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#### **Original Research**

# Studying the Impact of Exchange Rate Fluctuations on the Stock Returns-an Empirical Study on the Stock Companies Listed in the Damascus Securities Exchange During the Crisis Period

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# Abstract

The research studies the impact of the exchange rate fluctuations of the local currency on the share dividends exchanged in the stock market, and stating whether there is a trace of the fluctuations occurring in the exchange rate on the fluctuations reflected on the stock returns in the stock market - during the political and economic crisis in Syria. The descriptive analytical approach was adopted to indicate whether there is any direct or indirect impact of fluctuations in the exchange rate of the pound (Lira) against the dollar on the exchange value of the Damascus Securities Exchange Index. The study community consists of all stock companies listed in Damascus Securities Exchange. It covers the total of 23 listed companies. It relied on the period from 1/7/2011 through 12/31/2013 to study the impact of exchange rate fluctuations on stock returns, where the crisis began on 18/03/2011, but reflections on economic life began to appear in mid-2011 when the severe fluctuations in the exchange rate and returns began as a result of lack of stability and economic siege Syria has been witnessing and the study stretched until the year 2013. The data is a sort of daily observations of each of the dependent and independent variable sending with 381 observations. The study reached the many results some of which include that there is an inverse weak between the Syrian pound exchange rate and Damascus Securities Exchange Index returns. The inefficiency of Damascus Securities Exchange Index on the weak level, where, as we have seen, this index is not subject to normal distribution and it is auto-correlated of the third degree and does not settle at the first level; instead, it settles at the first change. Keywords: Exchange rate; Stock returns; Stock market.

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## **1. Introduction**

During the political and economic crisis Syria has been passing through nowadays, and with the economic difficulties and sanctions Syria has been facing, the question of managing the exchange rate of the Syrian pound rises as one of the most important topics which takes a great deal of attention by economists and citizens alike for its reflections on economic performance through its impact on the macro economic variables of the country especially on the general level of prices where the exchange rate of the Syrian Pound (Archeed, 1998) against the dollar has witnessed severe downward fluctuations after it had been dominated by a state of stability. This decrease in the exchange rate has had its reflections on economic life, where economists see that the influence on the economic situation of a country undergoing a political crisis is normal as it is the case with many nations since the economic and political aspects are two sides of the same coin (Yasser, 2012).

Due to the role played by the financial market in economic activity in terms of its function, whether in advanced or developing countries, and since the development of the stock market boom is a target of the goals that the state is seeking to achieve, according to business management, the stock dividend reflects the overall performance of the establishment, it is therefore a criterion of its success or failure. As for investors, to identify the most important factors that control the stock returns is a source of important information and thus help them in making sound investment decisions. Hence, it was necessary to study the impact of fluctuations occurring in the exchange rate of the pound arising from the current situations on the fluctuations in the stock dividends (Anonymous, 2012).

# 2. Research Problem

With regard to the stability of the exchange rate of the local currency during the pre-crisis period, there was no need to study the effect of the fluctuations of exchange rate on the stock dividends. However, as a result of the severe fluctuations which occurred on the exchange rate of the pound, it was inevitable to handle such a topic because of the importance of financial market and the monetary flow produced by the share dividends. Therefore, the thesis is embodied in answering the following question:

Do hard fluctuations occurring on the exchange rate of the pound against the dollar in the current period have a role in the fluctuations resulting from the share dividends in the financial market?

### **3. Importance of Research**

The importance of the research rises from its attempt to study the impact of potential fluctuations of the exchange rate of the local currency on the share dividends exchanged in the stock market. Therefore, it provides the shareholders and investors with an empirical evidence that would help them in future risk management. It also offers academics and researchers with opportunities to use multiple indicators models to test the effective factors on share dividends based on the results of the stock of a single index (the movement of exchange rates used in this study), in addition to being the first research of its kind - to the knowledge of the researcher - who is looking at this area.

### 4. Purpose of the Research

The research seeks to achieve the following objectives:

Studying the impact of exchange rate on stock returns and stating whether there is a trace of the fluctuations occurring in the exchange rate on the fluctuations reflected on the stock returns in the stock market – during the political and economic crisis in Syria, where finding out the impact of these fluctuations helps investors in making their decision – buying or selling – in addition to helping the market to identify the problems and obstacles that it might face as a result of these fluctuations and thus try to avoid them.

#### **5. Research Hypotheses**

This study seeks to test the following hypotheses:

The first hypothesis H1: The returns of shares exchanged in the Damascus Securities Exchange are linked with the movement of the local currency change rates in a contrasting relationship.

The second hypothesis H2: There is a trace of severe fluctuations occurring in the Syrian pound exchange rate against the dollar on the fluctuations taking place in the stock returns in the stock market during the crisis period.

### 6. Theoretical Background

Damascus Securities Exchange Weighted Index 4 (DWX): It is a predominant general index which adopts the weighting method in the market value of the companies listed in its valuation where each company is given a weight as far as its market value forms from the market value of the sample as a whole. The sample of the index is composed of all the listed companies which are currently 23.

In order to evaluate the weighted index in the market value, the following equation is used:

Average share price X number of shares of company

basic share price X number of shares of company

Exchange rate (Reddy, 2007): The concept of exchange rate is applied on a number of units of currency that can be purchased or exchanged for one unit of another currency (Weston *et al.*, 1996). It represents the price of the currency of a particular country with regard to the currency of another country. The exchange rate of currencies are calculated according to a reference currency, usually the American dollar. Currencies fluctuate about each other and about the dollar. The fluctuation ratio in the currency value is calculated by the following equation (Madura, 2006).  $\Delta \partial = (S-S_{t-1})/S_{t-1}$ 

Where :

- 1.  $\Delta \partial$  is the fluctuation ratio in the currency value
- 2. *S* is the exchange rate at the end of a period
- 3.  $S_{t-1}$  is the exchange rate at the beginning of a period

### 7. Previous Studies

Ramasamy (2001) and Al-Khafaji (2009) a study entitled "Exposure to the Risk of Foreign Exchange Rate during a Financial Crisis: The case of Malaysian multinational companies". The aim of this paper is to examine the relationship between the stock returns and fluctuations in exchange rates between the Malaysian multinational companies. The study focuses on the period of the financial crisis, specifically the recent Asian financial crisis. The experimental results showed that of the 146multinational Malaysian companies, which formed the sample, 56 companies demonstrated significant exposure to the exchange rate of foreign currencies. All these companies showed a statistically significant negative exposure except two. The study also suggests that the company size is positively correlated with the exposure to the price of foreign exchange rate, pointing out that large companies are more likely to exchange rate fluctuations. The results of this study support the step taken by the Malaysian government, that is linking the exchange rate (ringgit) with the American dollar.

(Rahman and Uddin, 2009), a study entitled" The Dynamics of relationship between stock prices and exchange rates, a proof from three African countries": The two researchers examined the impact of changes in currency exchange rates with stock prices in Bangladesh, India and Pakistan for the period between January 2003 to June 2008 and the inspection was per month. The result of the study showed that there was no relationship between the fluctuation of exchange rates with stock prices in the three countries mentioned above.

Agrawal (2010) This paper analyses the relationship between the returns (nifty) and exchange rates of the Indian rupee against the American dollar. The statistical tests were applied in order to study the behavior and dynamics of each of these series. The paper also studied the impact of each of the time-series on each other. The period of the study was from October 2007 to March 2009. In this study the daily closing indices were used, and the result of the

correlation between returns and exchange rates was negative. Then Granger Causality Test of two variables was applied, which proved the existence of a causal one-way stretch of the stock returns to exchange rates which means causing increased revenue decline in the exchange rates but the reverse is not right.

Can Inci (2011) This study is entitled" The Dynamic Relationship between stock returns and exchange rate changes. This study examines the relationship between stock returns and exchange rate changes in five major European countries, France, Germany, Italy, Switzerland, United Kingdom, the United States, Canada and Japan by taking into account the dynamic impacts including the lagged changes of the variables.

The Causality Test was conducted and it was found that the lagged exchange rates have significant impact on stock returns. They also found from Granger Causality Test evidence of exchange rate changes to stock returns. With respect to the fact that the stock market in developed countries is very effective, there is an evidence of reverse causality relationship from stock returns to exchange rate changes. Moreover, the relationship were more important and more powerful in recent years and periods of recession than it was in the early periods and periods of expansion.

Can Inci (2011)This study is entitled" The reason of the relationship between stock prices and exchange rates is an evidence from seven countries": The study found that on the long term there is a relationship between share prices and changes in currency rates.

Abu (2012) This study is entitled" The impact of Jordanian exchange rate fluctuation on the share values of public stock companies in service sector. The study aimed at testing the effect of the exchange rate fluctuation of the Jordanian Dinar on the share values of public stock companies in the services sector listed in Amman Stock Market. Seventeen major currencies were chosen, which are the most currencies dealt with in Amman. The study covered the monthly data of the period from January 2006 until June 2011. Results of the analysis showed that there is a statistically significant relationship between the equity contribution of the services sector and the prices of the Jordanian dinar exchange rate against the currencies of the countries under study, especially the currencies of the countries that have efficient service and commercial relationship with Jordan, such as the European euro zone, China, Denmark, Switzerland and Mexico. According to multiple linear regression analysis model, the effect of increasing the Jordanian dinar rates against the euro and Pesos and Danish and Swiss franc was positive on the share prices of service companies, while the effect of increasing the Jordanian dinar rates against the euro and Pesos and Danish and Swiss franc was positive on the share prices of service companies, while the effect of increasing the Jordanian dinar rates against the currencies in Jordanian dinar rates against the european euro and Pesos and Danish and Swiss franc was positive on the share prices of service companies, while the effect of increasing the Jordanian dinar rates against the currencies in Jordanian dinar rates against the Chinese Yuan and the Mexican peso was negative on shares of corporate service prices in Jordan.

Al-Khafaji (2009) The title of the study is "Measuring the response of share prices to the movement of exchange rates", an applied study on a sample of local companies in the Iraqi market. The impact of Iraqi dinar exchange rate fluctuations on the stock returns fluctuations due to the fact that the movement of stock prices and therefore their returns are one of the main changes in measuring the impact of exchange rate fluctuation on the value of the establishment. By using a sample of shares from 16 companies listed in the Iraqi stock market for the period from 2003 to 2007, and analyzing the fluctuations in the local currency exchange rate and the fluctuation in the stock prices represented in the returns, it was found that there was only 17 observations where the stock price fluctuations had a reverse link with the currency fluctuations. On the contrary, the other observations did not respond to the exchange rate fluctuations because of the weak relationship between the two variables and the Simple Linear Regression model was used.

### 8. The Status of the Current Study

As we have seen in previous studies, and as a result of inspecting a number of researches, the researcher noted the importance range of studying the exchange rate fluctuations as they occupy the attention of researchers and academics who seek to study the impact of these fluctuations on all.

Al-Khafaji (2009) "Measuring the response of share prices to the movement of exchange rates", an applied study on a sample of local companies in the Iraqi market, Al-Qadesieh University, Iraqi Scientific Journal fields and levels, due to the role played by exchange rate in the daily economic life where there is no community that lives immune from changes in the exchange market. In spite of that, this kind of study had not been touched in Syria which urged the researcher imperatively to do about such a study in Syria to see the impact of fluctuations occurring as a result of the current crisis and the severe fluctuations it is witnessing in the exchange rate on the stock returns. Therefore, our study headed toward knowing the effect of fluctuations resulting from the current crisis on the share returns because the financial market and the returns resulting from them has a role in the economic activity because it is the first research of its kind – to the knowledge of the researcher who is looking at this area.

### 9. Methodical Study

Analysis and processing of data of the study methodology adopted the following:

#### 9.1. Research Methodology

The descriptive analytical approach was adopted to indicate whether there is any direct or indirect impact of fluctuations in the exchange rate of the pound against the dollar on the exchange value of the Damascus Securities Exchange Index. This approach (Daudari, 2000) is a precise and detailed description of the phenomenon or a specific top icon the quality or quantity of a digital image. The quantitative expression: gives a digital description of this phenomenon and illustrates the amount or size and the degree of association with other phenomena. On the other hand, the qualitative expression describes a phenomenon and illustrates its characteristics. This method uses many of the tools and methods generally accepted in the theory of statistics, and then it analyses the relationship between variables and builds interpretable models and then get the results that can be generalized.

### 9.2. Data Sources

The daily time series of the values of index closure of Damascus Securities Exchange was obtained from the electronic website of Damascus Securities Exchange Market (Khandker and Samad, 2018). The exchange rates are for the exchange rate on the black market provided by Dr. Yasser Mashaal.

### 9.3. Research Community and Its Temporal and Spatial Boundaries

The study community consists of all stock companies listed in Damascus Securities Exchange. It covers the total of 23 joint-stock companies. Below are the most important information about them.

Symbol	Company Name	Market
AROP	Syria International Insurance AROPE	Regular
AVOC	Alahlia Vegetable Oil Company	Regular
BASY	Bank Audi Syria	Regular
BBSF	Banque Bemo Saudi Fransi	Regular
BSO	Bank of Syria and Overseas	Regular
FSBS	Fransbank Syria	Regular
IBTF	The International Bank for Trade & Finance	Regular
NIC	National Insurance Company	Regular
QNBS	Qatar National Bank - Syria	Regular
SHRQ	Bank Alsharq	Regular
SIIB	Syria International Islamic Bank	Regular
UIC	United Insurance Company	Regular
AHT	Alahliah. Co for Transport	Parallel A
ARBS	Arab Bank - Syria	Parallel A
ATI	Al-Aqeelah Takaful Insurance	Parallel A
BBS	Byblos Bank Syria	Parallel A
BOJS	Bank of Jordan Syria	Parallel A
SGB	Syria Gulf Bank	Parallel A
SKIC	Syrian Kuwaiti Insurance Company	Parallel A
SAIC	Solidarity Alliance Insurance	Parallel B
UG	United Group for Publishing, Advertising and Marketing	Parallel B
NAMA	Agricultural Engineering Co for Investments Nama'a	Parallel A
CHB	Cham Bank	Regular

It relied on the period from 1/7/2011 through 12/31/2013 to study the impact of exchange rate fluctuations on stock returns, where the crisis began on 18/03/2011, but reflections on economic life began to appear in mid-2011 when the severe fluctuations in the exchange rate and returns began as a result of lack of stability and economic siege Syria has been witnessing and the study stretched until the year 2013. The data is a sort of daily observations of each of the dependent and independent variable sending with 381 observations.

### 9.4. Research Variables

1. Dependant variable in this study is the daily returns of Damascus Securities Exchange Index. The daily returns of Damascus Securities Exchange Index were calculated by calculating the growth rate of the closing index values for two consecutive days.

# Rt = (Pt - Pt - 1)/Pt - 1

Where

R represents the average daily return of Damascus Securities Exchange Index in day t

Pt, Pt-1 the closing price of the index on day t and the previous day t-1

1. Independent variable is the exchange rate of the Syrian pound against the American dollar during the period from the beginning of the crisis until the end of 2013.

### 9.5. Research Parameters

- 1. It should be noted that it is through the researcher's study of the stock returns entered in the index, it was clear that the cash distribution of the shares listed in the Damascus Securities Exchange are not stationary and unstable. Therefore the researcher did not study the return index. Instead, the researcher studied the price index and overlooked the distributed cash dividends when calculating the average daily returns of the index because most companies do distribute free shares in lieu of cash.
- 2. As we know, Damascus Securities Exchange works three days a week, while the exchange rate datais daily. Therefore, the researcher was obliged to neglect the holidays of Damascus Securities Exchange from the exchange rate data of the Syrian pound.
- 3. This study was limited to the period from the beginning of the crisis (mid-2011) and up to the year 2013, due to the lack of documented data on the exchange rate for 2014.

#### 9.6. Research Tools and Means

- 1. Descriptive analysis of the characteristics of the dependent and independent variables and studying the stability and the auto-correlation of each.
- 2. Granger Causality Test to indicate the direction of the relationship whether the exchange rate affects the stock returns or the opposite.
- 3. Simple Linear Regression (a single index model).

 $\mathbf{Rt}=\mathbf{a}+\mathbf{bi}\mathbf{S}+\boldsymbol{\Sigma}$ 

Where

a: hard limit

bi: sensitive coefficient

 $\sum$ : random error

- S: Exchange rate
- 4. Determination coefficient R<sup>2</sup> and adjusted determination coefficient Adj-R2: Determination coefficient R<sup>2</sup> measures the interpretation capacity of the equation, i.e. the capacity of an independent variable in determining and interpreting a dependent variable (how much a constant variable can interpret the changes of the dependent variable).

On the other hand, the value of the adjusted determination coefficient  $Adj-R^2$  is not affected by the increase or decrease of the number of independent variables, as it eliminates the simple seasonal changes.

5. Also, the Nonlinear Regression Method ARMA was used because the conditions of the linear regression were not achieved (normal distribution, stability, and lack of returns autocorrelation), which is a sort of test that locates the dependent variable in an optimal environment and then the other variables are introduced, as it is through this test we get rid of the problem of autocorrelation.

Moreover, the Nonlinear Regression Method GARCH was used because of the lack of check homogeneity condition in ARMA environment where it is by GARCH method the problem of heterogeneity is cancelled because the residuals of the equation become homogenous, i.e., they have stable variation in this environment, and thus the problem of instability of the residual variance of the regression equation is over. This means that the variances of the daily returns residuals of the index are neither auto-correlated with their previous values nor with the random error of these residuals.

### **10. Applied Study**

### **10.1. Results of the Descriptive Analysis**

6. The statistical characteristics of the daily returns of Damascus Securities Exchange Index:

The following curve represents the daily returns Rt of Damascus Securities Exchange Index in the period from 1/7/2011 until 31/12/2013.



From the curve we note that the average daily return of Index Rt is stable and does not have a general trend in the period between 1/7/2011 and 31/12/2013, where the returns are characterized with great fluctuation in the period from 1/7/2011 until the end of 2011. It could be possible to ascribe it to what Syria witnessed during that period which represents the beginning of the crisis.

In 2012 we note that fluctuation decreased in the returns where the returns of the market index witnessed downs. This can be ascribed to fear and lack of confidence among investors, a factor which did not encourage them to enter the market. However, in 2013, as we see, the returns increased and became characterized by severe fluctuation which can be traced to restore the investors' confidence in the market as a result of not closing it as it happened in the rest of Arab stock markets which suffered crises.

The following curve represents the exchange rate in the period from 1/7/2011 until 31/12/2013.



It is noted that there is an exchange rate fluctuation but less than the fluctuation in the returns. We also note that in 2013 there was a significant increase in the Syrian pound exchange rate (decreased value of Syrian pound). This explains the rise as witnessed by including the Syrian status of events and disturbances, including a military strike on Syria marked by a strong rise in the exchange rate represents the increase in the second big. The first big was when the exchange rate became 310, this rise, from the researcher's point of view, is attributed to an important cause which is the continuous sale of the Syrian pound as a result of the weak confidence of individuals in the Syrian pound in addition to the case of severe speculation prevailing at the time.

From the curve we note that the exchange rate is unstable and has a rising general trend in the period between 1/7/2011 and 31/12/2013. The normal distribution of both variables: The normal distribution of both variables:



We note that the maximum value of the daily returns of Damascus Securities Exchange index amounted to 0.038688 on 22/05/2013 where the exchange market witnessed a significant increase and the index rose 3.87 and that day was characterized by the presence of huge deals. On the other hand, the minimum value of the average daily return of Damascus Securities Exchange Index amounted to 0.014 on 12/07/2011 where the market exchange witnessed a significant drop and the index fell by1.42 %.

Jarque – Bera Test points out that the distribution of the average daily return of Damascus Securities Exchange Index is not subject to normal distribution (where it should be less than 5.99 in order for the distribution to be normal) which is skew to the left (positive skewness) where the skewness has a positive value. It is supposed that in order for the distribution to be normal, the skewness must be equal to zero and the degree of its Kurtosis is higher than normal which is equal to 9.2566, while the normal Kurtosis is assumed to be equal to 3.

### 10.2. Normal Distribution of the Exchange Rate



We note that the maximum value of the exchange rate stood at 310 on 9/7/2013 and the minimum value of the exchange rate stood at 50 on 8/8/2011.

Jarque-Bera Test points out that the exchange rate is not subject to normal distribution (where it must be less than 5.99 in order for the distribution to be normal) which is skew to the left (positive skewness) and its kurtosis degree is higher than normal Kurtosis which is equal to 3.951, while the normal Kurtosis is assumed to be equal to 3.

The appendices can be referred to see the results of Autocorrelation Test and the stability of the value of Damascus Securities Exchange Index and the exchange rate <sup>1</sup> Appendix 1, Tables 1, 2

- 7. The average daily return is unstable on the first level and it stabilizes at the first different (differences series).
- 8. Regarding the exchange rate, it was found that it was unstable on the first level and it showed stability at the first different.
- 9. This Test(Stability) is intended to determine the stability of the daily index returns series and exchange rate, and in order to be stable within the standard deviation of the tunnel, i.e., the standard deviations must be equal, and the arithmetic average constant.
- 10. Studying the Autocorrelation of Variables

Auto-correlation is defined as a situation in which the value of the variable in period t depends on its value in the previous period t-1 and symbolized by the acronym AC. In other words, can the variable value be predicted and is it at random? Does its value depend on its value of the previous day and the day before?

The autocorrelation is conducted by using Correlogram Test.

By conducting the Autocorrelation Correlogram Test.

- 10. Of the average daily returns of Damascus Securities Exchange Index, the researcher noted that it is certainly First degree auto-correlated where the probability of the hypothesis of the absence of autocorrelation was equal to 36 delays. Therefore, the researcher had to verify the matter. We found that there was Third degree autocorrelation where the comparison standards improved when these delays were implicated. We cancelled the stationary one because it was not ideal.
- 11. As for the exchange rate, we found that it was certainly First degree auto-correlated. We tested whether there was correlation for more than one degree , and it was clear that there was a Second degree correlation, i.e., the exchange rate was only First degree auto-correlated.

Secondly: Conducting Granger Causality Test The findings showed that the relationship between the exchange rate and stock returns of Damascus Securities Exchange is a one-way relationship, moving from the exchange rate to share returns.

<sup>2</sup> Appendix 2, Tables 3 -4

 Pairwise Granger Causality Tests

 Date: 07/13/14
 Time: 21:51

 Sample: 1 381

 Lags: 2

 Null Hypothesis:
 Obs
 F-Statistic

 S does not Granger Cause RW
 379
 3.80068
 0.0232

 RW does not Granger Cause S
 1.29542
 0.2750

Thirdly: Simple Linear Regression  $Rt = a + bi S + \sum$  The statistical characteristics of the equation can be represented in the following table which represents the statistical characteristics of the Simple Linear Regression

Dependent Variable: RW Method: Least Squares Date: 07/13/14 Time: 17:47 Sample: 1 381 Included observations: 381

Variable	Coefficient	Std. Error	t-Statistic	Prob.
S C	3.18E-05 -0.002733	7.09E-06 0.000817	4.489228 -3.344555	0.0000 0.0009
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.050490 0.047984 0.007522 0.021441 1323.472 20.15316 0.000009	Mean depende S.D. depende Akaike info cr Schwarz crite Hannan-Quin Durbin-Watso	0.000502 0.007709 -6.936862 -6.916164 -6.928650 0.732189	

From the table we note that the exchange rate is significant at the indication level 5%.. The equation takes the following form:

#### R=3.1848095678e - 05\*S - 0.00273267105158

Determination coefficient R<sup>2</sup> (interpretation capacity of the model):

We note that the determination coefficient value amounted to 5%, while the value of the adjusted determination coefficient<sup>3</sup> R<sup>2</sup>amounted to 4.7% which is a very low value. We also note that Durban-Watson value that expresses the auto-correlation of the deviation of the equation residuals amounted to 0.732189 which means that there is a potential presence of the residuals autocorrelation.

Upon testing the randomization of the residuals or the standard error of the residuals of the equation of linear deviation of the two variables, it was found that it was not at random and showed heterogeneity <sup>3</sup>. Therefore, there was a need to move to the nonlinear regression environment (ARMA) because the equation was not linear. ARMA pattern is a non-linear environment of the second degree, constitutes the optimum environment of the dependent variable which is the average daily returns of the Damascus Securities Exchange Index.

The best environment of ARMA has been reached 3.2, which is the best environment for ARMA, i.e. an autocorrelation of the third degree, has two moving averages which means it has two general trends as in the following table.

```
Dependent Variable: RW
Method: Least Squares
Date: 07/12/14 Time: 22:34
Sample (adjusted): 4 381
Included observations: 378 after adjustments
Convergence achieved after 38 iterations
MABackcast: 2.3
                          Coefficient
        Variable
                                          Std. Error
                                                        t-Statistic
                                                                       Prob
         AR(1)
                          -0.609532
                                         0.068002
                                                       -8.963379
                                                                      0.0000
                           0.030225
         AR(2)
                                         0.061329
                                                        0.492828
                                                                      0.6224
         AR(3)
                           0.606017
                                         0.048669
                                                        12.45189
                                                                      0.0000
         MA(1)
                            1.288241
                                         0.066213
                                                        19,45589
                                                                      0.0000
         MA(2)
                           0.828997
                                         0.066008
                                                        12,55913
                                                                      0.0000
R-souared
                           0.471545
                                       Mean dependent var
                                                                    0.000461
Adjusted R-squared
                           0.465878
                                                                   0.007680
                                        S.D. dependent var
S.E. of regression
                           0.005613
                                        Akaike info criterion
                                                                   -7.514286
                           0.011752
Sum squared resid
                                        Schwarz criterion
                                                                   -7 462237
Log likelihood
                                       Hannan-Quinn criter
                                                                   -7.493628
Durbin-Watson stat
                            1.950625
Inverted AR Roots
                                       -.65+.67i
                            69
                                                    -.65-.67i
Inverted MA Roots
                        -.64-.64i
                                       -.64+.64i
```

Then the constant and the exchange rate were both added, and it was evident that the constant is insignificant, and it did not improve the pattern, so we deleted it while the exchange rate showed that it is insignificant (4).

Adjusted determination coefficient Adj-R<sup>2</sup> whose value is not affected by the independent variables increase or decrease; instead it is concerned with determining the sensitivity degree of the change of the main independent variables in the equation. It is noticed that it does not change much after cancelling the change of the DTV.

In view of the fact that the DW improved and the R-squared also improved it was inevitable to consider the randomly errors of residuals, which did not show randomization (where the distribution was not normal, but it showed that it was not auto correlated because ARMA handled the correlation). It also showed lack of homogeneity (Reddy, 2007). Therefore, it was necessary to move to GARCH environment where ARMA environment is not also the optimum environment and to the fact that the equation is of the third or fourth degree GARCH which expresses the general auto correlation of a stationary conditional variance. This is because the equation residuals become homogenous, i.e., it has a stationary variation in this environment, and therefore get rid of the problem of the instability of the variance residuals of the regression equation which means that the residuals variances of the daily returns of the index are neither auto correlated with their previous values nor with the randomly error of these residuals. It has been reached to the best environment of GARCH (1-2). The optimal distribution of this return is Student's Distribution due to the nonlinear characteristics of return because of not following the normal distribution, its instability and auto correlation. Then independent variable was introduced (exchange rate) as variable on the level.

We reached the following results:

Dependent Variable: R Method: ML - ARCH (M Date: 07/13/14 Time: Sample (adjusted): 4.3 Included observations Convergence achieved MABackcast: 2.3 Presample variance: b GARCH = C(7) + C(8)*	W arquardt) - Stud 16:42 381 : 378 after adjus 1 after 46 iteratio ackcast (param RESID(-1)^2 + 0	ient's t distribut stments ons ieter = 0.7) C(9)*RESID(-2)	ion ^2 + C(10)*G	ARCH(-1)
Variable	Coefficient	Std. Error	z-Statistic	Prob.
S AR(1) AR(2) AR(3) MA(1) MA(2)	-8.98E-06 0.025738 0.560577 -0.075110 0.467201 -0.334965	2.41E-06 0.353292 0.177865 0.181914 0.344354 0.326872	-3.729200 0.072853 3.151704 -0.412888 1.356747 -1.024759	0.0002 0.9419 0.0016 0.6797 0.1749 0.3055
	Variance	Equation		
C RESID(-1)^2 RESID(-2)^2 GARCH(-1)	2.41E-08 0.641700 -0.334819 0.799438	3.19E-08 0.234970 0.201058 0.041178	0.754267 2.730992 -1.665283 19.41422	0.4507 0.0063 0.0959 0.0000
T-DIST. DOF	3.611287	0.848857	4.254296	0.0000
R-squared	0.418070	Mean depend	tent var	0.000461

0.410249

0.005898

0 012941

1555.552

1.587782

.68

.39

12. As we can see that the exchange rate has of significance and associated with the returns with a negative signal, which means accepting the first hypothesis.

S.D. dependent var

Akaike info criterion

Hannan-Quinn criter.

-.80

Schwarz criterion

.14

-.86

0.007680

8.172231

-8 057723

-8.126784

4 Appendix 3, Tables 5-6

Adjusted R-squared

S.E. of regression

Log likelihood

Sum squared resid

Durbin-Watson stat

Inverted AR Roots

Inverted MA Roots

Table 5 shows ARMA environment when adding the exchange rate

Table 6: The Standard Error homogeneity Test of the residuals

13. The stock returns exchanged in the Damascus Securities Exchange are associated with movements of the local currency exchange rates in an inverse relationship.

14. Any rise in the exchange rate of the pound against the dollar leads to lower stock returns.

15. We note that the value of the determination coefficient of  $R^2$  amounted to 42%, while the value of the Adjusted determination coefficient  $R^2$  amounted to 41% which means that the exchange rate explains 42% of the changes in the Damascus Securities Exchange index returns. There are 58% of the returns explained by changes of other factors. The researcher tested the homogeneity of the equation residuals and appeared as homogeneous their variances are constant and equal, where the potential homogeneity of these residuals is greater than 5% (4) which means that it is an ideal model.

16. But when we introduced the exchange rate from the window of the variance (a window that takes the variable as oscillation or fluctuation).

The results were as follows:

Dependent Variable: RW Method: ML - ARCH (Marquardt) - Student's t distribution Date: 07/13/14 Time: 18:59 Sample (adjusted): 4 381 Included observations: 378 after adjustments Convergence achieved after 54 iterations MA Backcast: 2.3 Presample variance: backcast (parameter = 0.7) GARCH = C(6) + C(7)\*RESID(-1)\*2 + C(8)\*RESID(-2)\*2 + C(9)\*GARCH(-1) + C(10)\*S Variable Coefficient Std. Error z-Statistic Prob AR(1) 0 714670 0 189516 3.771018 0 0002 2.172440 AR(2) AR(3) 0.637134 0.293280 0.0298 0.115893 0.0020 MACT -0 186273 0.169727 -1.097485 0.2724 MA(2) -0.795009 0.166139 4.785215 0.0000 Variance Equation -7 30E-07 5 23E-07 -1.3964790.1626 C RESID(-1)^2 0.517760 0.182807 2.832274 0.0046

· · · · · · · · · · · · · · · · · · ·		the second secon		
RESID(-2)^2	-0.294220	0.167522	-1.756303	0.0790
GARCH(-1)	0.824980	0.041923	19.67863	0.0000
S	1.03E-08	7.13E-09 1.437981		0.1504
T-DIST. DOF	4.036868	0.985578	4.095940	0.0000
R-squared	0.420838	Mean depend	dent var	0.000461
Adjusted R-squared	0.414627	S.D. depende	0.007680	
S.E. of regression	0.005876	Akaike info cr	-8.179541	
Sum squared resid	0.012880	Schwarz crite	rion	-8.065033
Log likelihood	1556.933	Hannan-Quir	nn criter.	-8.134094
Durbin-Watson stat	1.695714			
Inverted AR Roots	.99	.48	76	
Inverted MA Roots	99	- 80		

As we can see, where the exchange rate is not significant, we reject the second hypothesis that there is a trace of fluctuation in the exchange rate on those in the returns.

Heteroskedasticity Test: ARCH

F-statistic	0.397538	Prob. F(1,378)	0.5287
Obs*R-squared	0.399221	Prob. Chi-Square(1)	0.5275

Test Equation: Dependent Variable: WC Method: Least Squares Date: 07/12/14 Time: 2 Sample (adjusted): 238 Included observations: 3	GT_RESID^2 3:40 31 380 after adjus	tments		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C WGT_RESID <sup>4</sup> 2(-1)	1.112334 -0.032405	0.138933 0.051395	8.006253 -0.630506	0.0000 0.5287
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.001051 -0.001592 2.485117 2334.455 -884.1155 0.397538 0.528745	Mean dependent var S.D. dependent var Akaike info criterion Schwarz criterion Hannan-Quinn criter. Durbin-Watson stat		1.077512 2.483141 4.663766 4.684504 4.671995 1.924813

### **11. Results**

- The study reached the following results:
- 2013 witnessed the highest level of fluctuation of the Syrian pound exchange rate against the dollar and the value of the Syrian pound dropped (the number of pounds needed to buy one unit of the American dollar increased). However, in 2013 Damascus Securities Exchange returns, where the index rose by 62%, i.e., about 1250 points in 2012 and recorded an exchange value of 2.2 billion Syrian pounds. Damascus Securities Exchange won the first place according to the report of the Union of Arab Stock Exchanges for the second spring of 2013and the third in the third quarter. During 2013, 900 new investment accounts were opened for exchange purposes.
- 2. The results showed that there is a relationship between the Syrian pound exchange rate and Damascus Securities Exchange Index returns which is an inverse weak relationship, where, as we have seen, the coefficient correlation of the equation was 42% (i.e. the exchange rate explains 42% of the changes in Damascus Securities Exchange Index returns and there are 58% of the changes in the returns interpreted by other factors), which means that other factors, not taken into account must be included in the equation.

The inverse relationship can be attributed to the fluctuations occurring on the exchange rate of the Syrian pound against the dollar. The fluctuation of gold prices prompted investors to turn to safer investment places. Therefore, the stock market was the primary target for them, resulting in improved performance and thus higher market index returns.

- 3. Granger Causality Test showed that the relationship direction between the market index and exchange rate returns which extends from the exchange rate returns to the market index.
- 4. The results also showed that there was no trace of fluctuations occurring in the pound exchange rate (oscillation or risk in the exchange rate) on the fluctuations taking place in returns where the fluctuations in the exchange rate were not significant.
- 5. The inefficiency of Damascus Securities Exchange Index on the weak level, where, as we have seen, this index is not subject to normal distribution and it is auto-correlated, of the third degree and does not settle at the first level. Instead, it settles at the first change, which confirms the conclusion reached in the study of (Al-Khafaji, 2009; Mosselli and Al-Samman, 2011).

### **12. Recommendations**

1. There is a need to use multiple indices to estimate the value of the factors affecting the stock returns movements with regard to what the mono-index pattern (exchange rate) provided of insufficient interpretive capacity in this respect.<sup>1</sup>

2. It is necessary for the Syrian bank to set future forecasts of the currency movements, by using predictive methods of the exchange rates for the purpose of utilizing them by investors and the market as we pointed out earlier in this research.

The main reason of the decline in the pound value happening as a result of the crisis is the lack of confidence in the Syrian pound despite what we possess of foreign currencies reserves and the link of the pound to a basket of currencies, in addition to the presence of management that has the credibility to control the Syrian pound. Thus, the government should restore the citizens' confidence in the power of the Syrian pound, as this would lead to re-ordering it and therefore raising its value.

3. We also recommend encouraging investors to invest equities and by encouraging the initial public offer shares (IPO) of emerging companies and to encourage and help family businesses to switch to joint-stock companies and easing the requirements needed for listing in the financial market, as this will help to improve and revitalize the financial market, which will reflect positively on the economic situation in the light of production and export disruptions and witnessed by the Syrian status today because of the current crisis.

4. Inflation as a strategic objective is good, which means that the Syrian pound is backed by real production, but in times of crisis it is a mistake, because the economy neglected for a long time the most important pillars of real economy, namely agriculture and industry as a result of economic openness, leaving no real production that enables us to support our pound. Hence, the government should be directed to give the exchange rate a margin of freedom, and not raise the question of inflating the pound because putting the concept of inflation in the language of economy will lead to the collapse of the pound.

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<sup>&</sup>lt;sup>1</sup> From Syrian Arab National Agency (SANA)

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# Appendices

Table -1.

Series: RW Workfile:	FILE::File\						- >
View Proc Object Prop	erties Print Na	ame [Freeze]	[Sample]	Genr	Sheet	Graph	Stats
	KPSS Unit I	Root Test on	D(RW)				
Null Hypothesis: D(RW Exogenous: Constant, Bandwidth: 19 (Newey-	) is stationary Linear Trend West automati	c) using Barl	lett kerne	el			-
					LM-S	Stat.	
Kwiatkowski-Phillips-S Asymptotic critical value	chmidt-Shin tes as*:	st statistic 1% level 5% level 10% level			0.028 0.216 0.146 0.119	3579 5000 5000 9000	
*Kwiatkowski-Phillips-8	3chmidt-Shin (*	1992, Table -	1)				
Residual variance (no o HAC corrected variance	correction) > (Bartlett kerne	el)			4.11E 5.37I	E-05 E-06	
KPSS Test Equation Dependent Variable: D Method: Least Squares Date: 07/12/14 Time: Sample (adjusted): 2 3 Included observations:	(RW) 15:16 81 380 after adjus	stments					
Variable	Coefficient	Std. Erro	r t-S	tatistic	P	rob.	
C	1.80E-06	0.00066	1 0.0	02725	0	0070	
@TREND(1)	6.60E-09	3.01E-0	6 0.0	02196	0.	9978 9982	

#### Table-2. Exchange Rate Stability Unit Root Test

Series: S Workfile: FI	LE::File\			_ = ×
View Proc Object Prope	rties Print Na	ame [Freeze]	[Sample] Genr]	Sheet Graph
	<b>KPSS Unit Ro</b>	ot Test on D	(5)	
Null Hypothesis: D(S) is Exogenous: Constant, L Bandwidth: 40 (Newey-	s stationary Linear Trend West automatio	c) using Bart	lett kernel	
				LM-Stat.
Kwiatkowski-Phillips-Se Asymptotic critical value	chmidt-Shin tes s*:	st statistic 1% level 5% level 10% level		0.082056 0.216000 0.146000 0.119000
*Kwiatkowski-Phillips-S	Schmidt-Shin (*	1992, Table 1	0	
Residual variance (no o HAC corrected variance	orrection) (Bartlett kerne	1)		64.04568 41.70231
KPSS Test Equation Dependent Variable: D( Method: Least Squares Date: 07/12/14 Time: 1 Sample (adjusted): 2 3 Included observations:	S) 15:14 31 378 after adjus	tments		
Variable	Coefficient	Std. Erro	r t-Statistic	Prob.
@TREND(1)	0.296649	0.827640	0.358428 -0.077564	0.7202
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.000016 -0.002644 8.024111 24209.27 -1322.523 0.006016 0.938217	Mean depe S.D. depen Akaike info Schwarz.cr Hannan-Qi Durbin-Wa	0.241005 8.013526 7.008056 7.028875 7.016319 2.013556	

Table-3.	The Average	e Daily Return	Auto-correlation	Test of the	Damascus S	ecurities Exchange
second the state of the second s						

Correlogram	eeze   Sa n of RW	mpie   Ge	nrjSheet	[Graph]S	tats
Correlogram	n of RW				
Correlation					-
Correlation					S
	AC	PAC	Q-Stat	Prob	
	1 0.654 2 0.443 3 0.342 4 0.238 5 0.231 6 0.141 7 0.103 8 0.129 9 0.127 0 0.148 1 0.177 2 0.163 3 0.196 4 0.161 5 0.091 6 0.104 7 0.094	0.654 0.025 0.075 -0.033 0.117 0.040 0.070 0.031 0.044 0.080 -0.007 0.084 -0.050 -0.059 0.061 0.012	164.43 239.88 284.99 306.90 327.69 335.47 339.62 346.11 352.48 361.07 373.41 383.94 399.14 409.46 412.76 417.11 420.65	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	
		10         0.0148           11         0.177           12         0.163           13         0.196           14         0.161           15         0.091           19         15         0.091           19         16         0.104           11         17         0.094           11         18         0.074	10         10         0.148         0.044           11         0.177         0.080           12         12         0.163         -0.007           13         0.196         0.084         -0.059           10         14         0.161         -0.059           11         15         0.091         -0.059           11         17         0.094         0.012           11         18         0.074         -0.028	10         0.148         0.044         361.07           11         10.177         0.080         373.41           12         0.163         -0.007         383.94           10         13         0.196         0.084         399.14           11         14         0.161         -0.050         409.46           11         15         0.091         -0.059         412.76           11         16         0.104         0.061         417.11           11         17         0.094         0.012         420.65           11         18         0.074         -0.028         422.84	I         10         0.148         0.044         361.07         0.000           I         11         0.177         0.080         373.41         0.000           I         12         0.163         -0.007         383.94         0.000           I         12         0.163         -0.007         383.94         0.000           I         13         0.196         0.084         399.14         0.000           I         14         0.161         -0.050         409.46         0.000           I         15         0.091         -0.059         412.76         0.000           I         16         0.104         0.061         417.11         0.000           I         17         0.094         0.012         420.65         0.000           I         18         0.074         -0.028         422.84         0.000

### Table-4. Exchange Rate Auto-correlation Test

Date: 07/12/14 Time: 21:40 Sample: 1 381 Included observations: 381							(m.
Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob	
1		1	0.987	0.987	374.27	0.000	
1	1 1	2	0.975	-0.003	739.94	0.000	
1	1 🗊	3	0.964	0.094	1099.0	0.000	
1	1 1	4	0.954	-0.006	1451.5	0.000	
1	1 11	5	0.945	0.052	1798.3	0.000	
1	1 200	6	0.940	0.158	2142.4	0.000	
1	1 I	7	0.933	-0.090	2482.0	0.000	
1	101	8	0.924	-0.031	2816.2	0.000	
1	1 11	9	0.917	0.035	3145.8	0.000	
1	IE I	10	0.908	-0.061	3469.8	0.000	
1	111	11	0.899	0.024	3788.3	0.000	
1	1 1	12	0.891	-0.004	4102.1	0.000	
1	E 1	13	0.880	-0.116	4409.4	0.000	
1	1 🗊	14	0.871	0.083	4711.2	0.000	
1	1 31	15	0.865	0.054	5009.3	0.000	
1	10.1	16	0.857	-0.048	5302.7	0.000	
1	111	17	0.848	0.013	5591.3	0.000	
	1 11	18	0.842	0.032	5876.4	0.000	
1		19	0.836	0.053	6158 2	0 000	

#### Table-5. Shows ARMA Environment When Adding the Exchange Rate

Dependent Variable: RW Method: Least Squares Date: 07/13/14 Time: 19:20 Sample (adjusted): 4 381 Included observations: 378 after adjustments Convergence achieved after 32 iterations MABackcast: 2 3

Variable	Coefficient	Std. Error	t-Statistic	Prob.
S AR(1) AR(2) AR(3) MA(1) MA(2)	8.84E-06 -0.618296 0.018289 0.598664 1.288542 0.830221	7.63E-06 0.068459 0.062001 0.048731 0.066236 0.066021	1.157925 -9.031623 0.294987 12.28504 19.45385 12.57510	0.2476 0.0000 0.7682 0.0000 0.0000 0.0000
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood Durbin-Watson stat	0.473369 0.466291 0.005611 0.011712 1425.854 1.947566	Mean dependent var S.D. dependent var Akaike info criterion Schwarz criterion Hannan-Quinn criter.		0.000461 0.007680 -7.512453 -7.449995 -7.487664
Inverted AR Roots Inverted MA Roots	.68 64+.64i	65+.67i 6464i	6567i	

#### Table-6. The Standard Error Homogeneity Test of the Residuals

Heteroskedasticity Test: ARCH

F-statistic	445.4423	Prob. F(1,378)	0.0000
Obs*R-squared	205.5616	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID*2
Method: Least Squares
Date: 07/12/14 Time: 21:55
Sample (adjusted): 2 381
Included observations: 380 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C RESID <sup>A</sup> 2(-1)	1.49E-05 0.735497	5.93E-06 0.034849	2.515982 21.10550	0.0123 0.0000
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.540951 0.539737 0.000109 4.50E-06 2928.723 445.4423 0.000000	Mean dependent var S.D. dependent var Akaike info criterion Schwarz criterion Hannan-Quinn criter. Durbin-Watson stat		5.64E-05 0.000161 -15.40380 -15.38306 -15.39557 1.959952

F-statistic	0.726569	Prob. F(1,375)	0.3945
Obs*R-squared	0.729031	Prob. Chi-Square(1)	0.3932

Test Equation: Dependent Variable: WGT\_RESID^2 Method: Least Squares Date: 07/14/14 Time: 19:33 Sample (adjusted): 5 381 Included observations: 377 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C WGT_RESID^2(-1)	0.974338 -0.043969	0.117505 0.051584	8.291891 -0.852390	0.0000 0.3945
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.001934 -0.000728 2.081518 1624.769 -810.3150 0.726569 0.394542	Mean dependent var S.D. dependent var Akaike info criterion Schwarz criterion Hannan-Quinn criter. Durbin-Watson stat		0.933328 2.080761 4.309363 4.330224 4.317643 2.003214