The Effect of Arab Investors and Institution on Stock Return Volatility at Egyptian Stock Market

Amira Sayed Muhammad Gad Alrab

الملخص:

يختبر البحث العلاقة بين الملكيات الأجنبية و كيف تؤثر على تذبذبات العائد على الأسهم في البورصة المصرية تعتمد الدراسة على مجموعة من البيانات عن الملكيات الأجنبية و العائد السوقي بين الفترة ٢٠٠٥ إلى ٢٠١٤.

لقد أصبح الاستثمار من أهم التخصصات التي يرغب في دراستها و معرفة كل جديد عنها أصحاب الأعمال أو الراغبين في المتاجرة عن طريق البورصة و أصبحت البورصة المصرية من أهم الأسواق الناشئة في الشرق الأوسط حيث أنها رتبت من اوائل هذه الأسواق في العديد من المواقع و المجلات العلمية ، حيث بلغ الرأس مال السوقي حوالى ٥٢٣,٢٧٠,٦٣٩,١٠٥ جنيه مصري حيث يمثل ٢٤ % من الناتج المحلي الإجمالي في ٢٠١٤.

يمثل الاستثمار الأجنبي في البورصة المصرية ٨,١ % كعرب و ٢,٨ % كغير عرب. لذا أصبح من المهم دراسة تأثير هذه الملكيات على السوق و معرفة ما إذا كان تأثيرات إيجابية أو سلبية و كيفية ربطها بالواقع و الظروف الاقتصادية و المالية للدولة.

- يقوم البحث علي الفروض التاليه:
- هناك علاقة إيجابية بين المنشآت العربية – شراع و تذبذب العائد على السهم.
- هناك علاقة إيجابية بين المنشآت العربية – بيع و تذبذب العائد على السهم.
- هناك علاقة إيجابية بين المستثمرين العرب – شراء و تذبذب العائد على السهم.
- هناك علاقة إيجابية بين المستثمرين العرب – بيع و تذبذب العائد على السهم.
- توصل البحث إلى أن هناك علاقة إيجابية بين المتغيرين الأساسين فى البحث و هما المنشآت العربية و المستثمرين العرب و تذبذب العائد على السهم.

Abstract:

The research examines the relationship between Arab Institution and Investors and stock return volatility through hypothesizing that there is a positive relationship between the independent variable and the dependent variable“ stock return volatility”.

Autoregressive Distributed Lagged Model is used to measure data accuracy through applying Unit Root Analysis. The Research objectives as follow: Identifying how stock volatility is affected by the size of Arab –Institutions- Buy (AIB), Identifying how stock volatility is affected by the size of Arab –Institutions- Sell (AIS) at EGX, Identifying how stock volatility is affected by the size of Arab –Individuals- Buy (APB) at EGX and Identifying how stock volatility is affected by the size of Arab –Individuals- Buy (APS) at EGX.

The research hypotheses; There is a positive relationship between Arab Investing and stock return volatility at the Egyptian stock market.The research has two main contributions; first, it proves that there are positive and significant relationships between Arab Investing’s sub-variables and stock return volatility and this proves that there is a positive and significant relationship between the main variable “Arab Investing’s” and stock return volatility at EGX.

Introduction:

This research empirically investigates the relationship between Arab Institutions and Investors and how it affects volatility at the Egyptian stock market based on data collected by researcher on foreign ownership in EGX and Market return for the period from 2005 to 2014. The study contributes to the current discussion on volatility, how it affects stock market efficiency and factors increasing volatility through modeling volatility.

Recently, investment has become one of the desirable specifications for business people, especially for the area of stock market. As a result, stock market has become a main source for investing money and a purpose for those who want to make fortunes. Egyptian stock market is an important emerging stock market in the Middle East where Bloomberg has ranked it as one of the best emerging markets. In 2014, its market capitalization reached about 523,270,639,105 L.E according to EGX.

In addition, it accounted for 24% of Egyptian GDP according to Oxford Business Group Report on Egypt in 2013.
The research examines the relationship between Arab Institution and Investors and stock return volatility through hypothesizing that there is a positive relationship between the independent variable and the dependent variable“ stock return volatility”. Autoregressive Distributed Lagged Model is used to measure data accuracy through applying Unit Root Analysis.
The chapter consists of the following points;

A-Research Objectives:

1. Identifying how stock volatility is affected by the size of Arab –Institutions- Buy (AIB)
2. Identifying how stock volatility is affected by the size of Arab –Institutions-Sell (AIS) at EGX.
3. Identifying how stock volatility is affected by the size of Arab –Individuals- Buy (APB) at EGX.
4. Identifying how stock volatility is affected by the size of Arab –Individuals- Buy (APS) at EGX.

B-Research Problem:

Arab Institutions and Individuals consider a major part of investing in Egyptian Stock Market; researcher examines its influence on the stock return volatility through their volume trade.

C-Research Hypotheses:

Two types of hypotheses are examined, a main hypotheses and sub-hypotheses, as Arab Investing at EGX is classified into as following Arab –Institutions- Buy (AIB), Arab –Institutions-Sell (AIS), Arab –Individuals- Buy (APB), Arab –Individuals- Sell (APS).

D-Main Hypothesis:

There is a positive relationship between Arab Investing and stock return volatility at the Egyptian stock market.

Sub-Hypotheses:

1. There is a positive relationship between size of Arab –Institutions- Buy (AIB) and stock return volatility at EGX.

2. There is a positive relationship between size of Arab – Institutions-Sell (AIS) and stock return volatility at EGX.
3. There is a positive relationship between size of Arab – Individuals- Buy (APB) and stock return volatility at EGX.
4. There is a positive relationship between size of Arab – Individuals- Buy (APS) and stock return volatility at EGX.

E-Research Methodology:

- Data Collection:

Data Collection Method:

Secondary data has been used to test hypotheses.

Data Source:

Data has been collected from Egypt for Information Dissemination (EGID) which is a sole aggregator and authorized distributor of the Egyptian Exchange' Listed Companies' information.

Population:

The Data intervals are daily for 10 years starting from 2005 to Oct. 2014. Data has been collected for both daily market turnover and daily foreign trade volume. The Research is designed to examine volatility on daily basis for 2480 days as a study population.

- Data Analysis and Interpretation:

In data analysis, we have three objectives; having an overview of data, testing the goodness of data and testing research hypotheses.

- Research Model

Based on the previous theoretical framework, the researcher can introduce the research variables as follows:

Dependent variable:Volatility (Y)

Stock return volatility is a movement in stock return varied during normal and abnormal times. Investors use volatility as a statistical measure of risk when making their investment decisions.

The independent variables (explanatory variables):

Foreign ownership is defined as the number of shares owned by foreign institutions or investors. The researcher divides foreign ownership into the following types:

1- Arab –Institutions- Buy: (AIB)
2- Arab –Institutions-Sell: (AIS)
3-Arab –Persons- Buy: (APB)
4-Arab –Persons- Sell: (APS)
5- Non-Arab –Institutions- Buy: (FIB)
6-Non-Arab –Institutions- Sell: (FIS)
7-Non-Arab – Persons - Buy: (FPB)
8-Non-Arab – Persons - Sell: (FPS)

In this research, the relationship between foreign ownership and stock return volatility is estimated using Autoregressive Distributed Lagged ARDL model.

According to Alam & Ahmad, 2010, and Tomanova, 2013, the model has two main advantages; first, the model can be applied regardless of stationary prosperities of variables. However, researcher presents a stationary test through unit root test before applying the model. Second, the model allows

identifying long-term relationship between variables and can be used regardless of whether regressors' character is I (1) or I (0).

Adkins, 2011, in his textbook on principles of Econometrics, defined it as the model that combines finite distributed Lags and its autoregressive is considered. Current research will apply Adkins model as following;

$$y_t = \delta + \theta_1 y_{t-1} + \cdots + \theta_p y_{t-p} + \delta_0 x_t + \delta_1 x_{t-1} + \cdots + \delta_q x_{t-q} + v_t$$

Testing the Hypotheses:

This section presents the models used to test the research hypotheses. Auto Regressive distributed Lagged model (ADRL) was used as a time series technique to test the effect of one or more independent variables and lagged dependent on one dependent variable.

Model (1)

Ha: There is a positive relationship between size of Arab –Institutions- Buy (AIB) and stock return volatility at EGX.

ARDL model is used to investigate if there is a positive relationship between

AIB (X) and Stock return volatility (Y). The results are listed below:

Table (15) summarizes the estimates of the model using Stock return volatility as the dependent variable.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_AIB	**0.084540**	**0.007979**	**10.59531**	**0.0000**
LOG_Y(-1)	**0.480931**	**0.018736**	**25.66839**	**0.0000**

LOG_Y(-2)	**0.369405**	**0.018663**	**19.79329**	**0.0000**
C	**0.785675**	**0.111085**	**7.072754**	**0.0000**
R-squared	**0.696210**	**Mean dependent var**		**8.819870**
Adjusted R-squared	**0.695822**	**S.D. dependent var**		**0.287846**
S.E. of regression	**0.158754**	**Akaike info criterion**		**-0.841228**
Sum squared resid	**59.25168**	**Schwarz criterion**		**-0.831437**
Log likelihood	**994.5458**	**Hannan-Quinn criter.**		**-0.837663**
F-statistic	**1795.964**	**Durbin-Watson stat**		**2.109622**
Prob(F-statistic)	**0.000000**			

Table (15): model (1) estimation

From table (15), the following results can be reported:

1. The final model is
   LOG_Y =0.785+0.0845 LOG_AIB+0.481 LOG_Y (-1) + 0.369 LOG_Y (-2) Where Y (-1) is Stock return volatility with lag (1)

   Y (-2) is Stock return volatility with lag (2)
2. The P-value for LOG_AIB suggests that AIB has a positive and significant effect on the Stock return volatility.

3. The P-value for the constant is 0.0. The value is less than the significance level (α =0.05) which means that the constant has a meaning and we cannot eliminate it.

Checking assumptions and model 1 (evaluation):

To check the assumption of auto correlationship regarding the calculated value of Durbin Watson statistic is 2.109 and the two tabulated values [dl =1.648 and du =1.708 at k = 3], the calculated value is between du and (4 – du) and it's close to 2. So, there is no evidence for the auto correlationship problem in the model.

1- Normality assumption for model 1

The following figure shows the distribution of the residuals of model 1

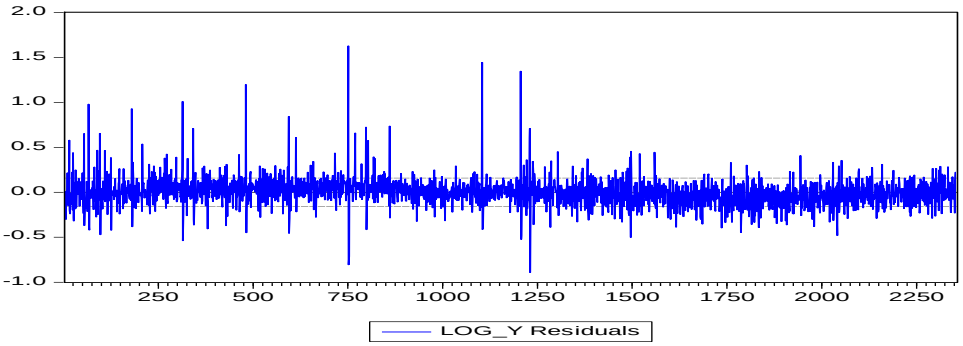

Figure 9: Distribution of residuals of model 1

Moreover, normality test is used to check the normality assumption about the residuals and table (16) shows the results.

Mean	**5.77e-15**
Median	**0.000373**
Std Dev	**0.8158**
Jarque-Bera	**22362.96**
Probability	**0.049**

Table (16): Jarque-Bera test of normality for model 1

Since the probability is almost the significance level, we can say that the residuals have a normal distribution.

Multicolinearity assumption for model 1:

The result are reported as following:

Variance inflation factor VIF was measured in table (17)

Variable	Coefficient Variance	Centered VIF
LOG_AIB	**6.37E-05**	**1.026244**
LOG_Y(-1)	**0.000351**	**2.717019**
LOG_Y(-2)	**0.000348**	**2.700493**

Table (17): VIF for model (1)

Table (17) shows that all values of Variance inflation factor VIF do not exceed value (10) which means that there is no evidence for multicolinearity problem.

2- Evaluation of Goodness of Fit for Model (1):

a. The coefficient of determination r^2 =69.6% which means that AIB and the lagged Stock return volatility are responsible to explain 69.6% of changes in Stock return volatility over time and 30.4% is due to random error.
b. Adj- r^2 = 69.5%; this value is close to or equivalent to the value of r^2 which means that the power of explanation after isolating the number of explanatory variables equals 69.5%. in turn, this appears to be a good explanatory power.
c. The p-value for f-test to test the goodness of the whole model is less than the significance level (α =0.05) , so that

the whole model can be acceptable and the empirical results can be applied.

Model (2)

Hb: There is a positive relationship between size of Arab – Institutions-Sell (AIS) and stock return volatility at EGX.

ARDL model is used to investigate if there is a positive relationship between AIS (X) and SRV (Y). The results are listed below:

Table (18) summarizes the estimated model using Stock return volatility as the dependent variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_AIS	0.092168	0.008431	10.93175	0.0000
LOG_Y(-1)	0.761808	0.012554	60.68320	0.0000
C	1.519307	0.111557	13.61910	0.0000
R-squared	0.647437	Mean dependent var		8.819797
Adjusted R-squared	0.647138	S.D. dependent var		0.287806
S.E. of regression	0.170963	Akaike info criterion		-0.693462
Sum squared resid	68.77461	Schwarz criterion		-0.686122
Log likelihood	819.8985	Hannan-Quinn criter.		-0.690789
F-statistic	2160.496	Durbin-Watson stat		2.428396
Prob(F-statistic)	0.000000			

Table (18) model (2) estimation

From table (18), the following results can be reported:

1. The final model is
   LOG_Y =1.519 +0.0921 LOG_AIS+0.7618 LOG_Y (-1)
   Where: Y (-1) is Stock return volatility with lag (1)

2. The P-value for LOG_AIS suggests that AIS has a positive significant effect on the Stock return volatility.
3. The P-value for the constant is 0.0 and the value is less than the significance level (α =0.05) which means that the constant has a meaning and we cannot eliminate it.

Checking assumptions and model 2 (evaluation):

To check the assumption of auto correlationship regarding the calculated value of Durbin Watson statistic is 2.428 and the two tabulated values [dl =1.552 and du =1.803 at k = 2], the calculated value is between (4-du) and (4 – dl) and we cannot determine whether the auto correlationship problem exists in the model or not because it is inconclusive region.

1- Normality assumption for model 2

The following figure shows the distribution of the residuals of model 2

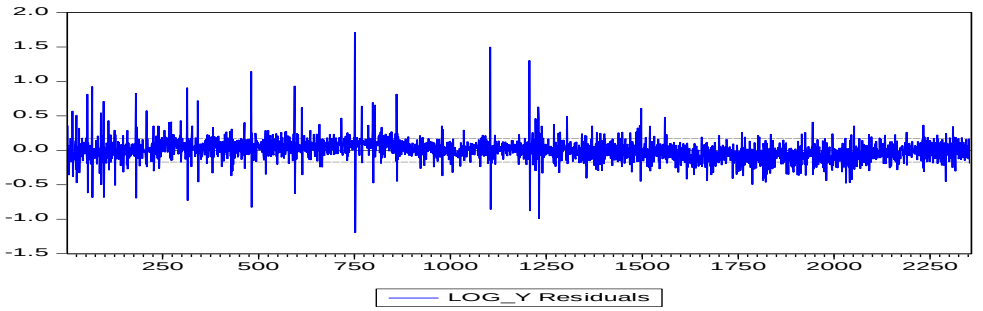

Figure 10: Distribution of residuals of model 2

Moreover, normality test is used to check the normality assumption about the residuals and table (20) shows the results.

Mean	**-2.22e-14**
Median	**0.0016**
StdDev	**0.7128**
Jarque-Bera	**17764.58**
Probability	**0.047**

Table (19): Jarque-Bera test of normality for model (2)

Since the probability almost the significance level, we can say that the residuals have a normal distribution.

2- Multicolinearity assumption for model 2:

The results are reported on Variance Inflation Factor (VIF) was measured in table (20).

Variable	Coefficient Variance	Centered VIF
LOG_AIS	**7.11E-05**	**1.053595**
LOG_Y(-1)	**0.000158**	**1.053595**

Table (20): VIF for model (2)

Table (20) shows that all values of Variance Inflation Factor (VIF) do not exceed value (10), so it appears that there is no evidence for multicolinearity problem.

3- Evaluation of Goodness of Fit for Model(2):

a. The coefficient of determination r^2 =64.74% . It means that AIS and the lagged Stock return volatility are

responsible for explaining 64.74% of changes in Stock return volatility over time and 35.26% is due to random error.

b. Adj- r^2 = 64.71 %, this value is close or equivalent to the value of r^2 which means that the power of explanation after isolating the number of explanatory variables equals 64.71% and this appears to be a good explanatory power.
c. The p-value for f-test to test the goodness of the whole model (f-statistic) is less than the significance level (α =0.05) , so that the whole model can be acceptable and the empirical results can be applied.

Model (3)

Hc: There is a positive relationship between size of Arab – Individuals- Buy (APB) and stock return volatility at EGX.

ARDL model is used to investigate if there is a positive relationship between APB and SRV. The results are listed below:

Table (21) summarizes the estimates of model 3 using Stock return volatility as the dependent variable.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_APB	0.121303	0.008295	14.62434	0.0000
LOG_Y(-2)	0.911742	0.006036	151.0493	0.0000
R-squared	0.574757	Mean dependent var		8.819870
Adjusted R-squared	0.574576	S.D. dependent var		0.287846

S.E. of regression	**0.187746**	**Akaike info criterion**	**-0.506603**
Sum squared resid	**82.93996**	**Schwarz criterion**	**-0.501708**
Log likelihood	**598.5255**	**Hannan-Quinn criter.**	**-0.504821**
Durbin-Watson stat	**1.720523**		

Table (21): model (3) estimation

From table (21), the following results can be reported:

1. The final model is:
   LOG_Y =0.1213 LOG_APB+0.911 LOG_Y (-2)
   Where Y (-2) denotes Stock return volatility with lag (2).

2. The P-value for LOG_APB suggests that APB has a positive and significant effect on the Stock return volatility.
3. The P-value for the constant is greater than the significance level (α =0.05) which means that the constant has a meaningless and we can eliminate it.

Checking assumptions and model (3) (evaluation):

To check the assumption of auto correlationship regarding the calculated value of Durbin Watson statistic is 1.72 and the two tabulated values [dl =1.552 and du =1.803 at k = 2], the calculated value is between du and dl. So, we cannot determine

whether the auto correlationship problem exists in the model or not because it is the inconclusive region.

1- Normality assumption for model 3

The following figure shows the distribution of the residuals of model 3

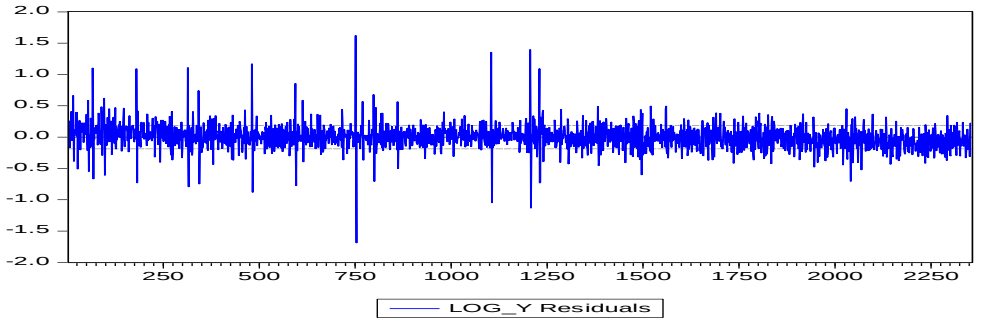

Figure 11: Distribution of residuals of model 3

Moreover, normality test is used to check the normality assumption about the residuals and table (22) shows the results.

Mean	**0.001**
Median	**-.0016**
StdDev	**0.8769**
Jarque-Bera	**13238.85**
Probability	**0.039**

Table (22): Jarque-Bera test of normality for model 3

Since the probability is almost the significance level, we can say that the residuals have a normal distribution.

2- Multicolinearity assumption for model 3:

The results are reported on the Variance Inflation Factor (VIF) which is measured in table (23).

Variable	Coefficient Variance	Centered VIF

LOG_APB	**6.35E-05**	**1.089310**
LOG_Y(-2)	**0.000177**	**1.089310**

Table (23) VIF for model (3)

Table (23) shows that all values of Variance Inflation Factor (VIF) do not exceed value (10). So, it appears that that there is no evidence for the multicolinearity problem.

4- Evaluation Goodness of Fit for Model (3):

a. The coefficient of determination r^2 =57.47% . It means that APB and the lagged Stock return volatility are responsible for explaining 57.47% of the variability in Stock return volatility over time and 42.53% is due to random error.
b. The value of Adj- r^2 is 57.45% and this value is close to or equivalent to the value of r^2 which means the power of explanation after isolating the number of explanatory variables equals 57.45%. This appear to be a good explanatory power.
c. The p-value for f-test to test the goodness of the whole model (f- statistic) is less than the significance level (α =0.05) , so that the whole model can be acceptable and the empirical results can be applied.

Model (4)

Hd: There is a positive relationship between size of Arab – Individuals- Sell (APS) and stock return volatility at EGX.

ARDL model is used to investigate if there is a positive relationship between APS and SRV. The results are listed below:

Table (24) summarizes the estimates of the model using Stock return volatility as the dependent variable.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_APS	0.103891	0.007633	13.61064	0.0000
LOG_Y(-2)	0.711911	0.013339	53.37136	0.0000
C	1.879067	0.112749	16.66586	0.0000
R-squared	0.620118	Mean dependent var		8.819870
Adjusted R-squared	0.619795	S.D. dependent var		0.287846
S.E. of regression	0.177488	Akaike info criterion		-0.618555
Sum squared resid	74.09263	Schwarz criterion		-0.611212
Log likelihood	731.3486	Hannan-Quinn criter.		-0.615881
F-statistic	1919.701	Durbin-Watson stat		1.572357
Prob(F-statistic)	0.000000			

Table (24): model (4) estimation

From table (24) the following results can be represented:

1. The final model is
   LOG_Y =1.87+0.103 LOG_APS+0.711 LOG_Y (-2)
   Where Y (-2) denotes Stock return volatility with lag (2).

2. The P-value for LOG_APS suggests that APS has a positive significant effect on the Stock return volatility.
3. The P-value for the constant is 0.0 and the value is less than the significance level (α =0.05) which means that the constant has a meaning and we cannot eliminate it.

Checking assumptions and model 4 (evaluation):

To check the assumption of auto correlationship regarding the calculated value of Durbin Watson statistic is 1.572 and the two tabulated values [dl =1.552 and du =1.803 at k = 2], the calculated value is between (4-du) and (4 – dl). So, we cannot determine whether the auto correlationship problem exist in the model or not because it is the inconclusive region.

1- **Normality assumption for model 4**

The following figure shows the distribution of the residuals of model 4.

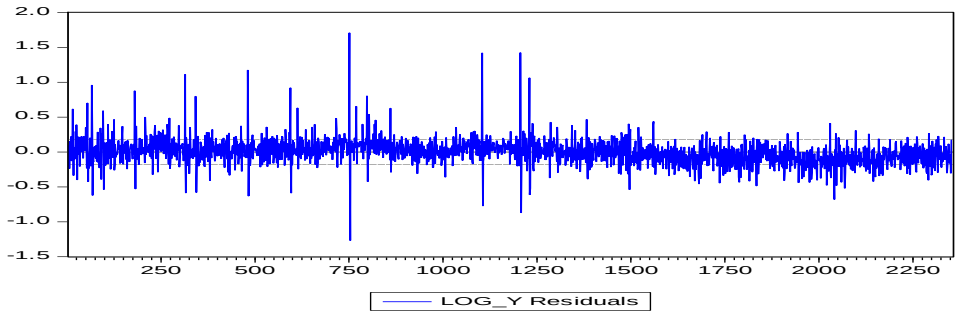

Figure 12: Distribution of residuals of model 4

Moreover, normality test is used to check the normality assumption about the residuals and table (25) shows the results.

Mean	**-2.22e-14**
Median	**0.002**
StdDev	**0.774**

Jarque-Bera	**13604.78**
Probability	**0.045**

Table (25): Jarque-Bera test of normality for model (4).

Since the probability almost the significance level, so we can say that the residuals have a normal distribution.

2- **Multicolinearity assumptionfor model 4:**

The results are reported on Variance Inflation Factor(VIF) which was measured in table (26).

Variable	Coefficient Variance	Centered VIF
LOG_APS	**5.83E-05**	**1.103618**
LOG_Y(-2)	**0.000178**	**1.103618**

Table (26): VIF for model (4)

Table (26) shows that all values of Variance Inflation Factor (VIF) do not exceed value (10). So, it appears that that there is no evidence for the multicolinearity problem.

3- **Evaluation of Goodness of Fit for Model (4):**

a. The coefficient of determination r^2 =62.01% which means that APS and the lagged Stock return volatility are responsible for explaining 62.01% of changes in Stock return volatility over time and 37.99% is due to random error.
b. The value of Adj- r^2 is 69.5% and this value is close to or equivalent to the value of r^2 which means that the power of explanation after isolating the number of explanatory

variables equals 61.97%. win turn, this appears to be a good explanatory power.

c. The p-value for f-test to test the goodness of the whole model (f-statistic) is less than the significance level (α =0.05) , so that the whole model can be acceptable and the empirical results can be applied.

Model (2)

Hb: There is a positive relationship between size of Arab – Institutions-Sell (AIS) and stock return volatility at EGX.

ARDL model is used to investigate if there is a positive relationship between AIS (X) and SRV (Y). The results are listed below:

Table (18) summarizes the estimated model using Stock return volatility as the dependent variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_AIS	0.092168	0.008431	10.93175	0.0000
LOG_Y(-1)	0.761808	0.012554	60.68320	0.0000
C	1.519307	0.111557	13.61910	0.0000
R-squared	0.647437	Mean dependent var		8.819797
Adjusted R-squared	0.647138	S.D. dependent var		0.287806
S.E. of regression	0.170963	Akaike info criterion		-0.693462
Sum squared resid	68.77461	Schwarz criterion		-0.686122
Log likelihood	819.8985	Hannan-Quinn criter.		-0.690789
F-statistic	2160.496	Durbin-Watson stat		2.428396
Prob(F-statistic)	0.000000			

Table (18) model (2) estimation

From table (18), the following results can be reported:

1. The final model is
   LOG_Y =1.519 +0.0921 LOG_AIS+0.7618 LOG_Y (-1)
   Where: Y (-1) is Stock return volatility with lag (1)

2. The P-value for LOG_AIS suggests that AIS has a positive significant effect on the Stock return volatility.
3. The P-value for the constant is 0.0 and the value is less than the significance level (α =0.05) which means that the constant has a meaning and we cannot eliminate it.

Checking assumptions and model 2 (evaluation):

To check the assumption of auto correlationship regarding the calculated value of Durbin Watson statistic is 2.428 and the two tabulated values [dl =1.552 and du =1.803 at k = 2], the calculated value is between (4-du) and (4 – dl) and we cannot determine whether the auto correlationship problem exists in the model or not because it is inconclusive region.

4- Normality assumption for model 2

The following figure shows the distribution of the residuals of model 2

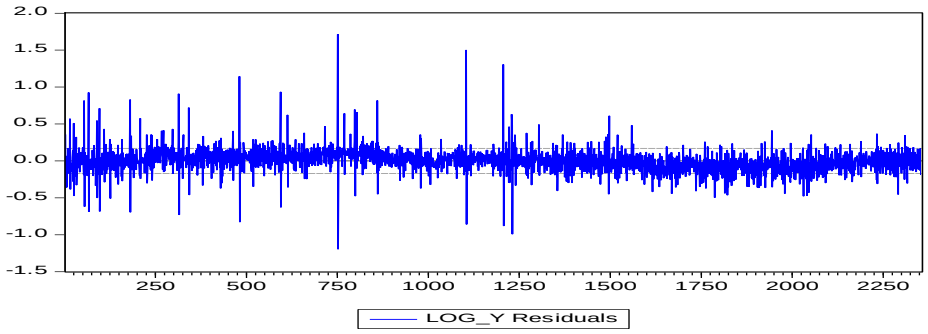

Figure 10: Distribution of residuals of model 2

Moreover, normality test is used to check the normality assumption about the residuals and table (20) shows the results.

Mean	**-2.22e-14**
Median	**0.0016**
StdDev	**0.7128**
Jarque-Bera	**17764.58**
Probability	**0.047**

Table (19): Jarque-Bera test of normality for model (2)

Since the probability almost the significance level, we can say that the residuals have a normal distribution.

5- Multicolinearity assumption for model 2:

The results are reported on Variance Inflation Factor (VIF) was measured in table (20).

Variable	Coefficient Variance	Centered VIF
LOG_AIS	**7.11E-05**	**1.053595**
LOG_Y(-1)	**0.000158**	**1.053595**

Table (20): VIF for model (2)

Table (20) shows that all values of Variance Inflation Factor (VIF) do not exceed value (10), so it appears that there is no evidence for multicolinearity problem.

6- Evaluation of Goodness of Fit for Model(2):

a. The coefficient of determination r^2 =64.74% . It means that AIS and the lagged Stock return volatility are

responsible for explaining 64.74% of changes in Stock return volatility over time and 35.26% is due to random error.

b. Adj- r^2 = 64.71 %, this value is close or equivalent to the value of r^2 which means that the power of explanation after isolating the number of explanatory variables equals 64.71% and this appears to be a good explanatory power.
c. The p-value for f-test to test the goodness of the whole model (f-statistic) is less than the significance level (α =0.05) , so that the whole model can be acceptable and the empirical results can be applied.

Model (3)

Hc: There is a positive relationship between size of Arab – Individuals- Buy (APB) and stock return volatility at EGX.

ARDL model is used to investigate if there is a positive relationship between APB and SRV. The results are listed below:

Table (21) summarizes the estimates of model 3 using Stock return volatility as the dependent variable.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_APB	0.121303	0.008295	14.62434	0.0000
LOG_Y(-2)	0.911742	0.006036	151.0493	0.0000
R-squared	0.574757	Mean dependent var		8.819870
Adjusted R-squared	0.574576	S.D. dependent var		0.287846
S.E. of	0.187746	Akaike info criterion		-0.506603

regression			
Sum squared resid	**82.93996**	**Schwarz criterion**	**-0.501708**
Log likelihood	**598.5255**	**Hannan-Quinn criter.**	**-0.504821**
Durbin-Watson stat	**1.720523**		

Table (21): model (3) estimation

From table (21), the following results can be reported:

1. The final model is:
   LOG_Y =0.1213 LOG_APB+0.911 LOG_Y (-2)
   Where Y (-2) denotes Stock return volatility with lag (2).

2. The P-value for LOG_APB suggests that APB has a positive and significant effect on the Stock return volatility.
3. The P-value for the constant is greater than the significance level (α =0.05) which means that the constant has a meaningless and we can eliminate it.

Checking assumptions and model (3) (evaluation):

To check the assumption of auto correlationship regarding the calculated value of Durbin Watson statistic is 1.72 and the two tabulated values [dl =1.552 and du =1.803 at k = 2], the calculated value is between du and dl. So, we cannot determine whether the auto correlationship problem exists in the model or not because it is the inconclusive region.

3- Normality assumption for model 3

The following figure shows the distribution of the residuals of model 3

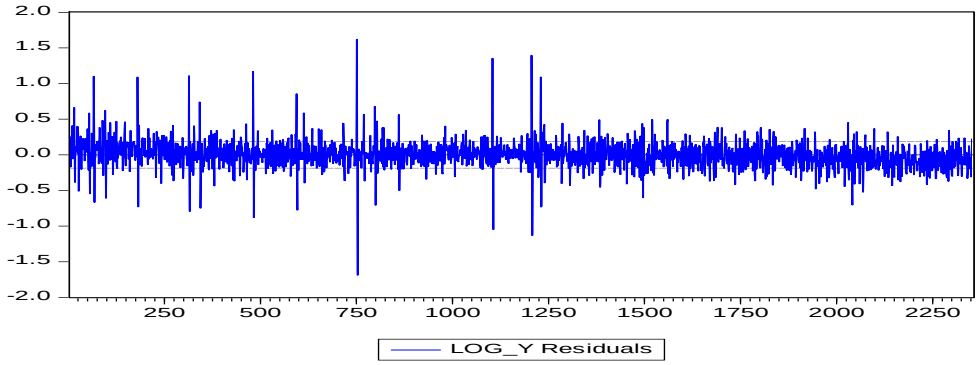

Figure 11: Distribution of residuals of model 3

Moreover, normality test is used to check the normality assumption about the residuals and table (22) shows the results.

Mean	**0.001**
Median	**-.0016**
StdDev	**0.8769**
Jarque-Bera	**13238.85**
Probability	**0.039**

Table (22): Jarque-Bera test of normality for model 3

Since the probability is almost the significance level, we can say that the residuals have a normal distribution.

4- Multicolinearity assumption for model 3:

The results are reported on the Variance Inflation Factor (VIF) which is measured in table (23).

Variable	Coefficient Variance	Centered VIF
LOG_APB	**6.35E-05**	**1.089310**
LOG_Y(-2)	**0.000177**	**1.089310**

Table (23) VIF for model (3)

Table (23) shows that all values of Variance Inflation Factor (VIF) do not exceed value (10). So, it appears that that there is no evidence for the multicolinearity problem.

5- Evaluation Goodness of Fit for Model (3):

a. The coefficient of determination r^2 =57.47% . It means that APB and the lagged Stock return volatility are responsible for explaining 57.47% of the variability in Stock return volatility over time and 42.53% is due to random error.

b. The value of Adj- r^2 is 57.45% and this value is close to or equivalent to the value of r^2 which means the power of explanation after isolating the number of explanatory variables equals 57.45%. This appear to be a good explanatory power.

c. The p-value for f-test to test the goodness of the whole model (f- statistic) is less than the significance level (α =0.05) , so that the whole model can be acceptable and the empirical results can be applied.

Model (4)

Hd: There is a positive relationship between size of Arab – Individuals- Sell (APS) and stock return volatility at EGX.

ARDL model is used to investigate if there is a positive relationship between APS and SRV. The results are listed below:

Table (24) summarizes the estimates of the model using Stock return volatility as the dependent variable.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG_APS	0.103891	0.007633	13.61064	0.0000
LOG_Y(-2)	0.711911	0.013339	53.37136	0.0000
C	1.879067	0.112749	16.66586	0.0000
R-squared	0.620118	Mean dependent var		8.819870
Adjusted R-squared	0.619795	S.D. dependent var		0.287846
S.E. of regression	0.177488	Akaike info criterion		-0.618555
Sum squared resid	74.09263	Schwarz criterion		-0.611212
Log likelihood	731.3486	Hannan-Quinn criter.		-0.615881
F-statistic	1919.701	Durbin-Watson stat		1.572357
Prob(F-statistic)	0.000000			

Table (24): model (4) estimation

From table (24) the following results can be represented:

1. The final model is
   LOG_Y =1.87+0.103 LOG_APS+0.711 LOG_Y (-2)
   Where Y (-2) denotes Stock return volatility with lag (2).

2. The P-value for LOG_APS suggests that APS has a positive significant effect on the Stock return volatility.
3. The P-value for the constant is 0.0 and the value is less than the significance level (α =0.05) which means that the constant has a meaning and we cannot eliminate it.

Checking assumptions and model 4 (evaluation):

To check the assumption of auto correlationship regarding the calculated value of Durbin Watson statistic is 1.572 and the two tabulated values [dl =1.552 and du =1.803 at k = 2], the calculated value is between (4-du) and (4 – dl). So, we cannot determine whether the auto correlationship problem exist in the model or not because it is the inconclusive region.

4- **Normality assumption for model 4**

The following figure shows the distribution of the residuals of model 4.

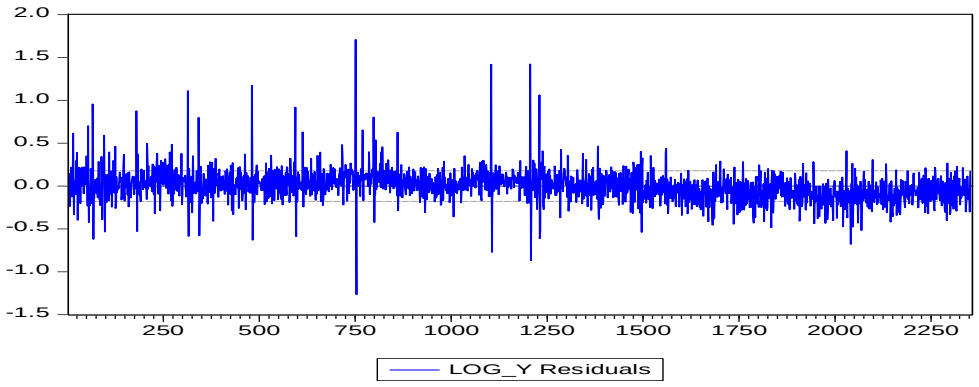

Figure 12: Distribution of residuals of model 4

Moreover, normality test is used to check the normality assumption about the residuals and table (25) shows the results.

Mean	**-2.22e-14**
Median	**0.002**
StdDev	**0.774**
Jarque-Bera	**13604.78**
Probability	**0.045**

Table (25): Jarque-Bera test of normality for model (4).

Since the probability almost the significance level, so we can say that the residuals have a normal distribution.

5- **Multicolinearity assumptionfor model 4:**

The results are reported on Variance Inflation Factor(VIF) which was measured in table (26).

Variable	Coefficient Variance	Centered VIF
LOG_APS	**5.83E-05**	**1.103618**
LOG_Y(-2)	**0.000178**	**1.103618**

Table (26): VIF for model (4)

Table (26) shows that all values of Variance Inflation Factor (VIF) do not exceed value (10). So, it appears that that there is no evidence for the multicolinearity problem.

6- **Evaluation of Goodness of Fit for Model (4):**

a. The coefficient of determination r^2 =62.01% which means that APS and the lagged Stock return volatility are

responsible for explaining 62.01% of changes in Stock return volatility over time and 37.99% is due to random error.

b. The value of Adj- r^2 is 69.5% and this value is close to or equivalent to the value of r^2, which means that the power of explanation after isolating the number of explanatory variables equals 61.97%. win turn, this appears to be a good explanatory power.
c. The p-value for f-test to test the goodness of the whole model (f-statistic) is less than the significance level (α =0.05) , so that the whole model can be acceptable and the empirical results can be applied.

Research Findings:

Research concluded that all models have coefficient of determination r^2, which is more than 50% as following. For first model, $r^2$is 69.6% and random error 30.4%. For second model; r^2 is 64.74% and random error 35.26%. For third model; r^2 is 57.47% and random error is 42.53%. For forth model; r^2 is 62.01% and random error 37.99%.

The p-value for f-test to test the goodness of the whole model (f-statistics) is less than significance level (α =. 05), so that the whole model can be acceptable and the empirical results can be applied.

The research has two main contributions; first, it proves that there are positive and significant relationships between Arab Investing's sub-variables and stock return volatility and this proves that there is a positive and significant relationship between the main variable "Arab Investing's" and stock return volatility at EGX.

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