EVALUATION OF THE IMPACT OF DAY TRADING ON THE EGYPTIAN STOCK MARKET

Islam Azzam, American University in Cairo
Jasmin Fouad, American University in Cairo

ABSTRACT

This paper investigates the effect of the introduction of day trading on the Egyptian stock market. We applied a GARCH (1, 1)–GED model on daily returns and volumes of 41 companies listed in the Egyptian Stock market for the period from 2004 to 2008. The results suggest that day trading decreases ex-post return, and ex-post and ex-ante risk. We also find no significant change in the coefficient of variation, which indicates that the return-to-risk relationship remains unchanged. The results of the paper further indicate that the introduction of day trading has no significant effect on the volatility clustering, volatility persistence, arrival of information and the liquidity of the market.

JEL: C22; G11; G15

KEYWORDS: GARCH; volatility clustering; day trading

INTRODUCTION

In recent years Cairo and Alexandria Stock Exchange (CASE), the only official stock exchange in Egypt, has been one of the most evolving emerging stock markets. In the year 2008, the value of trade of stocks and bonds reached 553.2 billion Egyptian pounds (103.3 Billion US Dollars) compared to 261.6 billion Egyptian pounds (48.8 billion US Dollars) in 2007. The average monthly value of trade in 2008 was 46.1 billion Egyptian pounds (8.6 billion US Dollars). CASE grew from a market capitalization of 602 billion Egyptian pounds (112.5 billion US Dollars) in 2007 to 813 billion Egyptian pounds in 2008(115.93 billion US Dollars). The market capitalization of 2008 represents 111% of the Egyptian Gross Domestic Product (GDP).

Based on the IFC financial report on risk and return in emerging markets, during the period from July 2007 to June 2008, Egypt was ranked number eight of 28 emerging countries with respect to return, and 18 out of 28 in terms of risk ranked from high to low. The annual market return was 29.7%, while the market risk was 6.94% for the same period. By the end of June 2008, Standard and Poor's and IFCG Indices for the price –earning ratio (P/E) for Egypt was 15.7 compared to an average P/E ratio of 26.4 for emerging markets. This indicates that the prices of stocks in the Egyptian market are on average relatively low compared to other emerging markets.

While developed stock markets can perform efficiently as they possess sound, deregulated structures, and the required technical and technological expertise; the emerging markets are still at large suffering from poor financial structures, which is reflected among others in the low liquidity of their stock markets (Singh,1999).

Like many other emerging stock markets, the Cairo and Alexandria Stock Exchange (CASE) has embarked on a restructuring program aiming to improve market operations by implementing a number of procedures. One of the recent developments by the CASE in August 2005 was the introduction of day trading. While some investors take long-term positions, relying on their confidence that their stock price will rise over time and provide them with long-term profits, other stock market investors, namely the day traders, take very short-term positions to profit from small fluctuations in share prices that occur between

the opening and closing price of the same day. A day trader closes out all positions at the end of every day, profiting from small price fluctuations that occur during the time span of one trading day. It should be noted that day traders differ from intra-day traders who hold positions for several days or weeks aspiring to profit from larger price changes. The main aim of this strategy is the enhancement of liquidity, which is expected to lead to a reduction of the downside risk, and the decrease of the cost of investing in projects that do not pay off in the long term (Yartey and Adjasi, 2007). In a liquid market, the investors can easily and at a low cost sell their shares in a poor performing company, and shift to better performing companies (Bencivenga and Smith, 1991). This will lead to a better allocation of capital, through its mobility in the economy.

To be licensed for day trading in CASE, brokerage firms must apply a set of requirements enforced by the Capital Market Authority (CMA), which include depositing 5 million Egyptian pounds ($945,180) with a clearing bank as a margin deposit. Day trading is risky, thus regulations require brokerage firms to assure that clients understand this risk by signing an agreement. A day trader can only trade 1/10,000 (one over ten thousands) of the number of listed shares registered for the company in the Stock Exchange. Any listed company is allowed to be traded according to the day trading system if: (1) the minimum trading days of the stock is not less than 95% of the working days; (2) the average number of brokerage companies, which execute transactions on the stock, is more than 50 companies over the year; (3) the stock average number of transactions per day should be at least 1% of the total market average number of transaction per year; and (4) the minimum free float should be 15% of the total listed shares.

The evaluation of day trading on emerging stock markets has received little attention in financial literature, so this research, to the best of our knowledge, is our contribution to fill this gap. This research evaluates the effect of day trading on ex-post and ex-ante risk and return; and analyzes its impact on liquidity, volatility clustering and persistence, and the arrival of information effect.   The remainder of this study is organized as follows: Section 2 provides a literature review. Section 3 describes the data used in our analysis. Section 4 presents the methodology that contains the diagnostic tests and the model. Section 5 provides the empirical results and a discussion of these results. Section 6 concludes.

LITERATURE REVIEW

The majority of published research on day trading deals with the U.S. market and other developed markets. Only a limited number of the recent studies have tackled the emerging markets. Day trading and Intra-day patterns in volatility were first documented by Wood, McInish and Ord (1985), Jain and Joh (1988) and Harris (1986). They find a high variance of returns at the beginning and at the end of the trading day. Foster and Viswanathan (1990) observe a U- shaped pattern in the variance of stocks price changes in the New York Stock Exchange (NYSE). Gerenty and Mulherin (1992) also report evidence of a U-shaped pattern in the intra-day volume for NYSE stocks.

Several authors have focused on developing models to document observed patterns, and usually they find a U-shape pattern in volume and volatility across the developed markets studied. Ozenbas, Schwartz and Wood (2002) have examined intraday share price volatility over the year 2000 for five markets, which include the New York Stock Exchange, NASDAQ, London Stock Exchange, Euronext Paris and Deutsche Bourse. They also found a U-shaped intraday volatility pattern, with a particularly sharp spike for the opening half hour. McInish and Wood (1990) report that for stocks traded on the Toronto Stock Exchange both returns and volume show a U-shaped pattern. Hamao and Hasbrouck (1993) find for the Tokyo Stock Exchange that the mean squared return and the bid-ask spread tend to be higher at the beginning and at the end of the two trading sessions during the day. Hillion and Spatt (1992) report for France a U-shaped pattern for volatility, i.e. high volatility at the open, declining thereafter with a slight rise at the close. Niemayer and Sandas (1993) witnessed a similar pattern on the Stockholm exchange. In

a study on the Australian trading system, Aitken et.al (1993) provides evidence of similar intra-day regularities.

Before Amihud and Mendelson (1987), daily volatility was measured from close-to-close returns. For the first time in their study, they compared the variance of the open-to-open returns to the close-to-close returns of the stocks of the Dow Jones Industrial Index. They found that open-to-open returns had a higher variance compared to the close-to-close returns. Hasbrouk and Schwartz (1988) show that the variance estimated for the same data sample, however at different sampling frequencies, give a different result. This result differs from the random walk model of stock returns, were the sampling frequency does not change the number of variance. Almgren and Lorenz (2006) show that the trading horizon of one day is the usual manner institutions trade. This is consistent with the results of Breen, Hodrick and Korajczyk (2002) who found that 92.5% of the sample of institutional orders is completed the same day they are initiated. Campbell, Ramadorai, and Schwartz (2007), using quarterly intra-day trading data from the New York Stock Exchange, found that institutional trading is highly persistent. In other words, institutions buy or sell the same stocks on successive days.

The intra-day patterns of volume and volatility found in Wood, McInish, and Ord (1985), Harris (1986), Jain and Joh (1988), and Pagano, Peng, and Schwartz (2008) can be explained with models of discretionary liquidity trading. Another important explanation for these results was found in Tversky and Kahneman (1974) that behavioral biases can cause an over-reaction or under- reaction of traders to news, which will lead to return periodicity. Anderson and Bollersov (1997) who found substantial evidence of intra-day periodicity of return volatility confirmed this result. Another group of studies has tried to build models to explain time dependent patterns in security trading and forecast the trading patterns in the future. For example, Admanti and Pfeiderer (1988) present a theoretical microstructure model, which explains the trading behavior of liquidity traders, who trade in order to minimize their trading costs. On the other hand, the market closure model by Brock and Kleidon (1992) is based on the idea that an optimal portfolio is a function of the ability to trade. The two models predict different patterns in volume and volatility. The first model predicts a concentration of volume during the trading day, and a positive correlation between volume and volatility. They explain this result by asymmetric information, where there   exist two groups of traders in the market, a group of informed versus a group of uninformed traders. However, the market closure model forecasts that volume will be U-shaped during the day and that volume is independent of volume. They explain this different result by the availability of uniform information to all traders in the market.

In addition to the evidence from the developed markets, there are very few studies that studied day trading in emerging markets, and most of them focused on the Asian stock exchanges. For example, Choe and Shin (1993) in their study about the Korean stock market (KSE) found that the close-to-close volatility is higher when the market closes in continuous trade than when it closes in call auction. On the same market Copeland and Jones (2002) find that the intraday effects in KSE translate is a U-shape pattern over the day. Bildik (2001) in his study on the Istanbul Stock Exchange finds a U- shaped pattern for the morning trading session followed by an L–shaped pattern for the afternoon session. To the best of our knowledge, there exists no literature examining the effect of day trading on African or Middle Eastern countries. This paper is the first to examine the effect of day trading on the Egyptian Stock Exchange.

 DATA

We examine a sample of Egyptian stocks that were introduced to the day trading system. To be included in the sample each stock must trade between July 1, 2004 and March 1, 2008, and be listed in the Egyptian Stock market throughout the period. Our sample includes 41 companies out of 373 companies listed in CASE in the year 2008 (Table 1). The daily total volume of trade for these selected 41 companies represent on average 98% of the market daily total volume of trade (CASE, 2008). The data includes

daily closing prices, which are the average prices weighted by the volume of trade, and the trading volume of the stocks.

Table 1: Data Description

Company	Date Price Limit was Removed	Date Day Trading was Introduced	Date Day Trading was Removed	Number of Obs. Before Day Trading	Number of Obs. After Day Trading	Total Number of Obs.
Alexandria Mineral Oils Company	2-Oct-05	4-Feb-07		326	366	692
Alexandria Spinning & Weaving	1-Feb-07	6-May-07		63	304	367
Arab Cotton Ginning	7-Aug-04	20-Oct-05		298	675	973
Arab Polvara Spinning & Weaving	7-Sep-03	20-Oct-05		306	677	983
ASEC Mining (ASCOM)		30-Jan-08		188	126	314
Commercial International Bank	20-Oct-05	20-Oct-05		305	676	981
Credit Agricole Egypt	31-Aug-06	8-Jul-07		204	263	467
Egyptian Company for Mobile Services	17-Jul-02	20-Oct-05	3-Aug-06	305	189	494
Egyptian Electrical Cables	17-Jun-07	30-Jan-08		148	125	273
Egyptian Financial Group-Hermes	7-Sep-03	20-Oct-05		306	674	980
Egyptian for Housing Development	17-Jun-07	30-Jan-08		145	124	269
Egyptian for Tourism Resorts		10-Feb-07		347	362	709
Egyptian Media Production City	17-Jul-02	20-Oct-05		311	672	983
El Ahli Investment and Development		4-Feb-07		592	366	958
EL Ezz Aldekhela Steel - Alexandria		20-Oct-05	3-Aug-06	156	189	345
El Ezz Porcelain (Gemma)	7-Feb-05	20-Oct-05		173	675	848
El Ezz Steel Rebars	26-Jan-06	2-May-06		63	552	615
El Nasr Clothes & Textiles (Kabo)		4-Feb-07		504	365	869
El Watany Bank of Egypt	17-Jul-02	20-Oct-05	3-Aug-06	306	190	496
Export Development Bank of Egypt	18-Jul-02	30-Jan-08		857	125	982
Extracted Oils	1-Feb-07	17-Sep-07		154	213	367
GB Auto		30-Jan-08		131	125	256
Housing & Development Bank	26-Jan-06	6-May-07		296	307	603
Medinet Nasr Housing	17-Jul-02	18-Mar-07	3-May-07	620	29	649
Misr Cement (Qena)	7-Apr-05	20-Oct-05	18-Dec-05	135	37	172
Misr Chemical Industries	7-Sep-03	20-Oct-05	4-Feb-07	304	309	613
Nile Cotton Ginning	26-Jan-06	2-May-06		62	550	612
Olympic Group Financial Investments	3-Aug-04	20-Oct-05	4-Jan-06	301	49	350
Orascom Construction Industries	17-Jul-02	20-Oct-05	15-Mar-07	306	340	646
Orascom Hotels And Development...	7-Feb-05	20-Oct-05		173	678	851
Orascom Telecom Holding	17-Jul-02	20-Oct-05		306	678	984
Oriental Weavers	7-Feb-05	18-Dec-05	15-Mar-07	212	300	512
Raya Holding For Technology	26-Jan-06	6-Aug-06		129	486	615
Remco for Touristic Villages Construction		3-Feb-08		193	114	307
Sidi Kerir Petrochemicals	26-Jun-05	6-Aug-06		272	487	759
Six of October Development & Investment	1-Feb-07	6-May-07		63	306	369
South Valley Cement		4-Feb-07		502	367	869
Telecom Egypt	13-Dec-05	4-Feb-07		274	367	641
United Housing & Development	26-Jan-06	4-Feb-07		248	361	609
Upper Egypt for Construction	17-Jun-07	30-Jan-08		150	124	274
Vodafone Egypt Telecommunications		20-Oct-05	3-Aug-06	190	280	470

*The above table describes the data. Column 1 shows the names of the companies in our sample. Columns 2, 3 and 4 represent the dates when the price limits were removed, day trading was introduced, and day trading was removed respectively. Columns 5 and 6 report the number of observations before the introduction of day trading and after the introduction respectively. Column 7 is the total number of observations for each company.*

We calculate the daily total return as follows:

$$TR_t = \ln(P_t) - \ln(P_{t-1})$$ (1)

Where TR_t is the total daily return on the stock at time t; P_t and P_{t-1} is the daily stock price on trading day t and $t-1$ respectively. We account for corporate action in the calculation of total return. Table 1 describes the data used, highlighting for each company the dates when the day trading system was introduced and /or removed. It also shows the dates when the price limits were removed. To control for the effect of price limit removal, the starting date for each company is the date when price limits were removed, and the ending date for the data is July 31 2008, unless the company was removed from the day trading system before this date. As the study compares the effect of day trading before and after, Table 1 reports the number of observations before and after day trading for each of the 41 companies of the study. Figure 1 below represents CASE30 Index which shows that the data before and after day trading are balanced; in other words, the trends observed before day trading are repeated after day trading. This controls for the market effect in our analysis.

Figure 1: Cairo and Alexandria Stock Exchange Index for the Most Active 30 Companies During the Period July 1st 2004 to July 31st 2008
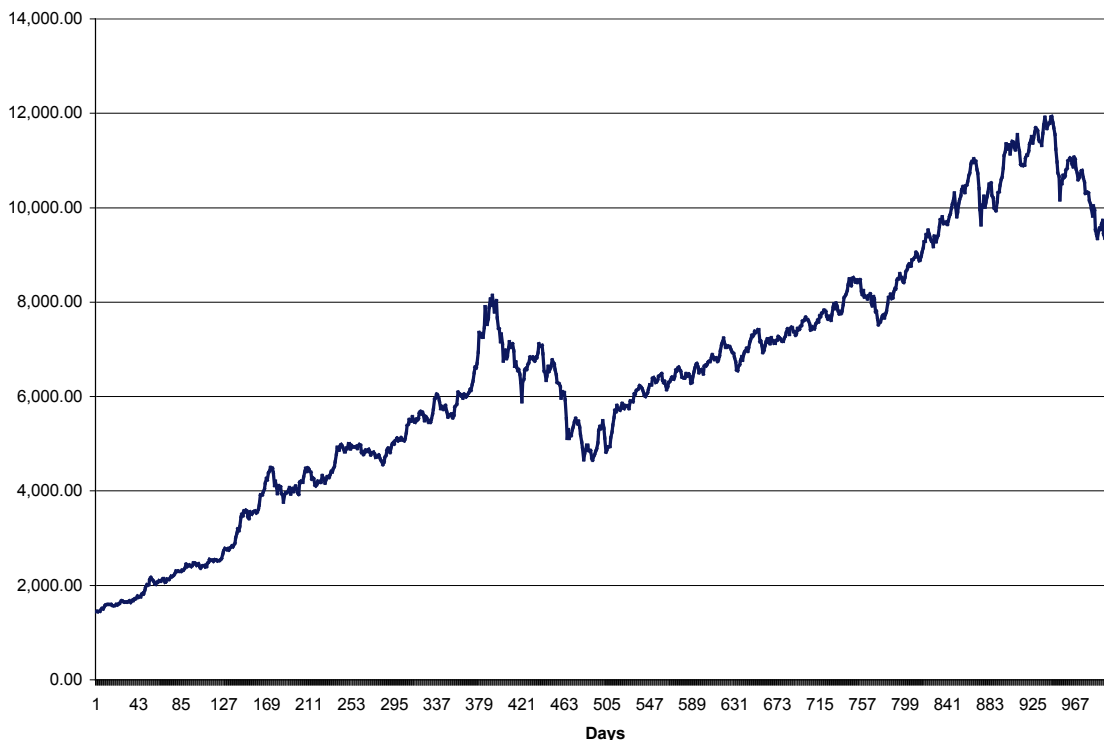
This figure shows the CASE 30 index (index for the 30 most actively traded stocks in the Egyptian Stock market) for the total time span before and after the introduction of day trading. The graph shows a balanced trend; in other words, the trends observed before day trading are repeated after day trading.

METHODOLOGY

The period of study is divided into two sub sets: (1) data before day trading and (2) data after day trading. We first examine the effect of the introduction of day trading on ex-post mean and volatility, then on ex-ante mean and volatility of the stocks. We also investigate its effect on volatility clustering and volatility persistence and market liquidity.

It is worth noting that there is no consensus in the literature about which is the preferred estimation method to be adopted by emerging markets. For an analysis of the two estimation methods, see Damodaran (1999) and Saabye (2003). We therefore apply the two methods first the historical approach (ex-post), and secondly the forward – looking approach (ex-ante).

In applying the first approach we examine the effect of day trading on ex-post mean return and volatility, we use the available historical data to calculate the traditional average return and standard deviation. The second approach rests on estimating ex -ante mean return and volatility, which represent the future expectations of the investors. Both ex- ante return and volatility are generated from the same model used in this paper. This model also estimates the volatility clustering and persistence and the arrival of news effects.

For specifying the model, diagnostic tests were run on the data. These tests determine the best model to fit the data and are represented in Tables 2 and 3. Table 2 summarizes the statistics for the daily total return for the whole sample, including the mean, median, standard deviation, Ljung-Box Q –statistics, Jarque-Bera test and Augmented Dickey Fuller (ADF) test on total return. The diagnostic tests highlight the following:

- The Ljung –Box Q Statistics reflects a significant autocorrelation in the total returns for 10 lags. It is significant for 35 out of 41 companies showing patterns of autocorrelation in the total returns.
- The high values of the Jarque-Bera test (Jarque and Bera, 1980) for normality decisively reject the hypothesis of a normal distribution for 39 out of 41 companies.
- The Augmented Dickey Fuller (ADF) test for the stationarity of the total return showed that the whole data is stationary.

These diagnostic tests resulted in the selection of an autoregressive process for the total return, described as follows:

$$TR_t = \alpha_0 + \alpha_1 TR_{t-1} + \alpha_2 Volume_t + \varepsilon_t \qquad (2)$$

Where TR_t is the total daily return on the stock at time t, and $Volume_t$ is the logarithm of the daily volume of trade at time t, while the error term is ε_t.

The Autoregressive Conditional Heteroskedasticity (ARCH) model, (Engle, 1982) and its generalization, the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model, (Bollerslev, 1986) is a widely used methodology applied on daily financial data. There are different representations for GARCH models: GARCH, GARCH-M, EGARCH and PGARCH. Other famous asymmetric GARCH models include Threshold GARCH (TGARCH) of Zakoian (1994), the Quadratic GARCH (QGARCH) of Sentana (1995), the Volatility Switching ARCH (VS-ARCH) of Fornari and Mele (1996), and Logistic Smooth Transition ARCH (LST-ARCH) of Gonzales-Rivera (1996) and Hagerud (1996).

We also find in the recent financial literature (Arago and Nieto, 2005) the application of GARCH models with a wide variety of densities (i.e. Normal, GED (Generalized Error Distribution), Student-*t*, GED with a fixed parameter, and Student-*t* with a fixed degree of freedom).

Table 2: Summary Statistics for the Daily Total Returns of Day Trading Companies for the Period July 1, 2004 Until July 31, 2008

Company	Mean	Median	Standard Deviation	Ljung-Box Q-statistics (10) on TR_t (*p*-Value)	Jarque-Bera Normality Test on TR_t	ADF Test on TR_t
Alexandria Mineral Oils Company	0.00022	-0.00095	0.02060	0.007	2218.0	-19.88
Alexandria Spinning & Weaving	-0.00217	-0.00367	0.02882	0.000	89.5	-15.92
Arab Cotton Ginning	0.00142	-0.00080	0.03620	0.000	475.6	-26.82
Arab Polvara Spinning & Weaving	0.00058	-0.00201	0.03846	0.000	602.1	-26.39
ASEC Mining (ASCOM)	0.00463	-0.00215	0.03554	0.000	17.8	-12.10
Commercial International Bank	0.00131	0.00077	0.02021	0.12**	670.6	-29.82
Credit Agricole Egypt	-0.00008	-0.00147	0.02163	0.056*	197.8	-20.12
Egyptian Company for Mobile Services	0.00149	0.00014	0.03141	0.086*	275.9	-20.51
Egyptian Electrical Cables	0.00224	0.00000	0.04274	0.017	178.9	-14.21
Egyptian Financial Group-Hermes	0.00278	0.00134	0.03221	0.000	377.4	-18.39
Egyptian for Housing Development	0.00247	-0.00384	0.05442	0.000	94.0	-13.19
Egyptian for Tourism Resorts	0.00599	0.00135	0.04119	0.000	25.5	-18.29
Egyptian Media Production City	-0.00056	-0.00266	0.02935	0.000	319.9	-21.56
El Ahli Investment and Development	0.00278	-0.00070	0.03693	0.000	84.0	-23.80
EL Ezz Aldekhela Steel - Alexandria	0.00272	0.00349	0.05007	0.006	18.4	-15.99
El Ezz Porcelain (Gemma)	0.00109	0.00000	0.03452	0.000	261.4	-24.25
El Ezz Steel Rebars	0.00010	0.00000	0.02809	0.000	326.0	-21.38
El Nasr Clothes & Textiles (Kabo)	0.00266	0.00000	0.03312	0.000	2.69	-22.76
El Watany Bank of Egypt	0.00230	0.00000	0.02826	0.162**	170.6	-20.84
Export Development Bank of Egypt	0.00125	0.00000	0.02785	0.000	647.1	-26.26
Extracted Oils	-0.00084	-0.00719	0.03699	0.000	538.6	-14.91
GB Auto	0.00018	-0.00013	0.02342	0.157**	116.3	-14.58
Housing & Development Bank	-0.00003	-0.00360	0.04391	0.000	339.3	-19.91
Medinet Nasr Housing	0.00172	0.00000	0.04530	0.061*	109.9	-23.63
Misr Cement (Qena)	0.00367	0.00103	0.02206	0.028	27.6	-11.08
Misr Chemical Industries	0.00104	0.00000	0.03411	0.002	115.1	-21.79
Nile Cotton Ginning	0.00161	-0.00191	0.04186	0.000	528.3	-16.60
Olympic Group Financial Investments	0.00255	0.00034	0.02848	0.215**	54.1	-17.43
Orascom Construction Industries	0.00273	0.00073	0.02208	0.006	137.0	-22.76
Orascom Hotels And Development...	0.00183	0.00110	0.03094	0.000	1443.5	-24.75
Orascom Telecom Holding	0.00153	0.00087	0.02101	0.000	306.4	-27.47
Oriental Weavers	0.00013	0.00000	0.02752	0.111**	239.4	-21.04
Raya Holding For Technology	-0.00102	-0.00161	0.02847	0.000	125.2	-20.99
Remco for Touristic Villages Construction	0.00061	-0.00320	0.03357	0.000	43.1	-14.38
Sidi Kerir Petrochemicals	0.00031	-0.00129	0.02207	0.000	250.7	-23.97
Six of October Development & Investment	-0.00007	0.00027	0.02005	0.036	9.99	-17.13
South Valley Cement	0.00462	0.00000	0.03022	0.000	1.96	-20.56
Telecom Egypt	-0.00042	-0.00059	0.02401	0.000	153.2	-18.23
United Housing & Development	0.00065	-0.00074	0.03627	0.003	194.5	-21.82
Upper Egypt for Construction	0.00024	-0.00514	0.04122	0.000	67.8	-12.92
Vodafone Egypt Telecommunications	0.00049	0.00000	0.02840	0.740**	2368.1	-21.28

This table provides diagnostic tests .Columns 2,3 and 4 show the mean, median and standard deviations of daily total return (TR), TR=ln (Pt) – ln (Pt-1), where(Pt) is the daily closing price in time t . Column 5 demonstrates the significance level (p- value) for the Lijung –Box Q statistics (10), which tests for autocorrelation. ***, **and * indicate significance at the 1, 5 and 10 percent levels respectively. Column 6 shows the Jarque-Bera Normality Test on total return (TR). Column 7 shows the augmented Dickey Fuller test on TR which test for the stationarity of the data

Table 3: Diagnostic Tests on the Residuals for Determining the Model That Fits the Daily Total Returns of Day Trading Companies for the Period July 1, 2004 Until July 31, 2008

Company	Breusch-Godfrey Serial Correlation LM Test on ε_t	Jarque-Bera Normality Test on ε_t	ARCH LM Test on ε_t
Alexandria Mineral Oils Company	21.2	1624.8	25.2
Alexandria Spinning & Weaving	13.9	142.6	6.1
Arab Cotton Ginning	36.6	583.8	69.5
Arab Polvara Spinning & Weaving	44.5	564.3	54.4
ASEC Mining (ASCOM)	3.6	11.0	8.8
Commercial International Bank	2.5	668.6	109.5
Credit Agricole Egypt	3.7	77.3	26.9
Egyptian Company for Mobile Services	2.8	259.9	11.2
Egyptian Electrical Cables	8.3	271.5	22.6
Egyptian Financial Group-Hermes Holding Company	13.3	423.1	108.2
Egyptian for Housing Development & Reconstruction	4.0	75.8	25.0
Egyptian for Tourism Resorts	29.9	35.6	23.5
Egyptian Media Production City	89.2	134.6	7.0
El Ahli Investment and Development	1.2	53.2	70.3
EL Ezz Aldekhela Steel – Alexandria	1.7	14.1	23.5
El Ezz Porcelain (Gemma)	39.6	366.1	21.3
El Ezz Steel Rebars	4.1	440.2	88.6
El Nasr Clothes & Textiles (Kabo)	1.2	7.9	21.8
El Watany Bank of Egypt	5.8	112.0	1.1
Export Development Bank of Egypt	10.0	299.7	58.4
Extracted Oils	3.8	401.8	29.7
GB Auto	0.95	119.3	3.2
Housing & Development Bank	18.8	330.2	69.4
Medinet Nasr Housing	12.6	83.8	19.4
Misr Cement (Qena)	8.7	8.3	0.55
Misr Chemical Industries	27.4	168.6	17.0
Nile Cotton Ginning	11.6	541.1	100.6
Olympic Group Financial Investments	26.7	58.4	7.4
Orascom Construction Industries	1.5	111.6	28.4
Orascom Hotels And Development...	0.4	1325.3	18.4
Orascom Telecom Holding	1.8	262.4	33.0
Oriental Weavers	0.07	242.1	42.4
Raya Holding For Technology And Communications	18.3	217.9	15.5
Remco for Touristic Villages Construction	3.5	106.3	55.2
Sidi Kerir Petrochemicals	36.1	157.2	45.2
Six of October Development & Investment	0.6	9.3	10.1
South Valley Cement	1.3	2.1	4.7
Telecom Egypt	7.8	146.2	24.3
United Housing & Development	10.5	202.5	25.1
Upper Egypt for Construction	9.2	36.1	12.3
Vodafone Egypt Telecommunications	0.9	2301.6	0.1

In this table we apply diagnostic tests on the residuals of the model $TR_t = \alpha_0 + \alpha_1 TR_{t-1} + \alpha_2 Volume_t + \varepsilon_t$. TR_t is the daily total return at time t while $Volume_t$ stands for the log of the daily volume of trade at time t. Column (2) shows the Breusch—Godfrey Serial Correlation (LM) test on the residual (ε_t) .Column (3) shows the results for the Jacque- Bera normality test on ε_t .Column (4) offers the results of the ARCH Lagrange multiplier (LM) Test on ε_t to test for the existence of the ARCH process.

To determine whether the error ε_t in equation 2 follows an autoregressive conditional heteroskedasticity model, we ran an ARCH Lagrange multiplier (LM) test on ε_t, to investigate whether the standardized residuals exhibit additional ARCH effects. The results in Table 3 showed that for the majority of companies in the study (37 out of 41) the error term ε_t follows an ARCH process. This confirms the legitimacy of using ARCH/GARCH type models.

Then we tested the normality of ε_t, using the Jarque-Bera test, which indicates that, with the exception of one company, ε_t for all companies is not normally distributed (See Table 3). Since skewness and kurtosis are important features in financial applications, the use of a GARCH model seems more appropriate. Therefore, this study applies a GARCH model with Generalized Error Distribution (GED), hence we add to the GARCH model the GED log-likelihood function for a normalized random error, (see Nelson (1991) and Hamilton (1994)).

We define the GARCH (1, 1)-GED model as follows:

$$TR_t = \alpha_0 + \alpha_1 TR_{t-1} + \alpha_2 Volume_t + \varepsilon_t \tag{2a}$$

$$\sigma_{\varepsilon,t}^2 = \beta_0 + \beta_1 \varepsilon_{t-1}^2 + \beta_2 \sigma_{\varepsilon,t-1}^2 \tag{2b}$$

$$L_{GED} = \sum_{t=1}^{T} \left[\ln\left(\frac{v}{\lambda_v}\right) - 0.5 \left|\frac{z_t}{\lambda_v}\right|^v - (1 + v^{-1}) \times \ln(2) - \ln\Gamma\left(\frac{1}{v}\right) - 0.5\ln(\sigma_t^2) \right]$$

$$\lambda_v = \sqrt{\frac{\Gamma\left(\frac{1}{v} 2^{-\frac{2}{v}-}\right)}{\Gamma\left(\frac{3}{v}\right)}} \tag{2c}$$

For v (positive parameter for the thickness of the tails of the distribution) = two, constant λ = one, the GED becomes the standard normal distribution. To sum up, we used the above-mentioned GARCH (1, 1)-GED model to generate ex-ante return and volatility and to estimate volatility clustering, volatility persistence, and the effect of information arrival before and after day trading. Ex-ante return is the average of the forecasted returns from the mean equation in our GARCH (1, 1)-GED model (Equation 2a). The ex-ante risk is the ex-ante standard deviation which is the average of the square root of the variances generated from the variance equation of our GARCH (1, 1)-GED model (Equation 2b).

EMPIRICAL RESULTS

We estimated our GARCH (1,1)-GED model in equations 2a, 2b and 2c for each company before and after day trading. A modification of the GARCH model (Lamoureux and Lastrapes, 1990, Lee and Ohk, 1992) that we adopted in this study is to add the trading volume as a proxy for information arrival time. Literatures found that volatilities of daily return are positively related to the rate of daily information arrival. The marginal effect of news arrival on total returns is measured by α_2.

Table 4 and Table 5 report the estimated coefficients from our GARCH (1, 1) - GED model before and after day trading respectively. Z-statistics are placed under the estimated coefficients. The arrival of information, measure by α_2, has a significant positive effect on the total returns of 13 companies before, and 15 companies after day trading. The parameter estimates of all the GARCH models in Tables 4 and 5 show that the coefficients, β_1 and β_2, are mostly positive and statistically significant at 1% and 5%, strongly supporting the existence of ARCH and GARCH effect. The volatility clustering, which means high volatilities are followed by low volatilities and visa versa, is measured by β_2. The clustering in

almost all companies before and after day trading is positive and significant ranging from 0.5 till1, indicating that volatilities of the stocks are not constant and change over time.

Table 4: Estimated Coefficients from the GARCH (1,1)-GED Model before Day Trading

Company	α_0	α_1	α_2	β_0	β_1	β_2
Alexandria Mineral Oils Company	-0.0798***	0.0386	0.0151***	0.000011	0.0912**	0.8954***
	(-4.88)	(0.89)	(4.78)	(0.95)	(2.00)	(20.67)
Alexandria Spinning & Weaving	-0.1606**	-0.0104	0.0108**	0.000048***	-0.1584***	1.0498***
	(-2.52)	(-0.10)	(2.50)	(16.47)	(-12.29)	(59.35)
Arab Cotton Ginning	-0.1170***	0.0536	0.0087***	0.000149**	0.2144**	0.7198***
	(-5.02)	(0.88)	(5.11)	(2.23)	(2.40)	(7.86)
Arab Polvara Spinning & Weaving	-0.0944	0.0952*	0.0076***	0.000018*	0.0558**	0.9364***
	(-4.63)***	(1.95)	(4.76)	(1.69)	(1.97)	(36.13)
ASEC Mining (ASCOM)	0.0184	0.3822***	-0.0011	0.000300	0.2069*	0.5790***
	(1.01)	(5.00)	(-0.68)	(1.20)	(1.71)	(2.84)
Commercial International Bank	-0.0537	-0.0952*	0.0044***	0.000012	0.1901**	0.8104***
	(-6.57)***	(-1.93)	(6.79)	(1.42)	(2.68)	(12.21)
Credit Agricole Egypt	-0.0528	0.0812	0.0039**	0.000054**	0.0820	0.7462***
	(-2.19)**	(1.13)	(2.15)	(2.17)	(1.37)	(9.18)
Egyptian Company for Mobile	-0.0271	0.0815	0.0026	0.000015	0.0775*	0.9073***
	(-1.20)	(1.51)	(1.32)	(1.02)	(2.16)	(22.78)
Egyptian Electrical Cables	-0.0474	0.2023**	0.0028	0.000392	0.1729	0.6328***
	(-0.78)	(2.44)	(0.73)	(1.42)	(1.28)	(3.54)
Egyptian Financial Group-Hermes	-0.1921	-0.0860	0.0137***	0.000146*	0.2373**	0.6218***
	(-6.14)***	(-1.42)	(6.43)	(1.79)	(2.12)	(4.12)
Egyptian for Housing Development	0.1313	0.0281	0.0096***	0.000078	0.0753	0.8628***
	(-2.88)***	(0.38)	(2.87)	(1.34)	1.51	14.89
Egyptian for Tourism Resorts	0.0212	0.0855***	-0.0013	0.000024**	0.0083	0.9683***
	(0.89)	(2.60)	(-0.84)	(2.35)	(0.55)	(68.44)
Egyptian Media Production City	-0.0658***	0.1547***	0.0052***	0.000198	0.2155	0.5713**
	(-2.78)	(2.91)	(2.77)	(1.62)	(1.62)	(2.55)
El Ahli Investment and Development	0.0038	0.0556	-0.0002	0.000875**	0.1355***	0.0738
	(0.59)	(1.46)	(-0.37)	(2.30)	(4.24)	(0.20)
EL Ezz Aldekhela Steel – Alexandria	-0.1103***	0.1667**	0.0125***	0.000133	0.1258	0.8210***
	(-2.93)	(2.13)	(3.11)	(1.14)	(1.54)	(8.35)
El Ezz Porcelain (Gemma)	-0.3078***	0.0761	0.0236***	0.000108	0.1139	0.8099***
	(-3.79)	(0.91)	(3.89)	(1.25)	(1.35)	(6.97)
El Ezz Steel Rebars	-0.1174	-0.0159	0.0089	0.000079	0.5073	0.5524***
	(-1.03)	(-0.11)	(1.09)	(0.62)	(1.41)	(3.11)
El Nasr Clothes & Textiles (Kabo)	0.0037	0.0995***	-0.0002	0.000006	0.0032	0.9874***
	(0.33)	(2.90)	(-0.20)	(1.55)	(0.65)	(448.17)
El Watany Bank of Egypt	-0.0608***	-0.0383	0.0050***	0.000031	0.1692**	0.7980***
	(-5.20)	(-0.82)	(5.31)	(1.56)	(2.28)	(9.29)
Export Development Bank of Egypt	-0.0176***	0.1245***	0.0016***	0.000077***	0.2796***	0.6462***
	(-2.88)	(3.64)	(2.94)	(3.52)	(4.51)	(11.41)
Extracted Oils	0.0357	-0.0636	-0.0034**	0.000568***	1.0561**	0.0012
	(1.57)	(-0.93)	(-2.02)	(3.09)	(2.41)	(0.03)
GB Auto	-0.0017	-0.0849*	0.0002	0.000013	0.0866	0.9215***

Company	α_0	α_1	α_2	β_0	β_1	β_2
Housing & Development Bank	(-0.36)	(-1.69)	(0.37)	(0.79)	(0.96)	(12.85)
	-0.0460**	0.1207*	0.0037**	0.000106	0.4784***	0.5985***
Medinet Nasr Housing	(-2.51)	(1.81)	(2.25)	(1.63)	(3.48)	(7.33)
	-0.0192***	0.0245	0.0018***	0.000087*	0.1730***	0.8059***
Misr Cement (Qena)	(-3.09)	(0.71)	(3.26)	(1.86)	(3.13)	(15.45)
	-0.0744***	0.0936	0.0078***	0.000030	0.0631	0.8372***
Misr Chemical Industries	(-6.30)	(1.38)	(6.61)	(0.74)	(0.84)	(4.56)
	-0.0802***	0.0310	0.0070***	0.000135**	0.2409***	0.6427***
Nile Cotton Ginning	(-3.69)	(0.53)	(3.86)	(2.22)	(2.67)	(6.22)
	0.2302	0.2176	-0.0171	0.002142***	0.6347***	-0.2235***
Olympic Group Financial Investments	(0.86)	(1.45)	(-0.92)	(3.81)	(2.82)	(-2.84)
	-0.0610***	0.0142	0.0057***	0.000189	0.1861**	0.5741**
Orascom Construction Industries	(-5.64)	(0.23)	(5.90)	(1.44)	(2.02)	(2.44)
	-0.0213	0.0098	0.0019*	0.000010	0.0773*	0.9053***
Orascom Hotels And Development...	(-1.57)	(0.20)	(1.72)	(0.95)	(1.77)	(17.20)
	-0.1351*	0.1299*	0.0101*	0.000063	0.0623	0.9032***
Orascom Telecom Holding	(-1.81)	(1.70)	(1.93)	(0.58)	(1.13)	(11.85)
	-0.0480***	0.0402	0.0038***	0.000021	0.0408	0.9209***
Oriental Weavers	(-2.71)	(0.78)	(2.90)	(1.46)	(1.43)	(20.40)
	-0.0048	0.1039*	0.0005	0.000114	0.2333	0.6805***
Raya Holding For Technology	(-0.53)	(1.92)	(0.61)	(1.32)	(1.41)	(3.88)
	-0.0857	0.0462	0.0064	0.000772	-0.0382	0.5669
Remco for Touristic Villages	(-1.25)	(0.56)	(1.20)	(0.28)	(-0.36)	(0.35)
	-0.0252	0.1665***	0.0021	0.000068	0.0799	0.7985***
Sidi Kerir Petrochemicals	(-1.15)	(2.59)	(1.27)	(1.48)	(1.55)	(6.84)
	-0.0327**	0.1493**	0.0024*	0.000176*	0.1911**	0.5540***
Six of October Development	(-1.98)	(2.20)	(1.92)	(1.80)	(2.16)	(3.15)
	-0.1666***	-0.0703	0.0140***	0.000021	-0.1599***	1.0689***
South Valley Cement	(-2.95)	(-0.64)	(3.08)	(1.56)	(-12.72)	(31.84)
	-0.0003	0.2736***	0.0003	0.000011	0.0137	0.9725***
Telecom Egypt	(-0.07)	(6.79)	(0.81)	(1.39)	(1.60)	(74.97)
	-0.1190***	0.1601***	0.0081***	0.000092	0.1667*	0.7261***
United Housing & Development	(-3.30)	(2.62)	(3.31)	(1.52)	(1.87)	(5.52)
	-0.1587***	0.0763	0.0126***	0.000055	0.2263***	0.7580***
Upper Egypt for Construction	(-4.21)	(1.26)	(4.27)	(1.43)	(2.88)	(11.44)
	-0.1358***	0.1425	0.0087***	0.000474**	0.4327*	0.2846
Vodafone Egypt Telecommunications	(-3.63)	(1.56)	(3.55)	(2.14)	(1.67)	(1.16)
	-0.0245***	0.0675***	0.0020***	0.000242	0.0832	0.2922
	(-5.22)	(2.78)	(4.84)	(0.70)	(0.65)	(0.33)

This Table reports the results of the estimation of the GARCH (1,1)-GED Model before the introduction of day trading:

$$TR_t = \alpha_0 + \alpha_1 TR_{t-1} + \alpha_2 Volume_t + \varepsilon_t$$

$$\sigma^2_{\varepsilon,t} = \beta_0 + \beta_1 \varepsilon^2_{t-1} + \beta_2 \sigma^2_{\varepsilon,t-1}$$

Below the estimated coefficients you find the z statistic in parentheses. ***, **and * indicate significance at the 1, 5 and 10 percent levels respectively. α_2 represents the arrival of information., while β_2 stands for the volatility clustering and the volatility persistence is measure by the sum of $\beta_1 + \beta_2$.,which is close to one for almost all companies.

Table 5: Estimated Coefficients from the GARCH (1,1)-GED Model After Day Trading

Company Name	α_0	α_1	α_2	β_0	β_1	β_2
Alexandria Mineral Oils Company	-0.0134***	0.1082**	0.0028***	0.000012	0.1708**	0.7165***
	(-2.62)	(2.22)	(2.61)	(1.55)	(2.32)	(6.06)
Alexandria Spinning & Weaving	-0.1284***	0.0902	0.0091***	0.000060*	0.1939**	0.7211***
	(-5.76)	(1.56)	(5.87)	(1.71)	(2.56)	(6.50)
Arab Cotton Ginning	-0.1050***	0.1494***	0.0071***	0.000014**	0.1697***	0.8230***
	(-6.59)	(3.98)	(6.66)	(2.26)	(4.93)	(29.39)
Arab Polvara Spinning & Weaving	-0.0627***	0.1299***	0.0044***	0.000034*	0.3045***	0.7266***
	(-5.07)	(3.37)	(4.96)	(2.10)	(5.69)	(20.00)
ASEC Mining (ASCOM)	-0.0934***	0.0684	0.0074**	0.000101	0.2403*	0.6043**
	(-2.66)	(0.69)	(2.56)	(1.34)	(1.83)	(2.56)
Commercial International Bank	-0.0154**	0.0326	0.0013**	0.000023*	0.1564***	0.7879***
	(-1.97)	(0.90)	(2.11)	(2.23)	(3.74)	(15.25)
Credit Agricole Egypt	-0.0566***	-0.0309	0.0047***	0.000180*	0.2641**	0.3402
	(-4.10)	(-0.49)	(4.23)	(1.85)	(2.05)	(1.14)
Egyptian Company for Mobile	-0.0163	0.1056	0.0013	0.000588***	0.2566	-0.0806
	(-1.07)	(1.50)	(0.98)	(3.07)	(1.48)	(-0.43)
Egyptian Electrical Cables	-0.2694***	0.0662	0.0165***	0.000603	0.1265	0.3711
	(-3.21)	(0.68)	(3.26)	(0.66)	(0.63)	(0.43)
Egyptian Financial Group-Hermes	-0.0900***	0.1638***	0.0063***	0.000017**	0.1441***	0.8349***
	(-4.79)	(4.15)	(4.91)	(2.29)	(4.48)	(24.34)
Egyptian for Housing Development	-0.2409***	0.1621*	0.0169***	0.000274	0.3493**	0.6000***
	(-3.19)	(1.69)	(3.24)	(1.36)	(2.20)	(5.27)
Egyptian for Tourism Resorts	-0.1148***	0.1760***	0.0074***	0.000022*	0.1471***	0.8250***
	(-4.72)	(3.43)	(4.79)	(1.83)	(2.86)	(16.84)
Egyptian Media Production City	-0.0864***	0.1380	0.0065***	0.000088**	0.1315***	0.7558***
	(-6.32)	(3.47)***	(6.34)	(1.98)	(2.80)	(8.43)
El Ahli Investment and Development	-0.1505***	-0.0204	0.0122***	0.000018	0.1279***	0.8676***
	(-8.97)	(-0.45)	(9.13)	(1.30)	(3.00)	(24.06)
EL Ezz Aldekhela Steel	-0.0220	0.0982	0.0022	0.001140**	0.2217	0.2036
	(-0.64)	(1.22)	(0.63)	(1.97)	(1.62)	(0.61)
El Ezz Porcelain (Gemma)	-0.1440***	0.0327	0.0115***	0.000038**	0.1390***	0.8255***
	(-10.81)	(0.90)	(11.01)	(2.33)	(3.82)	(21.11)
El Ezz Steel Rebars	-0.0830***	0.1132***	0.0066***	0.000016***	0.1006***	0.8691***
	(-6.24)	(2.94)	(6.46)	(2.66)	(5.34)	(42.59)
El Nasr Clothes & Textiles (Kabo)	-0.0668***	0.1039**	0.0046***	0.000017	0.1631***	0.8331***
	(-4.26)	(2.13)	(4.29)	(1.28)	(2.63)	(14.93)
El Watany Bank of Egypt	-0.0901***	-0.0411	0.0072***	0.000331	0.0335	0.6716
	(-2.82)	(-0.54)	(2.96)	(0.36)	(0.43)	(0.77)
Export Development Bank	-0.0717	-0.0570	0.0068***	0.000060	0.4997*	0.5228***
	(-5.61)	(-0.84)	(5.53)	(1.32)	(1.89)	(2.89)
Extracted Oils	-0.0306*	0.1751	0.0019	0.000016	0.0912**	0.9036***
	(-1.69)	(2.88)***	(1.47)	(1.07)	(2.06)	(20.31)
GB Auto	-0.0367***	-0.1074	0.0032***	0.000069*	0.6039**	0.3294
	(-2.92) ***	(-0.97)	(2.91)	(1.91)	(2.09)	(1.53)
Housing & Development Bank	-0.0594	0.1042	0.0047***	0.000290***	0.3124**	0.2965*

Company Name	α_0	α_1	α_2	β_0	β_1	β_2
	(-3.58)	(1.79)*	(3.50)	(3.41)	(2.23)	(1.90)
Medinet Nasr Housing	-0.0526***	-0.0435	0.0051***	0.000091	0.1929	0.5938
	(-2.84)	-(0.36)	(2.95)	(0.38)	(0.45)	(0.67)
Misr Cement (Qena)	-0.0818**	0.0611	0.0081**	0.000014	-0.1224	1.0817***
	(-2.08)	(0.46)	(2.21)	(0.30)	(-1.09)	(15.30)
Misr Chemical Industries	-0.0887***	0.1170	0.0075***	0.000003	0.0310	0.9640***
	(-3.71)	(2.30)**	(3.72)	(0.29)	(1.24)	(30.48)
Nile Cotton Ginning	-0.0995***	0.0897**	0.0073***	0.000021**	0.1958***	0.8027***
	(-5.80)	(2.06)	(5.88)	(2.00)	(4.93)	(26.41)
Olympic Group Financial	-0.1228***	-0.0665	0.0111***	0.000166	-0.1670	0.8200**
	(-4.33)	(-0.90)	(4.55)	(0.95)	(-1.42)	(2.28)
Orascom Construction Industries	-0.0232**	0.1531***	0.0021**	0.000005	0.0834**	0.9077***
	(-2.14)	(2.99)	(2.27)	(1.00)	(2.54)	(27.51)
Orascom Hotels	-0.0319***	0.0340	0.0027***	0.000007*	0.0571***	0.9321***
	(-4.77)	(1.00)	(5.03)	(1.69)	(3.23)	(49.34)
Orascom Telecom Holding	-0.0346	0.1288	0.0027***	0.000189***	0.2861***	0.2163
	(-3.62)***	(2.98)***	(3.74)	(3.65)	(3.71)	(1.39)
Oriental Weavers	-0.0147	0.0650	0.0013	0.000011	0.1048**	0.8746***
	(-1.56)	(1.25)	(1.57)	(1.27)	(2.67)	(23.22)
Raya Holding For Technology	-0.1584***	0.0641	0.0121***	0.000101**	0.1585***	0.6175***
	(-10.65)	(1.55)	(10.76)	(1.98)	(2.77)	(4.19)
Remco for Touristic Villages	-0.0680***	0.0410	0.0049***	0.000283	0.4502	0.4636**
	(-3.42)	(0.56)	(3.38)	(1.50)	(1.27)	(2.09)
Sidi Kerir Petrochemicals	-0.0152**	0.1103***	0.0011**	0.000028**	0.1767***	0.7509***
	(-2.53)	(2.83)	(2.47)	(2.11)	(2.64)	(9.71)
Six of October Development	-0.0652***	0.0843	0.0055***	0.000087*	0.1580*	0.5964***
	(-5.81)	(1.48)	(5.87)	(1.67)	(1.87)	(3.22)
South Valley Cement	-0.1176***	0.0127	0.0087***	0.000118**	0.3391***	0.4786***
	(-7.21)	(0.24)	(7.40)	(2.56)	(2.93)	(3.55)
Telecom Egypt	-0.0809***	0.1221	0.0058***	0.000082**	0.3047***	0.4457**
	(-6.35)	(2.23)**	(6.50)	(2.21)	(2.67)	(2.56)
United Housing & Development	-0.1365***	0.0606	0.0108***	0.000027	0.1272**	0.8510***
	(-7.18)	(1.25)	(7.27)	(1.33)	(2.36)	(14.96)
Upper Egypt for Construction	-0.1470***	0.1330	0.0094***	0.000127	0.3311**	0.6348***
	(-3.41)	(1.29)	(3.41)	(1.18)	(2.24)	(4.24)
Vodafone Egypt	0.0000004***	0.000001	0.0000001***	0.197501	0.5342	0.6070
	(-629.38)	(-0.31)	(-542.95)	(0.33)	(0.02)	(0.56)

This Table reports the results of the estimation of the GARCH (1,1)-GED Model after the introduction of day trading:

$$TR_t = \alpha_0 + \alpha_1 TR_{t-1} + \alpha_2 Volume_t + \varepsilon_t$$

$$\sigma_{\varepsilon,t}^2 = \beta_0 + \beta_1 \varepsilon_{t-1}^2 + \beta_2 \sigma_{\varepsilon,t-1}^2$$

*Below the estimated coefficients, you find the z statistic in parentheses. ***, **and * indicate significance at the 1, 5 and 10 percent levels respectively.*

The sum of the ARCH β_1 and GARCH β_2 estimates is concentrated in the range between 0.8 and 1, which is an indication of a covariance stationary model with a high persistence and long memory in the conditional variance. In the GARCH (1, 1)-GED model, the sum of β_1 and β_2 is also an estimation of the

rate at which the response function decays on a daily basis. Notice that in order to have a mean reverting variance process, the sum of the coefficients adds up to less than one. In our results, the sum $\beta_1 + \beta_2$ is close to one, which means that the process slowly reverts to its mean. Since the rate is high, the response function to shocks is likely to die slowly for the companies in this study.

Table 6 shows the ex-post means, volatilities and coefficient of variation (CV) before and after day trading. The results highlight that the ex-post means and volatilities before day trading are significantly higher than after day trading, indicating that day trading resulted in a reduction in ex-post means and volatilities. These findings can be explained by examining for example the ex-post mean and standard deviation results for Alexandria Mineral Oils Company .The mean increased from 0.0001 to 0.0003, while the standard deviation decreased from 0.0280 to 0.0103. A possible explanation can be that investors are impatient to wait for large increases in the stock price to sell, and large decreases to buy. This results in narrowing the range of the price movements of the stocks after day trading. However, the decrease in the ex- post mean was offset by the decrease of ex-post standard deviation keeping the ex-post coefficient of variation unchanged. Hence, the reward to risk ratio for the investors remained the same.

Ex-ante means and volatilities encompass the future expectations of the investors; which are important in portfolio allocation. Table 7 presents the ex-ante means, volatilities, and coefficient of variation before and after day trading. The results also show that ex-ante risk significantly decreased after day trading. Although the ex-post mean return significantly decreased after day trading, ex-ante mean return did not change significantly. In addition, day trading did not affect ex-ante CV, indicating that the ex-post and ex-ante reward to risk stayed the same.

From Tables 6 and 7, we conclude that ex- post means and volatilities are always higher than ex-ante means and volatilities before and after day trading. For example, the ex-post mean before day trading for Alexandria Mineral Oils Company stock is 0.0001 compared to the ex-ante mean before day trading equal to -0.00136.The ex-post volatility for the same stock before day trading is 0.02800 compared to an ex-ante volatility of 0.02677. The higher ex- post means relative to its ex-ante is explained by investors' tendency to expect returns less than the actual returns. Although ex-post volatility (total volatility) is higher than ex-ante volatility (unexplained volatility), the difference is insignificant, indicating that almost all the volatilities are unexplained (Pilotte and Sterbenz, 2006).

The average daily volume of trade as a proxy of liquidity increased in 25 companies after day trading, while it decreased in the remaining 16 companies (See Table 8). However, the day trading did not significantly affect market liquidity, which is tested in Table 9.

Table 9 provides the summary results by conducting significance tests for the equality of means and medians before and after day trading of (1) effect of information arrival; (2) persistence; (3) clustering; (4) ex-post mean; (5) ex-post standard deviation; (6) ex-post CV; (7) ex-ante mean return; (8) ex-ante standard deviation; (9) ex-ante CV; and (10) market liquidity (average daily volume).

Table 6: Ex-Post Mean and Volatilities for the Daily Total Returns of Day Trading (DT) Companies for the Period July 1, 2004 Until July 31, 2008

Company	Ex-post Mean before DT	Ex-post Mean after DT	Ex-post Standard Deviation before DT	Ex-post Standard Deviation after DT	Ex-post CV before DT	Ex-post CV after DT
Alexandria Mineral Oils Company	0.0001	0.0003	0.0280	0.0103	280.00	34.33
Alexandria Spinning & Weaving	-0.0064	-0.0013	0.0335	0.0277	-5.23	-21.31
Arab Cotton Ginning	0.0048	0.0001	0.0431	0.0328	8.98	328.00
Arab Polvara Spinning & Weaving	0.0026	-0.0003	0.0389	0.0383	14.96	-127.67
ASEC Mining (ASCOM)	0.0107	-0.0047	0.0391	0.0271	3.65	-5.77
Commercial International Bank	0.0023	0.0009	0.0207	0.0200	9.00	22.22
Credit Agricole Egypt	0.0001	-0.0002	0.0216	0.0217	216.00	-108.50
Egyptian Company for Mobile Services	0.0042	-0.0028	0.0340	0.0262	8.10	-9.36
Egyptian Electrical Cables	0.0031	0.0016	0.0475	0.0366	15.32	22.88
Egyptian Financial Group-Hermes	0.0071	0.0009	0.0315	0.0324	4.44	36.00
Egyptian for Housing Development	0.0012	0.0040	0.0512	0.0579	42.67	14.48
Egyptian for Tourism Resorts	0.0122	0.0001	0.0511	0.0274	4.19	274.00
Egyptian Media Production City	-0.0009	-0.0004	0.0297	0.0292	-33.00	-73.00
El Ahli Investment and Development	0.0019	0.0043	0.0368	0.0370	19.37	8.60
EL Ezz Aldekhela Steel - Alexandria	0.0068	-0.0002	0.0557	0.0450	8.19	-225.00
El Ezz Porcelain (Gemma)	0.0071	-0.0004	0.0403	0.0327	5.68	-81.75
El Ezz Steel Rebars	0.0014	-0.0001	0.0447	0.0256	31.93	-256.00
El Nasr Clothes & Textiles (Kabo)	0.0052	-0.0007	0.0356	0.0292	6.85	-41.71
El Watany Bank of Egypt	0.0026	0.0019	0.0235	0.0345	9.04	18.16
Export Development Bank of Egypt	0.0016	-0.0013	0.0280	0.0269	17.50	-20.69
Extracted Oils	-0.0008	-0.0010	0.0413	0.0336	-51.63	-33.60
GB Auto	0.0023	-0.0017	0.0242	0.0226	10.52	-13.29
Housing & Development Bank	0.0008	-0.0008	0.0559	0.0279	69.88	-34.88
Medinet Nasr Housing	0.0015	0.0078	0.0461	0.0242	30.73	3.10
Misr Cement (Qena)	0.0034	0.0058	0.0216	0.0245	6.35	4.22
Misr Chemical Industries	0.0035	-0.0012	0.0345	0.0337	9.86	-28.08
Nile Cotton Ginning	-0.0001	0.0019	0.0650	0.0385	-650.00	20.26
Olympic Group Financial Investments	0.0025	0.0036	0.0290	0.0257	11.60	7.14
Orascom Construction Industries	0.0045	0.0012	0.0224	0.0216	4.98	18.00
Orascom Hotels And Development...	0.0053	0.0010	0.0462	0.0256	8.72	25.60
Orascom Telecom Holding	0.0048	0.000050	0.0233	0.0197	4.85	394.00
Oriental Weavers	0.0018	-0.0010	0.0315	0.0243	17.50	-24.30
Raya Holding For Technology	-0.0053	0.0001	0.0412	0.0239	-7.77	239.00
Remco for Touristic Villages Const.	0.0013	-0.0003	0.0301	0.0387	23.15	-129.00
Sidi Kerir Petrochemicals	0.00032	0.00029	0.0281	0.0179	87.81	61.72
Six of October Development & Inv.	0.0038	-0.0010	0.0209	0.0199	5.50	-19.90
South Valley Cement	0.0057	0.0031	0.0335	0.0249	5.88	8.03
Telecom Egypt	-0.0017	0.0006	0.0299	0.0184	-17.59	30.67
United Housing & Development	0.0001	0.0010	0.0424	0.0314	424.00	31.40
Upper Egypt for Construction	-0.0001	0.0007	0.0396	0.0431	-396.00	61.57
Vodafone Egypt	-0.0004	0.0011	0.0198	0.0330	-49.50	30.00

This Table presents ex-post mean returns and ex-post standard deviations for the daily total return of day trading companies (DT) for the period July 1st until July31st 2008. Ex-post mean is the average of the total returns while ex-post standard deviation is the standard deviation of the total returns. Columns 2 and 3 show the ex-post mean returns before and after DT. Columns 4 and 5 demonstrate the ex-post standard deviation before and after DT. Columns 6 and 7 highlight the ex-post coefficient of variation, which is the ratio of standard deviation over average return, before and after DT

Table 7: Ex-ante Mean and Volatilities for the Daily Total Returns of Day Trading (DT) Companies for the Period July 1, 2004 until July 31, 2008

Company Name	Mean of Ex-ante Returns Before DT	Mean of Ex-ante Returns After DT	Mean of Ex-ante Standard Deviations Before DT	Mean of Ex-ante Standard Deviations After DT	Ex-ante CV Before DT	Ex-ante CV After DT
Alexandria Mineral Oils Company	-0.00136	0.0000009	0.02677	0.00997	-19.7	11077.8
Alexandria Spinning & Weaving	-0.00540	0.00080	0.02559	0.02501	-4.7	31.3
Arab Cotton Ginning	0.00462	0.00181	0.04064	0.02873	8.8	15.9
Arab Polvara Spinning & Weaving	0.00479	-0.00117	0.03627	0.03663	7.6	-31.3
ASEC Mining (ASCOM)	0.01054	-0.00470	0.03660	0.02449	3.5	-5.2
Commercial International Bank	0.00206	0.00115	0.01980	0.01886	9.6	16.4
Credit Agricole Egypt	-0.00112	0.00136	0.01906	0.02075	-17.0	15.3
Egyptian Company for Mobile Services	0.00298	-0.00185	0.03221	0.02619	10.8	-14.2
Egyptian Electrical Cables	-0.00267	0.00198	0.04418	0.03489	-16.5	17.6
Egyptian Financial Group-Hermes	0.00855	0.00287	0.02990	0.02765	3.5	9.6
Egyptian for Housing Development	-0.00283	0.00316	0.04427	0.05283	-15.6	16.7
Egyptian for Tourism Resorts	0.00286	0.00068	0.04451	0.02542	15.6	37.4
Egyptian Media Production City	-0.00020	-0.00043	0.02886	0.02707	-144.3	-63.0
El Ahli Investment and Development	0.00134	0.00359	0.03375	0.03246	25.2	9.0
EL Ezz Aldekhela Steel - Alexandria	0.00664	-0.00133	0.05164	0.04445	7.8	-33.4
El Ezz Porcelain (Gemma)	0.00737	0.00136	0.03684	0.02969	5.0	21.8
El Ezz Steel Rebars	0.00479	0.00121	0.04554	0.02278	9.5	18.8
El Nasr Clothes & Textiles (Kabo)	0.00194	0.00148	0.03547	0.02698	18.3	18.2
El Watany Bank of Egypt	0.00165	0.00228	0.02288	0.03370	13.9	14.8
Export Development Bank of Egypt	0.00068	-0.00100	0.02642	0.02538	38.9	-25.4
Extracted Oils	-0.01103	-0.00339	0.04009	0.03139	-3.6	-9.3
GB Auto	-0.00004	0.00012	0.02535	0.02113	-633.8	176.1
Housing & Development Bank	-0.00443	-0.00154	0.05450	0.02595	-12.3	-16.9
Medinet Nasr Housing	0.00147	0.00447	0.04561	0.02133	31.0	4.8
Misr Cement (Qena)	0.00357	0.00564	0.01804	0.02038	5.1	3.6
Misr Chemical Industries	0.00418	-0.00083	0.03143	0.03182	7.5	-38.3
Nile Cotton Ginning	-0.01361	0.00277	0.05802	0.03274	-4.3	11.8
Olympic Group Financial Inv.	0.00191	0.00179	0.02756	0.02123	14.4	11.9
Orascom Construction Industries	0.00221	0.00167	0.02190	0.02055	9.9	12.3
Orascom Hotels And Development	0.00670	0.00165	0.04453	0.02402	6.6	14.6
Orascom Telecom Holding	0.00343	0.00096	0.02285	0.01897	6.7	19.8
Oriental Weavers	0.00096	0.00045	0.03094	0.02281	32.2	50.7
Raya Holding For Tech. & Com.	-0.00565	0.00105	0.04092	0.02098	-7.2	20.0
Remco for Touristic Villages Const.	0.00222	-0.00103	0.02527	0.03820	11.4	-37.1
Sidi Kerir Petrochemicals	-0.00092	-0.00012	0.02643	0.01731	-28.7	-144.3
Six of October Develp. & Investment	0.00510	-0.00009	0.01979	0.01879	3.9	-208.8
South Valley Cement	0.00486	0.00330	0.03021	0.02312	6.2	7.0
Telecom Egypt	-0.00068	0.00172	0.02845	0.01713	-41.8	10.0
United Housing & Development	0.00021	0.00326	0.03969	0.02866	189.0	8.8
Upper Egypt for Construction	-0.00394	-0.00058	0.03738	0.03958	-9.5	-68.2
Vodafone Egypt Telecommunications	-0.00262	-0.0000001	0.01960	0.70776	-7.5	-7077

This table describes the ex-ante mean returns and standard deviation for the daily total return of day trading companies(DT) for the period July 1st till July31 2008. Columns 2 and 3 show the ex-ante mean returns before and after DT. Ex-ante mean return is the average of the returns generated from forecasting the mean equation of our GARCH (1,1)-GED in Equation 2. Columns 4 and 5 demonstrate the mean of the ex-ante standard deviations, which is the average of the square root of the forecasted variances from the variance equation in GARCH (1,1)-GED in Equation 2, before and after DT. Columns 6 and 7 highlight the ex-ante coefficient of variation, which is ex-ante mean of standard deviations over ex-ante, mean return, before and after DT.

Table 8: Average and Standard Deviation of Daily Volume Before and After Day Trading (DT) for the Period July 1, 2004 until July 31, 2008

Company Name	Average Volume Before DT	Average Volume After DT	Standard Deviation of Volume Before DT	Standard Deviation of Volume After DT
Alexandria Mineral Oils Company	187.94	141.18	65.26	82.46
Alexandria Spinning & Weaving	2,075,048	2,241,202	1,042,562	2,620,820
Arab Cotton Ginning	1,795,753	4,094,025	1,775,147	3,382,071
Arab Polvara Spinning & Weaving	647,363	1,928,312	561,023	2,372,184
ASEC Mining (ASCOM)	118,970	233,364	143,631	242,392
Commercial International Bank	488,829	749,325	460,154	700,855
Credit Agricole Egypt	677,307	408,424	735,461	553,969
Egyptian Company for Mobile Services	118,655	117,816	80,217	104,193
Egyptian Electrical Cables	11,520,195	17,553,271	7,900,323	11,807,505
Egyptian Financial Group-Hermes	2,879,779	3,406,020	1,706,500	2,831,891
Egyptian for Housing Development	1,088,801	2,339,816	1,173,836	1,878,883
Egyptian for Tourism Resorts	6,165,935	7,629,384	7,747,466	7,270,756
Egyptian Media Production City	443,533	852,155	342,314	990,592
El Ahli Investment and Development	231,052	431,914	322,662	356,675
EL Ezz Aldekhela Steel - Alexandria	18,885	17,604	55,094	28,290
El Ezz Porcelain (Gemma)	709,210	442,158	401,317	432,624
El Ezz Steel Rebars	972,617	483,251	528,551	401,048
El Nasr Clothes & Textiles (Kabo)	3,759,555	4,348,149	4,198,179	8,175,898
El Watany Bank of Egypt	412,845	563,621	434,241	601,257
Export Development Bank of Egypt	141,988	53,704	507,939	71,736
Extracted Oils	1,191,304	3,978,891	1,184,348	4,487,426
GB Auto	189,792	146,554	203,858	148,193
Housing & Development Bank	132,429	350,766	163,594	373,714
Medinet Nasr Housing	472,398	158,552	742,266	253,158
Misr Cement (Qena)	38,616	72,488	48,475	105,301
Misr Chemical Industries	221,524	174,023	202,385	175,779
Nile Cotton Ginning	1,708,365	1,539,261	759,259	1,264,614
Olympic Group Financial Investments	132,647	124,743	146,376	124,029
Orascom Construction Industries	241,599	191,438	204,448	161,246
Orascom Hotels And Development...	1,323,163	427,439	793,912	749,338
Orascom Telecom Holding	849,503	778,955	915,512	623,935
Oriental Weavers	71,015	185,406	91,730	285,674
Raya Holding For Technology	412,584	691,152	506,532	732,363
Remco for Touristic Villages Construction	816,612	1,233,643	838,568	1,268,767
Sidi Kerir Petrochemicals	1,266,520	1,444,859	2,989,379	5,647,094
Six of October Development & Investment	262,603	198,632	193,792	199,542
South Valley Cement	1,124,943	1,399,220	6,385,246	1,060,181
Telecom Egypt	2,931,980	1,950,650	2,328,208	1,680,932
United Housing & Development	351,084	630,875	250,844	623,967
Upper Egypt for Construction	6,030,695	10,389,813	5,592,799	11,340,800
Vodafone Egypt Telecommunications	135,560	16,278	176,990	88,495

This Table shows the average and standard deviation of daily volume before and after day trading for the period July 1st till July31st. Column 2 and 3 show the average of day volume before and after day trading, while columns 4 and 5 show the standard deviation of daily volume before and after day trading.

Table 9: Summary Results

Variables	Mean of the Variable Before DT	Mean of the Variable After DT	T-Statistics for Equal Means	Wilcoxon/Mann-Whitney Test for Equal Medians (tie-adj)
Effect of the Flow of News (α_2)	0.005166	0.006312	0.95	1.02
Persistence ($\beta_1 + \beta_2$)	0.866333	0.857956	-0.27	-0.21
Clustering (β_2)	0.697054	0.65822	-0.66	-0.95
Ex Post Mean	0.002461	0.00056	-2.90***	-3.32***
Ex Post Standard Deviation	0.035634	0.029063	-3.00***	-2.77***
Ex Post CV	22.06	10.72	-0.52	-0.96
Ex Ante Mean	0.001003	0.000842	-0.19	-0.85
Ex Ante Standard Deviation	0.033409	0.026751	-3.23***	-3.00***
Ex Ante CV	4.23	2.10	-0.26	-1.07
Liquidity (Average Daily Volume)	1,066,281	1,410,601	0.78	0.31

This table provides the summary results by conducting significance tests for the equality of means and medians before and after day trading in columns 2 and 3. In column 4 you find the t statistics for testing the hypothesis of the equality of means before and after day trading. The last column shows the Wilcoxon /Mann-Whitney Test for equal in Medians (tie-adj). ***, **and * indicate significance at the 1, 5 and 10 percent levels respectively.

Effect of the flow of news, persistence, and clustering are generated from the coefficients of our the GARCH (1,1)-GED Model:

$$TR_t = \alpha_0 + \alpha_1 TR_{t-1} + \alpha_2 Volume_t + \varepsilon_t$$

$$\sigma_{\varepsilon,t}^2 = \beta_0 + \beta_1 \varepsilon_{t-1}^2 + \beta_2 \sigma_{\varepsilon,t-1}^2$$

Ex post mean is the average of the total returns while ex post standard deviation is the standard deviation of the total returns. Ex ante mean return is the average of the returns generated from forecasting the mean equation of our GARCH (1,1)-GED while the ex ante standard deviation is the mean of the ex ante standard deviations, which is the average of the square root of the forecasted variances from the variance equation in GARCH (1,1)-GED. The ex post coefficient of variation is the ratio of ex post standard deviation over ex post mean. Ex ante coefficient of variation is the ratio of ex ante mean of standard deviations over ex ante mean return.

This Table reports the hypothesis tests for the difference between two means and the Wilcoxon/Mann-Whitney test for equal medians. We removed a few outliers before conducting the test for the significance difference between two means. It shows that there is a significant decline in ex-post mean return, ex-post volatility and ex-ante volatility. In contrast, there was no significant effect for day trading on information arrival, volatility clustering, volatility persistence, ex-post and ex-ante CVs, and market liquidity, confirming our previous findings. This highlights that day trading in general did not have a significant effect on investors, as both ex-post and ex-ante CVs did not significantly change after day trading. In addition, day trading had no effect on the market, as liquidity did not change significantly.

CONCLUSION

Motivated by the introduction of day trading in the Egyptian stock market, we studied the effect of this new system on the dynamics of stock returns and volatilities and market liquidity. We collected data on daily stock prices and volume of trade for all companies traded in the day trading system (forty-one companies), during the period from July 2004 until July 2008. We applied a GARCH (1, 1)-GED model to estimate the effect of news arrival, volatility clustering, volatility persistence and ex-ante means and volatilities before and after day trading. Our results show no significant change in volatility clustering and persistence, effect of news arrival, and market liquidity after day trading. Although ex-post means and ex-post volatilities significantly decreased after day trading, ex-post coefficient of variation showed insignificant change, indicating that applying this new system did not affect the reward to risk of investors in the Egyptian stock market. We also estimated the ex-ante means and volatilities, showing that ex-ante means did not significantly change, while the ex-ante volatility significantly dropped after day trading; however, ex- ante CV like ex- post CV did not significantly change.

Our objective was to evaluate the impact of day trading on the Egyptian Stock Market, which is one of the evolving emerging markets that have received little attention in the financial literature. Our results, however, cannot be generalized as they are focused on the Egyptian Stock market where the number of day trading companies is limited (41 companies). Further research can study the impact of the other trading mechanisms introduced recently in the Egyptian Stock market, which include short selling and margin trading. In conclusion, day trading had no effect on the investors in terms of reward to risk, or on the market in terms of liquidity.

REFERENCES

Admanti,A. and Pfeiderer,P. (1988),” A theory of intraday patterns: Volume and price variability”, *Review of Financial Studies*, vol.1, p3-40.

Aitken, M., Brown, P. and Walter, T. (1993),”Intraday Patterns in Returns, Trading volumes, volatility and trading frequency on SEATS”, Working paper (University of Western Australia).

Almgren, R., and Lorenz, J. (2006), “Bayesian adaptive trading with a daily cycle,” *Journal of Trading*, vol.1, p.38-46.

Amihud, Y. and Mendelson, H. (1987), “Trading mechanism and stock returns: An empirical investigation,” *Journal of Finance,* vol. 42, p.533-553.

Andersen, T. G., and Bollerslev, T.(1997), “ Intraday periodicity and volatility persistence in financial markets,” *Journal of Empirical Finance,* vol.4, p.115-158.

Arago, V., and Nieto, L. (2005), “Heteroskedasticity in the returns of the main world stock exchange indices: Volume versus GARCH effects,” *Journal of International Financial Markets, Institutions and Money*, vol.15, p.271-284.

Bencivenga, V. R., and Bruce D. S. (1991), “Financial intermediation and endogenous growth,” *Review of Economic Studies*, vol.58, p.195-209.

Biais, B., Hillion, P. and Spatt, C. (1995), "An Empirical Analysis of the Limit Order Book and the Order Flow in the Paris Bourse," *Journal of Finance, vol.* 55, p.1655-1689

Bildik, R. (2001), “Intra-day seasonality on stock returns: evidence from the Turkish Stock Market,” *Emerging Market Review*, vol.2 issue 4, p. 387-417.

Bollerslev, T. (1986), “Generalized autoregressive conditional heteroskedasticity,” *Journal of Econometrics*, vol. 31, p. 307-327.

Breen, W.J., Hodrick, L.S and Korajczyk, R.I (2002), “Predicting equity liquidity,” *Management Science*, vol. 48, p. 470-483.

Brock, W. and Kleidon A.W. (1992),”Periodic market closure and trading volume: a model of intraday bid and ask”, *Journal of Economic Dynamics and Control* vol.16, p.451-489.

Cairo and Alexandria Stock Exchange (2008), Annual report, CASE, Egypt.

Campbell, J.Y., Ramadorai, T. and Schwartz, A.(2007), “Caught on tape: Institutional trading, stock returns, and earnings announcements”, Working paper,(Harvard University)

(http://ssrn.com/abstract=998244), forthcoming, Journal of Financial Economics.

Choe H., and Shin H.S. (1993), "An analysis of interday and intraday return volatility: Evidence from the Korea Stock Exchange," *Pacific-Basin Finance Journal*, vol.1, p.175-188.

Copeland, Laurence and Jones, Sally Ann (2002) "Intradaily patterns in the Korea index futures market". *Asian Economic Journal*, vol. 162, p.153-174

Damodaran, A. (1999), "Estimating equity premiums," *Leonard Stern School Finance Department*, Working Paper series, 99-021.

Engle, R. (1982), "Autoregressive conditional heteroskedasticity with estimates of the variance of United Kingdom inflation," *Econometrica*, vol.50, p.987-1007.

Fornari, F., and Mele A. (1996), "Modeling the changing asymmetry of conditional   variance," *Economics Letters*, vol.50, p.197-203.

Foster, F.D. and Viswanathan, S. (1990),"A theory of intraday variations in volumes, variances and trading costs", *Review of Financial Studies*, vol.3, p.593-624

Gerenty, M.S. and Mulherin J.H. (1992),"Trading halts and market activity: An analysis of volume at the open and the close", *Journal of Finance*, vol.5, p.1765-1811.

Gonzales-Rivera, G. (1998), "Smooth-transition GARCH models," *Studies in Nonlinear Dynamics and Econometrics,* vol. 3, p.61–78.

Hagerud, G. (1996), "A smooth transition GARCH model for asset returns," Working Paper, No. 315, (School of Economics Series in Economics and Finance, Stockholm).

Hamao, Y. and Hasbrouck J. (1993)," Securities trading in the absence of dealers: Traders and quotes on the Tokyo Stock Exchange", Working paper (Graduate School of Business, Columbia University).

Hamilton, J. (1994), *Time series analysis*, Princeton University Press.

Harris, L. (1986), "A transaction data study of weekly and intra-daily pattern in stock returns," *Journal of Financial Economic,* vol. 16, p.99-118

Hasbrouk, J. and Schwartz, R. (1988)," Liquidity and execution costs in equity markets," *Journal of Portfolio Management*, spring, p. 10-15

International Financial Cooperation (IFC), (2008)," Financial report on risk and return in emerging markets", IFC.

Jain, P. and Joh, G.H. (1988), "The Dependence between Hourly Prices and Trading Volume", *Journal of Financial and Quantitative Analysis, vol.23*, p.269-285.

Jarque, C. and Bera, A. (1980)," Efficient tests for normality, homoscedasticity and serial independence of regression residuals," *Econometric Letters*, p.255-259.

Lamoureux, C. G. and Lastrapes, W. D. (1990), "Heteroskedasticity in stock return data: Volume versus GARCH effects," *Journal of Finance*, vol. 45, p.221-229.

Lee, S.B. and Ohk K. Y. (1992), "Stock index futures listing and structural change in time-varying volatility of future markets," *Journal of Futures Market*, vol. 12(5), p.493-509.

McInish, T.H. and Wood R.A. (1990),"An analysis of transaction data for the Toronto Stock Exchange: Return patterns and the End-of Day effect", *Journal of Banking and Finance* ,vol.14,p.441-458

Nelson, D.B. (1991), "Conditional heteroskedasticity in asset returns: A new approach. *Econometrica*," vol.59, p.347-370

Niemayer J. and Sandas, P. (1993),"The market microstructure of the Stockholm Stock Exchange", Working paper (Department of Finance, Stockholm School of Economics, Sweden)

Pagano, M. S., Peng L., Schwartz R.A. (2008), "The quality of price formation at market openings and closings: Evidence from the NASDAQ stock market," Working Paper, (Villanova University).

Pilotte, E. and Sterbenz, F. (2006)," Sharpe and Treynor ratios on treasury bonds," *Journal of Business*, vol.79, p. 149-180

Saabye, N. (2003), "The Equity Risk Premium," Denmark National bank, *Monetary Review*, 1st Quarter.

Sentana, E. (1995), "Quadratic ARCH models." *Review of Economic Studies*, vol. 62, p. 639-661.

Singh, A. (1999), "Should Africa promote stock market capitalism?" *Journal of International Development*, vol.11, p.343-365.

Tversky, A. and Kahneman, D. (1974), "Judgment under uncertainty: Heuristics and biases," *Science*, vol.185, p. 1124-1131.

Wood, R.A., McInish, T.H. and Ord, K. (1985), "An investigation of transactions data for NYSE stocks," *Journal of Finance*, vol. 40, p. 723-741

Yartey A. and Adjasi, C. K. (2007), "Stock market development in Sub-Saharan Africa: Critical Issues and Challenges," Working paper, August, wp/07/209(International Monetary Fund).

Zakoian, J.(1994), "Threshold heteroskedasticity models." *Journal of Economic Dynamic and Control*, vol.18, p. 931-955.

BIOGRAPHY

Dr. Islam Azzam is an Assistant Professor of Finance and Head of Finance at the Management Department at the American University in Cairo. He can be contacted at American University Cairo, P.O. Box 74.New Cairo 11835, Egypt. Email: islamazzam@aucegypt.edu

Dr. Jasmin Fouad is an Assistant Professor of Finance at the Management Department at the American University in Cairo. She can be contacted at American University Cairo, P.O. Box 74. New Cairo 11835, Egypt. Email: jfouad@aucegypt.edu