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TESTING THE CAPM-GARCH MODELS IN THE GCC-WIDE EQUITY SECTORS

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ABSTRACT

This paper tests the conditional and non-conditional versions of the Capital Asset Pricing Model (CAPM) in Gulf Cooperation Council GCC capital markets -wide equity sectors upon daily data during the period from February 22ed 2007 to February 22ed 2012. In the empirical analysis, we used Generalized Autoregressive Conditional heteroscedasticity (GARCH) models with CAPM. Main findings seem to show that the CAPM-EGARCH (1.1) appears more advantages than the traditional CAPM at the sectors considered in this study. This approach can be improved and developed in order to be widely applied as this model takes into account shocks, especially in the crisis period where volatilities are very high.

Contribution/ Originality: This study contributes to the literature on the cost of equity capital. It uses a new estimation methodology for beta in a highly volatile environment. It proposes a model taking into account the period of crisis and high volatility of returns. This study is one of the very few studies that have investigated the conditional beta heterogeneity of variance at the level of industries in the GCC stock exchanges.

1. INTRODUCTION

The role of the capital markets has been growing in GCC region and has increased in recent years. The market value of companies listed on the Arabic stock exchanges exceeded $ 1 billion and $ 20 million, this is due to several factors (Arab Monetary Fund), mainly financial surpluses, liquidity caused by high oil revenues and the interest of dealers in this type of investments; all this Which gives importance to the study of these markets and their role in wealth creation in order to safeguard the rights of stakeholders, before these markets become a means of mass financial destruction;

The growth of equity financing in light of the shift towards capital economics on the one hand and the lack of clarity on the cost of equity financing compared to borrowing on the other prompted the search for methods for

estimating and measuring the cost of equity capital. In 1964, William Sharp was one of the first to attempt to develop a model known as the capital asset pricing model "CAPM» (Sharpe, 1964) under a set of assumptions using a binary return-risk with the use of historical returns for future forecasting. Since then, this model has been widely tested in stock markets around the world, but the underlying assumptions have not been achieved most often, especially the homogeneity of variance hypothesis. This has led to the emergence of a model known as the CAPM conditional model, By Bollerslev (1986) and Engle (1982).

This study is based on the CAPM model in the GCC region at the level of each sector. The GCC Board has recently taken initiatives to harmonize prudential regulation and supervision of banks across countries. This is the first step towards a common market for financial services. It will be many years before the GCC has a passport system and harmonized market rules. The ambition of a common currency is also present, even if, again, its implementation is not for tomorrow.

The Saudi Arabia is particular. It is the most attractive market in the area, very populated and very rich. Following the events in the Arab world, the king has released large sums for the benefit of the population, which will create demand, especially from SMEs. Due to a housing deficit, investment in real estate will also grow significantly.

Sharpe (1964) and Lintner (1965) developed the most finance theory "Capital Asset Pricing Model (CAPM)" building on the earlier work of Harry Markowitz 1952 on diversification and modern portfolio theory and as a model that describes the relationship between asset risk and expected return and that is used during four decades to determine the cost of capital for firms and evaluating the performance of managed portfolios (see Fama and French (2004)).

In section 2 we present a Literature Review for the CAPM'S empirical. Section 3 presents the Model and the Methodology, followed by the results and discussion showed in Section 4, and finally, Section 5 presents the main conclusion.

2. LITERATURE REVIEW

The conditional CAPM has tested by many literatures, Thomas (1991) estimated by a Capital Asset Pricing Model (CAPM) using weekly data of 140 shares listed on Stock Exchange Paris CAC40 during the period 1969 to 1982, which led to modeling the variance dynamic of residuals CAPM based on models ARCH. His results detected that risk measures may well be specified as ARCH processes, whereas the structure of the CAPM model is unacceptable. Fama and French (1993) focused to test capital Asset Pricing Model CAPM with the introduction of some financial ratios and their relationship to the size expressed market capitalization and the percentage of the book value of the market value of shares. Sample study included all companies listed New York Stock Exchange during the period 1963 to 1990 except the financial sector. Empirical finding shows that band market factors capture the five most common variations can be explaining average returns on stocks and bonds. Hansson and Hordahl (1998) examined the relationship between the expected return and the variable risk over time in the Swedish stock market during the period 1977-1990 using a multi-factor model GARCH, and conditional capital asset pricing model. The authors tested hypotheses using the proceeds conservative level sectors, which have been classified on the basis of beta factor and size for showing that the risk premium is positive and significant for every conservative issue, as the capital asset pricing model traditional unacceptable to the pricing of assets, also supports this study strongly the use of the conditional version of the capital asset pricing model.

The study of Scheicher (2000) compared two specifications of the CAPM in German stocks. Hi found that risk is very variable and need more than one factor to fit the data set.

The conditional and non-conditional versions of the capital asset pricing model are tested in the study of Morelli (2003) using the returns Portfolio of equity in the United Kingdom during the period between January

1980 - December 1999. The two versions tests showed not statistically significant of Betas the average market premium but with a different sign.

Collins and Abrahamson (2006) examined the cost of equity in ten different sectors at the level of six African countries namely: Egypt, Kenya, Mauritius, Morocco, Zambia, South Africa and Zimbabwe during the period 1995-2002. The results showed whether the important attributes sector level in this region can benefit from financial liberalization.

In the Norwegian stock exchange, Solibakke (2005) used daily data series of stock return during the period October 1983 - February 1994,), this study implicated technique of the time series, and models ARMA-GARCH for monitoring and control of trading asynchronous and non-volatile trading.

Hearn and Piesse (2009) integrated the factor of liquidity within the CAPM multifactor for estimating the cost of capital key sectors in the largest African financial markets, namely: Morocco, Tunisia, Egypt, Kenya, Nigeria, Zambia, Botswana and South Africa during 2002-2008. The study concluded that the cost of capital at the level of all the countries studied was the lowest in Tunisia, Morocco, Namibia, South Africa, and the maximum was at the public level in Nigeria and Zambia. The financial sector appears the highest cost of capital sector.

Balcilar *et al.* (2014) examined the international diversification benefits of bloc-wide equity sectors of the stock markets of oil-rich Gulf Cooperation Council (GCC) countries by comparing alternative spillover models for local, regional and global factors. This study has been performed nine GCC-wide equity sector and sub-sector indices from the six GCC countries. The whole sample period includes 1/1/2006-11/25/2013, which is equivalent to 1,237 observations. This period is dictated by the availability of the data on the GCC equity sectors which have been newly re- classified, As of November 2013 by Thomson Reuters Business Classification System (TRBC). This study finds that the highly segmented GCC-wide equity sectors can serve as safe havens for international investors during periods of high and extreme market volatility.

3. DATA AND METHODOLOGY

In our analysis, we try to measure the cost of capital in the Arab stock exchanges using daily data over the February 22 2007 to February 22 2012, for seven GCC financial markets, namely: The Bahrain Stock Exchange, Muscat Securities Market, Dubai Financial Market, Abu Dhabi Securities Market, Kuwait Stock Exchange, Doha Securities Exchange, and Saudi Stock Market, (See Table 1).

3.1. Econometric Model

Capital Asset Pricing Model is the most part of the Capital Market Theory (CMT). It includes securities analysis, the theory of portfolio management and standard theory taught the actions of investors in the selection of common stock to their portfolios, under a range of assumptions, in contrast, CAPM theory is positive; what means it describes market relations would lead if investors behaved manner determined by the portfolio theory.

Represents CAPM cornerstone of conceptual modern theory of the capital market, and its importance seriously at the level of the business sector, evaluation processes, capital budgets, the commercial interests of companies, and business investment is a branch of the investment opportunities available in the overall capital market, and therefore, the pricing of companies and evaluated theoretically should be subject to the same economic forces and relationships that determine the prices of other investment assets.

Results

3.2. CAPM Formula and Structural Hypotheses

The main contribution of portfolio theory is determined the rate of cost-effectiveness, allowing imposed by the shareholder; model according to CAPM proposed by Sharpe (1964). The average is a weighted sum of the risk-free

rate of return as compensation for the time, as well as systemic risk-weighted factor sensitivity, and computes the following mathematical relationship:

$$E(R_i) - r_f = \beta_i (R_m - r_f) \quad (01)$$

Where

E(.) : Expected value

Ri : return rate of security

Rf: risk-free rate (we use the Euribor rate is risk-free rate return see (Bendob, 2017))

Rm : return rate of market portfolio;

B : Beta coefficient

On a practical level to estimate β rely on ordinary least squares OLS regression model to estimate the following:

$$R_{it} - r_{ft} = \beta_i (R_{mt} - r_{ft}) + \varepsilon_{it} \quad (02)$$

Where

- ε_{it} : Random variable representing the model residuals or errors term;

Assumptions of CAPM Regression

- Error term (ε_{it}) is indépendantes et identiquement distribuées (iid)
- There linear relationship between variables studied (market return and the return on the portfolio)
- COV(ε_t χ_t) =0 : Explanatory variables is uncorrelated with the disturbance (error) term
- $E(\varepsilon_t^2) = \sigma^2$: variance of the error is constant; i.e., homoscedastic
- E(ε_t ε_t)=0 : There is no correlation between error terms; i.e., no serial- or auto-correlation
- Regression model is correctly specified

Heteroskedasticity problem and GARCH Models

Most classical regression models, including the CAPM , based on the basic idea is that the variance of the error is constant in the time and they are independent from each other, namely:

$$E(\varepsilon_t) = 0, \qquad \forall t = 1, \ldots\ldots, T$$

$$Var(\varepsilon_t) = E(\varepsilon_1^2) = \sigma^2 \quad \forall t = 1, \ldots\ldots, T$$

$$Cov(\varepsilon_t, \varepsilon_{t'}) = E(\varepsilon_t \varepsilon_{t'}) = 0 \quad , \forall t \neq t' t, t' = 1, \ldots\ldots, T$$

To resolve this problem suggested (Engle, 1982) through his study of the rate of inflation in the United Kingdom Autoregressive Conditional Heteroskedasticity (ARCH).

The ARCH process can be defined White noise follows normal distribution η_t multiplied for each period of a random variable Autoregressive so that :

$$\varepsilon_t = \eta_t \times h_t^{1/2} \quad (03)$$

$$h_t = \alpha_0 + \sum_{i=1}^{p} \alpha_t \varepsilon_{t-1}^2$$
$$\eta_t \to N(0,1)$$

3.3. GARCH Models

GARCH model was proposed in 1986 by Bollerslev (1986) where the model writes return any financial asset as follows:

$$R_t = \ln(\frac{S_t}{S_{t-1}})$$

Where

Rt: return rate

St: asset price in date t.

According to ARCH model the return of a financial asset writes as follows :

$R_t = \sqrt{h_t}\,\upsilon_t$.

$\upsilon_t \xrightarrow{iid} N(0,1)$

The GARCH (p,q) model s writes as follows:

$$h_t = \alpha + \sum_{j=1}^{p} \beta_j h_{t-j} + \sum_{k=1}^{q} \gamma_k R_{t-k}^2 \qquad (04)$$

Where α, β, γ is Positive real numbers, And as a special case we write GARCH (1,1) :

$$h_t = \alpha + \beta h_{t-1} + \gamma R_{t-1}^2$$

3.4. GARCH Models

EGARCH model was proposed by Nelson (1991) concluded that the conditional variance function is exponential (EGARCH), not linear as (Bollerslev, 1986) believed, and the conditional variance function takes the following form :

$$\log(h_t) = \omega + \beta_j \sum_{j=1}^{p} \log(h_{t-j}) + \alpha_k \sum_{k=1}^{q} \frac{|R_{t-k}|}{\sigma_{t-i}} + \gamma_k \sum_{k=1}^{q} \frac{R_{t-k}}{\sigma_{t-i}} \qquad (05)$$

Which γ_k measures of leverage effect (see Peijie (2009)).

4. RESULTS AND COMMENT

In Table 1, we present Descriptive Statistics for the excess returns of sectors portfolio in Gulf Stock Exchange during the selected period. The same table shows that the excess return average is negative in most of the sectors while, can it be explained by the subprime crisis contagion. The Kuwait and Dubai Stock Exchanges Recorded greater degree of risk especially food and gear sectors. The distribution figure of excess returns is buckled to the left (left-tailed) of most sectors in the Gulf bourses, especially Qatar, Saudi Arabia and Kuwait. This situation can be explained by the adoption of the agents in the financial market on historical data, and the rationality of agents. We observe the kurtosis coefficients are a more than normal value while The Jarque-Bera test was statistically significant.

4.1. Estimation Output of the Static CAPM (with OLS)

Table 2 reports the results of CAPM estimation with OLS, beta coefficient is statistically significantly different to zero for all sectors of the GCC stock markets except Dubai and Kuwait. High persistence of shocks in the volatility can be explained by that impact on the linear relationship. The Acceptance of model CAPM Indicates existence of a positive relationship between systemic risk and the excess return on the portfolio sectors while R square coefficient is high and significant for all Saudi sectors. In the Qatar and Muscat Exchanges was the banking and real estate, due to the strength of the economy Saudi and diversity in addition to the surplus petrodollars on the first hand. On the other hand, adoption of economic activity in the banking sector and the real estimate only in Qatar and Bahrain. In Kuwait, CAPM model was not statistically significant in most sectors, because boiling high volatility in the stock market caused by the impact of the global financial crisis. In addition, political events witnessed by Kuwait during the period estimated. Finally the Abu Dhabi the CAPM model acceptable to most sectors on generally.

Before illustrating the results of generalized autoregressive conditional heteroscedasticity (GARCH) models, it is necessary to examine heteroscedasticity test. The ARCH LM test proposed by Engle (1982) indicates the presence of ARCH effects of all sectors returns residuals (See Table 03), except six segments: three in Dubai, two in Saudi Arabia and last one in Dubai.

4.2. Estimation Output of the Conditional CAPM (CAPM-GARCH)

We also note in Table (4) the conditional capital asset pricing model is statistically significant at 5% when Bahrain and Dubai markets appears just insurance sector is acceptable. Cannot accept the interpretation of the model at the level of this sector to several factors, including the sector is characterized as a mandatory what makes a bit of volatility, and the growth of cooperative insurance activity. In the Kuwait Stock Exchange real estate sector and the non-Kuwaiti companies and food. As in Saudi Arabia, the industry and hotel sectors, the latter linked to the pilgrimage season.

The lowest maximum value of the variance at a level of long-term in sectors of Qatar Stock Exchange valued at 0.000. We also observe that ARCH coefficients ware more than the coefficient GARCH, which lead to conclude the modern information more influence than historical information of all sectors without exception. The relationship between return and risk is positive and statistically significant at the 1% level. The sum of ARCH and GARCH coefficients are greater than one, especially in Qatar. Thus, greater weight shows shock Saudi markets insistence. Means accepting statistically conditional model and shows a positive relationship between sectoral stock returns and variation dynamic beta over time. The GCC stock exchange was able to generate the impact of the risk premium in the global financial crisis. Thus, traders in the affected practically the risk of financial crisis and therefore the latter have an impact on stock market fluctuations. see Figure 1.

The Index of persistence of volatility shocks (ARCH+GARCH) shows that reduced the volatility by.882 per day. The energy sector in Abu Dhabi Stock Exchange up to 0.0035 $((.882)^{45})$ after month and a half month. Any half-life of shock up to three weeks later, while the rest of the sectors to devolve shock is the end, which requires dealing with a special type of these models, namely the exponential model G ARCH EGARCH and non-linear, which we will discuss in the next section.

4.3. Estimation Output of the Conditional and Exponential CAPM (CAPM-EGARCH)

The Conditional exponential model (CAPM-EGARCH (1.1)) is statistically significant when the proportion of 5 % on the entire conservative sector in high volatility persistence shock. The betas estimated were different significantly from zero. See table (5). The Constant in the equation of variation differed significantly from zero in the entire sectors at the level of significance of 5 %, which has a signal negative at the level of each governor sectors that have the GARCH effect, which is the exact opposite of the constant in the equation of variation of the model

GARCH linear as was the variance in long-term positive in full sectors. This is due to the GARCH models contain only positive variation Unlike EGARCH models, which handles the part of the positive and negative contrast.

The Qatar Exchange is characterized by a negative and significant effect leverage at the level of all sectors. This is due to the concentration of activity on the banking and financial sectors Which is characterized by high financial leverage.

In the Saudi stock exchange Leverage effect is significant on the level of insurance sectors and petrochemistry only, he is Resulting from fluctuations in the price of oil in global stock markets, And the consequences of the bankruptcy of the insurance companies in the world (AIG in USA for example). It can also interpret this case the lack of reliance on interest rate and growth the profit and loss sharing (PLS) funding. At the level of the rest of the sectors in GCC, with mixed results (see the table 5).

In the end, the EGARCH model is the best, According to statistics of Akaike and Schwarz. Because the EGARCH model measures the impact of leverage and divides the shocks to the positive and negative.

5. CONCLUSION

The form of the distribution of excess returns sectors does not follow a normal distribution, characterized by the left-tailed and leptokurtic at the level of most sectors of Gulf stock markets during the period estimation. The results of estimating CAPM with OLS seems beta coefficient is statistically significant and different from zero for all sectors of the GCC stock markets in general, with the exception of five sectors. The Lagrange multiplier contained in the table 3 with to test Larch confirms the hypothesis of the Heteroscedasticity for every sector with the exception of six segments This result is also corroborated by a study of Thomas (1991); Hansson and Hordahl (1998); Eleftherios (2008). In the secondly examine, we make evaluates using tests of the Akaike information criterion (AIC), Hannan-Quinn Criterion (HQC), and Schwarz Criterion, (SC), for detecting the best models between ARCH family models were selected (GARCH (1, 1), EGARCH (1, 1)). The EGARCH appears more advantages which have less values of the Akaike information criterion (AIC), Hannan-Quinn criter (HQC) and Schwarz Criterions.

Appendix-1. List GCC-wide equity sectors in study and its abbreviations

Abbreviations	Signified	Abbreviations	Signified
Abu Dhabi PRICE INDEX BY SECTORS		KUWAIT SE PRICE INDEX BY SECTORS	
ABUASI	ADX GENERAL	KSEBANK	KUWAIT SE BANKS
ABUBANK	ADX BANKS	KSEFOOD	KUWAIT SE FOOD
ABUCMST	ADX CONSUMER STAPLES	KSEINSU	KUWAIT SE INSURANCE
ABUENER	ADX ENERGY	KSEINDS	KUWAIT SE INDUSTRIAL
ABUINDT	ADX INDUSTRIAL	KSEINVT	KUWAIT SE INVESTMENT
ABUINSU	ADX INSURANCE	KSEKCOS	KUWAIT SE KUWAIT COMPANIES
ABUREES	ADX REAL ESTATE	KSEREAL	KUWAIT SE REAL ESTATE
ABUSRVS	ADX SERVICES	KSENKCO	KUWAIT SE NON KUWAIT COMPANIES
ABUTELE	ADX TELECOM	KSESERV	KUWAIT SE SERVICES
Bahrain PRICE INDEX BY SECTORS		KSEASI	KUWAIT AL-SHALL GENERAL
BHRAASI	BAHRAIN ALL SHARE	OMAN MUSCAT SECURITIES PRICE INDEX BY SECTORS	
BHRABNK	BAHRAIN AS COMMERCIAL BANKS	OMANBAI	OMAN MSM BANKING & INVESTMENTS
BHRAHAT	BAHRAIN AS HOTEL AND TOURISM	OMANSAI	OMAN MSM SERVICES & INSURANCE
BHRAIND	BAHRAIN AS INDUSTRIAL	OMANIND	OMAN MSM INDUSTRY
BHRAINS	BAHRAIN AS INSURANCE	OMANASI	OMAN MUSCAT SECURITIES MKT
BHRAINV	BAHRAIN AS INVESTMENT	QATAR FINANCIALS PRICE INDEX BY SECTORS	
BHRASER	BAHRAIN AS SERVICES	QAFNL	TR QATAR FINANCIALS L
BHRELSH	ESTERAD INDE	QABIL	TR QATAR BNKING/INV SVS L

DUBAI FIN MKT PRICE INDEX BY SECTORS		QABGL	TR QATAR BNKING/INV SVS L
DFMBANK	DUBAI FIN MKT BANK	QABKL	TR QATAR BANKS L
DFMCSTP	DUBAI FIN MKT CONSUMER STAPLES	QAASI	TR QATAR L
DFMFINI	DUBAI FIN MKT FINANCIAL INVEST	SAUDI TADAWUL PRICE INDEX BY SECTORS	
DFMINSU	DUBAI FIN MKT INSURANCE	TDWAGFD	SAUDI TADAWUL AGR & FOOD
DFMMATR	DUBAI FIN MKT MATERIALS	TDWBANK	SAUDI TADAWUL BANKS & FIN SVCS
DFMREST	DUBAI FIN MKT REALEASTATE	TDWBACN	SAUDI TADAWUL BLDG & CONSTR
DFMTCOM	DUBAI FIN MKT TELECOMM	TDWCMNT	SAUDI TADAWUL CEMENT
DFMTRNS	DUBAI FIN MKT TRANSPORT	TDWEAUT	SAUDI TADAWUL ENERGY & UTL
DFMUTIL	DUBAI FIN MKT UTILITIES	TDWHATO	SAUDI TADAWUL HOTEL & TOURISM
DFMASI	DUBAI FINANCIAL MARKET	TDWIDUS	SAUDI TADAWUL INDUSTRIAL DEV
		TDWINSR	SAUDI TADAWUL INSURANCE
		TDWMDPB	SAUDI TADAWUL MEDIA & PUBLISHING
		TDWMINV	SAUDI TADAWUL MULTI INVESTMENT
		TDWPCHM	SAUDI TADAWUL PETROCHEMICALS
		TDWREST	SAUDI TADAWUL REAL ESTATE DEV
		TDWRETL	SAUDI TADAWUL RETAIL
		TDWTELE	SAUDI TADAWUL TELE & INFO TECH
		TDWTRNS	SAUDI TADAWUL TRANSPORT
		TDWASI	SAUDI TADAWUL ALL SHARE (TASI)

Table 1. Descriptive statistics for the excess returns

MARKETS	Sectors	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
ABU DHABI SE	RABUASI	-0.013550	0.000000	39.81833	-36.49202	1.964503	1.368847	223.1588	2633939.	0.000000
	RABUBANK	-0.005695	0.000000	27.77643	-23.74092	1.752528	0.939150	78.39657	309057.3	0.000000
	RABUCMST	-0.021362	0.000000	60.59839	-52.30591	3.556459	1.156411	159.3791	1328981.	0.000000
	RABUENER	-0.056070	0.000000	58.29790	-55.85875	3.250358	0.421153	148.4545	1149569.	0.000000
	RABUINDT	-0.050276	0.000000	17.08022	-17.71918	1.844031	-0.280405	18.74943	13494.18	0.000000
	RABUINSU	-0.018269	0.000000	11.18052	-11.32031	0.902774	0.175246	41.56057	80795.85	0.000000
	RABUREES	-0.097261	0.000000	28.41410	-20.77420	3.052912	-0.043736	12.58293	4989.989	0.000000
	RABUSRVS	0.015990	0.000000	17.27999	-17.96062	2.159976	-0.274926	12.22991	4645.148	0.000000
	RABUTELE	0.003036	0.000000	18.62519	-17.99297	1.763737	0.361236	28.80460	36207.70	0.000000
BAHRAIN SE	RBHRAASI	-0.048202	0.000000	2.621708	-4.919996	0.645340	-0.998001	8.990113	2166.025	0.000000
	RBHRABNK	-0.031738	0.000000	7.628495	-7.525428	1.201120	-0.412842	10.12875	2798.215	0.000000
	RBHRAHAT	0.045542	0.000000	5.526021	-8.144565	0.697725	0.096197	39.59243	72754.68	0.000000
	RBHRAIND	-0.028404	0.000000	9.185345	-10.23509	1.033737	-2.066334	50.96231	125915.4	0.000000
	RBHRAINS	-0.004415	0.000000	3.952523	-4.846009	0.706271	-0.641009	10.81995	3411.869	0.000000
	RBHRAINV	-0.074973	0.000000	2.852715	-10.21429	0.838278	-2.506486	26.46180	31273.49	0.000000
	RBHRASER	-0.030260	0.000000	6.832441	-7.442013	0.878356	-0.290087	17.04582	10737.45	0.000000
	RBHRELSH	-0.046272	0.000000	3.141074	-6.226687	0.725752	-1.019152	10.75379	3492.328	0.000000
DUBAI FIN MKT	RDFMASI	-0.074056	0.000000	10.21990	-9.620462	1.903800	-0.141881	8.546019	1675.577	0.000000
	RDFMBANK	-0.071066	0.000000	7.318199	-7.058928	1.386504	-0.186371	6.707870	754.5399	0.000000
	RDFMCSTP	-0.007136	0.000000	4.879016	-5.129329	0.773256	-0.707558	39.87379	73984.54	0.000000
	RDFMFINI	-0.091240	-0.047011	13.83907	-13.31531	2.562807	0.238119	8.431376	1615.148	0.000000
	RDFMINSU	-0.264000	0.000000	13.97760	-318.0561	8.953829	-34.31476	1218.818	80572143	0.000000
	RDFMMATR	0.179496	0.000000	318.0992	-10.53685	9.010269	33.71926	1190.452	76859440	0.000000
	RDFMREST	-0.082478	0.000000	20.02177	-11.78062	2.982992	0.158837	8.487354	1641.517	0.000000
	RDFMTCOM	-0.081762	0.000000	13.94234	-12.76442	2.672692	0.355704	9.114635	2058.954	0.000000
	RDFMTRNS	-0.023121	0.000000	18.99192	-11.25903	2.400640	0.868127	14.38847	6480.764	0.000000
	RDFMUTIL	-0.147688	0.000000	13.91142	-15.02827	3.153503	0.133852	7.272179	995.5594	0.000000

Continued to **Table-1.** descriptive statistics for the excess returns

MARKETS	Sectors	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
Kuwait SE	RKSEASI	-0.034340	0.000000	6.540830	-9.010518	1.491663	-0.663248	7.567279	1229.000	0.000000
	RKSEBANK	0.006295	0.000000	136.0902	-137.7076	6.161015	-0.364533	393.4209	8281975.	0.000000
	RKSEFOOD	0.009987	0.000000	151.9903	-153.0995	14.38661	-0.146007	89.84162	409757.6	0.000000
	RKSEINDS	-0.029987	0.000000	99.97145	-101.7637	6.164156	-0.240224	147.0959	1128170.	0.000000
	RKSEINSU	-0.005357	0.000000	170.0281	-169.3104	13.83342	0.023225	110.6825	630023.3	0.000000
	RKSEINVT	-0.086733	0.000000	76.97092	-76.92859	4.842102	-0.263036	162.4115	1380735.	0.000000
	RKSEKCOS	-0.035923	0.000000	3.802645	-9.334746	0.825189	-1.957608	19.41214	15468.01	0.000000
	RKSENKCO	-0.016648	0.000000	183.7453	-183.1933	10.08257	0.044956	192.6348	1953901.	0.000000
	RKSEREAL	-0.057136	0.000000	185.8793	-186.0795	9.653534	-0.084846	234.7119	2917179.	0.000000
	RKSESERV	-0.024716	0.000000	116.1013	-117.1206	11.64890	-0.023213	74.98774	281568.2	0.000000
Oman SE	ROMANASI	-0.001154	0.000000	8.038831	-8.698988	1.337618	-0.936778	14.66013	7577.805	0.000000
	ROMANBAI	-0.012175	0.000000	7.843912	-9.485625	1.547726	-0.820876	12.02147	4568.468	0.000000
	ROMANIND	0.010848	0.000000	7.947145	-9.171620	1.536034	-0.871860	11.16009	3783.099	0.000000
	ROMANSAI	0.002526	0.000000	8.764972	-8.486126	1.216269	-0.907509	15.20802	8276.601	0.000000
QATAR SE	RQAASI	0.032848	0.032663	8.467425	-10.24778	1.680586	-0.516710	9.445029	2314.945	0.000000
	RQABGL	0.042865	0.049036	9.411620	-10.20069	1.760868	-0.236173	8.913934	1912.410	0.000000
	RQABIL	0.042795	0.048218	9.407007	-10.20587	1.760201	-0.236853	8.915872	1913.725	0.000000
	RQABKL	0.043055	0.047588	9.407791	-10.18777	1.767631	-0.218949	8.872576	1884.220	0.000000
SAUDI SE	RTDWAGFD	0.015107	0.049902	9.092304	-10.11821	1.729142	-0.604487	10.93615	3426.280	0.000000
	RTDWASI	-0.013362	0.023217	9.087370	-10.32845	1.652083	-0.705355	11.75741	4275.078	0.000000
	RTDWBACN	-0.029523	0.031125	12.56091	-10.43222	2.065326	-0.754471	10.24688	2894.961	0.000000
	RTDWBANK	-0.017420	0.000000	8.731150	-10.28336	1.656686	-0.197300	11.17487	3527.831	0.000000
	RTDWCMNT	0.007553	0.000000	9.301290	-10.38991	1.454297	-0.531382	15.42063	8242.750	0.000000
	RTDWEAUT	0.006164	0.000000	9.124176	-10.32836	1.633760	-0.002149	11.02897	3408.555	0.000000
	RTDWHATO	0.013833	0.000000	22.22294	-12.92112	2.405901	0.763434	17.30493	10900.01	0.000000
	RTDWIDUS	0.018511	0.000000	16.71426	-12.37092	1.986538	-0.522227	13.25255	5593.494	0.000000
	RTDWINSR	-0.014986	0.000000	9.230774	-13.50116	2.235591	-0.853568	7.375182	1169.915	0.000000
	RTDWMDPB	-0.049772	-0.017095	13.43338	-10.52939	2.017768	-0.089542	9.489348	2235.373	0.000000

	RTDWMINV	-0.041509	0.000000	18.52139	-10.30659	2.168035	-0.335875	12.36829	4693.834	0.000000
	RTDWPCHM	0.012557	0.022877	29.54717	-23.72522	2.458322	0.099000	29.20515	36168.78	0.000000
	RTDWREST	-0.035671	0.000000	13.07179	-10.46721	1.756409	-0.338729	13.27118	5633.329	0.000000
	RTDWRETL	0.021000	0.001635	11.50287	-10.38325	1.672428	-0.536483	13.30007	5683.862	0.000000
	RTDWTELE	-0.017256	0.000000	9.422875	-10.50749	1.643277	-0.511893	12.12442	4439.965	0.000000
	RTDWTRNS	-0.014422	0.000000	9.314488	-10.40968	2.076025	-0.255631	9.410595	2198.820	0.000000

Table-2. Estimation output of the CAPM with OLS

Sectors	constant	t-Statistic	Beta	t-Statistic	Adjusted R2	F-statistic	Akaike	Schwarz	DW stat
ABU DHABI SE									
RABUBANK	-0.247981	-10.47023	0.819021	83.72463	0.843235	7009.814	2.109845	2.117779	1.966915
RABUCMST	0.255780	2.790202	1.186465	31.33613	0.429498	981.9529	4.816617	4.824551	2.185482
RABUENER	0.606735	11.62727	1.459283	67.70790	0.778641	4584.360	3.689688	3.697623	1.895305
RABUINDT	-1.021859	-17.12307	0.303116	12.29759	0.103377	151.2307	3.958115	3.966050	1.919315
RABUINSU	-1.093728	-40.82136	0.229633	20.75073	0.247948	430.5927	2.356496	2.364430	2.076081
RABUREES	0.101126	1.413661	1.130754	38.27122	0.529040	1464.686	4.320576	4.328510	1.894892
RABUSRVS	-0.855840	-12.33514	0.373681	13.03986	0.114833	170.0381	4.259474	4.267408	2.158334
RABUTELE	-0.549831	-12.24963	0.599316	32.32736	0.444837	1045.058	3.388442	3.396376	2.056642
BAHRAIN SE									
RBHRABNK	0.628765	12.10047	1.422779	43.47331	0.591783	1889.929	2.313905	2.321839	2.042920
RBHRAHAT	-1.260189	-26.65023	0.065142	2.187246	0.002896	4.784044	2.125316	2.133250	2.036034
RBHRAIND	-1.058658	-15.31821	0.255352	5.866293	0.025002	34.41339	2.884307	2.892242	1.718708
RBHRAINS	-1.301696	-27.15600	0.070976	2.350941	0.003462	5.526922	2.152529	2.160463	1.976137
RBHRAINV	-0.273126	-6.235507	0.829897	30.08181	0.409583	904.9151	1.972227	1.980161	1.916422
RBHRASER	-0.649194	-11.87348	0.539359	15.66220	0.157890	245.3044	2.415727	2.423661	1.960052
RBHRELSH	0.106212	7.243339	1.072004	116.0733	0.911810	13473.00	-0.216407	-0.208473	1.918023
DUBAI FIN MKT									
RDFMBANK	-0.540182	-22.25307	0.631531	62.64956	0.750716	3924.968	2.106362	2.114296	2.039769
RDFMCSTP	-1.396565	-51.61967	0.007222	0.642809	-0.000451	0.413204	2.323246	2.331181	1.266507
RDFMFINI	0.310596	8.241746	1.222355	78.10785	0.823986	6100.836	2.986070	2.994004	2.049526
RDFMINSU	-1.056792	-3.381429	0.411960	3.174238	0.006917	10.07579	7.216899	7.224833	1.999267
RDFMMATR	-1.159969	-3.674997	0.041116	0.313683	0.000076	0.098397	7.236702	7.244637	2.037242
RDFMREST	0.447966	7.815653	1.309598	55.02137	0.699031	3027.351	3.824690	3.832624	2.128407
RDFMTCOM	-0.016640	-0.251713	0.993939	36.20730	0.501334	1310.969	4.110013	4.117948	1.826242
RDFMTRNS	0.062773	1.243804	1.002070	48.99037	0.671994	2400.057	3.476844	3.485489	2.115782
RDFMUTIL	0.337764	4.808994	1.279077	43.85413	0.595992	1923.184	4.231232	4.239167	2.016682
KUWAIT SE									

RKSEBANK	-0.335787	-1.442001	0.737578	6.558827	0.031240	43.01821	6.444324	6.452258	2.980209
RKSEFOOD	-1.273466	-2.304441	0.081303	0.304649	0.000071	0.092811	8.172750	8.180684	2.717553
RKSEINDS	-0.639676	-2.725694	0.551016	4.861809	0.017076	23.63719	6.459910	6.467844	2.797261
RKSEINSU	-1.555877	-2.928182	-0.104883	-0.408736	0.000128	0.167065	8.094258	8.102192	2.747114
RKSEINVT	-0.838091	-4.549555	0.452252	5.083650	0.018710	25.84350	5.975625	5.983559	2.885397
RKSEKCOS	-0.890149	-38.32529	0.380538	33.92638	0.468814	1150.999	1.833989	1.841924	1.944488
RKSENKCO	-0.684069	-1.771288	0.510769	2.738611	0.004964	7.499992	7.456136	7.464070	2.838564
RKSEREAL	-1.069625	-2.886944	0.270204	1.510135	0.000982	2.280509	7.373162	7.381096	2.913813
RKSESERV	-0.427789	-0.959843	0.695058	3.229297	0.007184	10.42836	7.742664	7.750599	2.774802

Continued to **Table-2.** Estimation output of the CAPM with OLS on

Sectors	**constant**	**t-Statistic**	**Beta**	**t-Statistic**	**Adjusted R2**	**F-statistic**	**Akaike**	**Schwarz**	**DW stat**
OMAN MSM									
ROMANBAI	0.071192	2.842716	1.058672	81.96880	0.837549	6718.885	1.899754	1.907688	1.931148
ROMANIND	-0.002590	-0.082846	0.989586	61.37599	0.742948	3767.013	2.343426	2.351360	1.563260
ROMANSAI	-0.268244	-11.85686	0.805939	69.07622	0.785462	4771.524	1.696484	1.704419	1.995357
QATAR FM									
RQABGL	-0.012124	-0.561833	0.983805	98.82565	0.882279	9766.509	1.833450	1.841385	2.071510
RQABIL	-0.012589	-0.583947	0.983517	98.89710	0.882429	9780.637	1.831419	1.839353	2.070141
RQABKL	-0.009861	-0.447651	0.985322	96.95966	0.878260	9401.176	1.874656	1.882590	2.073113
RQAFNL	-0.018337	-1.047997	0.984085	121.9206	0.919402	14864.62	1.413994	1.421929	2.018118
SAUDI TADAWUL									
RTDWAGFD	-0.139223	-4.046603	0.885692	55.72582	0.708862	3105.367	2.700583	2.708658	1.910231
RTDWBACN	0.089408	2.262984	1.081649	59.08037	0.733627	3490.490	2.968544	2.976659	1.669793
RTDWBANK	-0.135322	-5.106739	0.913499	74.41329	0.814247	5537.338	2.166795	2.174931	2.157981
RTDWCMNT	-0.463121	-12.85339	0.659460	39.58980	0.551853	1567.353	2.785209	2.793299	2.195810
RTDWEAUT	-0.567487	-11.61290	0.588376	26.01676	0.347694	676.8716	3.393858	3.401968	2.506676
RTDWHATO	-0.086183	-1.243641	0.926208	28.85007	0.396942	832.3263	4.089474	4.097610	1.998884
RTDWIDUS	0.086254	2.304474	1.045423	60.29061	0.742085	3634.957	2.857501	2.865637	1.982163
RTDWINSR	-0.078548	-1.318788	0.947533	34.41157	0.481907	1184.156	3.790446	3.798536	1.828210
RTDWMDPB	-0.257764	-4.751134	0.845334	33.70340	0.471524	1135.920	3.603774	3.611864	2.094645
RTDWMINV	0.032279	0.664989	1.047514	46.70299	0.630805	2181.169	3.389465	3.397534	1.942732
RTDWPCHM	0.521742	13.44232	1.359124	75.58637	0.818933	5713.299	2.930139	2.938275	2.412839
RTDWREST	-0.173872	-4.934437	0.897138	55.11390	0.704282	3037.542	2.748347	2.756422	1.936058
RTDWRETL	-0.238877	-6.335289	0.809241	46.41435	0.628828	2154.292	2.876028	2.884123	2.009494
RTDWTELE	-0.254221	-7.387117	0.828889	51.99070	0.681465	2703.033	2.689542	2.697678	1.970998
RTDWTRNS	-0.041217	-0.848030	0.976198	43.47807	0.597073	1890.343	3.391549	3.399623	2.012992

Table-3. Testing the ARCH effect in the Residuals of CAPM with OLS

	Sectors	F-statistic	Probability	Obs*R-squared	Probability
ABU DHABI SE	RABUBANK	42.47224	0.000000	183.2498	0.000000
	RABUCMST	119.7834	0.000000	411.2195	0.000000
	RABUENER	21.37036	0.000000	99.15369	0.000000
	RABUINDT	42.78154	0.000000	184.3949	0.000000
	RABUINSU	6.051878	0.000000	29.70464	0.000000
	RABUREES	54.98103	0.000000	227.7573	0.000000
	RABUSRVS	42.38595	0.000000	182.9300	0.000000
	RABUTELE	68.06057	0.000000	270.6500	0.000000
BAHRAIN SE	RBHRABNK	13.95946	0.000000	66.52983	0.000000
	RBHRAHAT	0.140750	0.982728	0.706631	0.982603
	RBHRAIND	160.6746	0.000000	497.8034	0.000000
	RBHRAINS	13.50684	0.000000	64.47975	0.000000
	RBHRAINV	3.142588	0.007963	15.59632	0.008096
	RBHRASER	22.49293	0.000000	103.9454	0.000000
	RBHRELSH	14.93155	0.000000	70.90987	0.000000
DUBAI FIN MKT	RDFMBANK	6.481415	0.000006	31.76141	0.000007
	RDFMCSTP	61.84675	0.000000	250.7091	0.000000
	RDFMFINI	34.16211	0.000000	151.5790	0.000000
	RDFMINSU	0.000833	0.999999	0.004185	0.999999
	RDFMMATR	0.000769	0.999999	0.003864	0.999999
	RDFMREST	19.59281	0.000000	91.48712	0.000000
	RDFMTCOM	23.84493	0.000000	109.6659	0.000000
	RDFMTRNS	0.120738	0.987805	0.606494	0.987704
	RDFMUTIL	42.10992	0.000000	181.9055	0.000000
KUWAIT SE	RKSEBANK	183.9115	0.000000	539.8753	0.000000
	RKSEFOOD	46.89722	0.000000	199.4110	0.000000
	RKSEINDS	103.0102	0.000000	370.0399	0.000000
	RKSEINSU	60.06350	0.000000	244.8429	0.000000
	RKSEINVT	158.8277	0.000000	494.2586	0.000000
	RKSEKCOS	3.244635	0.006574	16.09649	0.006453
	RKSENKCO	139.6715	0.000000	455.5518	0.000000
	RKSEREAL	164.3842	0.000000	504.8300	0.000000
	RKSESERV	59.83553	0.000000	244.0882	0.000000
OMAN	ROMANBAI	18.94956	0.000000	88.68860	0.000000
	ROMANIND	35.90145	0.000000	158.3557	0.000000
	ROMANSAI	25.86652	0.000000	118.1180	0.000000
QATAR	RQABGL	20.30572	0.000000	94.57363	0.000000
	RQABIL	20.35145	0.000000	94.77107	0.000000
	RQABKL	21.01373	0.000000	97.62337	0.000000
	RQAFNL	21.04934	0.000000	97.77635	0.000000
SAUDI TADAWUL	RTDWAGFD	17.66263	0.000000	82.94164	0.000000
	RTDWBACN	38.96212	0.000000	169.4751	0.000000
	RTDWBANK	104.9110	0.000000	371.5298	0.000000
	RTDWCMNT	59.36509	0.000000	241.4476	0.000000
	RTDWEAUT	22.96299	0.000000	105.7142	0.000000
	RTDWHATO	1.156539	0.327839	5.783692	0.328599
	RTDWIDUS	2.533129	0.111554	2.532060	0.111730
	RTDWINSR	22.00414	0.000000	101.6243	0.000000
	RTDWMDPB	6.996714	0.000002	34.20179	0.000002
	RTDWMINV	14.32746	0.000000	68.11154	0.000000
	RTDWPCHM	38.78670	0.000000	168.9689	0.000000
	RTDWREST	149.3979	0.000000	470.2323	0.000000
	RTDWRETL	10.33225	0.000000	49.86965	0.000000
	RTDWTELE	18.99352	0.000000	88.69962	0.000000
	RTDWTRNS	19.44025	0.000000	90.69348	0.000000

Table-4. Estimation output of the CAPM with GARCH(1.1)

Sectors	constant	t-Statistic	Beta	z-Statistic	Variance Equation						Akaike	Schwarz	Adjus R2	F-statistic	ARCH +GARCH
					constant	z-Statistic	ARCH(1)	z-Statistic	GARCH(1)	z-Statistic					
OMAN MSM															
ROMANBAI	0.045488	2.274881	1.038167	148.1548	0.022071	5.239501	0.158499	9.994809	0.797987	87.57881	1.771822	1.791658	0.886855	1671.940	0,956486
ROMANIND	-0.065562	-2.812178	0.965282	77.77076	0.001805	2.413509	0.045958	8.276018	0.952090	178.6805	1.978467	1.998303	0.741555	955.6785	0,998048
ROMANSAI	-0.294880	-14.76549	0.790802	88.59085	0.010789	4.411548	0.105789	6.632628	0.862790	44.05921	1.557768	1.577599	0.784658	1187.968	0,968579
QATAR FM															
RQABGL	0.040687	2.578056	1.014848	182.9457	0.000507	2.221758	0.055545	9.639808	0.945788	202.2117	1.552888	1.572674	0.881091	2414.741	1,001328
RQABIL	0.040695	2.579402	1.014797	188.0182	0.000496	2.162872	0.055848	9.598064	0.945567	200.7859	1.549949	1.569785	0.881226	2417.858	1,001415
RQABKL	0.044597	2.768815	1.017548	181.0745	0.000494	2.180828	0.056085	9.455156	0.945865	195.6066	1.582498	1.602329	0.877008	2328.699	1,001450
RQAFNL	0.044592	3.587478	1.022525	162.8845	0.000266	2.946555	0.046825	10.09165	0.953201	250.6440	1.039847	1.059688	0.917772	3636.810	1,000026
SAUDI TADAWUL															
RTDWAGFD	-0.158736	-5.841211	0.864226	77.52934	0.120887	7.470508	0.211791	8.956296	0.658896	20.25984	2.555200	2.575886	0.707674	772.6418	0.870187
RTDWBACN	0.015776	0.551828	1.045651	90.64868	0.008127	4.609076	0.068827	9.702960	0.927807	154.7587	2.708219	2.728507	0.782055	866.8952	0.996134
RTDWBANK	-0.151988	-8.202177	0.909615	138.9895	0.017504	7.840094	0.100596	9.495781	0.871267	69.27049	1.898224	1.918564	0.818748	1380.492	0.971868
RTDWCMNT	-0.452628	-19.40080	0.672181	80.52844	0.048850	11.85122	0.134185	18.89914	0.828181	67.52106	2.458492	2.478716	0.550562	890.5501	0.957816
RTDWEAUT	-0.561667	-16.96995	0.590729	60.56516	0.250856	10.79940	0.276564	8.968176	0.610594	19.42932	3.168502	3.188777	0.346187	168.8118	0.887158
RTDWHATO	-0.128555	-2.714814	0.922651	67.28954	0.008289	4.498820	0.048120	14.72069	0.958427	342.7857	3.815885	3.836226	0.895257	207.8727	1.001547
RTDWIDUS	0.093298	3.452514	1.047867	92.88264	0.011529	3.756290	0.066802	8.558080	0.921176	91.96784	2.591212	2.611552	0.741468	906.5448	0.987978
RTDWINSR	-0.036891	-0.784048	1.014275	55.48085	0.016047	3.661462	0.056021	8.042807	0.939884	188.7005	3.658100	3.678324	0.477728	291.8728	0.995855
RTDWMDPB	-0.304180	-6.569126	0.881184	47.81246	0.038025	5.566115	0.044647	7.216777	0.937400	120.3594	3.497178	3.517397	0.469969	282.9648	0.982047
RTDWMINV	-0.062636	-1.774258	0.987199	72.79298	0.092487	6.139607	0.183945	9.326742	0.769920	35.10288	3.145526	3.165699	0.627814	539.0998	0.953865
RTDWPCHM	0.381089	17.03625	1.252616	116.5817	0.002701	2.689450	0.107516	19.85802	0.911970	199.3159	2.818744	2.834085	0.818441	1877.744	1.019486
RTDWREST	-0.315560	-14.88866	0.818185	106.8200	0.008230	5.408005	0.072827	8.709332	0.919055	120.2284	2.476068	2.496254	0.697211	784.9687	0.991882
RTDWRETL	-0.359329	-12.25709	0.785405	62.70659	0.014670	6.641301	0.066860	9.019336	0.917720	115.4477	2.641272	2.661509	0.622602	525.1987	0.984580
RTDWTELE	-0.305981	-11.48788	0.798784	70.95012	0.031899	6.013690	0.156624	9.900476	0.814657	49.82058	2.455286	2.475626	0.679478	670.3612	0.971281
RTDWTRNS	-0.197429	-5.940018	0.894255	62.31021	0.016227	5.058271	0.066718	10.37208	0.927460	152.5710	3.152571	3.172757	0.591518	462.5678	0.994178

Continued to **Table-4.** Estimation output of the CAPM with GARCH(1.1)

Sectors	constant	t-Statistic	Beta	z-Statistic	Variance Equation						Akaike	Schwarz	Adjus R2	F-statistic	ARCH +GARCH
					constant	z-Statistic	ARCH(1)	z-Statistic	GARCH(1)	z-Statistic					
OMAN MSM															
ROMANBAI	0.045433	2.274381	1.038167	143.1548	0.022071	5.239501	0.158499	9.994809	0.797937	37.57331	1.771822	1.791658	0.836855	1671.940	0,956436
ROMANIND	-0.065362	-2.812178	0.965232	77.77076	0.001305	2.413509	0.045958	8.276013	0.932090	173.6305	1.978467	1.998303	0.741555	935.6735	0,998048
ROMANSAI	-0.294330	-14.76549	0.790302	83.59035	0.010789	4.411543	0.105789	6.632623	0.862790	44.05921	1.557763	1.577599	0.784658	1187.963	0,968579
QATAR FM															
RQABGL	0.040687	2.573056	1.014843	132.9457	0.000507	2.221758	0.055545	9.639808	0.945783	202.2117	1.552838	1.572674	0.881091	2414.741	1,001328
RQABIL	0.040695	2.579402	1.014797	133.0182	0.000496	2.162372	0.055848	9.598064	0.945567	200.7359	1.549949	1.569785	0.881226	2417.853	1,001415
RQABKL	0.044397	2.763815	1.017548	131.0745	0.000494	2.180323	0.056085	9.455156	0.945365	195.6066	1.582493	1.602329	0.877003	2323.699	1,001450
RQAFNL	0.044592	3.537473	1.022525	162.3345	0.000266	2.946555	0.046825	10.09165	0.953201	250.6440	1.039847	1.059683	0.917772	3636.810	1,000026
SAUDI TADAWUL															
RTDWAGFD	-0.153736	-5.841211	0.864226	77.32934	0.120337	7.470503	0.211791	8.956296	0.658396	20.25984	2.555200	2.575386	0.707674	772.6418	0.870187
RTDWBACN	0.015776	0.551323	1.045651	90.64368	0.008127	4.609076	0.068327	9.702960	0.927807	154.7587	2.708219	2.728507	0.732055	866.3952	0.996134
RTDWBANK	-0.151988	-8.202177	0.909615	138.9395	0.017504	7.340094	0.100596	9.495731	0.871267	69.27049	1.893224	1.913564	0.813743	1380.492	0.971863
RTDWCMNT	-0.452623	-19.40030	0.672131	80.32344	0.043850	11.85122	0.134135	13.39914	0.823181	67.52106	2.453492	2.473716	0.550562	390.5501	0.957316
RTDWEAUT	-0.561667	-16.96995	0.590729	60.56516	0.250856	10.79940	0.276564	8.963176	0.610594	19.42932	3.168502	3.188777	0.346137	168.8113	0.887158
RTDWHATO	-0.128555	-2.714814	0.922651	67.23954	0.008239	4.498820	0.043120	14.72069	0.958427	342.7357	3.815885	3.836226	0.395257	207.3727	1.001547
RTDWIDUS	0.093293	3.452514	1.047867	92.83264	0.011529	3.756290	0.066802	8.558080	0.921176	91.96784	2.591212	2.611552	0.741463	906.3443	0.987978
RTDWINSR	-0.036891	-0.734048	1.014275	55.48085	0.016047	3.661462	0.056021	8.042807	0.939834	138.7005	3.658100	3.678324	0.477723	291.8723	0.995855
RTDWMDPB	-0.304130	-6.569126	0.831184	47.81246	0.038025	5.566115	0.044647	7.216777	0.937400	120.3394	3.497173	3.517397	0.469969	282.9648	0.982047
RTDWMINV	-0.062636	-1.774258	0.987199	72.79293	0.092487	6.139607	0.183945	9.326742	0.769920	35.10288	3.145526	3.165699	0.627814	539.0993	0.953865
RTDWPCHM	0.381089	17.03625	1.252616	116.5817	0.002701	2.689450	0.107516	19.85802	0.911970	199.3159	2.313744	2.334085	0.813441	1377.744	1.019486
RTDWREST	-0.315560	-14.88366	0.813135	106.8200	0.008230	5.408005	0.072827	8.709332	0.919055	120.2284	2.476068	2.496254	0.697211	734.9637	0.991882
RTDWRETL	-0.359329	-12.25709	0.735405	62.70659	0.014670	6.641301	0.066560	9.019336	0.917720	115.4477	2.641272	2.661509	0.622602	525.1987	0.984550
RTDWTELE	-0.305931	-11.48733	0.793784	70.93012	0.031899	6.013690	0.156624	9.900476	0.814657	49.82053	2.455286	2.475626	0.679478	670.3612	0.971251
RTDWTRNS	-0.197429	-5.940013	0.894255	62.31021	0.016227	5.058271	0.066713	10.37205	0.927460	152.5710	3.152571	3.172757	0.591513	462.5678	0.994173

Table-5. Estimation output of the CAPM with EGARCH(1.1)

Sectors	constant	t-Statistic	Beta	z-Statistic	Variance Equation								Akaike	Schwarz	Adjusted R2
					constant	z-Statistic	|RES|/SQR [GARCH](1)	z-Statistic	RES/SQR [GARCH](1)	z-Statistic	EGARCH(1)	z-Statistic			
ABU DHABI SE															
RABUBANK	-0.112765	-6.270514	0.902483	136.2956	-0.132032	-12.62912	0.163759	13.80890	-0.067271	-7.345665	0.985320	241.0608	1.822039	1.845842	0.833863
RABUCMST	-0.249310	-5.190692	0.788874	76.10816	-0.180189	-13.10445	0.560773	19.91329	0.223818	9.412924	0.901427	72.10353	4.330028	4.353831	0.379017
RABUENER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RABUINDT	-0.719439	-20.86038	0.551086	46.87151	-0.375726	-10.16489	0.939074	30.03493	-0.037446	-1.527798	0.629183	25.38585	3.561453	3.585256	0.030020
RABUINSU	-1.151191	-54.80736	0.211726	35.78590	-0.035369	-6.872557	0.043522	6.618435	0.019436	3.415289	0.990033	541.1305	2.162721	2.186524	0.242848
RABUREES	0.645437	12.36086	1.550333	77.64453	-0.260252	-8.974991	0.580873	15.06771	0.104977	4.474542	0.872154	52.73249	4.031996	4.055799	0.454159
RABUSRVS	-0.857837	-17.05919	0.414246	24.15648	-0.124571	-11.20538	0.262837	14.35517	0.035325	2.655131	0.950231	114.0359	4.082742	4.106545	0.109982
RABUTELE	-0.314053	-15.71483	0.796441	114.0501	-0.606849	-20.83011	0.969058	24.52580	-0.389546	-16.77285	0.535107	24.00653	2.823650	2.847453	0.394177
BAHRAIN SE															
RBHRABNK	0.657389	22.26405	1.435198	95.79546	-0.234136	-10.60080	0.265561	11.51677	-0.048194	-3.146183	0.926446	72.06813	2.177217	2.201020	0.590401
RBHRAHAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RBHRAIND	-1.342455	-170.9860	0.072147	16.66185	-0.316597	-33.58834	0.491514	29.33013	0.160313	11.41955	0.853143	148.0940	1.712785	1.736588	0.008372
RBHRAINS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RBHRAINV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RBHRASER	-0.794135	-24.96067	0.456250	23.83385	-0.306950	-25.09995	0.374092	0.070314	5.013100	0.888724	98.22420	2.193914	2.217717	0.150736	
RBHRELSH	0.142805	15.50313	1.094584	211.5321	-0.141484	-9.872951	0.130621	10.64448	0.032814	4.314564	0.983219	444.3302	-0.500409	-0.476606	0.911104
DUBAI FIN MKT															
RDFMBANK	-0.520817	-26.40613	0.642231	80.55997	-0.485283	-7.727015	0.334898	8.148748	0.021197	0.879095	0.687972	13.60413	2.059701	2.083504	0.749725
RDFMCSTP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RDFMFINI	0.200603	6.325389	1.159918	119.2923	-0.201403	-10.35244	0.276510	10.11183	-0.028561	-1.979941	0.954880	110.9491	2.768128	2.791931	0.821236
RDFMINSU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RDFMMATR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RDFMREST	0.725101	29.11312	1.481276	141.9306	-0.209848	-17.14520	0.291960	17.66235	-0.038438	-3.574407	0.982634	288.1207	2.938961	2.962764	0.685975
RDFMTCOM	-0.273501	-5.104677	0.845488	44.64206	-0.140518	-10.41252	0.252462	11.74057	-0.006307	-0.630957	0.968161	177.5615	3.861252	3.885055	0.488358
RDFMTRNS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RDFMUTIL	0.283455	6.720067	1.206796	61.59384	-0.131608	-11.74973	0.247115	14.33079	-0.027729	-3.118012	0.966617	178.3677	4.002165	4.025968	0.592560
KUWAIT SE															
RKSEBANK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RKSEFOOD	-1.067762	-6.492589	0.255283	7.764936	0.178990	18.77189	0.143127	28.59486	0.141012	21.90874	0.952200	583.6949	7.202851	7.226654	0.000264
RKSEINDS	-0.981353	-40.13746	-0.014972	-2.812304	0.091495	4.646854	1.680739	65.09558	-1.187250	-53.45656	0.684514	223.0275	5.532818	5.556621	0.006804
RKSEINSU	-1.436279	-10.02496	-0.002554	-0.030218	0.522114	37.57036	0.271980	16.80251	0.075602	3.385755	0.877541	283.2080	7.337410	7.361213	0.000002
RKSEINVT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RKSEKCOS	-0.851771	-63.07169	0.392687	69.32724	-0.265405	-22.08579	0.322538	24.12715	-0.007834	-0.665996	0.972470	248.9501	1.394780	1.418583	0.466056
RKSENKCO	-1.809646	-538.2297	0.640930	100.4597	0.384899	197.7315	-0.038084	-447.6093	-0.380115	-178.8974	0.921781	2810.016	6.650130	6.673933	0.015493
RKSEREAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RKSESERV	-1.858098	-13434.55	0.150146	6.653502	0.261966	41.43877	-0.002125	-1.035430	-0.294908	-40.04149	0.940017	662.0337	6.847989	6.871792	0.003893

Continued to **Table-5.** Estimation output of the CAPM with EGARCH(1.1)

sectors	constant	t-Statistic	Beta	z-Statistic	Variance Equation								Akaike	Schwarz	Adjusted R2
					constant	z-Statistic	|RES|/SQR[GARCH](1)	z-Statistic	RES/SQR[GARCH](1)	z-Statistic	EGARCH(1)	z-Statistic			
OMAN MSM															
ROMANBAI	0.021761	1.215898	1.030152	133.7409	-0.296225	-11.21313	0.306802	14.10866	-0.049518	-3.868501	0.927537	67.78998	1.765625	1.789428	0.836401
ROMANIND	-0.076879	-3.318274	0.960473	74.78092	-0.082951	-9.207681	0.109989	9.101454	-0.011768	-1.775612	0.996767	624.5890	1.979384	2.003187	0.741034
ROMANSAI	-0.278179	-13.96259	0.795794	83.76299	-0.210002	-8.140279	0.202647	8.731804	0.013810	1.036793	0.952696	99.74654	1.566582	1.590385	0.784664
QATAR FM															
RQABGL	0.040231	2.534712	1.018401	139.0158	-0.101823	-11.21447	0.129918	10.52137	-0.024144	-2.982344	0.994750	531.9966	1.538966	1.562769	0.880812
RQABIL	0.039837	2.521056	1.018631	139.5783	-0.102232	-11.20536	0.130488	10.51047	-0.024321	-3.009942	0.994798	529.7219	1.536265	1.560069	0.880931
RQABKL	0.042412	2.564098	1.019891	133.3946	-0.101100	-11.25556	0.129431	10.56469	-0.022496	-2.772919	0.995028	552.7661	1.569705	1.593508	0.876792
RQAFNL	0.039103	3.105950	1.020835	170.0834	-0.083596	-11.37849	0.106366	10.44144	-0.031829	-4.893349	0.996700	872.0704	1.034252	1.058055	0.917849
SAUDI TADAWUL															
RTDWAGFD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RTDWBACN	-0.001980	-0.068244	1.049727	82.65241	-0.106979	-15.45235	0.149958	13.98855	-0.012673	-1.724371	0.988670	445.5523	2.714140	2.738486	0.731633
RTDWBANK	-0.153902	-8.058864	0.906719	128.7933	-0.060260	-23.80500	0.081966	26.49638	0.040792	9.238152	0.994181	686.0231	1.883297	1.907705	0.813581
RTDWCMNT	-0.442671	-17.44346	0.672542	77.99029	-0.199007	-16.14256	0.263388	16.98821	0.051359	5.126184	0.937404	161.3411	2.455379	2.479649	0.550218
RTDWEAUT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RTDWHATO	-0.183623	-4.024679	0.890764	65.01644	-0.069515	-14.25367	0.115492	15.10118	0.004864	0.638249	0.993095	837.9256	3.783949	3.808357	0.394048
RTDWIDUS	0.109924	3.934586	1.053096	87.62477	-0.078892	-10.55023	0.105128	10.10872	-0.015566	-1.896179	0.992128	384.9607	2.589544	2.613953	0.741182
RTDWINSR	-0.085255	-1.555214	0.963979	44.92433	0.873756	8.982726	0.351956	8.258935	-0.091265	-3.033269	-0.241343	-2.368305	3.751766	3.776035	0.479945
RTDWMDPB	-0.293298	-6.885452	0.834212	51.18878	-0.062070	-7.573318	0.115592	8.420836	0.050297	4.780131	0.969061	187.8444	3.490468	3.514737	0.469676
RTDWMINV	-0.110844	-3.621362	0.973408	70.67373	-0.193727	-11.08933	0.288795	10.75863	-0.016945	-1.155933	0.939223	93.68272	3.141263	3.165471	0.626152
RTDWPCHM	0.372575	16.24755	1.239499	126.4083	-0.113659	-27.63761	0.166823	29.47865	-0.017492	-3.210404	0.998502	677.6699	2.292346	2.316755	0.811925
RTDWREST	-0.331771	-14.51546	0.805667	93.64611	-0.115059	-12.88561	0.151848	11.74583	-0.007824	-0.868499	0.986507	463.0272	2.488346	2.512569	0.695724
RTDWRETL	-0.378784	-13.38965	0.731194	64.52844	-0.118486	-13.85361	0.159055	13.08994	-0.010666	-1.422864	0.979556	305.3792	2.639743	2.664028	0.621464
RTDWTELE	-0.299891	-11.08810	0.805106	77.17000	-0.233418	-13.47383	0.292193	13.27226	0.016058	1.258026	0.936735	98.98712	2.462851	2.487259	0.679834
RTDWTRNS	-0.203278	-6.666217	0.896201	67.46849	-0.095761	-13.56467	0.144447	12.70842	0.014675	1.631009	0.986055	348.8496	3.136040	3.160264	0.591209

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