DOW effects in returns and in volatility of stock markets during quiet and turbulent times

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DOW EFFECTS IN RETURNS AND IN VOLATILITY OF STOCK MARKETS DURING QUIET AND TURBULENT TIMES

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Abstract
The persistence in time of the calendar anomalies is one of the most disputed subjects from the financial literature. Quite often, the passing from quiet to turbulent periods of time provokes radical changes in the investors' behaviors which affect the stock markets seasonality. In this paper we investigate the presence of the day of the week effects in returns and volatility for 32 indexes from advanced and emerging markets. We analyze this seasonality for two periods of time: a relative quiet period, from January 2000 to December 2006, and a more turbulent period, from January 2007 to September 2012. A GJR-GARCH model allows us to identify, for the two periods, various forms of day of the week effects in returns and volatility. However, only for few indexes we find the stability in time of the daily seasonality. For many of the advanced markets indexes, the day of the week effects in returns identified for the quiet period disappeared during the turbulent period. A less radical decline occurred for the day of the week effects in volatility. In the case of indexes from the emerging markets, the persistence in time of the daily seasonality in returns was more consistent in comparison with advanced markets indexes. Regarding the volatility of emerging markets, we find that during the turbulent period many day of the week effects in volatility disappeared, while new others appeared.

Key words: *Calendar Anomalies, GJR - GARCH, Volatility, Day of the Week Effects, Stock Markets*

JEL Classification: C58, G02, G14, G15

1. Introduction

The day of the week (DOW) effects are among the first discovered seasonal behaviors that affect the financial markets. One of the most known forms, the so-called week-end effect, consisting in significant differences between the stock returns from the last trading day of a week and those from the first trading day of the next week, was revealed many decades ago (Kelly, 1930; Fields, 1931; Cross, 1973; French, 1980; Gibson and Hess, 1981; Lakonishok and Levi, 1982; Gultekin and Gultekin, 1983; Keim and Stambaugh, 1984). In general, the empirical researches concerning the week-end effect reported that returns from the last trading day of a week were higher than those from the first trading day of the next week. Later, there were found significant differences among the returns from other days of week (Rogalski, 1984; Chang et al., 1993). The study of such patterns is justified by practical and theoretical reasons. The knowledge about differences among the returns from the specific day of a week could be used in the stock market investment. In fact, this kind of investment is opposed to one of the main Efficient Market Hypothesis (EMH) principles which proclaimed the impossibility of obtaining profits by extrapolating the past evolutions of capital markets (Fama, 1970). In the last decades the calendar anomalies existence was one of the main arguments against EMH provided by the Behavioral Finance Theory.

The researches on calendar effects from the last decades approached various aspects such as the different behaviors of the advanced financial markets and the emerging markets, the seasonality of the stock markets volatilities and the persistence in time of the calendar anomalies. Empirical researches revealed some differences between the calendar anomalies from advanced financial markets and those from the emerging markets (Wong, 1992; Balaban, 1995; Ajayi et al., 2004; Doyle and Chen, 2009). There are many explanations for such differences. Usually, by comparing to the developed financial markets, the emerging markets are perceived by the international investors as having superior potential of growing but also as much riskier. The emerging markets lower development makes them less sensitive to some factors with high influence on the advanced financial markets. While the strong linkages between developed financial markets make them very vulnerable to

the contagion of the stock prices declines, many emerging markets are immune to this phenomenon (Claessens, 1995; Phylaktis and Ravazzolo, 2002; Li et al., 2003; Gupta and Donleavy, 2009).

The analysis of the financial markets seasonal behaviors gained a new dimension after the appearance of the so called General AutoRegressive Conditional Heteroskedasticity (GARCH) models pioneered by Engle (1982) and Bollersev (1986) which were meant to capture the time-varying volatility. Many empirical researches that used GARCH models found calendar effects, including DOW effects, not only on returns of stock indexes but also on their volatilities (Choudhry, 2000; Kiymaz and Berument, 2003; Yalcin and Yucel, 2006).

Another important dimension of the a seasonality analysis consists in its persistence in time. The disappeareance or the decrease in intensity of some calendar anomalies were used by EMH partisans to prove that such inefficiency of stock markets was just temporary (Fama, 2007). A Murphy‘s law for financial markets anomalies, proposed by Dimson and Marsh (1999), consider that a calendar effect could disappear or could go to reverse after a lot of investors became aware by it. The changes in the seasonal behavior of the stock markets could be linked by the passing from relatively quiet to turbulent time periods (Holden et al, 2005; Marquering et al, 2006; Wong et al., 2006; Kourkoumelis, and Hourvouliades, 2010).

In this paper we approach the DOW effects on some capital markets for two periods of time. The first period, from January 2000 to December 2006, could be considered, for most of the financial markets, as relatively quiet. Instead, during the second period, from January 2007 to September 2012, the stock markets were affected by some processes (real estate speculative bubble from 2007, the adhesion of new members to European Union, the recent global crisis etc.) that brought substantial turbulences. We use daily values of 32 indexes from 31 advanced and emerging stock markets (due to the importance of the capital market from United States we employed two indexes from this country: Nasdaq – 100 and Standard & Poor's). We identify and study the DOW effects on these indexes by Glosten et al. (1993) GJR – GARCH models which allow taking into consideration the different stock behaviors in the circumstances of bull and bear markets.

The remainder of this paper is organized as it follows: the second part describes the data and the methodology used in our investigation, the third part approaches the prior researches on DOW effects, the fourth part presents the empirical results of our investigation and the fifth part concludes.

2. Literature review

The week-end effect was highly approached in the Behavioral Finance literature which offers many hypotheses explaining this calendar anomaly such as the settlement issue, the institutional trading issue, the liquidity issue or the short sellers issue (Pettengill, 2003; Dicle and Levendis, 2010).

The settlement hypothesis, developed by Lakonishok and Levy (1982) explained the weekend effect, in part, by a practice, established in 1968 in United States, which imposed that settlement of the common stocks had to take place five business days after trading. Because of the non-trading days from weekend, for the stocks purchased on Friday the payment occurred with a two calendar days delay. These circumstances motivated the investors to buy stocks on Friday rather than other days. However, Dyl and Martin (1985) investigation found no significant impact of settlement practice on the weekly pattern of stock returns.

The institutional trading issue highlights the differences between the individual and the institutional investors' behaviors during and after week-ends. Miller (1988) revealed that on non-trading days, in the absence of their brokers' advices, many individual investors decide to sell risky assets from their portfolios. In these circumstances, on Monday, the sell orders exceed the buy orders causing the decrease of returns. Lakonishok and Maberly (1990) confirmed these findings adding that during Monday the individual investors were much more active than the institutional investors who dedicated the beginning of the week to discussions about their strategies. Instead, Sias and Starks (1995) indicated the institutional investors' behavior as the primary source of DOW effects.

The liquidity hypothesis linked the low stock returns on Mondays to the decrease of the liquidity on capital markets (Foster and Viswanathan, 1993). Abraham and Ikenberry (1994) found that reduced activity of the institutional investors during Mondays caused, in part, the low level of liquidity.

The short sellers issue explains the week-end effect by the investors risk aversion regarding the uncertainty from the non-trading days. Chen and Singal (2003) claimed that behaviors of the speculative short sellers, who used to

close their risky positions on Fridays and to re-establish new short positions on Mondays, were, at least in part, responsible for the week-end effects. The anxiety of investors to close their positions on Fridays was justified by the large amounts of news, many of them bad news, arriving during the non-trading days. In fact, it was revealed that many firms and even government entities preferred to delay for the weekends the announcement of bad news (French, 1980; Rogalski, 1984; Penman, 1987; Kiymaz and Berument, 2003). However, the results of Blau et al. (2008) investigation about weekend effect on New York Stock Exchange didn't support the short sellers' hypothesis.

The results of some researches proved significant patterns of stock returns not only for Monday and Friday but also for other days of the week (Solnik and Bousquet, 1990; Athanassakos and Robinson, 1994; Angelidis and Lyroudi, 2004). Such findings were explained by delayed influence from leading markets (Aggarwal and Rivoli, 1989) or by Murphy Law of the calendar anomalies (Dimson and Marsh, 1999). There were also researches that failed to find evidences of the presence of DOW effects on stock returns. Santemases (1986) proved that no significant DOW effects characterized the behavior of Madrid Stock Exchange between 1979 and 1983. Brooks and Persand (2001) investigated the presence of daily effects for five South - East Asian stock markets finding no DOW effect for Korea and Philippines.

The importance of markets instability on investment decisions stimulated the researches on seasonality of volatility. Chukwuogor - Ndu (2006) studied the day-of-the-week effects on returns and volatility for 15 emerging and developed European capital markets. Eleven of them exhibited the highest volatility, as expressed by standard deviation, on Monday. Later, Chukwuogor - Ndu (2007) investigated the daily seasonality for ten East Asian stock markets for the turbulent period 1998 - 2003. The results indicate that the lowest volatility occurred on Tuesday for Japan, Philippines, Singapore and Thailand, on Wednesday for Indonesia and India and on Friday for China and Korea. Instead, the highest volatility occurred on Monday for China, Japan, Malaysia, Philippines, Singapore, Korea and India, on Tuesday for Thailand, on Wednesday for Taiwan and on Friday for Indonesia. Other researches revealed the presence of daily patterns on the volatility for various capital markets by employing GARCH models to capture the conditional variance. Bhattacharya et al (2003) investigated the stability of the DOW effects in returns and volatility at the Indian capital market, covering the period January 1991 – September 2000 using GARCH and OLS with lagged returns models. They divided this period of time in two sub-periods: first from January 1991 to December 1995 and second from January 1996 to September 2000. The analysis in a GARCH framework provided results that were different from those obtained in the OLS framework. Regarding the seasonality in volatility, for the first sub-period it was found no DOW effect. Instead, for the second sub-period, there were revealed significant positive day effects for Monday, Tuesday and Wednesday. Berument *et al*. (2003) investigated DOW effect on the volatility of Istanbul Stock Exchange between 1986 and 2003. Their results indicated the highest level on Monday and the lowest level on Tuesday.

Apolinario et al. (2006) examined daily seasonality of stock prices returns and volatility for 13 European capital markets using symmetric and asymmetric GARCH models. The results indicate significant DOW effects on volatility for all the countries, excepting the Czech Republic. Yalcin and Yucel (2006) studied the evolutions of 20 emerging markets proving significant DOW effects on volatility for five of them. Kenourgios and Samitas (2008) analyzed the day-of-the-week effects on returns and volatility for Athens Stock Exchange during two periods: an emerging period from 1995 to 2000 and a developed period from 2001 to 2005. While for the first period there were obtained strong evidences in favor of the daily seasonality of returns and volatility, for the second period the results suggested the weakening of DOW effects. Batuo Enowbi et al. (2009) found significant DOW effects on the volatility of stock markets from Egypt, Morocco, South-Africa and Tunisia. Duran (2010) investigated DOW effects on stock returns and volatility in four Latin American capital markets: Argentina, Brazil, Chile and Mexico for the period March 1998 – March 2010. It was found significant daily seasonality of volatility only for Brazil and Mexico. The lowest volatility for both countries occurred on Friday while only for Brazil it was found a peak of volatility on Monday.

3. Data and Methodology

In our investigation we employ daily closing values of the indexes from 32 stock markets for a time period between January 2000 and September 2012 (Table 1). Half of them are from 15 developed countries stock exchanges (due to the importance of US capital market we use two indexes from this country: Nasdaq – 100 and Standard & Poor's) and the other 16 from emerging markets.

(Insert here Table 1)

In order to capture the differences between quiet and turbulent circumstances we divide the sample of data into two sub-samples:
- first sub-sample, corresponding to a quiet period, from January 2000 to December 2006;
- second sub-sample, corresponding to a turbulent period, from January 2007 to September 2012.

We use continuous return of indexes ($r_{i,t}$), each of them being computed by the formula:

$$r_{i,t} = [\ln(P_{i,t}) - \ln(P_{i,t-1})] * 100 \qquad (1)$$

where $P_{i,t}$ and $P_{i,t-1}$ are the closing values of index i on the days t and t-1, respectively.

We analyze the stationarity of returns by employing the Augmented Dickey – Fuller (ADF) tests (Dickey and Fuller, 1979). Based on the graphical representations of the returns time series we chose to use intercept terms in the ADF regressions. The numbers of lags are determined by Akaike (1973) Information Criteria.

As a preliminary stage before the investigation of DOW effects in a GARCH framework we perform ARMA (p, q) models on returns, using a Box-Jenkins methodology to find the appropriate values of p and q. Then, we study the autocorrelation and the heteroscedasticity of the residuals by Ljung-Box test Q and the Engle (1982) Lagrange Multiplier (LM) test for ARCH effects.

We define five dummy variables associated to the five working days of a week:
- D_1, taking the value 1 for returns from Monday and value zero otherwise;
- D_2, taking the value 1 for returns from Tuesday and value zero otherwise;
- D_3, taking the value 1 for returns from Wednesday and value zero otherwise;
- D_4, taking the value 1 for returns from Thursday and value zero otherwise;
- D_5, taking the value 1 for returns from Friday and value zero otherwise.

A special case is Tel Aviv Stock Exchange which, from the most of the period 2000-2006, was closed on Fridays. In these circumstances, for this market, we don't use D_5 in the regressions for the first sub-sample.

The GJR - GARCH (q,p) model applied to reveal DOW effects on returns and volatility is described by two equations: the conditional mean equation and the conditional variance equation.

In the conditional mean equation of the returns the constant term is excluded in order to avoid the collinearity:

$$r_t = \sum_{j=1}^{5} \mu_j * D_{jt} + \sum_{k=1}^{n} \xi_k * r_{t-k} + \varepsilon_t \qquad (2)$$

where:
- μ_j (j=1,2…5) are coefficients which reflect the DOW effects on returns;
- D_{jt} are dummy variables corresponding to the five working days of the week;
- ξ_k (k=1,..n) are coefficients associated to lagged returns;
- n is the number of lagged returns, calculated by the Akaike (1969) Final Prediction Error Criterion;
- ε_t is the error term.

In the conditional variance equation the dummy variable associated to Wednesday (D_3) is excluded in order to avoid the dummy trap:

$$\sigma_t^2 = \omega + \sum_{j=1}^{5} \upsilon_j * D_{jt} + \sum_{k=1}^{q} [\alpha_k * \varepsilon_{t-k}^2 + \gamma_k * \varepsilon_{t-k}^2 * I(\varepsilon_{t-k} < 0)] + \sum_{l=1}^{p} (\beta_l * \sigma_{t-l}^2) \qquad (3)$$

where:

- σ_t^2 is the conditional variance of the returns;

- ω is a constant term reflecting the seasonal effect on volatility for the excluded dummy variable (associated to Wednesday);

- υ_j (j=1, 2, 4, 5) are coefficients which reflect the DOW effects on volatility for the other four working days;

- α_k and γ_k (k=1,..q) are coefficients associated to the squared values of the lagged values of error term from the conditional mean equation;

- $I(\varepsilon_{t-k}<0)$ is a dummy variable taking the value 1 if the k-lagged error term is strict negative and value zero otherwise;

- q is the number of lagged values of the error term, calculated by the Akaike (1973) Information Criteria;
- β_1 (j=1, 2, …p) are coefficients associated to the lagged values of the conditional variance;
- p is the number of lagged values of conditional variance, calculated by the Akaike (1973) Information Criteria.

For each return we analyze the robustness of GJR - GARCH model by employing Lagrange Multiplier (LM) test for ARCH effects on the residuals.

4. Empirical Results

The Table 2 reports the results of ADF tests. For all 32 returns the null hypothesis of unit root was rejected for both sub-samples.

(Insert here Table 2)

The results of Ljung-Box Q and ARCH LM tests are presented in the Table 3. For all the returns and for both sub-samples there cannot be rejected the null hypothesis of autocorrelation and the heteroscedasticity of the residuals.

(Insert here Table 3)

The Table 4 provides the coefficients of the GJR-GARCH conditional mean regressions performed on the advanced markets indexes for the first sub-sample. The results reveal the presence of DOW effects on the returns. Most of significant coefficients are positive: four for D_1 (AEX General, All Ordinaries, ATX, BEL-20 and S&P TSX Composite), one for D_2 (ATX), two for D_3 (ATX and BEL-20), two for D_4 (ATX and OSEAX) and six for D_5 (All Ordinaries, ATX, FTSE 100, OSEAX, Straits Times and TAIEX). Only for Nasdaq – 100 and Standard & Poor's resulted negative coefficients of D_5.

(Insert here Table 4)

The coefficients of GJR-GARCH conditional variance equations of advanced markets indexes for the first sub-sample are presented in the Table 5. The results indicate various DOW effects on volatility for the advanced markets indexes from the first sub-sample. Some significant positive coefficients result: five for ω (All Ordinaries, ATX, FTSE 100, Hang Seng and OSEAX) and two for D_1 (Straits Times and TAIEX). There are also some significant negative coefficients: five for D_1 (AEX General, All Ordinaries, CAC 40, DAX and FTSE 100), one for D_4 (All Ordinaries) and three for D_5 (All Ordinaries, Hang Seng and OSEAX).

(Insert here Table 5)

For the second sub-sample, the GJR-GARCH conditional mean equations of the advanced markets indexes indicate only positive significant coefficients: one for D_3 (TAIEX) and two for D_5 (DAX and OSEAX).

(Insert here Table 6)

The GJR-GARCH conditional variance regressions performed for the second sub-sample on the advanced markets indexes revealed DOW effects on volatility. Positive significant coefficients were found for ω (All Ordinaries and Straits Times), for D_2 (S&P TSX Composite and TAIEX), and for D_4 (S&P TSX Composite and SSMI). Significant negative coefficients were found for ω (S&P TSX Composite), for D_2 (All Ordinaries, Straits Times,), for D_4 (Straits Times) and for D_5 (All Ordinaries).

(Insert here Table 7)

The results of GJR-GARCH conditional mean regressions performed on the emerging markets indexes from the first sub-sample are presented in the Table 8. There are positive significant coefficients for D_1 (BUX, PX and TA 100), for D_2 (BET-C, CROBEX, IPC, OMXT and SSE Composite), for D_3 (BET-C, Bovespa, MerVal, OMXT, SEMDEX, IDX Composite and IPC), for D_4 (Athex Composite Share, BET-C, BSE 30, KOSPI, IPC, IDX Composite, MerVal, OMXT, PX, SEMDEX and TA 100) and for D_5 (Athex Composite Share, BET-C, Bovespa, BSE 30, IDX Composite, IPC, KLSE Composite, OMXT, PX and SEMDEX). There are also negative significant coefficients for D_1 (Athex Composite Share) and for D_4 (SSE Composite).

(Insert here Table 8)

The Table 9 reports the coefficients of GJR-GARCH conditional variance equation for the first sub-sample data of the emerging markets indexes. Positive significant values were found for ω (BUX, IDX Composite, KLSE Composite, SEMDEX, SSE Composite and TA 100) and for D_1 (BET-C). Negative significant values occurred for D_1 (BUX and KLSE Composite), for D_2 (KLSE Composite, SSE Composite and TA 100) and for D_5 (Athex Composite Share, Bovespa, IPC and KLSE Composite).

(Insert here Table 9)

The results of GJR-GARCH conditional mean regression for the second sub-sample data of emerging markets indexes are presented in the Table 10. There are positive significant coefficients for D_1 (IPC), for D_2 (IDX Composite, KLSE Composite, CROBEX, IDX Composite, KLSE Composite, MerVal and PX), for D_3 (CROBEX, KLSE Composite, IDX Composite, KLSE Composite, MerVal and PX), for D_4 (KLSE Composite) and for D_5 (BET-C, IDX Composite, KLSE Composite, OMXT and SEMDEX). There are also negative significant coefficients for D_1 (Athex Composite Share, BET-C, CROBEX, OMXT and SEMDEX).

(Insert here Table 10)

The Table 11 reports the coefficients of GJR-GARCH conditional variance equation for the second sub-sample data of emerging markets indexes. Positive significant values were found for ω (KOSPI, SEMDEX), for D_1 (Athex Composite Share, BET-C, MerVal, OMXT and TA 100), for D_2 (Athex Composite Share, Bovespa, for D_4 (Athex Composite Share, OMXT and TA 100). Negative significant coefficients were found for ω (Athex Composite Share), for D_2 (KOSPI, TA 100), for D_4 (SEMDEX) and for D_5 (SEMDEX).

(Insert here Table 11)

For all GJR-GARCH regressions the ARCH LM tests revealed no ARCH remaining effects.

(Insert here Table 12)

5. Conclusions and implications

In this paper we investigated the presence of daily seasonality on returns and volatility for 32 indexes from advanced and emerging markets during two periods of time: a relative quiet one and a turbulent one. Based on GJR-GARCH models we identified various DOW effects in the two periods.

Our investigation revealed significant differences between quiet and turbulent times. In fact only few DOW effects identified for the first period survived to the second one. For the returns we found persistence in time for Monday (Athex Composite Share), Tuesday (CROBEX), Wednesday (MerVal) and Friday (BET-C, IDX Composite, KLSE Composite, OMXT and SEMDEX). The DOW effects on volatility survived for Monday (BET-C), Wednesday (All Ordinaries and SEMDEX) and Friday (All Ordinaries). Instead, for many indexes, new forms of daily seasonality appeared during the turbulent times. Such evolutions could be associated to changes in investors' behaviors from the quiet to the turbulent period.

The results suggest that the decline of DOW effects on returns was more consistent for the advanced markets than for the emerging markets. In fact, for many emerging markets, the investors had highly risk perceptions even during the quiet times so the changes induced by the turbulences were less sharp as in case of the most advanced markets.

In the recent context of financial instability it is hard to formulate irevocable conclusions about the causes of the changes in DOW effects. Such changes could be provoked by the turbulences on the financial markets or there could be viewed as the confirmation of Dimson and Marsh (1999) Murphy's law for the calendar anomalies. In these circumstances, the researches on the persistence in time of DOW effects should be extended to the post-global crisis periods.

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Appendix

Table 1 - Indexes from advanced and emerging markets used in DOW effects investigation

Advanced Markets		Emerging Markets	
Index	**Market**	**Index**	**Market**
AEX General	Amsterdam Stock Exchange	Athex Composite Share	Athens Stock Exchange
All Ordinaries	Australian Securities Exchange	BET-C	Bucharest Stock Exchange
ATX	Vienna Stock Exchange	Bovespa	São Paulo Stock, Mercantile & Futures Exchange
BEL-20	Brussels Stock Exchange	BSE 30	Bombay Stock Exchange
CAC 40	Paris Bourse	BUX	Budapest Stock Exchange
DAX	Frankfurt Stock Exchange	CROBEX	Zagreb Stock Exchange
FTSE 100	London Stock Exchange	IDX Composite	Indonesia Stock Exchange
Hang Seng	Hong Kong Stock Exchange	IPC	Mexican Stock Exchange
Nasdaq - 100	Nasdaq Stock Market	KLSE Composite	Kuala Lumpur Stock Exchange
Nikkei 225	Tokyo Stock Exchange	KOSPI	Korea Stock Exchange
OSEAX	Oslo Stock Exchange	MerVal	Buenos Aires Stock Exchange
S&P TSX Composite	Toronto Stock Exchange	OMXT	Talinn Stock Exchange
Standard & Poor's	New York Stock Exchange	PX	Prague Stock Exchange
Straits Times	Singapore Exchange	SEMDEX	The Stock Exchange of Mauritius
SSMI	SIX Swiss Exchange	SSE Composite	Shanghai Stock Exchange

TAIEX	Taiwan Stock Exchange	TA 100	Tel Aviv Stock Exchange

Table 2 - Results of ADF tests for the returns

Index	First sub-sample		Second sub-sample	
	Number of lags	**Test statistics**	**Number of lags**	**Test statistics**
Panel A: advanced markets				
AEX General	14	-10.7823 (0.0001***)	18	-8.32651 (0.0001***)
All Ordinaries	17	-10.0896 (0.0001***)	6	-15.5319 (0.0001***)
ATX	13	-9.77552 (0.0001***)	24	-6.23618 (0.0001***)
BEL-20	13	-11.8373 (0.0001***)	11	-10.6814 (0.0001***)
CAC 40	14	-10.5709 (0.0001***)	15	-9.76248 (0.0001***)
DAX	24	-8.53843 (0.0001***)	24	-7.37193 (0.0001***)
FTSE 100	14	-10.8309 (0.0001***)	5	-17.5394 (0.0001***)
Hang Seng	7	-15.3832 (0.0001***)	17	-9.19713 (0.0001***)
Nasdaq - 100	20	-9.56295 (0.0001***)	17	-9.26676 (0.0001***)
Nikkei 225	15	-11.2584 (0.0001***)	20	-8.51149 (0.0001***)
OSEAX	8	-13.2077 (0.0001***)	7	-13.8879 (0.0001***)
S&P TSX Composite	12	-11.1597 (0.0001***)	11	-11.5512 (0.0001***)
Standard & Poor's	15	-10.1123 (0.0001***)	15	-9.51837 (0.0001***)
Straits Times	5	-16.6154 (0.0001***)	11	-10.6075 (0.0001***)
SSMI	14	-10.156 (0.0001***)	6	-16.9921 (0.0001***)
TAIEX	11	-11.0642 (0.0001***)	13	-8.61777 (0.0001***)
Panel B: emerging markets				
Athex Composite Share	17	-10.2631 (0.0001***)	16	-7.96602 (0.0001***)
BET-C	19	-8.22136 (0.0001***)	21	-6.59446 (0.0001***)
Bovespa	15	-8.96446 (0.0001***)	19	-7.92883 (0.0001***)
BSE 30	13	-10.7685 (0.0001***)	13	-9.04364 (0.0001***)
BUX	10	-13.3637 (0.0001***)	6	-15.3365 (0.0001***)
CROBEX	6	-19.5391 (0.0001***)	5	-14.7376 (0.0001***)
IDX Composite	2	-22.1749 (0.0001***)	4	-18.0152 (0.0001***)
IPC	7	-15.2835 (0.0001***)	6	-16.2523 (0.0001***)
KLSE Composite	12	-11.9723 (0.0001***)	1	-31.5414 (0.0001***)
KOSPI	6	-17.1261 (0.0001***)	2	-21.7521 (0.0001***)
MerVal	6	-13.4829	4	-17.2232

		(0.0001***)		(0.0001***)
OMXT	5	-18.3964 (0.0001***)	4	-14.9384 (0.0001***)
PX	14	-9.62865 (0.0001***)	12	-9.75293 (0.0001***)
SEMDEX	7	-11.8471 (0.0001***)	3	-16.4603 (0.0001***)
SSE Composite	19	-8.89945 (0.0001***)	14	-9.00431 (0.0001***)
TA 100	11	-9.26086 (0.0001***)	7	-12.8812 (0.0001***)

Notes: p-values are within brackets ***, **, *; mean significant at 0.01, 0.05, and 0.1 levels, respectively

Table 3 -Results of Ljung-Box Q Tests and ARCH LM Tests

Index	First sub-sample		Second sub-sample	
	Ljung-Box Q Test	**ARCH LM Test**	**Ljung-Box Q Test**	**ARCH LM Test**
Panel A: advanced markets				
AEX General	13.446 (0.00376***)	391.334 (0.0001***)	8.96528 (0.02976**)	396.203 (0.0001***)
All Ordinaries	6.51525 (0.08906*)	91.3962 (0.0001***)	5.05377 (0.07991*)	280.89 (0.0001***)
ATX	27.8973 (0.06364*)	182.746 (0.0001***)	58.2389 (0.0003***)	296.366 (0.0001***)
BEL-20	15.583 (0.0013***)	258.237 (0.0001***)	26.9399 (0.01268**)	276.957 (0.0001***)
CAC 40	6.38657 (0.09424*)	288.244 (0.0001***)	16.0411 (0.0011***)	238.082 (0.0001***)
DAX	28.0102 (0.0001***)	373.69 (0.0001***)	14.2688 (0.0025***)	198.317 (0.0001***)
FTSE 100	14.5175 (0.0022***)	390.88 (0.0001***)	27.8931 (0.0001***)	311.59 (0.0001***)
Hang Seng	9.37888 (0.0247**)	53.57 (0.0001***)	17.4304 (0.0259**)	333.17 (0.0001***)
Nasdaq - 100	7.64417 (0.0539*)	245.89 (0.0001***)	8.81411 (0.0318**)	299.15 (0.0001***)
Nikkei 225	3.18548 (0.0743*)	88.7815 (0.0001***)	28.8302 (0.0505*)	405.995 (0.0001***)
OSEAX	19.9717 (0.0676*)	243.456 (0.0001***)	24.4474 (0.0177**)	393.726 (0.0001***)
S&P TSX Composite	26.4092 (0.0908*)	68.0158 (0.0001***)	17.6595 (0.0005***)	374.746 (0.0001***)
Standard & Poor's	24.9918 (0.03465**)	235.028 (0.0001***)	8.19199 (0.04221**)	385.787 (0.0001***)
Straits Times	12.226 (0.0067***)	50.7723 (0.0001***)	32.1008 (0.0004***)	259.125 (0.0001***)
SSMI	12.4504 (0.0060***)	300.031 (0.0001***)	40.1069 (0.0001***)	383.978 (0.0001***)
TAIEX	10.1508 (0.0173**)	144.199 (0.0001***)	15.187 (0.0188**)	136.241 (0.0001***)
Panel B: emerging markets				
Athex Composite Share	13.0424 (0.0003***)	264.699 (0.0001***)	16.3939 (0.08890*)	77.0799 (0.0001***)
BET-C	7.63799 (0.0541*)	171.096 (0.0001***)	7.27873 (0.06352*)	245.17 (0.0001***)
Bovespa	72.9216 (0.0760*)	68.6832 (0.0001***)	39.5832 (0.0024***)	371.278 (0.0001***)
BSE 30	14.0105 (0.0029***)	336.769 (0.0001***)	25.3007 (0.0317**)	114.615 (0.0001***)

BUX	7.96806 (0.0467**)	56.0144 (0.0001***)	25.0094 (0.0001***)	206.719 (0.0001***)
CROBEX	54.8695 (0.0724*)	134.155 (0.0001***)	6.64009 (0.03615**)	303.79 (0.0001***)
IDX Composite	4.38838 (0.0362**)	60.1264 (0.0001***)	6.61387 (0.0366**)	172.101 (0.0001***)
IPC	48.2081 (0.0189**)	129.471 (0.0001***)	14.5206 (0.0243**)	191.49 (0.0001***)
KLSE Composite	22.994 (0.0604*)	161.162 (0.0001***)	26.8158 (0.0203**)	315.752 (0.0001***)
KOSPI	29.7704 (0.0280**)	94.412 (0.0001***)	49.5997 (0.09854*)	325.521 (0.0001***)
MerVal	39.0468 (0.0270**)	266.118 (0.0001***)	12.2962 (0.0064***)	251.076 (0.0001***)
OMXT	59.7153 (0.0572*)	38.4731 (0.0001***)	10.9985 (0.0117**)	102.436 (0.0001***)
PX	42.0537 (0.0828*)	132.742 (0.0001***)	6.09437 (0.04749**)	318.364 (0.0001***)
SEMDEX	7.34232 (0.06175*)	107.484 (0.0001***)	6.67927 (0.0829*)	286.652 (0.0001***)
SSE Composite	52.8942 (0.07812*)	34.8136 (0.0001***)	8.35051 (0.0393**)	61.7187 (0.0001***)
TA 100	7.83988 (0.0494**)	62.7447 (0.0001***)	27.1864 (0.0755*)	160.63 (0.0001***)

Notes: p-values are within brackets ***, **, *; mean significant at 0.01, 0.05, and 0.1 levels, respectively.

Table 4 - GJR - GARCH conditional mean equation for advanced markets indexes: first sub-sample

Index	μ_1	μ_2	μ_3	μ_4	μ_5
AEX General	0.0755424 (0.0425985) [0.0762*]	-0.014037 (0.0463955) [0.7622]	-0.045273 (0.0480921) [0.3465]	0.0242148 (0.0492975) [0.6233]	0.0397865 (0.0501093) [0.4272]
All Ordinaries	0.0767990 (0.0319269) [0.0162**]	0.0285597 (0.0265139) [0.2814]	0.0420356 (0.0341807) [0.2188]	0.0453442 (0.0334003) [0.1746]	0.0614361 (0.0252957) [0.0152**]
ATX	0.100589 (0.0461255) [0.0292**]	0.0771809 (0.0425585) [0.0698*]	0.106041 (0.0441400) [0.0163**]	0.0850316 (0.0456686) [0.0626 *]	0.122212 (0.0451495) [0.0068***]
BEL-20	0.0699541 (0.0373864) [0.0613*]	0.0468310 (0.0375811) [0.2127]	0.101732 (0.0373977) [0.0065***]	0.0456243 (0.0407414) [0.2628]	0.0375359 (0.0392643) [0.3391]
CAC 40	0.0326705 (0.0490380) [0.5053]	-0.0102087 (0.050220) [0.8389]	-0.0317669 (0.0528445) [0.5477]	0.0404277 (0.0526624) [0.4427]	0.0511922 (0.0551603) [0.3534]
DAX	0.0814277 (0.0563164) [0.1482]	-0.0248078 (0.0516843) [0.6312]	-0.0497526 (0.0584292) [0.3945]	0.0415427 (0.0549179) [0.4494]	0.0213303 (0.059217) [0.7187]
FTSE 100	0.0304428 (0.0412265) [0.4603]	-0.0521080 (0.0388607) [0.1800]	-0.0512377 (0.0414916) [0.2169]	-0.00280678 (0.0424596) [0.9473]	0.0782482 (0.0407947) [0.0551*]
Hang Seng	0.0940742 (0.0601015) [0.1175]	-0.0214411 (0.0507183) [0.6725]	0.0269410 (0.0590832) [0.6484]	0.0348119 (0.0544895) [0.5229]	0.0734177 (0.0459185) [0.1098]
Nasdaq - 100	0.0391001 (0.0657167) [0.5519]	-0.0167946 (0.0626917) [0.7888]	0.0487685 (0.0634829) [0.4424]	0.0599143 (0.0594164) [0.3133]	-0.101019 (0.0598356) [0.0914*]
Nikkei 225	0.0637049 (0.0782963) [0.4159]	-0.0172316 (0.0580664) [0.7667]	-0.00367104 (0.0594898) [0.9508]	-0.0102692 (0.0625170) [0.8695]	0.0976279 (0.0612161) [0.1108]
OSEAX	0.0755638 (0.0523840) [0.1492]	0.0597820 (0.0491672) [0.2240]	-0.0155395 (0.0524583) [0.7671]	0.200088 (0.0559445) [0.0003***]	0.220883 (0.0478317) [0.0001***]
S&P TSX	0.126156	0.0390491	0.0291947	0.0464563	0.0593796

Composite	(0.0417848) [0.0025***]	(0.0434801) [0.3691]	(0.0427279) [0.4944]	(0.0400900) [0.2465]	(0.036458) [0.1034]
Standard & Poor's	0.0374551 (0.0444341) [0.3993]	0.00049457 (0.0449662) [0.9912]	0.00702435 (0.0447479) [0.8753]	0.0285865 (0.0410869) [0.4866]	-0.0674330 (0.0409787) [0.0999*]
Straits Times	0.00612006 (0.0521439) [0.9066]	0.0356064 (0.0465193) [0.4440]	0.0507027 (0.0453576) [0.2636]	0.0325270 (0.0470304) [0.4892]	0.104062 (0.0375684) [0.0056***]
SSMI	0.0670227 (0.0437310) [0.1254]	0.00926668 (0.0433340) [0.8307]	0.0373755 (0.0449233) [0.4054]	0.0257060 (0.0427924) [0.5480]	0.00674820 (0.0385334) [0.8610]
TAIEX	-0.0712241 (0.0797420) [0.3718]	-0.0898057 (0.0603976) [0.1370]	0.0526373 (0.0634890) [0.4071]	0.0646611 (0.0626027) [0.3017]	0.198857 (0.0589379) [0.0007***]

Notes: Standard Errors are within round brackets; p-values are within squared brackets; ***, **, * mean significant at 0.01, 0.05, and 0.1 levels, respectively

Table 5 - GJR - GARCH conditional variance equation for advanced markets indexes: first sub-sample

Day of the week variables

Index	**ω**	**v_1**	**v_2**	**v_4**	**v_5**
AEX General	0.069117 (0.06571) [0.2929]	-0.21395 (0.09199) [0.0200**]	0.009673 (0.11095) [0.9305]	-0.03552 (0.12786) [0.7812]	-0.04056 (0.10243) [0.6921]
All Ordinaries	0.116228 (0.0260930) [0.0001***]	-0.0700591 (0.0316015) [0.0266**]	-0.145880 (0.0350167) [0.0001***]	-0.0869523 (0.0478562) [0.0692*]	-0.206828 (0.0440856) [0.0001***]
ATX	0.130381 (0.0651009) [0.0452**]	-0.0673397 (0.0892650) [0.4506]	-0.127099 (0.105459) [0.2281]	-0.0873039 (0.106051) [0.4104]	-0.0496915 (0.0906895) [0.5837]
BEL-20	0.0096560 (0.0465206) [0.8356]	-0.0440816 (0.0697419) [0.5273]	0.0285455 (0.0828361) [0.7304]	0.0389628 (0.0751039) [0.6039]	0.0243701 (0.0658809) [0.7114]
CAC 40	0.0672835 (0.0585675) [0.2506]	-0.218619 (0.0968381) [0.0240**]	-0.0136544 (0.113720) [0.9044]	-0.0736037 (0.101956) [0.4703]	0.0288606 (0.103654) [0.7807]
DAX	0.132803 (0.0888274) [0.1349]	-0.218094 (0.117754) [0.0640*]	-0.152345 (0.163741) [0.3522]	-0.201320 (0.153543) [0.1898]	-0.00241635 (0.102610) [0.9812]
FTSE 100	0.0591741 (0.0355662) [0.0962*]	-0.128583 (0.0521320) [0.0136**]	-0.0537116 (0.0669453) 0.4224]	-0.0265733 (0.0698259) 0.7035]	-0.0286375 (0.0719706) 0.6907]
Hang Seng	0.157792 (0.0852169) [0.0641*]	-0.0188709 (0.108922) [0.8625]	-0.169943 (0.134824) [0.2075]	-0.165205 (0.143637) [0.2501]	-0.385455 (0.139066) [0.0056***]
Nasdaq - 100	0.0918860 (0.120317) [0.4450]	-0.111892 (0.144467) [0.4386]	0.0251918 (0.175397) [0.8858]	-0.191255 (0.192655) [0.3208]	-0.152514 (0.157670) [0.3334]
Nikkei 225	-0.0519134 (0.111793) [0.6424]	0.237786 (0.159214) [0.1353]	-0.176526 (0.221939) [0.4264]	0.269265 (0.188953) [0.1541]	0.0893470 (0.145633) [0.5395]
OSEAX	0.170605 (0.0961636) [0.0760*]	0.0950489 (0.140852) [0.4998]	-0.188489 (0.164505) [0.2519]	0.0656093 (0.171233) [0.7016]	-0.333945 (0.138399) [0.0158**]
S&P TSX Composite	0.0274643 (0.0619646) [0.6576]	0.0342679 (0.0853346) [0.6880]	0.0364816 (0.0988075) [0.7120]	-0.0877512 (0.0996926) [0.3787]	-0.0443450 (0.0877460) [0.6133]
Standard & Poor's	-0.00541086 (0.0604250) [0.9286]	-0.0211977 (0.0769656) [0.7830]	0.102185 (0.0961420) [0.2878]	-0.0533156 (0.0863178) [0.5368]	0.0330222 (0.0816537) [0.6859]
Straits Times	-0.0159532 (0.0590535) [0.7870]	0.158551 (0.0774300) [0.0406**]	0.0338716 (0.102396) [0.7408]	0.0615633 (0.101916) [0.5458]	-0.0732825 (0.0888782) [0.4096]
SSMI	0.0729621	0.0115838	-0.0790849	-0.125081	-0.0905412

	(0.0517219) [0.1583]	(0.0691287) [0.8669]	(0.0851100) [0.3528]	(0.0965111) [0.1950]	(0.0750840) [0.2279]
TAIEX	-0.110675 (0.141213) [0.4332]	0.337181 (0.179067) [0.0597*]	-0.0222709 (0.254942) [0.9304]	0.0982198 (0.198429) [0.6206]	0.213084 (0.204167) [0.2966]

Other conditional variance variables

Index	α_1	α_2	γ_1	γ_2	β
AEX General	0.0359564 (0.006201) [0.0001***]	x	0.990887 (0.013041) [0.0001***]	x	0.917023 (0.01286) [0.0001***]
All Ordinaries	0.0326235 (0.00598842) [0.0001***]	x	0.976623 (0.0287170) [0.0001***]	x	0.898325 (0.0176162) [0.0001***]
ATX	0.0677402 (0.0214342) [0.0016 ***]	x	0.403252 (0.142376) [0.0046 ***]	x	0.840959 (0.0331369) [0.0001***]
BEL-20	0.0982407 (0.0217138) [0.0001***]	x	0.348152 (0.0896264) [0.0001***]	x	0.866056 (0.0218759) [0.0001***]
CAC 40	0.0309540 (0.00497699) [0.0001***]	x	0.984412 (0.0184129) [0.0001***]	x	0.928840 (0.00995893) [0.0001***]
DAX	0.0356813 (0.00515075) [0.0001***]	x	0.981625 (0.0190388) [0.0001***]	x	0.918774 (0.0107879) [0.0001***]
FTSE 100	0.0379096 (0.00607039) [0.0001***]	x	0.984430 (0.0170426) [0.0001***]	x	0.908964 (0.0135027) [0.0001***]
Hang Seng	0.0160259 (0.00346387) [0.0001***]	x	0.977247 (0.0305710) [0.0001***]	x	0.959993 (0.00848066) [0.0001***]
Nasdaq - 100	0.0285278 (0.0154484) [0.0648*]	x	0.745991 (0.419150) [0.0751*]	x	0.951707 (0.00984780) [0.0001***]
Nikkei 225	0.0659869 (0.0123894) [0.0001***]	x	0.320605 (0.0999821) 0.0013***]	x	0.912522 (0.0147372) 0.0001***]
OSEAX	0.0816038 (0.0255899) [0.0014***]	x	0.434648 (0.143545) [0.0025***]	x	0.815866 (0.0455215) [0.0001***]
S&P TSX Composite	0.0269631 (0.00751698) [0.0003***]	0.0300864 (0.0146464) [0.0400**]	0.104373 (0.0293401) [0.0004***]	-0.0296341 (0.0144567) [0.0404**]	0.912324 (0.0233715) [0.0001***]
Standard & Poor's	0.0302520 (0.00559027) [0.0001***]	x	0.993993 (0.00722113) [0.0001***]	x	0.932818 (0.0118254) [0.0001***]
Straits Times	0.0743685 (0.0250608) [0.0030***]	x	0.199799 (0.0735604) [0.0066***]	x	0.904503 (0.0306879) [0.0001***]
SSMI	0.0397917 (0.00689665) [0.0001***]	x	0.970371 (0.0589502) [0.0001***]	x	0.904977 (0.0136424) 0.0001***]
TAIEX	0.0421033 (0.0112890) [0.0002***]	x	0.296706 (0.0876213) [0.0007***]	x	0.947357 (0.0132104) [0.0001***]

Notes: Standard Errors are within round brackets; p-values are within squared brackets; ***, **, * mean significant at 0.01, 0.05, and 0.1 levels, respectively

Table 6. GJR - GARCH conditional mean equation for advanced markets indexes: second sub-sample

Index	μ_1	μ_2	μ_3	μ_4	μ_5
AEX General	-0.00154014 (0.0616886)	-0.0484031 (0.0688564)	-0.0394375 (0.0645827)	-0.0165317 (0.0671994)	0.0511868 (0.0588107)

	[0.9801]	[0.4821]	[0.5414]	[0.8057]	[0.3841]
All Ordinaries	0.0244476 (0.0594320) [0.6808]	-0.00962768 (0.0530526) [0.8560]	-0.0130367 (0.0568489) [0.8186]	0.0909229 (0.0586453) [0.1210]	-0.0456738 (0.0551605) [0.4077]
ATX	-0.0259364 (0.0892951) [0.7715]	-0.0893432 (0.0842077) [0.2887]	0.0123288 (0.0859728) [0.8860]	-0.0069001 (0.0926134) [0.9406]	0.0289874 (0.0797465) [0.7162]
BEL-20	-0.0133871 (0.0651973) [0.8373]	-0.0556456 (0.0677728) [0.4116]	0.0152431 (0.0661938) [0.8179]	-0.0863495 (0.0672150) [0.1989]	0.0275490 (0.0619648) [0.6566]
CAC 40	-0.0458785 (0.0689226) [0.5056]	-0.0422756 (0.0708645) [0.5508]	0.0150984 (0.0713530) [0.8324]	-0.0568853 (0.0723867) [0.4320]	0.0531790 (0.0761244) [0.4848]
DAX	0.0200216 (0.0634883) [0.7525]	0.0355220 (0.0660633) [0.5908]	0.0524474 (0.0696703) [0.4516]	0.00016441 (0.0694342) [0.9981]	0.112974 (0.0679473) [0.0964*]
FTSE 100	0.0151388 (0.0583701) [0.7954]	-0.0168573 (0.0637588) [0.7915]	-0.0481037 (0.0626174) [0.4424]	-0.0047505 (0.0600161) [0.9369]	0.0822111 (0.0580826) [0.1569]
Hang Seng	0.0706178 (0.0878434) [0.4215]	-0.0668694 (0.0815728) [0.4124]	-0.00089909 (0.0803999) [0.9911]	0.0198497 (0.0740114) [0.7885]	0.0634904 (0.0760585) [0.4039]
Nasdaq - 100	0.0389407 (0.0666882) [0.5593]	-0.0145717 (0.0659888) [0.8252]	0.0936727 (0.0641544) [0.1443]	0.0653279 (0.0672002) [0.3310]	0.00816826 (0.0703892) [0.9076]
Nikkei 225	-0.0127374 (0.0824980) [0.8773]	-0.0831226 (0.0670854) [0.2153]	0.0196591 (0.0738713) [0.7901]	0.116310 (0.0743260) [0.1176]	-0.120585 (0.0792662) [0.1282]
OSEAX	0.0466948 (0.0707644) [0.5093]	-0.0920927 (0.0802278) [0.2510]	0.0183655 (0.0756938) [0.8083]	0.0526510 (0.0744943) [0.4797]	0.167674 (0.0673503) [0.0128**]
S&P TSX Composite	-0.00315342 (0.0543088) [0.9537]	-0.0210763 (0.0734330) [0.7741]	0.0744394 (0.0573689) [0.1944]	0.0187790 (0.0581985) [0.7469]	0.0673859 (0.0494494) [0.1730]
Standard & Poor's	0.0212589 (0.0504691) [0.6736]	0.0228199 (0.0545812) [0.6759	0.0803565 (0.0547923) [0.1425]	0.0856502 (0.0583547) [0.1422]	0.0704222 (0.0561053) [0.2094]
Straits Times	-0.0154191 (0.0677824) [0.8201]	0.0428444 (0.0551151) [0.4369]	0.0703298 (0.0619488) [0.2563]	-0.0452142 (0.0508141) [0.3736]	0.0809787 (0.0507811) [0.1108]
SSMI	-.0324872 (0.0477756) [0.4965]	-.0244685 (0.0538065) [0.6493]	0.0213740 (0.0490269) [0.6629]	0.00526163 (0.0553460) [0.9243]	0.0143190 (0.0559189) [0.7979]
TAIEX	0.0944737 (0.0785341) [0.2290]	0.00189929 (0.0615602) [0.9754]	0.164928 (0.0655463) [0.0119**]	0.0482840 (0.0670236) [0.4713]	0.0174514 (0.0641278) [0.7855]

Notes: Standard Errors are within round brackets; p-values are within squared brackets;
***, **, * mean significant at 0.01, 0.05, and 0.1 levels, respectively

Table 7 - GJR - GARCH conditional variance equation for advanced markets indexes: second sub-sample

Day of the week variables

Index	**ω**	**v_1**	**v_2**	**v_4**	**v_5**
AEX General	-0.04324 (0.12852) [0.7365]	0.168222 (0.17277) [0.3302]	0.188584 (0.22181) [0.3952]	0.0997146 (0.198414) [0.6153]	-0.10076 (0.18702) [0.5900]
All Ordinaries	0.142746 (0.078788) [0.0700*]	0.126296 (0.127923) [0.3235]	-0.318576 (0.141847) [0.0247**]	-0.0596804 (0.158566) [0.7066]	-0.292120 (0.122670) [0.0172**]
ATX	0.0789616 (0.195994) [0.6870]	-0.0799536 (0.271261) [0.7682]	0.156419 (0.358553) [0.6627]	0.0966971 (0.277149) [0.7272]	-0.306418 (0.299758) [0.3067]

BEL-20	0.0113127 (0.168275) [0.9464]	0.174054 (0.236872) [0.4625]	0.135552 (0.296688) [0.6478]	0.0892056 (0.278415) [0.7487]	-0.155335 (0.219552) [0.4792]
CAC 40	-0.0383724 (0.187525) [0.8379]	0.00720544 (0.245441) [0.9766]	0.173227 (0.374967) [0.6441]	0.160380 (0.276801) [0.5623]	0.127108 (0.265154) [0.6317]
DAX	0.00826400 (0.188436) [0.9650]	-0.0840347 0.219478) [0.7018]	0.171380 0.360970) [0.6349]	0.0658735 0.283167) [0.8160]	0.00389301 0.248533) [0.9875]
FTSE 100	0.0251352 (0.134414) [0.8517]	0.0455005 (0.168334) [0.7869]	0.123995 (0.226670) [0.5844]	-0.0669032 (0.213619) [0.7541]	-0.0473587 (0.162442) [0.7706]
Hang Seng	0.104723 (0.176249) [0.5524]	0.190971 (0.277384) [0.4912]	-0.310712 (0.303084) [0.3053]	-0.307724 (0.263576) [0.2430]	0.130701 (0.223103) [0.5580]
Nasdaq - 100	-0.0732849 (0.146824) [0.6177]	-0.0456796 (0.169046) [0.7870]	0.251059 (0.283806) [0.3764]	0.176123 (0.231170) [0.4461]	0.172736 (0.195628) [0.3772]
Nikkei 225	0.231315 (0.154421) [0.1341]	-0.219734 (0.206983) [0.2884]	-0.450391 (0.280074) [0.1078]	-0.147757 (0.246798) [0.5494]	0.00732893 (0.227326) [0.9743]
OSEAX	-0.0868262 (0.167132) [0.6034]	0.0768428 (0.208162) [0.7120]	0.459701 (0.289283) [0.1120]	0.0391907 (0.252344) [0.8766]	0.0757571 (0.260115) [0.7709]
S&P TSX Composite	-0.176455 (0.07477) [0.0183**]	0.153245 (0.112762) [0.1741]	0.479664 (0.166563) [0.004***]	0.209477 (0.123576) [0.0901*]	0.140566 (0.102230) [0.1691]
Standard & Poor's	-0.0481409 (0.123343 [0.6963]	-0.0409121 (0.147554 [0.7816]	0.230775 (0.242846 [0.3420]	0.165012 (0.226507 [0.4663]	-0.0273488 (0.157758 [0.8624]
Straits Times	0.180433 (0.085670) [0.0352**]	0.0448178 (0.121795) [0.7129]	-0.331768 (0.138955) [0.0170**]	-0.403754 (0.134656) [0.0027***]	-0.133057 (0.104887) [0.2046]
SSMI	-0.12999 (0.090833) [0.2135]	0.0498034 (0.124468) [0.6891]	0.304655 (0.187383) [0.1040]	0.248457 (0.131974) [0.0598*]	0.0997675 (0.119725) [0.4047]
TAIEX	0.179270 (0.140792) [0.2029]	0.00245523 (0.234657) [0.9917]	0.462692 (0.226193) [0.0408**]	0.154864 (0.284204) [0.5858]	0.110801 (0.181664) [0.5419]

Other conditional variance variables

Index	α_1	α_2	γ_1	γ_2	β
AEX General	0.0439067 (0.007776) [0.0001***]	x	1.02878 (0.019222) [0.0001***]	x	0.899037 (0.01673) [0.0001***]
All Ordinaries	0.0289263 (0.0128317) [0.0242**]	x	1.47776 (0.481306) [0.0021***]	x	0.883720 (0.0190041) [0.0001***]
ATX	0.0671511 (0.0283737) [0.0179**]	x	0.509659 (0.176026) [0.0038***]	x	0.898397 (0.0314497) [0.0001***]
BEL-20	0.0790858 (0.0246216) [0.0013***]	x	0.667860 (0.212183) [0.0016***]	x	0.860715 (0.0274383) [0.0001***]
CAC 40	0.0523974 (0.0103578) [0.0001***]	x	1.01369 (0.00754771) [0.0001***]	x	0.877372 (0.0217141) [0.0001***]
DAX	0.0431282 (0.00827872) [0.0001***]	x	1.01772 (0.0103799) [0.0001***]	x	0.895449 (0.0183616) [0.0001***]
FTSE 100	0.0458975 (0.00843226) [0.0001***]	x	1.01504 (0.00795133) [0.0001***]	x	0.887379 (0.0192211) [0.0001***]
Hang Seng	0.0730281	x	0.353519	x	0.901957

	(0.0131446) [0.0001***]		(0.0898681) [0.0001***]		(0.0177123) [0.0001***]
Nasdaq - 100	0.0420197 (0.00763084) [0.0001***]	x	1.01958 (0.0140955) [0.0001***]	x	0.892819 (0.0166944) [0.0001***]
Nikkei 225	0.0722617 (0.0228655) [0.0016***]	x	0.574660 (0.222813) [0.0099***]	x	0.869902 (0.0215227) [0.0001***]
OSEAX	0.0709407 (0.0150306) [0.0001***]	x	0.529780 (0.132217) [0.0001***]	x	0.889612 (0.0157966) [0.0001***]
S&P TSX Composite	0.0204790 (0.0121594) [0.0921*]	0.0487121 (0.0258899) [0.0599*]	1.02348 (0.0118150) [0.0001***]	0.0838395 (0.0497548) [0.0916*]	0.884812 (0.0190063) [0.0001***]
Standard & Poor's	0.0460070 (0.00859964) [0.0001***]	x	1.02633 (0.0126575) [0.0001***]	x	0.895880 (0.0168948) [0.0001***]
Straits Times	0.0651887 0.0168562) [0.0001***]	x	0.360451 (0.0894941) [0.0001***]	x	0.917132 0(.0186075) [0.0001***]
SSMI	0.0484465 (0.00826308) [0.0001***]	x	1.02040 (0.0168760) [0.0001***]	x	0.880444 (0.0180590) [0.0001***]
TAIEX	0.0591813 (0.0215096) [0.0059***]	x	0.487612 (0.171944) [0.0046***]	x	0.905759 (0.0302413) [0.0001***]

Notes: Standard Errors are within round brackets; p-values are within squared brackets; ***, **, * mean significant at 0.01, 0.05, and 0.1 levels, respectively

Table 8 - GJR - GARCH conditional mean equation for emerging markets indexes: first sub-sample

Index	**μ_1**	**μ_2**	**μ_3**	**μ_4**	**μ_5**
Athex Composite Share	-0.124650 (0.0531007) [0.0189**]	-0.0491162 (0.0529838) [0.3539]	0.0272962 (0.4795) [0.6316]	0.120085 (0.0562685) [0.0328**]	0.124267 (0.0496491) [0.0123**]
BET-C	0.0617362 (0.0533116) [0.2469]	0.118531 (0.0528773) [0.0250**]	0.152402 (0.048756) [0.0018***]	0.0978414 (0.0461737) [0.0341**]	0.150505 (0.0484912) [0.0019***]
Bovespa	-0.0781432 (0.0932146) [0.4019]	0.0548061 (0.0900391) [0.5427]	0.171253 (0.0939205) [0.0682*]	0.0247076 (0.0982074) [0.8014]	0.196375 (0.0803072) [0.0145**]
BSE 30	0.170586 (0.0692384) [0.0137]	0.0788403 (0.0612375) [0.1979]	0.0804323 (0.0601387) [0.1811]	0.174107 (0.0631244) [0.0058***]	0.134966 (0.0666715) [0.0429**]
BUX	0.167014 (0.0711989) [0.0190**]	0.0556660 (0.0667083) [0.4040]	-0.0385334 (0.0728563) [0.5969]	0.100626 (0.0688408) [0.1438]	0.0480655 (0.0647362) [0.4578]
CROBEX	0.0656239 (0.0526915) [0.2130]	0.0796818 (0.0481369) [0.0979*]	0.0650210 (0.0455672) [0.1536]	0.0722343 (0.0466311) [0.1214]	0.0616566 (0.0450899) [0.1715]
IDX Composite	-0.101013 (0.0673556) [0.1337]	0.0961067 (0.0590346) [0.1035]	0.181250 (0.0624430) [0.0037***]	0.115435 (0.0624985) [0.0647*]	0.279932 (0.0609141) [0.0001***]
IPC	0.0804551 (0.0577221) [0.1634]	0.136578 (0.0603060) [0.0235**]	0.124638 (0.0616259) [0.0431**]	0.143806 (0.0592880) [0.0153**]	0.0953993 (0.0522136) [0.0677*]
KLSE Composite	-0.0137552 (0.0360811) [0.7030]	-0.00382785 (0.0301491) [0.8990]	0.0409280 (0.0365695) [0.2631]	0.00707011 (0.0360224) [0.8444]	0.0800758 (0.0299072) 0.0074***]
KOSPI	0.0151799 (0.0863878) [0.8605]	0.00235562 (0.0696418) [0.9730]	0.0706150 (0.0785223) [0.3685]	0.170977 (0.0764530) [0.0253**]	0.114755 (0.0752548) [0.1273]
MerVal	0.0218198 (0.0991120) [0.8258]	0.0561594 (0.0865118) [0.5162]	0.151455 (0.0901837) [0.0931*]	0.210751 (0.0918500) [0.0218**]	0.0588398 (0.0841262) [0.4843]

OMXT	0.0193603 (0.0331517) [0.5592]	0.0819035 (0.0337247) [0.0152**]	0.0675682 (0.0341702) [0.0480**]	0.0857097 (0.0312644) [0.0061***]	0.0818093 (0.0331336) [0.0135**]
PX	0.161169 (0.0561626) [0.0041***]	0.0481942 (0.0574828) [0.4018]	0.0589307 (0.0574290) [0.3048]	0.200690 (0.0575984) [0.0005***]	0.125966 (0.0496882) [0.0112**]
SEMDEX	0.0234146 (0.0153544) [0.1273]	0.0141426 (0.0150355) [0.3469]	0.0330008 (0.0159882) [0.0390**]	0.0295841 (0.0156898) [0.0594*]	0.0526948 (0.0153986) [0.0006***]
SSE Composite	-0.00110230 (0.0595221) [0.9852]	0.149286 (0.0391230) [0.0001***]	0.0399518 (0.0497895) [0.4223]	-0.0800717 (0.0451211) [0.0760*]	-0.00849171 (0.0451516) [0.8508]
TA 100	0.212063 (0.105034) [0.0435**]	-0.0173368 (0.0527500) [0.7424]	-0.0178327 (0.0613055) [0.7711]	0.118978 (0.0593434) [0.0450**]	x

Notes: Standard Errors are within round brackets; p-values are within squared brackets;
***, **, * mean significant at 0.01, 0.05, and 0.1 levels, respectively

Table 9 - GJR - GARCH conditional variance equation for emerging markets indexes: first sub-sample

Day of the week variables

Index	**ω**	**ν_1**	**ν_2**	**ν_4**	**ν_5**
Athex Composite Share	0.184483 (0.15401) [0.2310]	0.0845121 (0.20414) [0.6789]	-0.12293 (0.23492) [0.6008]	-0.1430 (0.23581) [0.5442]	-0.358769 (0.17188) [0.0369**]
BET-C	-0.017187 (0.116454) [0.8827	0.328612 (0.179966) [0.0679*]	0.228741 (0.220013) [0.2985]	0.0744826 (0.181314) [0.6812]	0.253330 (0.155149) [0.1025]
Bovespa	0.217147 (0.292247) [0.4575]	0.500373 (0.323601) [0.1220]	-0.313047 (0.464946) [0.5008]	-0.0400775 (0.371483) [0.9141]	-0.723147 (0.367780) [0.0493**]
BSE 30	0.227722 (0.154138) [0.1396]	0.0385744 (0.200375) [0.8473]	-0.375799 (0.238404) [0.1150]	-0.0628776 (0.260641) [0.8094]	-0.0819548 (0.211602) [0.6985]
BUX	0.355699 (0.167571) [0.0338**]	-0.372005 (0.216705) [0.0860*]	-0.302052 (0.269077) [0.2616]	-0.442701 (0.276158) [0.1089]	-0.197457 (0.255499) [0.4396]
CROBEX	0.0721569 (0.138093) [0.6013]	0.324140 (0.203262) [0.1108]	-0.0318306 (0.230716) [0.8903]	0.180517 (0.219093) [0.4100]	0.0278884 (0.173797) [0.8725]
IDX Composite	0.360355 (0.194380) [0.0638*]	0.170070 (0.243876) [0.4856]	-0.349778 (0.289747) [0.2274]	-0.165766 (0.297831) [0.5778]	-0.277376 (0.230314) [0.2285]
IPC	0.135606 (0.0990071) [0.1708]	0.0272622 (0.147945) [0.8538]	-0.0421552 (0.163550) [0.7966]	-0.128571 (0.173026) [0.4574]	-0.292022 (0.166339) [0.0792*]
KLSE Composite	0.124158 (0.0489771) [0.0112**]	-0.128533 (0.0611690) [0.0356**]	-0.176982 (0.0694633) [0.0108**]	0.0909103 (0.0557009) [0.1027]	-0.138849 (0.0706565) [0.0494**]
KOSPI	0.165548 (0.229069) [0.4699]	-0.0617593 (0.239613) [0.7966]	-0.345344 (0.308141) [0.2624]	-0.256106 (0.409730) [0.5319]	0.0496151 (0.266716) [0.8524]
MerVal	0.330504 (0.325283) [0.3096]	0.259874 (0.374279) [0.4875]	-0.516650 (0.636516) [0.4170]	-0.395128 (0.527232) [0.4536]	-0.422134 (0.455789) [0.3544]
OMXT	0.0560990 (0.0653915 [0.3910]	-0.0053958 (0.0940359) [0.9542]	-0.0639412 (0.0997121) [0.5214]	-0.0989721 (0.110435) [0.3701]	-0.0328028 (0.108236) [0.7618]
PX	0.0697436 (0.123330) [0.5717]	0.0423529 (0.145699) [0.7713]	0.0845749 (0.193244) [0.6616]	0.0908410 (0.201354) [0.6519]	-0.267399 (0.184297) [0.1468
SEMDEX	0.110958 (0.0302207) [0.0002***]	-0.0303218 (0.0241039) [0.2084]	-0.0400914 (0.0249661) [0.1083]	-0.0290464 (0.0279354) [0.2984]	-0.0367730 (0.0231048) [0.1115]

SSE Composite	0.483199 (0.183315) [0.0084***]	0.437855 (0.323937) [0.1765]	-1.23670 (0.352987) [0.0005***]	-0.404270 (0.336544) [0.2297]	-0.316930 (0.278272) [0.2547]
TA 100	0.341122 (0.147023) [0.0203**]	0.335492 (0.276179) [0.2245]	-0.932165 (0.20426) [0.0001***]	-0.201513 (0.269004) [0.4538]	x

Other conditional variance variables

Index	**α_1**	**α_2**	**γ_1**	**γ_2**	**β**
Athex Composite Share	0.104079 (0.030645) [0.0007***]	x	0.260595 (0.067758) [0.0001***]	x	0.842609 (0.047852) [0.0001***]
BET-C	0.390246 (0.0574123) [0.0001***]	-0.273368 (0.0709686) [0.0001***]	0.194886 (0.112049) [0.0820*]	0.228700 (0.0961448) [0.0174**]	0.867559 (0.0619715) [0.0001***]
Bovespa	0.0220422 (0.00607510) [0.0003***]	x	0.968402 (0.054849) [0.0001***]	x	0.922980 (0.0271047) [0.0001***]
BSE 30	0.124758 (0.0243646) [0.0001***]	x	0.362801 (0.0918808) [0.0001***]	x	0.788715 (0.0370616) [0.0001***]
BUX	0.0619469 (0.0144608) [0.0001***]	x	0.257143 (0.112207) [0.0219**]	x	0.885238 (0.0216555) [0.0001***]
CROBEX	0.203779 (0.0792956) [0.0102**]	x	-0.164579 (0.0808776) [0.0419**]	x	0.710559 (0.108483) [0.0001***]
IDX Composite	0.0880075 (0.0343131) [0.0103**]	x	0.398331 (0.145956) [0.0064***]	x	0.764327 (0.0839018) [0.0001***]
IPC	0.0647729 (0.0194441) [0.0009***]	x	0.507126 (0.119515) [0.0001***]	x	0.888887 (0.0276038) [0.0001***]
KLSE Composite	0.0981506 (0.0579478) [0.0903*]	x	-0.124127 (0.0719683) [0.0846*]	x	0.894011 (0.0634279) [0.0001***]
KOSPI	0.0399033 (0.0199430) [0.0454**]	0.0916998 (0.0409716) [0.0252**]	0.984021 (0.0215196) [0.0001***]	0.228292 (0.121790) [0.0609*]	0.899318 (0.0351897) [0.0001***]
MerVal	0.0942423 (0.0169718) [0.0001***]	x	0.222608 (0.0633037) [0.0004***]	x	0.879824 (0.0201464) [0.0001***]
OMXT	0.198619 (0.0532266) [0.0002***]	x	0.0506546 (0.0204370) [0.0132**]	x	0.832328 (0.0377430) [0.0001***]
PX	0.0951020 (0.0148611) [0.0001***]	x	0.254242 (0.0896571) 0.0046***]	x	0.858748 (0.0195196) 0.0001***]
SEMDEX	0.576364 (0.132050) [0.0001***]	x	-0.228739 (0.0741679) [0.0020***]	x	0.0967157 (0.0346091) [0.0052***]
SSE Composite	0.182950 (0.0557012) [0.0010***]	x	0.224401 (0.0677898) [0.0009***]	x	0.761419 (0.0598452) [0.0001***]
TA 100	0.0788252 (0.0324123) [0.0150**]	x	0.306229 (0.162902) [0.0601*]	x	0.835340 (0.0820009) [0.0001***]

Notes: Standard Errors are within round brackets; p-values are within squared brackets; ***, **, * mean significant at 0.01, 0.05, and 0.1 levels, respectively

Table 10. GJR- GARCH conditional mean equation for emerging markets indexes: second sub-sample

Index	**μ_1**	**μ_2**	**μ_3**	**μ_4**	**μ_5**

Athex Composite Share	-0.271912 (0.0975980) [0.0053***]	-0.135823 (0.106226) [0.2010]	0.0738800 (0.0921946) [0.4229]	-0.0581420 (0.0929195) [0.5315]	0.132957 (0.0851906) [0.1186]
BET-C	-0.129960 (0.076394) [0.0889 *]	-0.0807418 (0.0679077) [0.2344]	0.0522272 (0.0642144) [0.4160]	0.0923277 (0.0668125) [0.1670]	0.188367 (0.0638602) [0.0032***]
Bovespa	0.0121202 (0.0847223) [0.8862]	-0.0470852 (0.101406) [0.6424]	0.0486121 (0.0898602) [0.5885]	0.0365851 (0.0852854) [0.6679]	0.0464125 (0.079884) [0.5612]
BSE 30	0.0115869 (0.0790990) [0.8835]	0.0917477 (0.121324) [0.4495]	0.0220690 (0.0706942) [0.7549]	-0.0163387 (0.0713767) [0.8189]	0.0634090 (0.126805) [0.6170]
BUX	-0.00120307 (0.0852512) [0.9887]	-0.0897011 (0.0847159) [0.2897]	0.0221549 (0.0805930) [0.7834]	-0.0859577 (0.0760934) [0.2586]	0.0239887 (0.0861747) [0.7807]
CROBEX	-0.265705 (0.0525838) [0.0001***]	-0.0636285 (0.0536227) [0.2354]	0.0960594 (0.0533120) [0.0716*]	0.0562492 (0.0471270) [0.2326]	0.134675 (0.0461246) [0.0035***]
IDX Composite	-0.0284996 (0.0734586) [0.6980]	0.122663 (0.0688393) [0.0748*]	0.226459 (0.069304) [0.0011***]	0.0865944 (0.0674238) [0.1990]	0.174906 (0.0671185) [0.0092***]
IPC	0.110366 (0.0600480) [0.0661*]	-0.0671275 (0.0661109) [0.3099]	0.0858926 (0.0595861) [0.1494]	0.0526721 (0.0507405) [0.2992]	0.0496451 (0.0558366) [0.3739]
KLSE Composite	-0.0001688 (0.0451861) [0.9970]	0.0662186 (0.0349022) [0.0578*]	0.0970672 (0.0379239) [0.0105**]	0.0735054 (0.0360355) [0.0414**]	0.0883412 (0.0351702) [0.0120**]
KOSPI	-0.0594856 (0.0727538) [0.4136]	0.00232102 (0.0589869) [0.9686]	0.0962986 (0.0675418) [0.1539]	0.0618686 (0.071298) [0.3855]	0.0248066 (0.0761519) [0.7446]
MerVal	0.000900761 (0.101350) [0.9929]	0.0252420 (0.0964758) [0.7936]	0.193599 (0.0764287) [0.0113**]	0.0153923 (0.0881444) [0.8614]	0.103877 (0.0727339) [0.1532]
OMXT	-0.128825 (0.0605006) [0.0332**]	-0.0421612 (0.0595410) [0.4789]	0.0536126 (0.0484965) [0.2689]	-0.0224543 (0.0519274) [0.6654]	0.0960759 (0.0528979) [0.0693*]
PX	0.00712210 (0.0678791) [0.9164]	-0.0979148 (0.0682125) [0.1512]	0.135969 (0.0649496) [0.0363**]	-0.0367208 (0.0691632) [0.5955]	0.0153903 (0.068136) [0.8213]
SEMDEX	-0.0661893 (0.0264205) [0.0122**]	-0.002094 (0.0253749) [0.9342]	0.0129429 (0.0305844) [0.6722]	0.00600948 (0.0248812) [0.8091]	0.0564874 (0.023132) [0.0146**]
SSE Composite	0.192124 (0.117297) [0.1014]	-0.0977652 (0.0876406) [0.2646]	0.0632809 (0.0938420) [0.5001]	-0.0861354 (0.0846607) [0.3090]	0.102332 (0.0743509) [0.1687]
TA 100	0.0893025 (0.106690) [0.4026]	0.0284323 (0.06402) [0.6570]	0.117337 (0.07167) [0.1016]	-0.0337701 (0.0599409) [0.5732]	0.0459268 (0.07632) [0.5473]

Notes: Standard Errors are within round brackets; p-values are within squared brackets; ***, **, * mean significant at 0.01, 0.05, and 0.1 levels, respectively

Table 11 - GJR - GARCH conditional variance equation for emerging markets indexes: second sub-sample

Day of the week variables

Index	**ω**	**ν_1**	**ν_2**	**ν_4**	**ν_5**
Athex Composite Share	-0.70948 (0.33104) [0.0321**]	1.16439 (0.465883) [0.0124**]	1.52021 (0.642969) [0.0181**]	0.78225 (0.448849) [0.0814*]	0.581959 (0.430533) [0.1765]
BET-C	-0.048467 (0.164286) [0.7680]	0.527912 (0.222805) [0.0178**]	-0.049947 (0.350144) [0.8866]	0.282060 (0.263561) [0.2845]	-0.072963 (0.216509) [0.7361]
Bovespa	-0.158273 (0.224914)	0.279844 (0.335054)	0.623337 (0.362470)	0.207060 (0.375471)	0.0452774 (0.290304)

	[0.4816]	[0.4036]	[0.0855*]	[0.5813]	[0.8761]
BSE 30	0.241072 (0.404899) [0.5516]	-0.212904 (0.969580) [0.8262]	-0.727474 (0.661998) [0.2718]	-0.150383 (0.372171) [0.6862]	0.150030 (0.182962) [0.4122]
BUX	0.0524111 (0.222611) [0.8139]	-0.0626724 (0.318108) [0.8438]	0.0312995 (0.352697) [0.9293]	-0.132712 (0.407681) [0.7448]	0.213927 (0.309138) [0.4889]
CROBEX	0.0484317 (0.0975308) [0.6195]	0.164144 (0.178574) [0.3580]	-0.102346 (0.149660) [0.4941]	-0.0931211 (0.172532) [0.5894]	-0.120889 (0.125403) [0.3350]
IDX Composite	0.255580 (0.166776) [0.1254	0.140655 (0.232096) [0.5445	-0.360884 (0.249311) [0.1478	-0.195675 (0.283555) [0.4901	-0.105504 (0.244748) [0.6664
IPC	-0.0679870 (0.105419) [0.5190]	0.241915 (0.148378) [0.1030]	0.101468 (0.182722) [0.5787]	-0.0781436 (0.162456) [0.6305]	0.156489 (0.150863) [0.2996]
KLSE Composite	0.114915 (0.0798989) [0.1504]	0.0906616 (0.0925893) [0.3275]	-0.133645 (0.113936) [0.2408]	-0.108611 (0.106478) [0.3077]	0.00821924 (0.0952105) [0.9312]
KOSPI	0.273026 (0.114255) [0.0169**]	-0.242561 (0.172378) [0.1594]	-0.579115 (0.206330) [0.0050***]	-0.136426 (0.228498) [0.5505]	-0.144025 (0.162496) [0.3754]
MerVal	-0.294361 (0.332848) [0.3765]	1.21610 (0.450005) [0.0069***]	0.470952 (0.519128) [0.3643]	0.772515 (0.579288) [0.1823]	-0.0783283 (0.449992) [0.8618]
OMXT	-0.207958 (0.149723) [0.1648]	0.575371 (0.247652) [0.0202**]	0.266292 (0.295461) [0.3674	0.364028 (0.212580) [0.0868*]	0.163546 (0.192961) [0.3967
PX	0.0219779 (0.135025) [0.8707]	0.0179886 (0.181896) [0.9212]	0.100432 (0.242338) [0.6786]	0.0853103 (0.222628) [0.7016]	-0.0470677 (0.188512) [0.8028]
SEMDEX	0.123090 (0.0634068) [0.0522*]	-0.0576658 (0.0492140) [0.2413]	-0.0643370 (0.0683285) [0.3464]	-0.146310 (0.0579367) [0.0116**]	-0.0957100 (0.0573707) [0.0953*]
SSE Composite	0.130702 (0.231231) [0.5719]	0.468668 (0.355610) [0.1875]	-0.440635 (0.345214) [0.2018]	-0.361733 (0.474638) [0.4460]	-0.182143 (0.357691) [0.6106]
TA 100	-0.0828191 (0.0667726) [0.2149]	0.758071 (0.0785422) [0.0001***]	-0.496967 (0.135232) [0.0002***]	0.275656 (0.107751) [0.0105**]	0.206715 (0.129141) [0.1094]

Other conditional variance variables

Index	α_1	α_2	γ_1	γ_2	β
Athex Composite Share	0.121571 (0.0189677) [0.0001***]	x	0.172749 (0.0625657) [0.0058***]	x	0.859862 (0.0202896) [0.0001***]
BET-C	0.261956 (0.0543404) [0.0001***]	-0.140327 (0.0586892) [0.0168**]	0.218263 (0.0973720) [0.0250**]	-0.188392 (0.0884440) [0.0332**]	0.868292 (0.0230347) [0.0001***]
Bovespa	0.0590878 (0.0200976) [0.0033***]	x	0.619012 (0.201297) [0.0021***]	x	0.895973 (0.0281731) [0.0001***]
BSE 30	0.0694722 (0.0146853) [0.0001***]	x	0.543793 (0.194587) [0.0052***]	x	0.893300 (0.0272159) [0.0001***]
BUX	0.101276 (0.0246544) [0.0001***]	x	0.272977 (0.0704770) [0.0001***]	x	0.877639 (0.0297007) [0.0001***]
CROBEX	0.0964529 (0.0271008) [0.0004***]	x	0.165297 (0.0610617) [0.0068***]	x	0.897070 (0.0251165) [0.0001***]
IDX Composite	0.135833 (0.0363724)	x	0.389331 (0.114635)	x	0.775995 (0.0737159)

	[0.0002***]		[0.0007***]		[0.0001***]
IPC	0.0341845 (0.0158726) [0.0313**]	x	0.127792 (0.0271572) [0.0001***]	x	0.924336 (0.0180237) [0.0001***]
KLSE Composite	0.0388799 (0.0172558) [0.0242**]	x	0.220187 (0.0729673) [0.0025***]	x	0.676888 (0.0829656) [0.0001***]
KOSPI	0.0362009 (0.0148925) [0.0151**]	0.0584439 (0.0337227) [0.0831*]	1.00923 (0.00659752) [0.0001***]	0.132805 (0.0636295) [0.0369**]	0.864559 (0.0317880) [0.0001***]
MerVal	0.130114 (0.0313601) [0.0001***]	x	0.201293 (0.0821764) [0.0143**]	x	0.824001 (0.0427067) [0.0001***]
OMXT	0.172179 (0.0566040) [0.0024***]	x	0.117645 (0.0558468) [0.0352**]	x	0.814076 (.0557115) [0.0001***]
PX	0.132491 (0.0234456) [0.0001***]	x	0.160412 (0.0576846) [0.0054***]	x	0.846052 (0.0245922) [0.0001***]
SEMDEX	0.598606 (0.238969) [0.0122**]	x	0.159287 (0.091909) [0.0655*]	x	0.525315 (0.160344) [0.0011***]
SSE Composite	0.134050 (0.0497006) [0.0070***]	x	0.0475152 (0.0286597) [0.0973*]	x	0.961951 (0.0301153) [0.0001***]
TA 100	0.0602547 (0.0146969) [0.0001***]	x	0.446569 (0.149146) [0.0028***]	x	0.889283 (0.0247238) [0.0001***]

Notes: Standard Errors are within round brackets; p-values are within squared brackets; ***, **, * mean significant at 0.01, 0.05, and 0.1 levels, respectively

Table 12 - Results of ARCH LM tests for residuals of GJR - GARCH models

Advanced Markets			Emerging Markets		
Index	**First sub-sample**	**Second sub-sample**	**Index**	**First sub-sample**	**Second sub-sample**
AEX General	3.82442 (0.5749)	8.16378 (0.2263)	Athex Composite Share	4.2315 (0.7527)	9.56303 (0.7933)
All Ordinaries	5.79642 (0.7601)	7.01345 (0.5351)	BET-C	6.52508 (0.6864)	5.76374 (0.6736)
ATX	4.69548 (0.6971)	11.6598 (0.3084)	Bovespa	8.84215 (0.6364)	8.93558 (0.6278)
BEL-20	4.65513 (0.7937)	2.34918 (0.8849)	BSE 30	3.3976 (0.7575)	6.29409 (0.7101)
CAC 40	4.55634 (0.8711)	11.6779 (0.4719)	BUX	9.96961 (0.6964)	3.94477 (0.7861)
DAX	4.71099 (0.5814)	7.20135 (0.2060)	CROBEX	3.25728 (0.8602)	8.89959 (0.7114)
FTSE 100	5.03728 (0.6554)	7.5501 (0.5801)	IDX Composite	6.46223 (0.7750)	6.4898 (0.7725)
Hang Seng	3.65111 (0.7237)	12.2059 (0.5108)	IPC	4.78851 (0.7799)	3.33323 (0.76600
Nasdaq - 100	5.31084 (0.8064)	6.34414 (0.3857)	KLSE Composite	9.96271 (0.6192)	7.34715 (0.6923)
Nikkei 225	5.29606 (0.8705)	9.19298 (0.4196)	KOSPI	4.75869 (0.78302)	9.04092 (0.7698)
OSEAX	3.54891 (0.6160)	6.6219 (0.4692)	MerVal	3.37442 (0.7605)	6.35409 (0.2732)
S&P TSX Composite	2.76026 (0.7368)	8.50659 (0.2901)	OMXT	4.21014 (0.7552)	8.09781 (0.7774)
Standard & Poor's	5.80689 (0.8312)	6.17705 (0.2893)	PX	9.92352 (0.6226)	7.35218 (0.7698)
Straits Times	3.97698 (0.7824)	12.8984 (0.5345)	SEMDEX	8.88502 (0.6325)	9.42561 (0.8028)

SSMI	4.3547 (0.6287)	9.24011 (0.5094)	SSE Composite	6.40792 (0.7799)	6.86153 (0.3338)
TAIEX	3.92782 (0.8635)	11.6764 (0.3884)	TA 100	3.69551 (0.8834)	7.16281 (0.5191)

Notes: p-values are within brackets