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Abstract

This paper investigates the month-of-the-year effect for the Sudanese stock market by using daily closing values of the market index over the period January 2, 2008, to December 30, 2014. Ordinary Least Squares technique and two different specifications of the Generalized Autoregressive Conditional Hetroscedastic model are applied to see how average returns of the Khartoum Stock Exchange (KSE) index are statistically different across months of the year. Empirical results suggest that the possible month-of-the-year effect in KSE is generally murky, especially for the market returns. Based on volatility equation however, the results show very little evidence that the market can be characterized by significant positive returns during the first few months of the year and negative returns over the last months. These results indicate that KSE seems to be an informationally inefficient market and therefore, investors cannot take any advantage of information about a single month of the year when taking investment decisions to gain abnormal returns and consequently they should not consider this calendar anomaly when formulating their portfolios. It is left to future research, when appropriate data will be available to investigate how calendar anomalies are valid at the sectoral and firm levels for the KSE market.

JEL Classification: E1, G4

Keywords: Month of the year effect, stock returns, Volatility, Khartoum Stock Exchange

ملخص

تهدف هذه الورقة إلى دراسة ظاهرة الموسمية فى عوائد وتقلبات سوق الأوراق المالية فى السودان من خلال التعرف على مدى تباين سلوك السوق خلال أشهر السنة المختلفة. أستخدمت الورقة نموذج المربعات الصغرى العادية ونموذجين من عائلة نماذج الإنحدار الذاتي المعمم والمشروط بعدم تجانس التباين على بيانات يومية لقيم الإغلاق للمؤشر العام لسوق الخرطوم للأوراق المالية خلال الفترة من 2 يناير 2008 وحتى 30 ديسمبر 2014م. أشارت النتائج التطبيقية إلى عدم وجود إختلافات معنوية بين العوائد المتحققة خلال شهر يناير والعوائد فى الأشهر الأخري من السنة وذلك خلافاً لما يلاحظ فى العديد من الأسواق المالية حول العالم. وفيما يتعلق بإختبار أثر الموسمية عند أخذ تقلبات السوق فى الإعتبار، فقد أوضحت نتائج الدراسة أثراً محدوداً يشير إلى أن عوائد السوق تختلف معنوياً بين الاشهر الثلاثة الأولى من السنة مقارنة بالأشهر الأخرى. وخلصت الورقة بصورة إجمالية إلى أن البيانات التاريخية عن مؤشر السوق خلال الأشهر المختلفة لاتحتوي على معلومات كافية تساعد المستثمرين على فهم سلوك السوق ومن ثم تبنى الإستراتيجيات التى تعينهم على تحقيق عوائد غير عادية. تأتي هذه النتائج متوافقة مع ما توصلت اليه بعض الدراسات السابقة حول قبول فرضية عدم كفاءة سوق الخرطوم للاوراق المالية عند المستوى الضعيف، والتي تشير إلى أن أسعار الأسهم فى السوق لا تعكس المعلومات التاريخية الخاصة بها. وقد أقترحت الورقة ضرورة تواصل هذا الإتجاه البحثي فى محاولة التعرف على مدى تحقق ظاهرة الموسمية وذلك من خلال التركيز على القطاعات المختلفة للسوق والشركات المدرجة فيها.

1. Introduction

Over the past few decades, a considerable body of research has documented the seasonal behavior of stock returns in several stock exchanges around the globe with greater analyses given to stock markets in the US and the developed economies. It is well documented that stock returns are systematically higher or lower depending on the day of the week, the day of the month, or month of the year. These stock market anomalies are called calendar anomalies and were first reported by Wachtel (1942) who identified the seasonality patterns in the Dow Jones Industrial Average during the period 1927-1942. Probably, the most prominent anomalies[1] are: the day of the week effect or Monday effect, the holiday effect, the turn-of-the-month effect, and the monthly or January effect. The Monday effect happens when returns are significantly lower or negative on Mondays in comparison with the returns on other days of the week (see, e.g., Cross, 1973; French, 1980; Harris, 1986; Kiymaz and Berument, 2003; Chukwuogor, 2007; Phaisarn and Wichian, 2010; Abdalla, 2012a). The holiday effect occurs when returns are expected to be higher on the days before some festivals or vacations (see, e.g., Ariel, 1990; Al-Loughani et al., 2005). The turn-of-the-month effect indicates that returns at the end and at the beginning of a month tend to be higher than on other days (see, e.g., Ariel, 1987; Ogden, 1990; Cadsby and Radner, 1992; Kunkel et al., 2003; Holden et al., 2005; Nikkinen et al., 2007). The month-of-the-year or January effect occurs when returns are abnormally higher in January compared to other months of the year[2] (see, e.g., Gultekin and Gultekin, 1983; Keim, 1983; Yao, 2012). The existence of these calendar anomalies is useful especially for market participants whose strategy is based on speculation of the price variation, rather than investing for longer periods of time. Where these effects are observed for a particular market, then the analyses try to determine the best time to sell and to buy stocks on that market, by observing which time of the day, week, month or year has the highest and the lowest returns.

Following the consensus view that month-of-the-year effect is one of the most persistent stock market anomalies[3], the current study investigates the presence of this seasonal behavior for the Sudanese stock market. According to this calendar anomaly, the average daily returns of the market are not the same for all months of the year, as it would be expected on the basis of efficient market theory. The presence or absence of this effect has important implications for investors. Their investment strategies, portfolio selection and management will vary according to different effects, to reap maximum profits.

The pioneering work to investigate the month-of-the-year effect for the stock markets was done by Rozeff and Kinney (1976) who consider the NYSE for the period 1904 to 1974. They find that the average return for the month of January was 3.48% compared to only 0.42% for other months of the year. Since that time, many articles have investigated the statistical significance of this effect to see why stock returns are abnormally larger in January. For example, Keim (1983) also uses the NYSE data for the period 1963 to 1979 and finds that almost 50% of the average magnitude of the risk-adjusted premium of small firms relative to large firms is due to January abnormal returns. He also shows that 50% of the January premium is due to abnormal returns during the first week of trading in the year. These results were also confirmed by Roll (1983) and Reinganum (1983) for small firms, and particularly for small firms with low share

1 Other calendar anomalies include, for example, the week-of-the-year effect, in which there should be a statistically different weekly return pattern for different weeks of the year; trading month effect, which indicates higher returns over the first fortnight of the month; the half month effect, in which returns are statistically higher over the first half of the month; and the turn of the month where statistically higher returns on turn of the month days than other trading days).

2 This creates an opportunity for investors to buy stocks for lower prices before January and sell them after their value increases. Therefore, the main characteristics of the January Effect are an increase in buying securities before the end of the year for a lower price, and selling them in January to generate profit from the price differences.

3 Empirical literature tells that while most anomalies weaken or dissipate after their initial discovery (Schwert, 2003; McLean and Pontiff, 2014), the month of the year effect continues to persist more than three decades after it was originally documented by Rozeff and Kinney (1976) (Huag and Hirschey, 2006; Sias and Starks, 1997; Ng and Wang, 2004).

prices. Rogalski and Tinic (1986) also support these findings by using NYSE and the American Stock Exchange stocks for the period 1963-1982. In the same line, Mehdian and Mark (2002) use Dow Jones index, NYSE and SP500 over the period 1964-1998 and demonstrate that there was a significant January effect between 1964 and 1987, but not after 1987.

Although most of empirical evidence is documented for the US market, the January effect seems to be a worldwide phenomenon. For example, Kato and Schallheim (1985) investigate excess returns in January for the Tokyo Stock Exchange. They find excess returns in January and a strong relationship between return and size, with the smallest firms returning 8% and the largest 7%. Balaban (1995) provides evidence for the presence of this effect for stock markets in Malaysia and Turkey. Additional empirical investigations include, for example, the works done by Barone (1990) for Italy, Ziemba (1991) for Japan, Cadsby and Ratner (1992) for Australia, Canada, Germany and Switzerland, Ziemba (1994) for the UK, Martikainen et al. (1995) for Finland, Silvapulle (2004) for the OECD countries and emerging economies, Zhang and Li (2006) for the Chinese stock market, Lean et al. (2007) for several Asian stock markets and Martikainen et al. (1994) for larger groups of countries and regions around the world. Contrary to the January effect documented in Western countries, Ariss et al. (2011) find a statistically significant positive December effect for the stock markets in the Gulf Cooperation Council (GCC) countries. It is worth mentioning here that the January effect is not an exclusive anomaly of stock returns, as shown by Al-Khazali (2001) and Starks et al. (2006) for the bond markets and the evidence by Rendon and Ziemba (2007) for the futures markets.

From a theoretical standpoint, it makes sense to show a large number of studies have attempted to determine what causes the unusual patterns of stock market returns. As indicated by Sikes (2014), the two leading explanations in the extant literature for this effect are tax-loss- selling by individual investors and window-dressing by institutional investors. The tax-loss-selling hypothesis holds that, prior to year-end, individual investors sell stocks that have declined in value to realize tax losses. Therefore, there is a downward pressure on the prices of stocks that have faced a price decline during the year. Consequently, at the beginning of the new tax year, in the absence of selling pressure, the downward pressure on stock prices disappears and the stock prices gain their real market price. This phenomenon generates large abnormal stock returns at the turn of each tax year (see, Rozeff and Kinney, 1976; Givoly and Ovadia, 1983; Ritter, 1988; Poterba and Weisbenner, 2001; Grinblatt and Moskowitz, 2004; among others). According to the window-dressing hypothesis, just prior to year-end, institutional investors buy stocks with positive prior returns ("winners") and sell stocks with negative prior returns ("losers") to present attractive year-end portfolio holdings to their clients (e.g., Lakonishok et al., 1991; Musto, 1997; Ng and Wang, 2004; among others).

Given the current growth of the Sudanese stock market (the Khartoum stock exchange, KSE) and its future growth prospects, very little research work has been done on the market dynamics. Empirical evidence on seasonality in particular is very limited. For example, Abdalla (2012b) investigates the day of the week effect anomaly on stock market returns and the conditional volatility of the KSE over the period of January 2, 2006, to October 30, 2011. Based on using OLS and GARCH[4] models he finds; in general, negative and insignificant estimated parameters for all days of the week in both returns and conditional volatility equations. Furthermore, his results show that the null hypothesis that the day of the week dummy variables are jointly equal to zero is accepted. Hence, day of the week effect is not present in the KSE index returns during that period, a finding which contradicts most of the empirical literature investigating the phenomenon for a wide range of stock exchange around the globe. In an attempt to fill the gap in the stock market anomalies for the KSE, this paper investigates the

4 Over the past few years this methodology has been applied extensively for the Sudanese stock market (see, e.g., (Abdalla, 2011, 2012c, 2013, 2014; Abdalla and Winker, 2012).

month-o-the-year effect for the market over the period 2008-2014. The remainder of this paper is organized as follows: Section 2 provides a general overview of the Sudanese stock market. Section 3 describes the data and provides summary statistics. In the fourth section the methodology is presented, while the results of the estimation are discussed in section 5. Finally, section 6 concludes the paper.

2. An Overview of the Sudanese Stock Market

The origin of the stock market in Sudan dates back to January 1995 when the market started its activities officially with the assistance of the Common Market for Eastern and Southern Africa (COMESA), with the objective of regulating and controlling the issuance of securities, and mobilizing private savings for investment in securities. Securities traded in the KSE are ordinary shares and investment units. Furthermore, a substantial number of mutual funds and Government Investment Certificates (GISs) are also traded, (KSE Annual report, 2010). Trading in securities is taking place in two markets, the so called primary and secondary markets. The Primary Market deals with the trading of new securities. When a company issues securities for the first time (i.e., IPO), they are traded in the Primary Market through the help of issuing houses, dealing /brokerage firms, investment bankers and or underwriters. The acronym IPO stands for Initial Public Offering, which means the first time a company is offering securities to the general public for subscription. Once the securities (shares) of a company are in the hands of the general public, they can be traded in the Secondary Market to enhance liquidity amongst holders of such financial securities. Thus, the Secondary Market facilitates the buying and selling of securities that are already in the hands of the general public (investors). Although the market switched from manual to computer-based trading in January 2012, trading still occurs for only one hour (10:00 am to 11:00 am) and brokers must be physically present at the exchange (IMF, 2014).

Despite its short history, KSE has contributed a number of benefits to the investment climate in Sudan, among which, it promoted the auditing profession as one of the listing requirement of any company to submit audited accounts for the latest two years and every year after listing. And, also enhanced awareness in securities investment as manifested in the increasing number of the investment funds in the country (Onour, 2010).

When it comes to look at the market size, it is very important to point out that it is relatively small even compared to the stock markets in the Arab region, for example the number of listed companies is few and most stocks are infrequently traded, market capitalization and traded value are also very low (See Table 1 and Fig. 1). Banks, communications and certificates sectors dominate the trading activity of the market in terms of trading volume and number of shares (See Fig. 2, Tables 2 and 3). The market is currently listing 59 companies with a total market capitalization of SDG 11,758.06 (2,243.90 $US million) million (Arab Monetary Fund, 2014). Although, the amount of capitalization is very small, but it shows considerable increase, especially during the past few years (see Fig. 3). The overall performance of the market is measured by the KSE index, which is a market capitalization-weighted index. In September 2003, the KSE index was established and listed in the Arab Monetary Fund database. At the end of the first month the index closed at 961.74 points. Currently, the index is fluctuating around 3100 points.

Despite its rapid growth in terms of market capitalization, KSE is characterized as a highly concentrated market as only a few companies constitute significant contribution of both capitalization and traded value, around 90% of the total market capitalization. Moreover, it can also be regarded as an illiquid market as the shares of only a few companies are tradable. As the main concern of this paper is to investigate the monthly seasonality in stock returns for the KSE, it may be useful to provide monthly behavior of the key market activities such as No. of transactions, market capitalization, No. of stocks in circulation, No. of certificates in

circulation, No. of shares in circulation, and volume in circulation. Average values of these indicators by months of the year for the period 2008-2013 are reported in Figure 4.

3. The Data and Basic Statistics

3.1 Data for analysis

The data set consists of daily closing values of Khartoum Stock Exchange (KSE) index over the period of January 2, 2008, to December 40, 2014. Daily Returns (R_t) are calculated as the first differences in the natural logarithms of the stock market index as indicated by:

$$R_t = log\left(\frac{P_t}{P_{t-1}}\right) \quad (1)$$

where P_t and P_{t-1} denote the closing market index of KSE at the current (t) and previous day (t-1), respectively.

3.2 Summary statistics

To specify the distributional properties of the KSE index returns series R_t for each month of the year as well as for the entire study period, various descriptive statistics were calculated, the results are reported in Table 4. According to the results, various important points are be observed: First, KSE has positive daily mean returns, but very small value (very close to zero) for all months of the year as well as for the full sample period. Second, the lowest returns (0.000034) are observed on November and the highest ones (0.001478) occur on February. Third, in view of the value of standard deviation (an indication of unconditional variance in the return series) regarding the mean value it is very clear that the month of August is characterized by higher volatility in comparison with stock returns on other months of the year. Fourth, the results also indicate that the sample distributions of monthly returns do not conform to normal distribution but display positive skewness (the distribution has a long right tail) for all months except for August, September, October, and November. Furthermore, they all exhibit high levels of kurtosis (distributions have thicker tails than normal distributions). Finally, the Jarque-Bera (JB) statistic confirms that the distribution of daily returns is non-normal at a p-value of almost 1% for all months of the year.

Figs. 5-8 display the KSE general index, its returns, mean and standard deviation, as well as the mean values and standard deviations by months of the year over the period 2008-2014. The general conclusion is that KSE index starts the year with higher returns and higher standard deviations and ends with lower mean returns and standard deviations. Additionally, to shed more light on the distributional properties of KSE index and its returns, Fig. 9 provides some graphs for that purpose.

4. Methodology

To investigate the month-of-the-year effect, the paper considers three specifications. In the first one, the paper employs ordinary least squares (OLS) model with lagged return[5] (Coutts et al., 2000). The other two specifications are used to investigate the month-of-the-year effect in return and volatility equations. Accordingly, the second model of the paper investigates the effect for only the return equation by using the GARCH (1,1) specification. The third one incorporates the effect for both the return and volatility equations by using the GARCH-M (1,1) specification. This model is also used to test whether the month-of-the-year effect is influenced by the stock market risk. The parameters of the two different GARCH types of specifications for the return and volatility equations are estimated following the quasi-maximum likelihood (QML) estimation introduced by Bollerslev and Wooldridge (1992) under

5 Note that the lagged return is included to eliminate the possibility of having autocorrelated errors.

the assumption of Gaussian distributed error terms. The log likelihood function is maximized using Marquardt's numerical iterative algorithm to search for optimal parameters.[6]

Model 1: month-of-the-year effect in returns based on OLS regression

In the first model, the paper employs a dummy variable approach based on a linear regression with 12 dummy variables referring to the months of the year. Accordingly, the first model can be written as follows:

$$R_t = \alpha_1 + \sum_{i=2}^{12} \alpha_i M_{it} + \emptyset R_{t-1} + \varepsilon_t$$

where $M_{it} = 1$ if the return at time t belongs to month i and 0 for any other month ($i = 2, \dots, 12$ corresponds to February through October), α_1 represents the mean returns for January, whilst α_2 to α_{12} represent the average differences in returns between January and each individual month and ε_t is the error term.

The null hypothesis of no month-of-the-year effect is:

$$H_0: \alpha_2 = \cdots = \alpha_{12} = 0$$

Against the alternative hypothesis of at least one of the coefficients is not equal to another coefficient.

According to the null hypothesis, average returns of all months of the year are equal. For testing the presence of this effect, the Wald test, for example, can be used. Therefore, if the null hypothesis can be rejected through the significant Wald test; it indicates the existence of month-of-the-year effect since the average returns of the days are unequal.

Month-of-the-year effect in returns and volatility

Assuming that the error term follows a Generalized Autoregressive Conditional Hetroscedastic (GARCH) process (Bollerslev, 1986), the paper employs GARCH model in which the conditional variance is represented as a linear function of a long term mean of the variance, its own lags and the previous realized variance. Specifically, the paper uses the GARCH (1,1) model since Engle (2001) states that GARCH (1,1) is the simplest and most robust of the family of volatility models, and is the most widely applicable one used in the literature. Therefore, the paper runs a GARCH (1,1) regression to account for the time varying nature of stock market returns and it is given by the following model:

$$R_t = \alpha_1 + \varepsilon_t, \qquad \varepsilon_t \backslash \emptyset_{t-1} \sim N(0, \sigma_t^2)$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2$$

where σ_t^2 is the variance of ε_t conditional upon the information set $\emptyset$ at time $t-1$ and is modeled following an ARMA(1,1) process. and σ_{t-1}^2 are the variance of the stock index returns for Month t and $t-1$ respectively, and α_0, α_1, β are the GARCH model coefficients.

Model 2: month-of-the-year effect in returns based on GARCH model

The second model is the GARCH (1,1), which will be used to address the possibility of having heteroscedasticity problem. The model has the following form:

$$R_t = \alpha_1 + \sum_{i=2}^{12} \alpha_i M_{it} + \emptyset R_{t-1} + \varepsilon_t$$

6 For potential issues regarding the numerical solution of the maximum likelihood estimators for GARCH models, the interested reader might consult Maringer and Winker (2009).

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2$$

This GARCH (1,1) specification has shown in many empirical investigations to be a parsimonious representation of asset returns dynamics (Sun and Tong, 2010). However, the exact number of lag terms used comes from the diagnostic statistics. The lag term R_{t-1} is added to the mean equation to filter out possible first-order serial correlation in the return series.

Model 3: month-of-the-year effect in returns and volatility based on GARCH-M model

In the third model, the paper makes use of the Generalized Autoregressive Conditional Heteroscedasticity in Mean (GARCH-M)[7] model, in which we include some exogenous variables into the variance equation to allows one to incorporate volatility effect as well as risk premium, therefore, the third model of the following form:

$$R_t = \alpha_1 + \sum_{i=2}^{12} \alpha_i M_{it} + \emptyset R_{t-1} + \lambda \sigma_t^2 + \varepsilon_t$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 + \sum_{i=2}^{12} \alpha_i M_{it}$$

where λ is called the risk premium parameter. A positive λ indicates that the return is positively related to its volatility. In other words, a rise in mean return is caused by an increase in conditional variance as a proxy of increased risk.

5. Empirical Results

Month-of-the-year effect based on OLS regression

The results of OLS regression for each month of the year using model (1) are presented in Table 5. The results in Panel A show that all t-statistics of the estimated parameters are statistically insignificant for all months except for August where significant positive returns are observed. The Wald test results in Panel B indicate that the null hypothesis that the month of the year dummy variables are jointly equal to zero is accepted. Hence, the month-of-the-year effect is not present in the KSE returns series during the period of the study, confirming the results of panel A of Table 4. However, the validity of these results cannot be justified due to the presence of ARCH effect. Since, the ARCH-LM test results in Panel C provide strong evidence for rejecting the null hypothesis of no ARCH effects for all lags included, the variance of the returns series of KSE index is non-constant as required by the OLS regression. The paper therefore implements a GARCH model to further investigate the month-of-the-year effect for the market. Otherwise, the results are drawn from the OLS method may be not valid.

Month-of-the-year effect based on GARCH (1,1) Model: in returns equation

Table 6 summarizes the results of reexamination the month-of-the-year effect on the KSE index returns with the GARCH (1,1) model. The estimated coefficients of monthly seasonality as indicated by the results are statistically significant for all months of the year with negative returns in April, June, July, September, and October and positive returns for other months of the year. However, these results cannot be reasonably justified as the estimated conditional volatility is found to be an explosive process as indicated by the very large value (9.888294)[8] of the persistent coefficient in the variance equation. It is important to mention here that one stylized fact in empirical finance literature is that the estimated persistent coefficient (based on GARCH methodology) must be very close to one in order to conclude that volatility shocks are quite persistent. In Panel B, the ARCH-LM test does not indicate the presence of a significant

7 This model is an extension of the basic GARCH framework, which allows the conditional mean of a sequence to depend on its conditional variance or standard deviation. It was developed by Engle, Lilien, and Robins (1987)

8 Persistent coefficient in the conditional variance equation can be obtained by adding up the ARCH and GARCH coefficients.

ARCH effect in the residual series, which means that the conditional variance equitation is well specified. Therefore, the paper further investigates the presence of the month-of-the-year effect in both the return and conditional variance equations.

Month-of-the-year effect based on GARCH-M (1,1) Model: in return and volatility equations

In a further step, the paper applies the GARCH-M (1,1) model to test whether the month-of-the-year effect is influenced by the stock market risk. This model is estimated by allowing the mean equation of the returns series to depend on a function of the conditional standard deviation. The results of estimation are presented in Table 7. The results indicate that while January and May show significant positive returns, the returns observed in March are significant negative. The remaining months do not exhibit significant returns. Fig. 10 provides the estimated conditional volatility of KSE returns across months of the year. The negative value of the risk premium parameter (-0.52) indicates that KSE returns are negatively related to its volatility as measured by conditional standard deviation. The AECH-LM test statistic in panel B rejects the null hypothesis of no ARCH effect left.

To sum up, the results for possible month-of-the-year effect in Sudanese stock market are generally murky based on the empirical results of the different models employed. It appears that the turn-of-the-year effect found for many stock exchanges around the globes does not extend to the Sudanese stock market. One could attribute this to the fact that KSE, like many developing stock markets, is considered an immature market with peculiar characteristics. For instance, KSE is a highly concentrated market with only few companies constituting significant contribution of both capitalization and traded value, coupled with the fact that KSE is an illiquid market, as the shares of only few companies are tradable (see Fig. 2). It is worth mentioning at this juncture that KSE seems to work under the inefficient market hypothesis, in which securities prices are random and not influenced by past events. This conclusion can be confirmed by the empirical evidences provided by Arabi (2014) and Onour (2010) who show that the current market prices do not instantly and fully reflect the information available for investors regarding securities. In such situations, some securities will be over-priced and others will be underpriced, which means some investors can make excess returns while others can lose more than warranted by their level of risk exposure.

Accordingly, the results of this paper indicate that KSE investors cannot take any advantage of information about specific month of the year when taking decisions to invest in the KSE market to gain abnormal returns. This also means that they should not consider the seasonal effects when constructing their portfolios.

To explain why calendar anomaly (month-of-the-year effect) does not exhibit in the KSE activities, the paper suggests that, to some extent, information disclosure and transparency can be considered as powerful explanations for the absence of this phenomenon. In a forward-looking perspective, policy makers, regulators and the market authority should put greater emphasis on this important issue by ensuring that the registered companies are disclosing timely, consistent, complete and accurate information about their activities. This, of course, represents an important element of a robust corporate governance framework, investors' confidence and investment flows. A good starting point in this regard can be done by developing a new disclosure regime and transparency standards compatible with the best international practices while embracing local realities. Other initiatives in this regard include, for example, (i) Building a culture of high quality disclosure and transparency at both firm and market levels as a first and foremost task; (ii) Review thoroughly the current framework for periodic disclosure of financial and non-financial information of the listed companies; (iii) Promote the effective utilization of information technologies by companies to communicate with their shareholders; and (iv) Introducing new regulations to promote the quality of

disclosures by companies to ensure that they are really providing reliable information about: the company objectives, major share ownership, voting rights, audited financial statements and management report, and to guarantee that such information can be swiftly accessed on a non-discriminatory basis.

6. Concluding Remarks

The presence of calendar anomalies are widely accepted as stylized facts in stock markets world-wide. It is well documented that stock returns are systematically higher or lower depending on the day of the week, the day of the month, or month of the year. For example, the literature tells that the average daily returns of the market are not the same for all the months of the year, as it would be expected on the basis of efficient market theory. However, with a variety of institutional features and trading arrangements, investigation of seasonal patterns in stock returns of developing markets could provide some different patterns of those observed in developed markets. This paper investigates the month-of-the-year effect for the Sudanese stock market over the period 2008-2014. The paper applies OLS regression as well as two different GARCH specifications to look at seasonality behaviour of KSE index returns across different months of the year. To that end, the paper estimates conditional mean (returns) and conditional variance (volatility) equations. Contradicting what has been seen in several stock exchanges around the globe, the results of this paper show that the month of the year effect is not very prominent in the returns of KSE general index. However, after including monthly dummies in both conditional mean and conditional variance equations, the results provide little evidence that KSE market can be characterized by significant returns during the first few months of the year and ends with negative returns. Generally, these results may be attributed to the fact that KSE, like many developing stock markets, is considered an immature market with peculiar characteristics, such as low volume of trading and liquidity. In fact, KSE can be considered a relatively inactive market.

Further research can and should be undertaken to investigate to what extent the month-of-the-year effect is valid at sectoral and firm levels. Another fruitful area of research can be an investigation of other calendar anomalies such as: the half month effect, the turn of the month effect, the month of the year effect, the end of the year effect or holiday effect.

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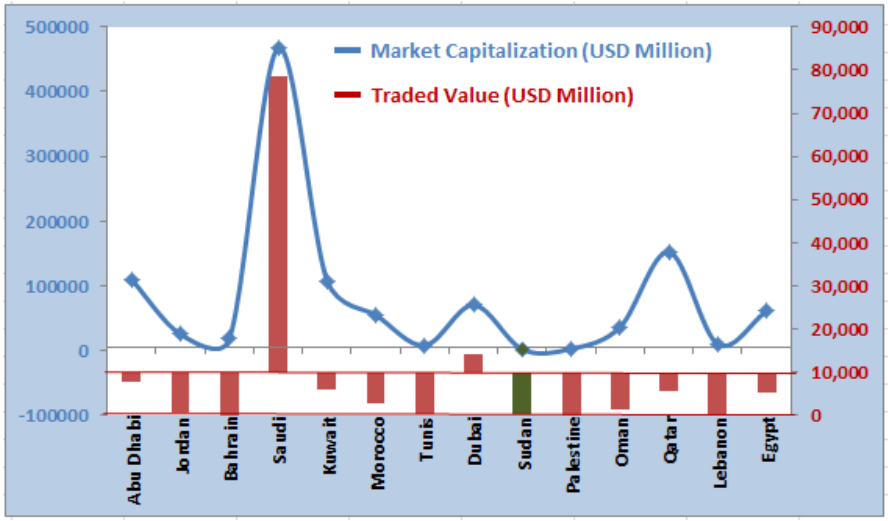
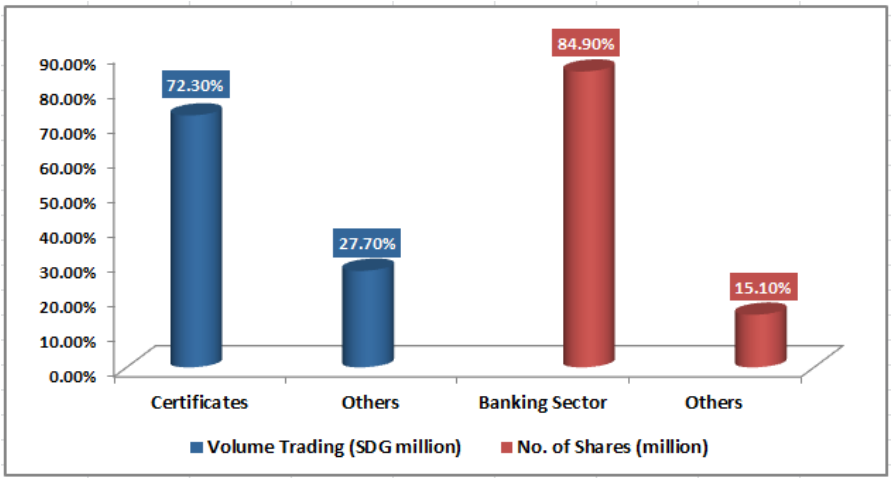
Figure 1: Trading Activity in Selected Arab Stock Markets, End-2013



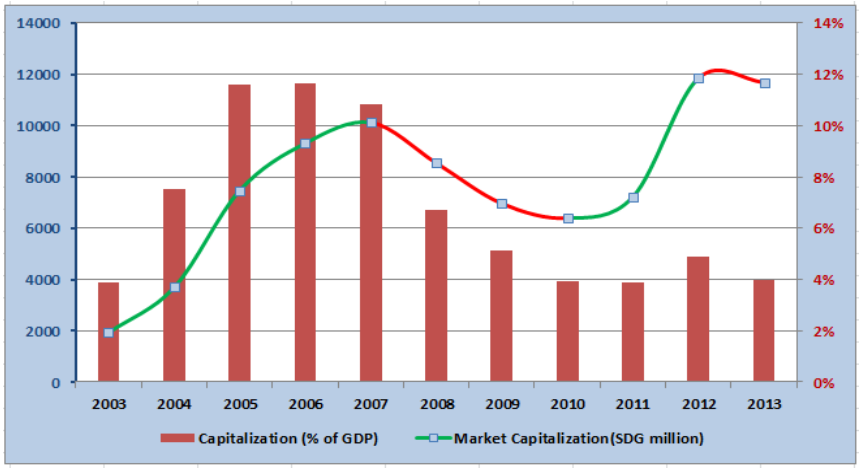
Source: Arab Monetary Fund for the KSE (2003-2013)

Figure 2: Trading volume and No. of Shares in KSE (End-2013)



Source: Central Bank of Sudan (Annual report, 2013)

Figure 3: Market Capitalization for the KSE (2003-2013



Source: Central Bank of Sudan (Annual report, various issues)

Figure 4: Average Values of Selected Market Variables by Month of the Year (2008-2013)

Source: Central Bank of Sudan

Figure 5: KSE general index and its returns (January 2, 2008 – December 30, 2014)

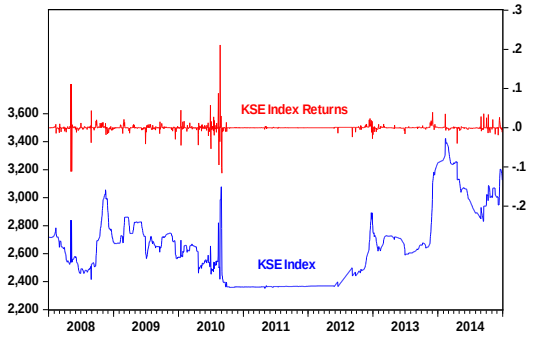


Figure 6: The mean and standard deviation of KSE index 2008-2014

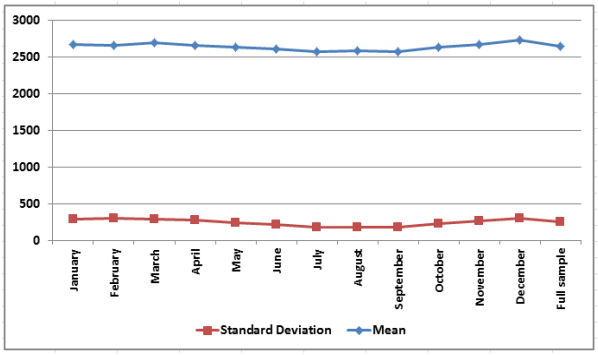


Figure 7: KSE index mean returns by month of the year 2008-2014

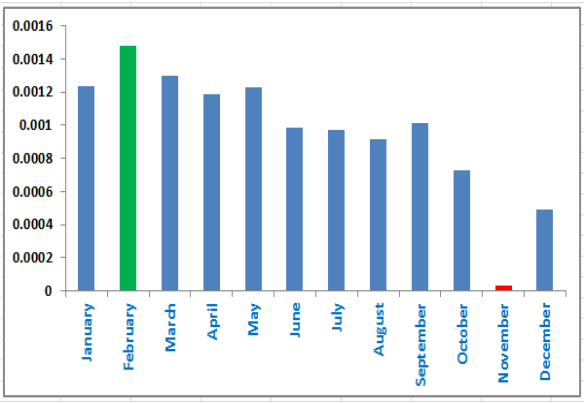


Figure 8: KSE index standard deviations by month of the year 2008-2014

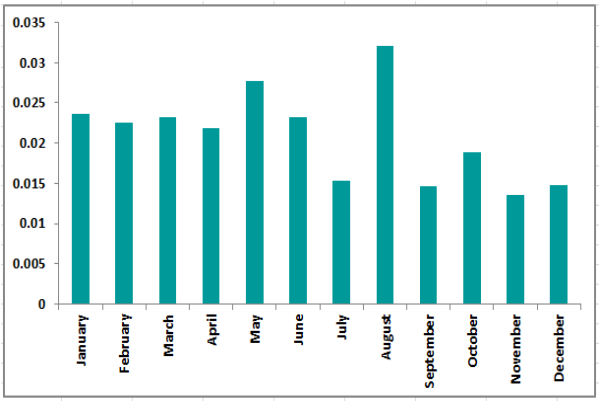


Figure 9: KSE index and its returns by month of the year 2008-2014

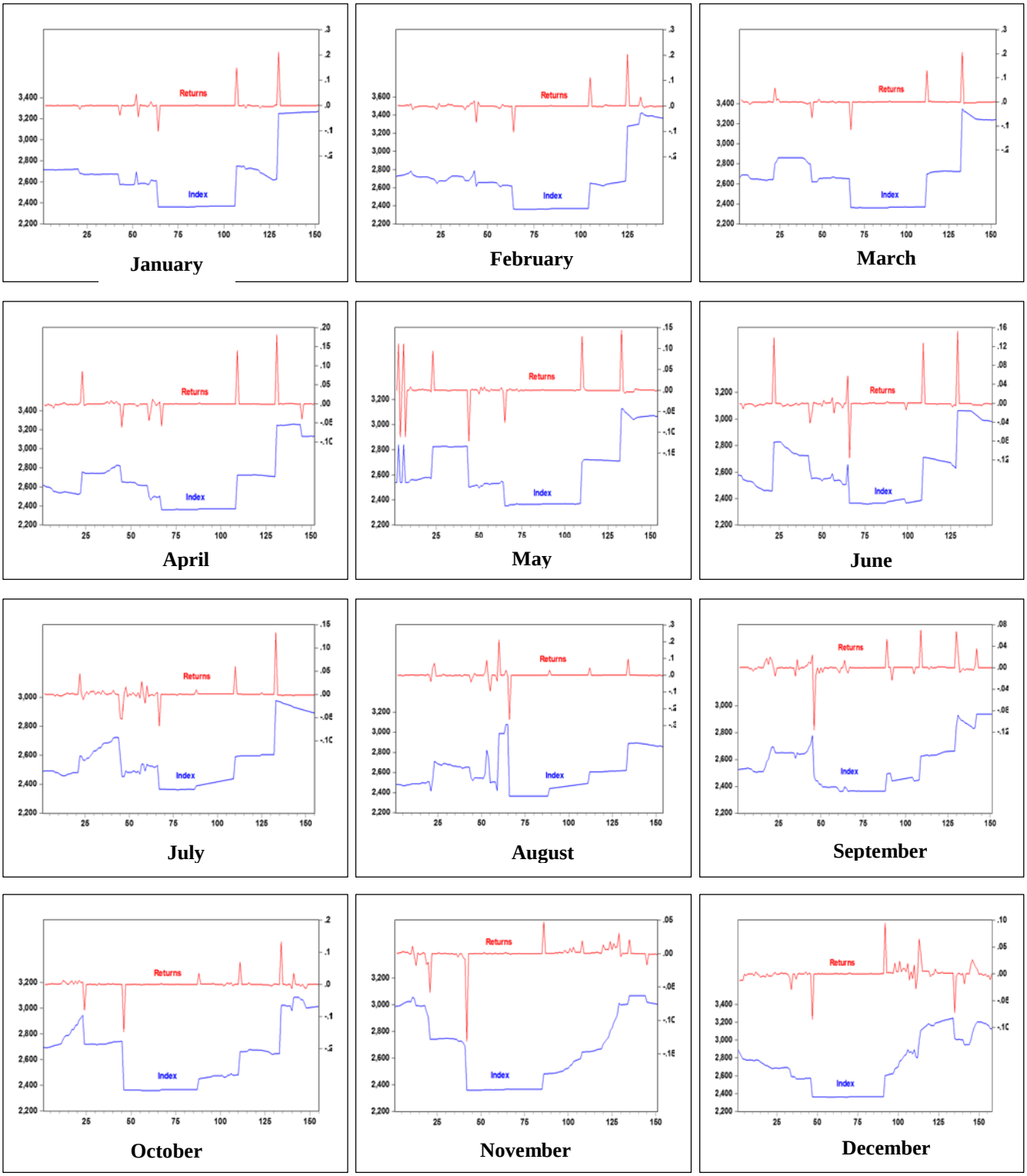


Figure 10: Conditional volatility of KSE index by month of the year 2008-2014

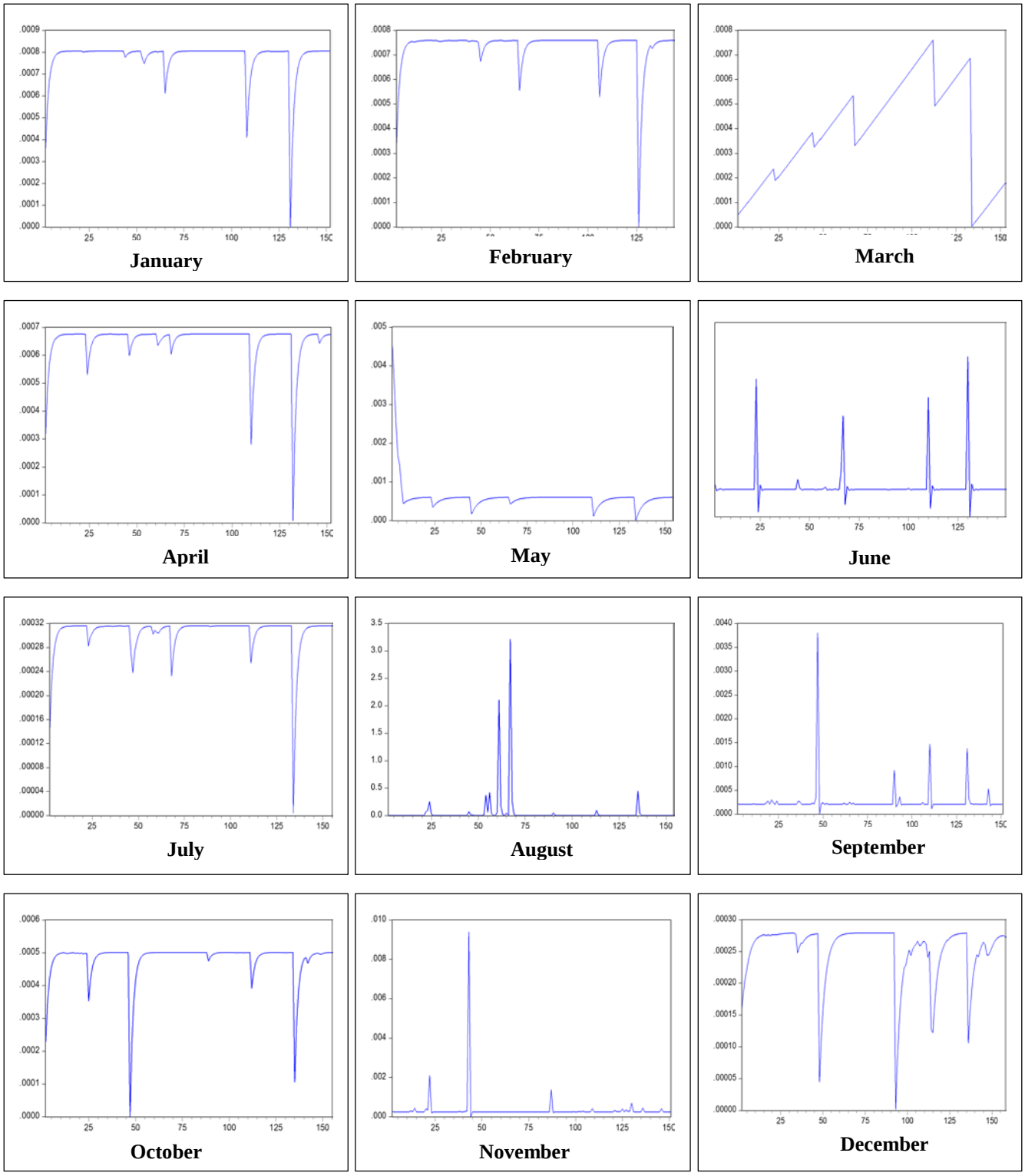


Table 1: Trading activity in selected Arab stock markets, End-2013

	Number of Shares Traded (In Million)	Daily average shares traded (Million)	Daily Average Value Traded (Million $U.S.)	Relative Market Capitalization (% of Total)	Stocks Traded Turnover Ratio (%)	Number of Listed Companies
Abu Dhabi Securities Market	17,044.68	304.369	131.0	9.68	7.05	66
Amman Stock Exchange	526.55	9.079	12.9	2.28	2.9	240
Bahrain Bourse	440.20	7.590	2.2	1.63	0.7	47
Saudi Stock exchange	10,993.02	180.213	1,287.4	41.28	16.8	163
Kuwait Stock Exchange	17,507.68	265.268	90.7	9.57	5.5	210
Casablanca Stock Exchange	94.15	1.569	44.5	4.89	4.8	75
Algeria Stock Exchange	0.034	0.0014	11.0	0.01	0.21	2
Tunis Stock Exchange	54.43	0.878	3.5	0.76	2.5	65
Dubai Financial Market	40,746.10	690.612	240.0	6.24	20	55
Damascus Securities Exchange	2.24	0.064	0.1	0.09	0.29	22
Khartoum Stock Exchange	**32.87**	**0.522**	**3.1**	**0.20**	**8.6**	**59**
Palestine Stock Exchange	91.58	1.607	2.5	0.29	4.4	49
Muscat Securities Market	1,735.10	29.408	26.4	3.25	4.2	131
Qatar Exchange	591.88	10.205	98.1	13.48	3.7	42
Beirut Stock Exchange	20.40	0.352	2.8	0.93	1.5	28
Egyptian Exchange	10,270.00	168.361	89.7	5.43	8.9	212

Source: Arab Monetary Fund.

Table 2: No. of Shares (million) by Sectors (2002 –2013)

Years	Banks	Insurance	Commerce	Industry	Agriculture	Communication	Services	Funds	Certificates	Others
2002	1926.566	0.0067	2130.592	0.0164	0	0	0	0	0	3.0553
2003	8950.99	0.0004	790.228	0.0544	0	0	0	0	0	4.1844
2004	1506.397	0.0074	650.9387	21.6722	0	0	0	0.0308	0.1021	6.9789
2005	848.351	0.0021	848.0048	21.501	0	0	0	0.8458	0.3081	12.6575
2006	7146.345	0.0018	316.0161	28.0363	0	0	0	1.4334	1.4724	74.4771
2007	9283.037	8.0397	22.6046	2.056	0.0435	88.5736	1.9954	2.7172	2.0165	0.475
2008	195.7864	0.078	0.9087	1.0072	0.0679	78.1495	5.5248	4.9769	2.4211	0.0873
2009	85.0252	0.1689	1.48	39.3634	0	36.583	2.0034	4.2289	3.4177	0.089
2010	144.346	0.13389	0.2135	2.88556	0.00705	12.49552	1.36723	1.79111	4.0589	5.09979
2011	64.42859	1.39631	0.10922	13.6168	0.00008	21.84176	0.21574	7.33345	3.89207	4.90361
2012	165.1817	0.0942	0.0627	0.1313	0	5.8242	1.2666	5.7936	5.1166	0.0199
2013	12.5216	1.7148	0.066	0.0308	0	43.8405	5.7097	1.4473	6.9833	16.974
Period Average (%)	84.90	0.03	13.33	0.36	0.0003%	0.80	0.05	0.09	0.08	0.36

Source: Central Bank of Sudan (various issues) and own calculation

Table 3: Volume Trading (SDG million) by Sectors (2002 –2013)

Years	Banks	Insurance	Commerce	Industry	Agriculture	Communication	Services	Funds	Certificates	Others
2002	13.594	0.023	9.123	0.005	0	0	0	10.754	108.853	106.703
2003	39.7	0.001	1.946	0.016	0	0	0	7.414	62.663	132.364
2004	7.805	0.004	39.29	38.958	0	0	0	2.767	113.702	245.197
2005	11.095	0.008	18.309	48.2	0	0	0	47.116	194.408	897.697
2006	91.4	0	22.3	57	0	0	0	120.2	799.9	977.3
2007	139.7	1.9	22	4	0.1	432.2	0.8	130.3	1068.5	0.1
2008	135.8	1.8	6.2	0.8	0.1	320.1	7.6	123.5	1283.2	0.04
2009	81.5	0.1	15.1	25.4	0	122.5	0.9	164.8	1836.3	0
2010	145.94	0.07	0.5	2	0.01	23.23	0.93	81.4	2157.93	10.31
2011	114.728	35.473	0.216	8.746	0.001	32.148	0.299	302.481	2059.139	9.394
2012	41.2	0.1	0.4	0.2	0	9.2	0.6	308.1	2713.7	0.03
2013	9.9	1.6	0.5	0.01	0	95.9	23.6	71.7	3679.7	2.4
Period Average (%)	**3.77**	**0.19**	**0.62**	**0.84**	**0.001**	**4.68**	**0.16**	**6.20**	**72.76**	**10.78**

Source: Central Bank of Sudan (various issues) and own calculation

Table 4: Descriptive Statistics of the KSE Return Series

	Statistics								
	Mean	Median	Maximum	Minimum	Standard deviation	Skewness	Kurtosis	Jarque-Bera	Obs.
January	0.001238	0.00005	0.212306	-0.101964	0.0237	5.79	55.52	18198.3*	151
February	0.001478	0.000008	0.203048	-0.103185	0.0225	5.04	53.56	15839.7*	143
March	0.001298	0.00000	0.206383	-0.115871	0.0232	4.79	51.94	15754.4*	152
April	0.001184	0.00000	0.181811	-0.061398	0.0218	5.48	44.92	11811.2*	151
May	0.001228	0.00000	0.143841	-0.121222	0.0278	1.02	18.29	1519.06*	153
June	0.000982	-0.00015	0.152570	-0.115720	0.0232	3.59	31.63	5372.34*	148
July	0.000972	0.00000	0.133497	-0.067951	0.0153	3.64	43.15	10683.5*	154
August	0.000917	0.00002	0.211228	-0.263077	0.0321	-1.60	44.16	10868.8*	153
September	0.001011	0.00006	0.069898	-0.116074	0.0146	-1.68	35.24	6565.86*	150
October	0.000725	0.000007	0.132826	-0.147875	0.0189	-1.05	44.54	11100.1*	154
November	0.000034	0.000118	0.047619	-0.131123	0.0135	-6.26	63.33	23726.2*	150
December	0.000492	0.000000	0.094379	-0.084694	0.0148	0.27	24.52	3032.31*	157
Full sample	0.000077	0.000000	0.211228	-0.116074	0.0103	3.38	153.56	1728350*	1826

Notes: * denotes statistical significance at 1% level.

Table 5: OLS Results for the Month-of-the-Year Effect

Variable	Panel A: OLS Results			
	Coefficient	Std. Error	t-Statistic	Probability
January	-0.000265	0.000827	-0.320079	0.7489
February	0.000441	0.000859	0.513213	0.6079
March	-0.000243	0.000827	-0.029381	0.9766
April	-0.000936	0.000830	-1.127384	0.2597
May	0.0000830	0.000825	0.100694	0.9198
June	-0.000862	0.000836	-1.030609	0.3029
July	-0.000107	0.000817	-0.130947	0.8958
August	0.001433	0.000828	1.731072	0.0836
September	-0.001074	0.000833	-1.289545	0.1974
October	0.000893	0.000820	1.089153	0.2762
November	0.000816	0.000842	0.969198	0.3326
December	0.000657	0.000817	0.804670	0.4211
R_{t-1}	-0.080466	0.023422	-3.435530	0.0006

Panel B: Diagnostic Checking: Wald Test		
Statistics	Value	Probability
F-Statistic	0.842957	0.6059
Chi-Square	10.11548	0.6058

Panel C: Diagnostic Checking: ARCH-LM Test		
Lags	ARCH-LM test statistic	Prob. Chi-square
5	94.81910	0.0000
10	299.6602	0.0000
15	314.1680	0.0000
20	315.2716	0.0000
30	314.5996	0.0000

Table 6: The Month-of-the-Year Effect in Returns Equation

Panel A: Coefficient Estimates				
Mean Equation				
Variable	**Coefficient**	**Std. Error**	**Z-Statistic**	**Probability**
January	0.000180	0.00000836	21.48038	0.0000
February	0.001408	0.0000199	70.65103	0.0000
March	0.000232	0.0000112	20.76406	0.0000
April	-0.001548	0.0000204	-76.04366	0.0000
May	0.000643	0.0000241	26.69450	0.0000
June	-0.001267	0.0000207	-61.09919	0.0000
July	-0.000487	0.0000144	-33.91476	0.0000
August	9.81E-05	0.0000202	4.858516	0.0000
September	-0.000684	0.0000118	-58.03520	0.0000
October	-0.000356	0.0000118	-30.05553	0.0000
November	0.000712	0.0000195	36.52119	0.0000
December	0.000396	0.000017	23.34813	0.0000
R_{t-1}	0.645489	0.004943	130.5846	0.0000
Variance Equation				
α_0	0.0000000146	0.0000000153	0.952030	0.3411
α_1	9.778366	0.169784	57.59312	0.0000
β	0.109928	0.004171	26.35790	0.0000

Panel B: Diagnostic Checking: ARCH-LM Test		
Lags	**ARCH-LM test statistic**	**Prob. Chi-square**
5	1.508635	0.9121
10	2.682888	0.9879
15	4.080512	0.9975
20	4.968002	0.9997
30	11.03197	0.9994

Table 7: The Month-of-The-Year Effect in Both Returns and Volatility Equations

Panel A: Coefficient Estimates				
Mean Equation				
Variable	**Coefficient**	**Std. Error**	**Z-Statistic**	**Probability**
January	0.003157	0.001331	2.371441	0.0177
February	0.000322	0.001501	0.214562	0.8301
March	-0.003133	0.001328	-2.359802	0.0183
April	-0.001723	0.001710	-1.007545	0.3137
May	0.010391	0.002495	4.164712	0.0000
June	0.001564	0.001197	1.306172	0.1915
July	-0.002057	0.001306	-1.575115	0.1152
August	0.002290	0.001593	1.437255	0.1506
September	0.001215	0.001400	0.868023	0.3854
October	-0.001925	0.001331	-1.446300	0.1481
November	-0.000893	0.001339	-0.666837	0.5049
December	-0.000581	0.001407	-0.412598	0.6799
R_{t-1}	-0.059054	0.030352	-1.945634	0.0517
λ	-0.520466	0.035299	-14.74444	0.0000
Variance Equation				
January	-0.0000548	0.00000362	-15.12557	0.0000
February	-0.000072	0.00000478	-15.05770	0.0000
March	-0.0000832	0.00000476	-17.50107	0.0000
April	-0.0000696	0.00000499	-13.95274	0.0000
May	-0.0000145	0.0000102	-1.427974	0.1533
June	-0.0000469	0.00000377	-12.44354	0.0000
July	-0.0000831	0.00000475	-17.47556	0.0000
August	-0.000056	0.00000501	-11.16283	0.0000
September	-0.0000702	0.00000487	-14.43334	0.0000
October	-0.0000822	0.00000476	-17.27146	0.0000
November	-0.0000784	0.00000477	-16.45380	0.0000
December	-0.0000767	0.00000478	-16.05004	0.0000
α_0	0.0000832	0.00000476	17.50126	0.0000
α_1	0.181916	0.008496	21.41149	0.0000
β	0.610245	0.008552	71.35721	0.0000

Panel B: Diagnostic Tests		
Lags	**ARCH-LM test statistic**	**Prob. Chi-square**
5	2.822038	0.7274
10	8.977331	0.5343
15	10.11077	0.8127
20	10.87579	0.9494
30	17.72752	0.9628