoru and Asekome (2013) explored the connection between the exchange rate and stock prices in Nigeria. They found a long-run positive connection, and also bi-directional causality.

Maheen (2013) relied on cointegration techniques to explore the exchange rate-market return nexus for the case of Pakistan. Results showed that exchange rate and stock market return in Pakistan have equilibrium relationship in the long run.

Akdoğu and Birkan (2016) looked at how exchange rates influence stock prices in 21 developing nations from January 2003 to June 2013. Causality analysis was employed in the study, and causality was found in most of the countries.

Using the Pakistan Stock Exchange as a case study, Bagh et al. (2017) looked at how exchange rate volatility impacts the stock index performance, by relying on monthly data for 12 years (2003-2015). They found a positive linkage.

Anjum, Ghumro and Husain (2017) investigated how exchange rates affect share prices in Germany. The study relied on 1993-2017 data. Both standard ARDL and NARDL models were applied in the study, and empirical findings revealed an asymmetric effect.

Bhuvaneshwari and Ramya (2017) studied the exchange rate-stock price nexus for the case of India over the 2006-2015 period. Unit root, cointegration, and causality tests were relied upon in the study. No cointegration was reported.

For the case of Nigeria, Adebowale and Akosile (2018) examined the connection between exchange rate and stock market development over the 1981-2017 period. Relying on OLS, the revealed relationship was a positive one.

Effiong and Bassey (2018) explored the exchange rate-stock price connection in Nigeria. Monthly data from January 2000 to December 2016 was relied upon in the study. Relying on the NARDL model, they showed asymmetric impacts – stock prices react differently depending on whether the currency appreciates or depreciates.

Arora and Akhtar (2018) explored how the Indian Rupee / U.S. Dollar exchange rate relates to stock prices in India over the 2007-2017 period. A time series approach was applied in the study. No cointegration, but unidirectional causality (from stock prices to exchange rate), was found.

Aimer (2019) explored the exchange rate-stock price nexus in MENA countries from January 2004 to April 2018. The GARCH model, time-series methodologies, and causality tests were relied upon in the study. Empirical results showed unidirectional exchange-rate-to-stock-price causality.

Relying on 67,166 panel data observations, Chi-Ming (2020) studied how the exchange rate of cryptocurrency influences stock prices in China and Taiwan. It was posited that the impact in China is stronger than that in Taiwan.

Nordin, Nordin and Ismail (2020) investigated the exchange rate-stock price nexus for the case of Malaysia. Using the ARDL model, long-run equilibrium relationship was revealed. Exchange rate was revealed to have a statistically-significant positive effect.

Sheikh et al. (2020) investigated how fluctuations in the economy affect market indices from January 2004 to December 2018. Unit-root and stationarity tests, as well as NARDL model were employed. Empirical results showed asymmetric effects.

Dang et al. (2020) examined the exchange rate-stock price connection in Vietnam over the 2001-2018 period. The NARDL model revealed asymmetric effects.

Okere, Muoneke and Onuoha (2021) studied the exchange rate-stock price linkage in Nigeria over the 1995-2019 period. Both standard ARDL and NARDL were relied upon. Both models showed insignificant impacts.

Chapter 3

DATA AND METHODOLOGY

This chapter includes the definitions of the data, data description, the specification of the empirical model, and a detailed discussion of the econometric methodology applied in the thesis.

3.1 Definition of Data

Technically speaking, a stock's price is distinct from the stock's value. However, but for daily changes in the stock price as a result of a rising or falling market, both the values and the prices of stocks are often close to each other. Thus, annual data for the stocks traded, total value (% of GDP) will be obtained from the World Bank database (The World Bank, 2022). Data for the annual average EGP / USD currency exchange rate will be retrieved from the World Bank (2022) database.

In order to limit the potential omitted-variable bias, other macroeconomic determinants of stock prices, as identified from the literature, will be added to the econometric model as control variables. In particular, economic growth (Mehr-un-nisa & Nishat, 2011), interest rates (Oyama, 1997; Mehr-un-nisa & Nishat, 2011; Eita, 2012; Narayan, Narayan & Singh, 2014; Rjoub, Civcir & Resatoglu, 2017; Duy, Hau & Dang, 2017; Panta, 2020; Farida, Purwantini & Nurpitasari, 2021), and inflation (Eita, 2012; Duy, Hau & Dang, 2017; Panta, 2020) will be used as additional independent variables, and the data for all the additional regressors will be retrieved from the World Bank (2022) database.

Table 1: Definition of Data

Variable	Measure	Database	Definition
Economic Growth	GDP per capita (constant 2015 US$)	World Development Indicators	This is the overall value of all the finished products, divided by the mid-year population.
Exchange Rate	Official Exchange Rate (LCU per US$, period average)	World Development Indicators	This is the annual average Egyptian Pound / U.S. Dollar currency exchange rate
Stock Price	Stocks Traded, total value (% of GDP)	World Development Indicators	This is the product of total stocks and respective prices.
Inflation	Inflation, Consumer Prices (annual %)	World Development Indicators	This is the yearly change in the cost of products
Interest Rate	Real Interest Rate (%)	World Development Indicators	This is the rate at which the bank lends out money, adjusted to account for the effect of inflation.

Annual data for the case of Egypt from 1976 to 2020 has been used in this thesis. Data proxies and definitions are shown in Table 1.

3.2 Descriptive Statistics

Table 2: Data Characteristics

Variable	N	Average	S.D.	Min.	Max.	JB
lnSP	45	22.18	11.76	3.03	58.86	4.26
lnER	45	4.67	4.59	0.39	17.78	29.36*
lnGDP	45	2530.04	827.09	1171.77	4028.42	2.81
lnIR	45	2.95	5.30	-9.31	17.58	0.59
lnCPI	45	11.74	6.11	2.27	29.51	2.62

Table 2 shows the main characteristics of the data. In logarithmic form, the GDP data has the highest average value, while the IR data has the lowest mean value. Also, the GDP data has the largest standard deviation, which means its data are further away from the mean value. While the ER data have the least variability, since they have the smallest standard deviation. It also means that its data are nearest to mean value.

In terms of the distribution of the data by testing our Jarque-Bera; with the exception of the ER data, the data of all the other variables are normally distributed. For our ER data, the probability value of the Jarque-Bera test statistics is less than 1%. So, we ended up rejecting the null hypothesis of normality and accepting the alternative hypothesis of no normality.

A time span of 45 years is appropriate for establishing long-run relationships, as the number of observations is quite sufficient.

3.3 Model Specification

In order to examine the impact of currency exchange rate on stock prices for the case of Egypt, the following model is specified, where stock price is expressed as a linear function of currency exchange rate and the control variables:

$lnSP_t = f\ (lnER_t, lnGDP_t, lnIR_t, lnCPI_t)$

from the above linear function, the specified econometric model for this thesis is:

$lnSP_t = ß_0 + ß_1(lnER_t) + ß_2(lnGDP_t) + ß_3(lnIR_t) + ß_4(lnCPI_t) + u_t$

where SP, ER, GDP, IR, and CPI stand for Stocks Traded, total value (% of GDP), Official Exchange Rate (LCU per US$, period average), GDP per capita (constant 2015 US$), Real Interest Rate (%), and Inflation, Consumer Prices (annual %), respectively. SP is the regressand; ER is the regressor of interest; and GDP, IR, and CPI are control independent variables. The variables are all log-transformed. $ß_0$ is the

intercept (constant term); ß$_1$, ß$_2$ … ß$_5$ are the partial coefficients of the independent variables; and u_t is the stochastic residual term. The model is linear both in the variables and in the parameters.

3.4 Methodology

Here, the methodology applied in this thesis is detailly discussed. A time-series approach is applied in the study, to empirically investigate how currency exchange rate affects stock prices in Egypt. Initially, unit root tests are run to check whether or not the variables have a unit root. Since all the variables each had a single unit root, the Johansen's procedure was applied. Thereafter, the vector error correction model was estimated. Finally, the Granger causality test was used to check if lagged values of any variable affects current values of other variable (s).

3.4.1 Unit Root Tests

The conventional unit root tests – the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) unit root tests – have been run to check whether or not the variables have unit root (s). This is always essential, in order to avoid spurious results and the persistence of shocks in the system.

All three models – the general model with trend and drift, the most restricted model with neither trend nor intercept, and the intercept-only model – have been used.

3.4.2 Johansen's Procedure

All the variables have been found to each have a single unit root. Hence, the Johansen's three-step procedure has been applied.

The preliminary step involves estimating a VAR model for optimal lag length determination. It is also essential for the VAR model to meet the condition for stability, otherwise its suggestions for optimal lag length cannot be relied upon.

The Johansen test for cointegration is the next step. It determines the existence (or otherwise) of a long-run equilibrium relationship. This is essential because if cointegration cannot be found, then a long-run relationship cannot be established.

Next, the VECM is estimated to correct for any previous-period deviation of the dependent variable away from its long-run equilibrium value. The VECM also provides the coefficients of the regressors.

3.4.3 Granger Causality

Finally, the Granger causality test has been used to check whether or not lagged value (s) of any of the variables has an explanatory power on the current realization of any other variable (s).

3.4.4 Short-Run Dynamics

In order to appreciate the impacts of shocks to the system, the short-run dynamics are also examined. In particular, the variance decomposition and the impulse response function (IRF) are examined. The variance decompositions of the variables show the contributions of shocks to each of the variables (including a particular variable's own shocks) to changes in the variances of each variable, while the IRF shows the responses (in time) of each of the variables to shocks to the system.

Chapter 4

RESULTS, ANALYSES, AND DISCUSSION

Here, the results are presented, critically analyzed, evaluated, and discussed. To begin with, a priori expectations are set based on observations from the graphs of the variables. The compatibility of these a priori expectations with the actual empirical findings is then tested.

4.1 A Priori Expectations from Graphs

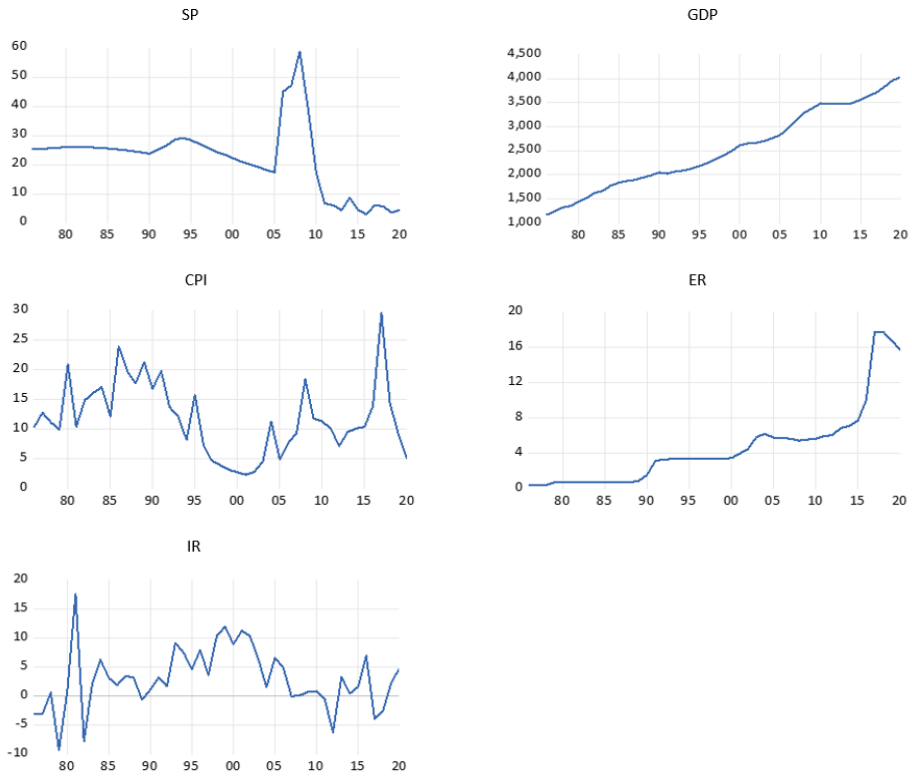

Figure 1: Line Graphs of lnSP, lnER, lnGDP, lnIR, and lnCPI.

Looking at the graphs in figure 1, lnSP variable has an average downward trend, with a sharp jump (outlier) around 2007, 2008, 2009, probably because of the 2007-2009 global economic / financial shock.

The lnGDP graph has an average upward trend. As the lnGDP graph goes up on average, the lnSP graph goes down on average. Hence, a negative long-run relationship is expected between lnGDP and lnSP.

The lnER graph has an average upward trend. As the lnER graph goes up on average, the lnSP graph goes down on average. Hence, a negative long-run relationship is expected between lnER and lnSP.

For the lnCPI and lnIR graphs, there are lots of fluctuations. So, it is difficult to spot the average behavior. The a priori expectations are summarized in table 3.

Table 3: A Priori Expectations

Variable	Expected Impact on lnSP
lnER	Negative (-)
lnGDP	Negative (-)
lnIR	N/A
lnCPI	N/A

NOTE: N/A means no average behavior could be spotted from the graphs, due to lots of fluctuations.

These a priori expectations will be tested by comparing them with the actual empirical findings. Economic growth (GDP) is expected to have a negative impact on the stock market. This is through the channels of inflation and interest rates. That is, very-high economic growth (GDP) will result to very-high inflation; and the governments and central banks will try to control the rising inflation by increasing interest rates in order to discourage borrowings and encourage savings, thereby reducing the money supply

in the economy. However, high interest rates (restrictive monetary policy) will intend slow down the economy, thereby having an adverse impact on financial markets, including stock markets.

4.2 Actual Results

4.2.1 Unit Root Tests

Unit root test results are presented in Table 4. The tests test the unit-root null hypothesis against the no-unit-root alternative hypothesis.

Table 4: Unit Root Test Results

Level Form	lnSP	lnER	lnGDP	lnIR	LnCPI
τT (ADF)	-0.27	-2.10	-2.73	-1.81*	-1.81
τμ (ADF)	-2.18	-1.94	1.28	-0.91	0.19
τ (ADF)	-0.48	-1.94	8.91	1.02	-3.92
τT (PP)	-0.93	-2.02	-3.82	-1.25	-2.37
τμ (PP)	-1.29	-2.91**	1.47	-0.93	0.02
τ (PP)	-5.92*	-1.73	8.91	1.79	-2.01
First Difference	Δ lnSP	Δ lnER	Δ lnGDP	Δ lnIR	Δ lnCPI
τT (ADF)	-4.39***	-5.93**	-4.29**	-6.01*	-4.36**
τμ (ADF)	-3.14**	-5.36*	-4.21*	-6.44*	-4.08**
τ (ADF)	-1.93**	-5.48*	-2.94**	-6.49*	-2.46*
τT (PP)	-4.84***	-6.45*	-4.76***	-6.84**	-4.86**
τμ (PP)	-3.39**	-6.29***	-4.15**	-6.62*	-4.29*
τ (PP)	-2.39***	-6.46**	-2.53***	-6.37*	-2.94*

NOTE: τT is the model with trend and drift, τμ is the drift-only model, and τ is the most restricted none model. *, **, and *** show that the null hypothesis is rejected with 90%, 95%, and 99% confidence, respectively

From the unit root test results, we see that all the variables are generally I (1) variables, since they each have single unit roots. At their first differences, all the variables are stationary.

Since all the variables each have a single unit root, we than rely on the Johansen test for cointegration (Johansen 1991; 1995).

4.2.2 Vector Autoregressive (VAR) Model

To determine the optimal lag length, a standard VAR model is estimated. As shown in Table 5, various information criteria are relied upon for the determination of the optimal lag length.

Table 5: Optimal Lag Length Selection

Lag	AIC	SC	HQ
0	-16.49	-15.93	-16.84
1	-27.39	-29.39*	-26.48
2	-28.73*	-22.93	-26.67*
3	-28.48	-24.83	-25.28

As shown on table 5, the optimal lag length is 2. This is because lag order 2 is selected the highest number of times by most of the information criteria.

In order to be sure of the VAR's selection of the optimal lag length, the stability of the VAR model is checked. The result is shown in Table 6.

Table 6. Roots of Characteristic Polynomial

Root	Modulus
0.983670 + 0.008426i	0.896700
0.829839 - 0.172909i	0.843477
0.848839 + 0.17218309i	0.790477
0.541873	0.519173

In table 6, we see that none of the moduli is greater than 1. Hence, the VAR model satisfies the stability condition.

4.2.3 Cointegration Test

After determining the optimal lag length and making sure that the standard VAR model is stable, the Johansen test for cointegration explores the existence (or otherwise) of a long-run relationship.

In order to determine the exact number of cointegrating relationships present, the null hypotheses of no long-run relationship, not more than one cointegrating vector, not more than two cointegrating equation, not more than three cointegrating equation, and not more than four cointegrating equation are tested sequentially. The results are presented in Table 7.

Table 7: Johansen Cointegration Test

Trace Statistic					Maximum Eigenvalue				
r = 0	r < 1	r < 2	r < 3	r < 4	r = 0	r < 1	r < 2	r < 3	r < 4
139.21*	85.25	53.14	29.41	12.58	48.28*	35.21	19.24	11.13	09.18

NOTE: r = 0, r < 1, r < 2, r < 3, r < 4, and r < 5 are null hypotheses indicating no cointegrating equation, not more than one cointegrating equation, not more than two cointegrating equations, not more than three cointegrating equations, not more than four cointegrating equations and not more than five cointegrating equations, respectively. * Shows that the null hypothesis is being rejected at the 1% level of significance.

Using both the trace test statistic and the maximum eigen value, we can only reject the null hypothesis of no-cointegrating equation. We therefore accept the alternative hypothesis that there is at least one cointegrating vector present. Since the second null hypothesis of at most one cointegrating vector cannot be rejected, we therefore

conclude that just one cointegrating equation is present. Since we have at least one cointegrating vector present, we conclude that there is a long-run relationship between our variables.

4.2.4 Vector Error Correction Model

The VECM provides the coefficients of the regressors, and the speed of adjustment of the regressand towards long-run equilibrium. The results are shown in Tables 8, 9, and 10.

Table 8: Short Run Coefficients of Variables

Dependent variable	Regressors				
	D(lnSP(-1))	D(lnER(-1))	D(lnGDP(-1))	D(lnIR(-1))	D(lnCPI(-1))
D(lnSP)	0.19 [0.91]	0.38 [1.38]	0.47 [0.23]	-0.39 [1.48]	-0.53 [-1.29]

NOTE: The variables are all log-transformed. Numbers in square brackets are t-statistics of each coefficient

Table 9: Long Run Coefficients of Variables

Dependent variable	Regressors			
	lnER	lnGDP	lnIR	LnCPI
lnSP	-0.15 [3.13]	3.84 [5.14]	-3.81 [-1.32]	-1.73 [-0.14]

NOTE: The variables are all log-transformed. Numbers in square brackets are t-statistics of each coefficient.

Table 8 shows the short-run coefficients of the variables. For all the variables, the t-statistics is less than 2 in absolute value. Hence, none of the short-run coefficients is statistically significant. Therefore, none of exchange rates, economic growth, interest rates, or inflation has a statistically-significant impact on stock price in the short run. The impulse response function (IRF) and variance decomposition (VD) show the impacts of shocks to the system.

4.2.4.1. Impulse Response Function (IRF)

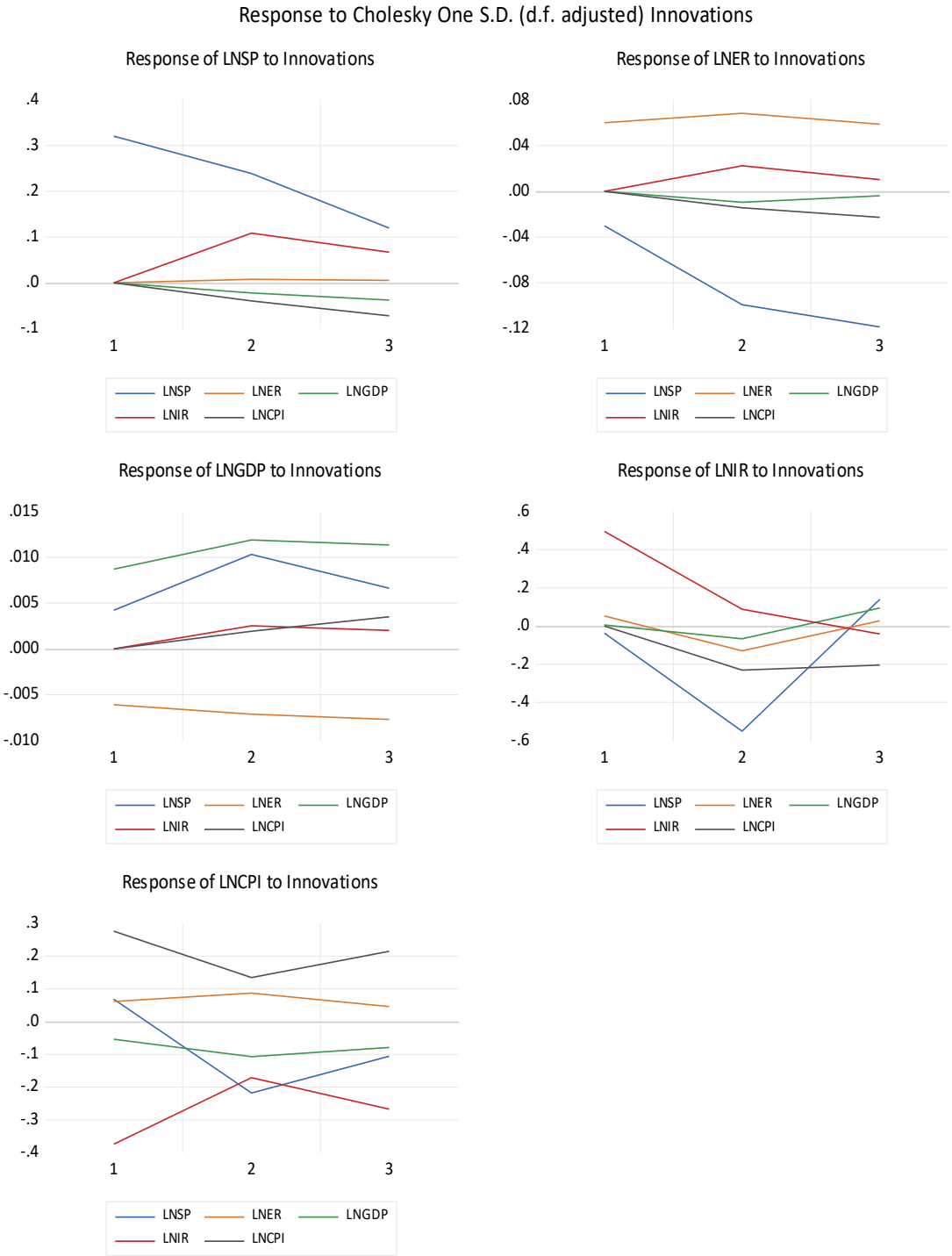

Figure 2: 3-year Impulse Response Function for lnSP, lnER, lnGDP, lnIR, and lnCPI. Source: Author's construction using the data collected from the World Bank.

The graphs in figure 2 are all self-explanatory. They show the first, second, and third responses of all the variables to shocks to the system, including their own shocks and shocks of the other variables. Focusing on the research question of this thesis (with stock price being the dependent variable), we notice that for the next three periods (years), shocks to economic growth and inflation will cause stock price to decrease and be negative, shocks to interest rate will have no impact on stock price, shocks to stock price itself will cause stock price to decrease but still remain positive, while shocks to exchange rate will cause stock price to increase sharply from period 1 to period 2, and then decrease slowly from period 2 to period 3.

4.2.4.2 Variance Decomposition (VD)

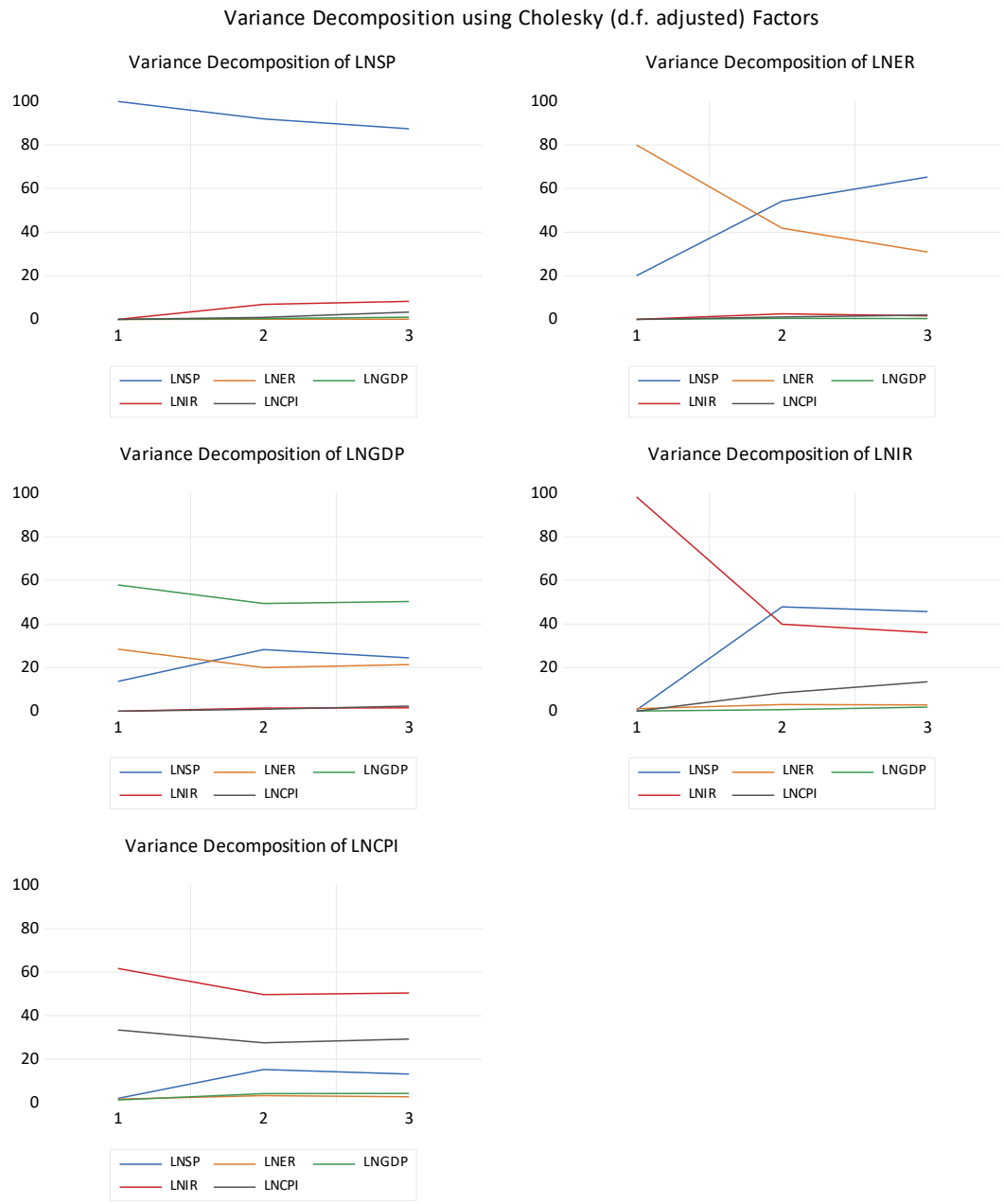

Figure 3: 3-year Variance Decompositions of lnSP, lnER, lnGDP, lnIR, and lnCPI.

Figure 3 shows the variance decompositions of each of the variables. The graphs are all self-explanatory. As can be seen from figure 3, shocks to stock price itself has the highest contribution to the variation in the stock price, while the contributions of the shocks to the other variables to the variance of stock price are very minimal.

Table 9 shows the long-run coefficients of the variables. For interest rate and inflation, they each have no statistically-significant impact on stock price in the long run. This is because their respective t-statistics are less than 2 in absolute value.

The t-statistics of currency exchange rate and economic growth are each greater than 2 in absolute value. Hence the long-run coefficients of currency exchange rate and economic growth are statistically significant. When interpreting these coefficients, we reverse the signs of the coefficients. Thus, exchange rate has a positive impact on stock price in the long run, while GDP has a negative impact on stock price in the long run. The compatibility of these actual empirical findings with the a priori expectations are shown in Table 10.

Table 10: Compatibility of a Priori Expectations with Empirical Findings

Variable	Expected Impact on Stock Market (A)	Actual Impact on Stock Market (B)	Compatibility between A and B?
lnER	Negative	Positive	No
lnGDP	Negative	Negative	Yes
lnIR	N/A	Positive but insignificant	-
lnCPI	N/A	Positive but insignificant	-

NOTE**:** N/A means no average behavior could be spotted from the graphs, due to lots of fluctuations.

All the aforementioned results are reliable because the vector error-correction model is appropriate, due to the negativity, statistical significance, and less-than unity (in absolute value) of the coefficient of the error-correction term (see Table 11).

Table 11: Vector Error Correction

Coefficient of ECT	t-statistic
-0.6863	-6.0373*

NOTE**:** ECT: Error Correction Term. * Shows that the t-statistic is statistically significant.

This coefficient of the error correction term indicates how fast the stock price in the current period adjusts back towards its long-run equilibrium level, whenever there is a shock in the previous period.

4.2.5 Granger Causality Test

Granger causality tests show whether or not lagged values of any of the variable (s) has an explanatory power on the current realization of any other variable (s). The results are shown in Table 12.

Table 12: Granger Causality Test under the VECM (Block Exogeneity Wald Tests)

	Regressand				
Regressors	D(lnSP)	D(lnER)	D(lnGDP)	D(lnIR)	D(lnCPI)
D(lnSP)	-	0.2814	1.9383	1.8924	3.7824
D(lnER)	1.8224	-	2.9634	4.8674	2.7783
D(lnGDP)	0.9184	2.8234	-	4.9873	3.8834
D(lnIR)	6.9278	5.4143	12.924	-	1.8341
D(lnCPI)	6.2932	4.6294	8.9283	7.8373	-
All	14.448	18.794	13.904	11.823	12.984

NOTE**:** "All" shows long-run causality, while "D(variable)" shows short-run causality. *, **, *** show that the null hypothesis is being rejected at the 1%, 5%, and 10% significance levels, respectively.

For the Granger causality test, the null hypothesis is that "there is no Granger causality", while the alternative hypothesis is that "there is Granger causality". Since we cannot reject the null hypothesis in any case, we conclude that neither of the variables Granger-causes each other in both the long-run and the short-run. That is, there is no causality running from any of the variables to another variable in both the long run and short run.

Chapter 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

By making the domestic country cheaper and attracting foreign investors, currency depreciation / devaluation can promote overall stock market development and boost up stock prices. Through this channel, it is logical to expect a positive connection between currency exchange rate and stock prices. To quantify this relationship, this thesis has investigated the impact of exchange rate on stock prices for the case of Egypt over the 1976-2020 period.

Stocks traded, total value (% of GDP) and annual average EGP / USD currency exchange rate were used as proxies for stock prices and currency exchange rate, respectively. In an attempt to reduce the omitted variable bias, other indicators of stock prices – economic growth, interest rates, and inflation – were added to the model as control variables.

Based on intuition, the existing literature, and the graphs, exchange rate and economic growth were each expected, a priori, to have negative impacts on stock prices. These research hypotheses were then tested by comparing them to the actual empirical results.

Unit root tests were run to determine the orders of integration of all the variables. The variables were all determined to have a single unit root each, implying the application of Johansen test for cointegration, which was the next step followed.

The estimated VAR model determined an optimal lag order of 2, Johansen cointegration test revealed the presence of a long-run equilibrium relationship, and the VECM provided the long-run coefficients.

None of exchange rates, economic growth, interest rates, or inflation was found to have a statistically-significant impact on stock price in the short run. That said, other short-run dynamics – impulse response function, variance decomposition, Granger-causality – were looked at. With respect to the impulse response function, over the next three periods, shocks to interest rate will have no impact on stock price, shocks to economic growth and inflation will cause stock price to decrease and be negative, shocks to stock price itself will cause stock price to decrease but still remain positive, while shocks to exchange rate will cause stock price to increase sharply from period 1 to period 2, and then decrease slowly from period 2 to period 3. With respect to the variance decomposition, shocks to stock price itself has the highest contribution to the variation in the stock price, while the contributions of the shocks to the other variables to the variance of stock price are very minimal. With respect to the Granger-causality, none of the variables was found to Granger-cause another in the short run.

The negativity, statistical significance, and less-than unity (in absolute value) of the coefficient of the ECT, showed the appropriateness of the VECM with respect to the establishment of long-run relationships. The annual speed of adjustment of stock price towards long-run equilibrium was found to be 68.6%.

In the long-run, both interest rate and inflation have no statistically-significant impacts on stock price. On the other hand, currency exchange rate was found to have a statistically-significant positive impact on stock price in the long-run, while economic growth was found to have a statistically-significant negative impact on stock price in the long run. In terms of the directions of the long-run relationships, none of the variables was found to Granger-cause another variable in the long-run.

5.2 Policy Implications

As per the empirical findings, exchange rate has a statistically-significant positive impact on stock price in the long-run, while economic growth has a statistically-significant negative impact on stock price in the long-run.

Based on these results, the Egyptian government should consider adopting a managed-float exchange rate regime. This will allow them to intervene in the foreign exchange market to devalue their currency against other currencies. By so doing, Egypt will be a cheap country for foreign investors, who will be attracted to invest in the country. These investors will invest in various sectors in the country, including the financial sector (the stock market). As a result, stock market development will result, and this will have an overall positive effect on stock prices.

Secondly, the Egyptian government and central bank should consider adopting expansionary fiscal and monetary policies. By expansionary fiscal policy, they will reduce taxation and increase public spending. This will lead to an increase in income and, hence, imports. The overall impact on the balance of payments will be negative. Increase in imports will mean increase in the demand for foreign currency, thereby causing the Egyptian currency to depreciate against foreign currency. This depreciation in the Egyptian currency will increase the country's currency exchange

rate, and this will in turn have a positive impact on stock prices, as shown by the empirical findings of this thesis.

Similarly, expansionary monetary policy will reduce interest rates and increase money supply in the economy. This will discourage savings and encourage borrowings. More money will therefore be available for investments, and investments will bring more income. More income will mean more imports, and, hence more demand for foreign currency. Domestic currency will depreciate, and exchange rate will increase. Increased exchange rate will increase stock prices.

5.3 Limitations of Study

One of the limitations of this study is that structural breaks were disregarded while performing the unit root tests to determine the order of integrations of the variables.

Secondly, Stocks traded, total value (% of GDP) was used as a proxy for stock prices. Technically speaking, the value of a stock (intrinsic) is different from the market price of the stock (stock price) which is determined in the market by the forces of demand and supply.

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