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Empirical investigation of the day-of-the-week effect on the return and conditional variance using EGARCH model: The case study of the H-shares index in Hong Kong

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Abstract

The purpose of this paper is to investigate the day-of-the-week effect on both the returns and volatility of the H-shares (Hang Seng China Enterprises) Index in Hong Kong. To do this, we applied the exponential GARCH method to the daily closing price of the H-share index from 3 January 2000 to 1 August 2008. The empirical results indicate that there are significant, positive Monday and Friday effects on returns. However, after adjusting for market risks that vary across the days of the week, only the Monday effect remains. We further check the day-of-the-week effect on volatility and find Monday has the highest effect, which is consistent with the theory of availability of information. Together, these two sets of results imply that the Monday effects on risk-adjusted returns may be a reward for a higher conditional volatility on that day. Nevertheless, after adjusting for transaction costs, the abnormal returns for Monday become negligible.

JEL classification: G12, G14, G15

Keywords: EGARCH model; Volatility; H-shares Index; Day-of-the-week effect

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Introduction

The day-of-the-week effect has long been recognized as one of the most puzzling stock market anomalies in the study of financial markets. It occurs when the mean returns on some days of the week are consistently higher than for the others. The existence of this effect allows investors to develop active trading strategies to exploit abnormal returns. In particular, investors could buy stocks on the days with abnormally low returns and sell on the days with abnormally high returns. A number of prior empirical studies including Cross (1973), French (1980), Gibbons and Hess (1981), Keim and Stambaugh (1984), and Lakonishok and Smidt (1989) report significantly negative daily returns in the US markets on Mondays with abnormally high and positive returns on the last day of the week, namely Friday or Saturday, than on other days. Evidence of the lowest and highest returns on other weekdays in both developed and emerging markets is also found by, for instance, Jaffe and Westerfield (1985), and Basher and Sadorsky (2006). At first glance, the occurrence of day-of-the-week effects seems to violate the Efficient Markets Hypothesis (EMH). A closer inspection, however, reveals that evidence for a day-of-the-week effect does not necessarily imply market inefficiency. This is because a trading strategy based on the effect may not generate sufficiently high net gains if transaction costs are taken into account. Also, as noted by Fama (1970), all tests of market efficiency should be conditional on a model of market equilibrium. The significant effects of weekdays on mean returns may be attributable to time-varying stock market risk premiums. Therefore, it is important for researchers to take risk factors into account when considering the existence of calendar anomalies.

In addition to the effect on mean returns, it is also important for investors to investigate a similar day-of-the-week anomaly on stock market volatility, as higher returns on a particular weekday may be just a reward for greater risks taken on that day (Ho and Cheung, 1994). Moreover, the presence of this kind of market anomaly may help investors to predict volatility patterns in stock returns and, consequently, would have important implications for making hedging and speculative decisions, and pricing certain derivative instruments such as warrants and options (Berument and Kiymaz, 2001).

The purpose of this paper is to investigate the day-of-the-week effect on both the returns and the volatility (conditional variance) of the H-shares index in Hong Kong. The family of stock market indices in Hong Kong is managed and compiled by the Hang Seng Indexes Co. Ltd. The most widely quoted indicator for measuring market performance is the Hang Seng Index, which consists mainly of the largest and most liquid companies quoted on the Stock Exchange of Hong Kong. This has usually been employed for the study of stock market anomalies in Hong Kong (for example, Aggarwal and Rivoli, 1989, Ho, 1990, Lee *et al.* 1990, Wong *et al.* 1992, Agrawal and Tandon, 1994, Tong, 2000 and Chia *et al.*, 2008). Since 1993, enterprises incorporated in Mainland China have begun to be listed in Hong Kong and their shares are named as H shares. The par values of H shares are denominated in Renminbi (RMB), while subscription and trading are quoted in Hong Kong dollars. In order to measure the performance of H shares, the H-shares index (also known as the Hang Seng China Enterprises Index) was launched in August of 1994 comprising those H-shares companies that are included in the Hang Seng Composite Index (HSCI).[1] There is no restriction on the number of constituent stocks in the H-shares index, and those H-shares companies joining or leaving the HSCI are automatically included in or excluded from the index.[2] Over the last decade, the Hong Kong stock market has witnessed a significant increase in the market capitalization and turnover of this category of shares. As shown in Table 1, the market capitalization of H shares on the main board surged from HKD 85,139 million in 2000 to HKD 2,720,188 million in 2008, representing an average annual growth rate of 16.31%. Also, the turnover of H shares has increased from HKD 164,309 million in 2000 to HKD 6,130,592 million in 2008, recording a yearly growth rate of 16.27%. H-shares index-linked derivatives instruments such as H-shares Index Futures and Options are also actively traded on the Stock Exchange of Hong Kong. From Table 2, it can be seen that the average daily contract volumes of the H-shares Index Futures and Options have increased at an average annual rate of 79% and 85% respectively since their inceptions. Against such a background, the H-shares index has now become an important benchmark for the Hong Kong stock market. However, no attempt has been made by researchers to investigate the existence of day-of-the-week effects on both the returns and volatility of the H-shares index. In the light of this, it is in our interests to examine if the day-of-the-week effect actually exists in this new data set. The

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[1] The HSCI comprises the top 200 companies listed on the Stock Exchange of Hong Kong.

[2] See, *Hang Seng China Enterprises Index, Selection Criteria*, from the web site of the Hang Seng Indexes Co. Ltd. (www.hsi.com.hk).

empirical results may be enlightening for investors who want to invest in the H-share index or its index-linked derivatives.

As our study involves the use of high-frequency daily return data, it is important to note that this type of data usually exhibits volatility clustering, and follows a non-normal, fat-tailed distribution. Therefore, assumptions of normal distribution with constant variance about the stock return and regression error are most likely flawed. Connolly (1989) and de Jong *et al.* (1992) suggest the use of the General Autoregressive Conditional Heteroskedasticity (GARCH) models (Bollerslev, 1986) to help solve this problem. Studies such as Choudhry (2000), AL-Loughani and Chappell (2001), Berument and Kiymaz (2001), Kiymaz and Berument (2003) and Yakob *et al.* (2005) provide international evidence of the day-of-the-week effect in stock markets using GARCH models. On the other hand, Nelson (1991) proposes using the exponential GARCH (EGARCH) model for modeling volatility of asset returns as it allows for asymmetrical effects and guarantees non-negativity of conditional variance. Chia *et al.* (2008) uses this new approach to study day-of-the-week effects in selected East Asian stock markets. We adopt the EGARCH models for studying the day-of-the-week effects of the H-shares index.

The rest of the paper is organized as follows. Section 2 describes the details of the methodology employed. The data and the empirical results are reported in Section 3 and concluding remarks are made in the last section.

Methodology

Three conditional mean regression models generating H-shares index returns are estimated and tested in this paper. In Model 1, the H-shares index return is regressed on five daily seasonal dummy variables and a conditional variance of returns:

$$\boldsymbol{R}_{\boldsymbol{H}.\boldsymbol{t}} = \sum_{\boldsymbol{j}=1}^{5} \delta_{\boldsymbol{j}} \boldsymbol{D}_{\boldsymbol{jt}} + \theta \sigma_{\boldsymbol{t}}^{2} + \varepsilon_{\boldsymbol{t}} \qquad (1)$$

where $\boldsymbol{R}_{\boldsymbol{H}.\boldsymbol{t}}$ is the log return of the H-share index at time t, $\boldsymbol{D}_{1\boldsymbol{t}}$, $\boldsymbol{D}_{2\boldsymbol{t}}$, …, $\boldsymbol{D}_{5\boldsymbol{t}}$ are the dummy variables representing Monday, Tuesday, .., Friday respectively (so that $\boldsymbol{D}_{1\boldsymbol{t}} = 1$ when *t* is a Monday while zero otherwise, and so on); the coefficients δ_1 to δ_5 represent the size and the direction of the weekday effect on $\boldsymbol{R_{H.t}}$; and $\boldsymbol{\varepsilon_t}$ stands for an error term. It is possible that $\boldsymbol{\sigma_t^2}$, the conditional variance of $\boldsymbol{\varepsilon_t}$ at time t, which is used as a proxy for risk can affect stock market returns and, as a result, $\boldsymbol{\sigma_t^2}$ is included for explaining the conditional mean of $\boldsymbol{R_{H.t}}$ (Engle *et al.*, 1987).

It is noteworthy to mention that abnormal returns on particular weekdays may be caused by market risk factors (Gibbons and Hess, 1981). Therefore, we can replace $\boldsymbol{\sigma_t^2}$ in Model (2) with two market risk factors to improve the performance of the model. In particular, we employ the returns on the S&P500 index to represent the risk factor from the US on the grounds that the effects of US economic events are largely reflected in other markets through the US stock market (see for example Jaffe and Westerfield, 1985, Wong, *et. al.*, 1992, Agrawal and Tandon, 1994, and Clare, *et. al.* 1998). Owing to time zone differences, the returns on the H-shares index at time t are attributable to the returns on the S&P500 index at time t-1, $\boldsymbol{R_{SP.t-1}}$. Also, we add the returns on the Shanghai A share index at time t, $\boldsymbol{R_{A.t}}$, to Model 2 because the H-shares index and the Shanghai A Share index are likely to be subject to common market risk factors originating from Mainland China:[3]

$$\boldsymbol{R_{H.t}} = \sum_{\boldsymbol{j}=1}^{5} \delta_{\boldsymbol{j}} \boldsymbol{D_{jt}} + \beta_{\boldsymbol{SP}} \boldsymbol{R_{SP.t-1}} + \beta_{\boldsymbol{A}} \boldsymbol{R_{A.t}} + \varepsilon_{\boldsymbol{t}} \qquad (2)$$

In Model 2, the market risk factors are, however, assumed to be constant across the whole week. This assumption can be modified as shown in Model 3 by adding slope interaction dummy variables into Model (2) that allow market risks to vary across weekdays (Brooks and Persand, 2001):

$$\boldsymbol{R_{H.t}} = \sum_{\boldsymbol{j}=1}^{5} \delta_{\boldsymbol{j}} \boldsymbol{D_{jt}} + \sum_{\boldsymbol{j}=1}^{5} \beta_{\boldsymbol{SP.j}} (\boldsymbol{D_{jt}} \boldsymbol{R_{SP.t-1}}) + \sum_{\boldsymbol{j}=1}^{5} \beta_{\boldsymbol{A.j}} (\boldsymbol{D_{jt}} \boldsymbol{R_{A.t}}) + \varepsilon_{\boldsymbol{t}} \qquad (3)$$

For all the mean regression models (1), (2) and (3), statistically significant coefficients δ_j provide evidence of the day-of-the-week effect.

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[3] The Shanghai A Share index tracks the price performance of all A-shares listed on the Shanghai Stock Exchange in Mainland China (www.sse.com.cn). A-shares are quoted in RMB and are restricted to local investors and qualified institutional foreign investors.

As well as looking at returns, this paper also investigates the day-of-the-week effect on the volatility of the H-shares index returns by including daily dummy variables in the conditional variance equation for ε_t (Choudhry, 2000), which is specified as an EGARCH model of Nelson (1991):

$$\log(\sigma_t^2) = \omega + \sum_{m=1}^{q} \boldsymbol{a}_m \left| \frac{\varepsilon_{t-m}}{\sigma_{t-m}} \right| + \sum_{k=1}^{K} \gamma_k \frac{\varepsilon_{t-k}}{\sigma_{t-k}} + \sum_{n=1}^{p} \boldsymbol{b}_n \log(\sigma_{t-n}^2) + \sum_{j=2}^{5} \Phi_j \boldsymbol{D}_j \qquad (4)$$

The intercept ω in (4) refers to the log of conditional variance on Mondays. The coefficients, Φ_j, j = 2,…,5 of the seasonal daily dummy variables refer to the log of conditional variances for other days of the week deviating from Monday. The left-hand side of (4) is the log of conditional variance, which guarantees σ_t^2 to be non-negative. Also, the asymmetric effects of returns on conditional variance can be tested by the hypothesis that $\gamma_k \neq 0$. Evidence of a day-of-the-week effect on volatility is indicated by any significant values of ω and Φ_j, j = 2,…5, with different sizes and directions.

All the parameters of the mean and conditional variance equations can be simultaneously estimated using the maximum likelihood method. In order to better capture the fat-tailed property of the stock market data, Nelson (1991) employs generalized error distribution (GED) as the conditional distribution of ε_t. Consequently, the log-likelihood function L_t is of the form:

$$\boldsymbol{L}_t = -\frac{1}{2}\log\left(\frac{\Gamma(1/\nu)^3}{\Gamma(3/\nu)(\nu/2)^2}\right) - \frac{1}{2}\log(\sigma_t^2) - \left(\frac{\Gamma(3/\nu)(\varepsilon_t)^2}{\sigma_t^2\Gamma(1/\nu)}\right)^{\nu/2} \qquad (5)$$

where Γ is a gamma function and the tail-thickness parameter ν is greater than zero. The GED is a normal distribution if ν = 2, and becomes fat-tailed if ν < 2.

Data and empirical results

The stock market data set used here consists of the daily closing prices of the H-shares index, the Standard & Poor 500 index, and the Shanghai A Share index. They are all collected from DATASTREAM. The data series ran from 3 January 2000 to 1 August 2008. All holidays have been excluded. The total usable number of observations for all stock indices is 1450. The continuously compounded returns are calculated as the natural log of the daily differences of the stock market indices.

To understand more about the statistical characteristics of the stock market data, we ran several preliminary statistical tests. Table 3 shows the summary statistics for the return series of the three stock market indices used. All series are found to have a fatter tail and a higher peak than a normal distribution, as shown by the significant values of kurtosis. The results of the Jarque-Bera test confirm that we can reject the null hypothesis of normality at the 1% level for all series. Also, significant skewness is found in the return series of the Shanghai A Share index. Table 4 presents the contemporaneous and lagged correlations between the return series of stock indices. The strongest correlations between the returns of the H-shares index, and those of the Shanghai A Share and S&P 500 indices, occur at lag 0 and 1, being equal to 0.2707 and 0.1717 respectively. This means that today's returns on the H-shares index are most correlated with today's returns on Shanghai A Share index and the previous trading day's returns on the S&P 500 index. These correlations may be explained by the time zone differences between the US and Mainland China as well as Hong Kong. The stock market in Hong Kong closes just one hour later than Shanghai when the two markets are open on the same day. However, today's stock market performance in Hong Kong and Mainland China corresponds to yesterday's performance in the US market. Furthermore, we find that the correlations between the returns on the Shanghai A Share index and those on the S&P 500 index, both contemporaneous and lagged, are so small that these two indices represent two separate market risk factors. Therefore, their inclusion in the mean return equations (2) and (3) is not likely to cause the econometric problem of multicollinearity.

Table 5 reports the results for the estimation of the day-of-the-week effect on returns. In Model 1, significant positive Monday and Friday mean returns are observed. The coefficient of the conditional variance (θ_1) in the return equation is negative, albeit insignificant. There seems to be a negative relationship between conditional expected returns and conditional variance. Replacing the conditional variance with the two stock market indices from Mainland China and US as proxies for the market risk factors as shown in Model 2, we find that all the market betas (β_A and β_{SP}) are positive and significant, implying that the risk-return relationship becomes significantly positive. Nevertheless, the results of the positive Monday and Friday effects on returns do not change with the inclusion of market risks that do not vary across weekdays. From the estimation results for Model 3, the positive

Monday effect remains significant,[4] but the Friday effect disappears after adjusting for market risks that are allowed to vary across the days of the week. All the market betas ($\beta_{A.j}$ and $\beta_{SP.j}$, where j =1, 2,…,5) in Model 3 are positive, and almost all are significant. This implies that the Friday effect may be attributable to market risks from the US and Mainland China.

Table 5 also provides evidence of day-of-the-week effect on volatility. The Monday effect on conditional variance (ω) is positive, significant, and is the largest in all models. According to the information availability theory (French and Roll, 1986, and Foster and Viswanathan, 1990), stock return variance should be highest on Mondays when the informed trader has the greatest private information advantage, and should be lowest on Fridays. Since private information is assumed to be received throughout the week while public information is received only on weekdays, the information advantage declines with the arrival of the public information. As a consequence, traders' sensitivity to changes in order flow is at its maximum at the beginning of the week and decreases through the trading week. In contrast to this theory, our results show that the lowest and negative effect is on Tuesdays, not on Fridays. Nevertheless, the results shown in Table 5 still provide some evidence in favor of the information availability theory. Also, the existence of the day-of-the-week effect on volatility is likely to cause possible structure shifts of unconditional variance (Lamoureux and Lastrapes, 1990). With inclusion of the seasonal dummy variables in the conditional variance equation, the Q statistics cannot reject the null hypothesis of no autocorrelation for the standardized squared residuals $\varepsilon_t^2 / \sigma_t$ of all models, ruling out the possibility of model misspecification.[5] Furthermore, a_1, the coefficient of $|\varepsilon_{t-1} / \sigma_{t-1}|$, and b_n, the coefficient of $\log(\sigma_{t-n}^2)$ where n = 1, 2, 3, are significant, implying the existence of the EGARCH process in the residuals. Hence, the residuals may be represented by a non-normal, leptokurtic distribution. We find that the null hypothesis of the GED tail parameter $\nu \geqq 2$ is rejected for all cases in favor of the alternative hypothesis that $\nu < 2$. In other words, the GED of the

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[4] The result of a significant positive Monday effect on H-shares index returns in Table 5 is in contrast to those studies using the Hang Seng index as a case study of the Hong Kong stock market, which provide evidence of negative (albeit insignificant) Monday effects – see Lee *et al.* (1990), Ho (1990), and Agrawal and Tandon (1994) – or positive but insignificant effects after adjusting for equity risk (Chia *et al.*, 2008).

residuals is not normal but fat-tailed. This finding is further confirmed by the significance of the Jarque-Bera statistic and the kurtosis of the standardized residuals ε_t / σ_t for all cases. On the other hand, the asymmetric effects on the conditional variance (γ_1) are insignificant in all models. The news impact on conditional variance is symmetric, signifying that the effects of conditional volatility are unaffected by the signs of the residuals of the previous periods.

From the above empirical results, the Monday effect on risk-adjusted returns may be a reward for the Monday effect on volatility. The existence of certain patterns in returns on the H-shares index does not, however, imply the presence of abnormal profit opportunities after taking account of transaction costs. For instance, investors in Hong Kong pay 0.25% of the transaction amount as brokerage fees, 0.1% as stamp duty paid to the Government, 0.004% as a transaction levy, and 0.005% to the Hong Kong Exchange as a trading fee, with the total costs of a one-sided transaction therefore equaling 0.359%.[6] The costs for a two-sided transaction (buy and sell) accordingly add up to 0.718%. However, the gross average returns on Mondays (that is, buy at Friday close and sell at Monday close) represented by the estimated values of the coefficient δ_1 for all the models in Table 5 do not exceed the transaction costs.

Another possible explanation for the day-of-the-week effect is attributable to settlement procedures (Jaffe and Westerfield, 1985). In the case of the Hong Kong stock market, which has adopted a T+2 settlement period since 1992,[7] an investor buying at Wednesday close and selling at Thursday close makes payment on Friday, but could receive the cash on the following Monday. Since the cash payment occurs three days before the cash receipt, there should be higher expected returns on Thursdays to compensate for the loss of an additional two days of interest. But no positive significant

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[5] Without the seasonal dummy variables in the conditional variance equation, we found that the Q-statistics became significant at some lags, providing some evidence of model misspecification. These unreported results are available upon request.

[6] Effective from 1 April 2003, the brokerage fee is freely negotiable between brokers and their clients. The 0.25% is an example from the Hong Kong Bank. Information about other transaction costs is based on *Trading Information*, Hong Kong Exchanges and Clearing Ltd (www.hkex.com.hk/tradinfo/trancost/trancost.htm).

[7] See the HKFx Fact Book 2008, Hong Kong Exchange Clearing Ltd.

Thursday effect on returns (δ_4) can be found in our results. Therefore, the settlement period hypothesis cannot help explain the day-of-the-week patterns in the H-shares index.

Concluding remarks

This paper has examined the day-of-the-week effect on both return and volatility in the H-shares index of the Hong Kong stock market. We employed an EGARCH model to carry out the study. The empirical results indicate positive Monday and Friday effects on returns in Models 1 and 2, but the Friday effect becomes insignificant when market risks that vary across the days of the week are included, as in Model 3. The result can be explained by the significant Monday effect on volatility which indicates that Monday can increase conditional variance, but cannot be explained by the settlement period effect. In spite of this, after deducting transaction costs, we find that the abnormal profit on the H-shares index based on the day-of-the-week pattern is so negligible that the EMH remains unchallenged.

Table 1 Market capitalization and turnover of H shares on the main board

Year End	Market capitalization (HK$ million)	% of market capitalization	Turnover (HK$ million)	% of equity turnover
2000	85,139.58	1.78%	164,309.62	5.74%
2001	99,813.09	2.57%	245,201.03	13.47%
2002	129,248.37	3.63%	139,711.41	9.50%
2003	403,116.50	7.36%	501,496.87	22.12%
2004	455,151.75	6.87%	933,860.83	27.49%
2005	1,280,495.01	15.78%	949,155.23	26.46%
2006	3,363,788.46	25.39%	2,521,764.08	39.26%
2007	5,056,820.09	24.62%	7,748,899.57	46.93%
2008	2,720,188.76	26.53%	6,130,592.75	48.53%

Source: HKEx Fact Book, various issues, Hong Kong Exchanges and Clearing Ltd.

Table 2 Contract volumes of the H-shares Index Futures and Options

Year End	Contract Volume of H-shares Index Futures		Contract Volume of H-shares Index Options (Call and Put)	
	Average Daily	Total	Average Daily	Total
2003	3,196 [a]	47,941	____	____
2004	7,060	1,743,700	566 [b]	77,758
2005	8,027	1,978,673	1,044	257,425
2006	19,759	4,880,470	3,070	758,247
2007	44,271	10,846,277	7,052	1,727,647
2008	59,428	14,440,965	6,642	1,613,986

[a] Trading in H-shares Index Futures commenced on 8th December 2003.

[b] Trading in H-shares Index Options commenced on 14th June, 2004.

Source: HKEx Fact Book, various issues, Hong Kong Exchanges and Clearing Ltd.

Table 3 Descriptive statistics for stock indices returns

Index	Mean (%)	S.D. (%)	Jarque-Bera	Kurtosis	Skewness
H-shares	0.1251	2.5158	6768.279 *	13.5843*	-0.0007
Shanghai A Share	0.0460	1.9857	7713.765 *	14.2776*	-0.3507 **
S & P 500	-0.0083	1.3348	2299.491 *	9.1625*	0.1447

Notes:

S.D. stands for standard deviation.

The Jarque-Bera statistic is used to test if the standardized series are normally distributed under the null hypothesis. The test statistic will exceed the critical values of the chi-square distribution when the null hypothesis is rejected.

The critical values of skewness and kurtosis can be found in Pearson and Hartley (1976).

* and ** denote the level of significance at 1% and 5% respectively.

Table 4 Results of correlations between returns on H-shares and other stock market indices

Pair-wise indices	Lag 0	Lag 1	Lag 2
H-Shares – Shanghai A Share (Lag)	0.2707	-0.0348	0.0201
H-Shares – S&P 500 (Lag)	0.1678	0.1717	-0.0206
Shanghai A Share – S&P 500 (Lag)	-0.0286	0.0708	5.45E-07

Table 5 Day-of-the-week effect on the H-shares index return and volatility

Parameters	Model 1	Model 2	Model 3
Mean equation			
δ_1 (Monday)	0.0056 ** (2.5637)	0.0037 ** (2.4809)	0.0029 ** (2.0293)
δ_2 (Tuesday)	0.0008 (1.0450)	-0.0007 (-0.9796)	-0.0001 (-0.1748)
δ_3 (Wednesday)	0.00126 (1.3540)	-0.0002 (-0.2668)	-0.0001 (-0.1556)
δ_4 (Thursday)	0.0013 (1.4783)	0.0006 (0.9043)	0.0008 (1.1147)
δ_5 (Friday)	0.0026* (3.3008)	0.0017 * (2.6194)	0.0010 (1.6310)
θ (σ_t^2)	-2.4318 (-1.5352)		
β_A ($\boldsymbol{R_{A.t}}$)		0.2556 * (11.7740)	
β_{SP} ($\boldsymbol{R_{SP.t-1}}$)		0.2661 * (9.8587)	
$\beta_{A.1}$ ($\boldsymbol{R_{A.t}}$ -Monday)			0.3696 * (8.5829)
$\beta_{A.2}$ ($\boldsymbol{R_{A.t}}$ -Tuesday)			0.1533 * (2.9573)
$\beta_{A.3}$ ($\boldsymbol{R_{A.t}}$ -Wednesday)			0.2195 * (4.6344)
$\beta_{A.4}$ ($\boldsymbol{R_{A.t}}$ -Thursday)			0.3119 * (7.2681)
$\beta_{A.5}$ ($\boldsymbol{R_{A.t}}$ -Friday)			0.1738 * (3.2436)
$\beta_{SP.1}$ ($\boldsymbol{R_{SP.t-1}}$-Monday)			0.0253 (0.6919)
$\beta_{SP.2}$ ($\boldsymbol{R_{SP.t-1}}$-Tuesday)			0.5296 * (6.9929)
$\beta_{SP.3}$ ($\boldsymbol{R_{SP.t-1}}$-Wednesday)			0.3087 * (4.6531)
$\beta_{SP.4}$ ($\boldsymbol{R_{SP.t-1}}$-Thursday)			0.4688 * (7.4980)
$\beta_{SP.5}$ ($\boldsymbol{R_{SP.t-1}}$-Friday)			0.5791 * (3.9584)

Conditional variance equation			
ω (Monday)	1.1775 *	1.0689 *	1.1280 *
	(5.6818)	(5.5253)	(5.7817)
Φ_2 (Tuesday – Monday)	-3.1431 *	-2.6288*	-2.7290*
	(-7.3195)	(-7.2732)	(-7.0990)
Φ_3 (Wednesday – Monday)	-0.0233	-0.4634	-0.4174
	(-0.0608)	(-1.4377)	(-1.2297)
Φ_4 (Thursday – Monday)	-2.5729 *	-2.3006 *	-2.3071*
	(-10.0271)	(-10.7971)	(-10.2794)
Φ_5 (Friday – Monday)	-1.4690*	-1.6257 *	-1.6377*
	(-3.8474)	(-4.8694)	(-4.7848)
a_1 ($\lvert \varepsilon_{t-1}/\sigma_{t-1} \rvert$)	0.1828 *	0.2169 *	0.1984 *
	(5.2443)	(5.4365)	(5.0508)
γ_1 ($\varepsilon_{t-1}/\sigma_{t-1}$)	0.0125	-0.0165	-0.0070
	(0.5914)	(-0.6439)	(-0.2856)
b_1 ($\log(\sigma^2_{t-1})$)	1.1188 *	0.9829 *	0.9901 *
	(8.0330)	(8.5458)	(7.5839)
b_2 ($\log(\sigma^2_{t-2})$)	-0.8257*	-0.6918 *	-0.7008 *
	(-3.9423)	(-3.9086)	(-3.5842)
b_3 ($\log(\sigma^2_{t-3})$)	0.6907*	0.6872 *	0.6929 *
	(5.6723)	(5.6951)	(5.3946)
ν	1.2283 *	1.2418 *	1.2058 *
	[0.0684]	[0.0698]	[0.0667]
Akaike Information Criterion	-5.0438	-5.1498	-5.1856
Specification Tests:			
Standardized squared residuals ε_t^2/σ_t :			
Q-stat (1 lag)	0.3605	1.1708	0.9302
{p-value}	{0.548}	{0.279}	{0.335}
Q-stat (5 lags)	2.8754	2.7536	1.8351
{p-value}	{0.719}	{0.738}	{0.871}
Q-stat (35 lags)	30.337	28.376	29.117
{p-value}	{0.693}	{0.778}	{0.747}
Q-stat (50 lags)	53.027	51.565	45.542
{p-value}	{0.358}	{0.412}	{0.653}
Standardized residuals ε_t/σ_t :			
Jarque-Bera	205.9128 *	166.8846 *	182.7649 *
Kurtosis	4.8435**	4.6427**	4.7262**
Skewness	0.0493	0.1261	0.1063

Notes:

The significance of the GED parameter (ν) is examined under the null hypothesis of estimated $\nu \geqq 2$ against the alternative hypothesis of $\nu < 2$ using the one-tailed t statistic.

Q(k) refers to the Ljung-Box Q-statistics at lag k, which is used to test for the null hypothesis to see if there is an autocorrelation for a series of standardized squared residuals up to order k. Under the null hypothesis, Q is asymptotically distributed as χ^2 with degrees of freedom equal to k.

Figures in the brackets (.) are t-statistics, in squared brackets [.] are standard deviation, and in {.} are p-values.

Jarque-Bera statistic is used to test if the standardized series are normally distributed under the null hypothesis. The test statistic will exceed the critical values of the χ^2 distribution when the null hypothesis is rejected.

The critical values of skewness and kurtosis of ε_t / σ_t can be found in Pearson and Hartley (1976).

* and ** denote significance at the 1% and 5% level respectively.

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