



Market liberalization and volatility of returns in emerging markets

The case of Qatar Exchange (QSC)

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Abstract

Purpose – The purpose of this paper is to examine whether stock market liberalization creates excess stock return volatility in the Qatar Exchange (QSC).

Design/methodology/approach – The study utilizes two methods, simple analysis of variance and the EGARCH model with dummy variables.

Findings – Results reveal no change in market volatility following the partial removal of the restrictions on foreign participation. Results suggest, however, that the degree of persistence in volatility is high, which implies that once volatility increases it remains high over a long run. In addition, conditional volatility tends to rise when the absolute value of the standardized residuals was large. While, contrary to what has been found in the literature, the return volatility seems to be symmetric.

Research limitations/implications – The finding of volatility persistence and clustering might imply an inefficient stock market. Therefore, policy makers should emphasize and direct their attention toward increasing the efficiency of the stock market.

Practical implications – Being able to make predictions about financial market volatility is of special importance to investors and policy makers since it makes available to them a measure of risk exposure in their investments and decisions.

Originality/value – This paper provides a contribution to the empirical literature on stock market volatility. It is the only study, to the authors' knowledge, that investigates the issue of QSC liberalization and volatility. The authors believe that QSC has its own unique characteristics, and the results of the study depend mainly on the market's specific conditions, the quality of its financial institutions and the extent of financial liberalization obtained.

Keywords Liberalization, Volatility, Foreign participation, EGARCH, Qatar Exchange, Qatar, Emerging markets

Paper type Research paper

1. Introduction

This paper will focus on the effect liberalization has on the volatility of returns in the Qatar Exchange (QSC). The QSC, like most emerging markets in the world, has undergone a major liberalization in its financial market during the year 2005 by removing the restrictions on foreign participation in its market. Those directions were started by allowing the citizens of the Gulf Cooperation Council countries to own a maximum of 25 percent of the shares of listed companies in the service and industrial sectors.

JEL classification – G11, G12, G13



At the same time, non-Qatari residents were allowed limited access to trade in the shares of a few listed companies. On 3 April 2005, a law was issued amending some provisions of Law Number 13 of the year 2000 regulating foreign investment in the economic activities. The amendment allowed non-Qatari's to invest in all companies listed at the QSC at a rate not exceeding 25 percent of the traded shares. It was expected that such a decision would lead to an increase in the flow of investments from inside and outside Qatar. It was also believed that the decision will introduce more liquidity to the QSC with the entry of resident expatriates to the equity market. Moreover, it was hoped that the decision would improve market efficiency and the performance of the stock market, and lead to the increase of share prices – which were considered low before the implementation of the decision. The removal of restrictions on foreign participation in the market was blamed by many to be the main reason for increasing market volatility.

Stock market volatility has become a subject of mutual concern to investors, policy makers and financial intermediaries and is considered of great importance, especially in emerging economies. Many researchers and policymakers have acknowledged the process of opening stock markets, since such exchange provide many potential benefits toward financial integration with the rest of the world. However, the financial crisis experienced by East Asian countries, Mexico, Brazil and Russia, among others, indicated the risk involved of liberalizing foreign indirect investment. Foreign investors are concerned mainly with short term profits, and therefore, they possess speculative behavior (Öniş and Aysan, 2000).

Previous studies on the effect of liberalization on stock market volatility have provided conflicting results. For example, Bekaert and Harvey (1997) and Levine and Zervos (1998) among others find that liberalization increases stock return volatility in emerging markets, other researchers (Kim and Signal, 2000; Kassimatis, 2002; Cunado *et al.*, 2006), find that liberalization decreases volatility, while DeSantis and Imrohorglu (1997) noticed no change in volatility. Therefore, the realization of a particular situation depends mainly on the market's specific conditions, the quality of its financial institutions and the extent of financial liberalization obtained (Jauasiroya, 2005; Bellalah and Nguyen, 2008).

Several authors have found that when regime changes are considered, the highly persistent ARCH/GARCH effects are reduced. Susmel (2000) showed evidence for reduced switching volatility in the USA, Canada, the UK and Japan using the switching ARCH (SWARCH) model formerly developed by Hamilton and Susmel (1994). Malik *et al.* (2005) used the ICSS algorithm to detect the regime changes and show a decrease in the volatility for the Canadian stock returns after these changes are considered.

There is no doubt that stock price volatility adversely affects individual earnings and the economy as a whole, while financial stability allows financial institutions and markets to mobilize savings, provide liquidity and allocate investments. In addition, it is expected that well functioning markets and sound policies will direct resources to their most productive activities and facilitate efficient transmission of monetary policy initiatives. Financial economists lately found that the degree of stock market volatility can help forecasters predict the conduit of the growth in an economy.

The study of volatility is important for different parties and for different reasons. It is of concern to policy makers, investors and other financial market participants as well as researchers. Previous studies show that volatility discourages investors to enter the market (Poshakwade, 1966; Raju and Ghosh, 2004). In addition, volatility represents

a serious concern for policy makers because financial instability in that market may create uncertainty which can negatively affect the growth potentials. Furthermore, stock prices and return volatility constrain economic growth and performance through its effect on consumer spending. For example, Garner (1988) finds that the stock market crash in 1987 brought about a reduction in consumer spending in the USA. Forecasting the financial market volatility is of crucial importance to investors and other economic agents as it makes available to them a measure of risk exposure in their investments (Poon and Granger, 2003). Furthermore, we can perceive that the pricing of derivatives is a function of volatility (Joshi and Pandya, 2008).

The purpose of this paper is to examine whether stock market liberalization creates excess stock return volatility in QSC during the period 1 February 2002 to 4 May 2008. The paper specifies a dummy variable relates to the regime change (i.e. the removal of official restrictions on foreign participation), and reexamines EGARCH model to see how regime change alters the volatility structure of the market. Additional dummy variable is also implemented to examine if the results are sensitive to the change in price limits.

The paper is organized so that Section 2 will introduce the institutional characteristics of the QSC. Section 3 will outline the data and the methodology used. Results will be discussed in Section 4, and the final section will conclude the paper.

2. Institutional characteristics of Qatar Exchange (QSC)

Qatar Exchange (QSC) is the sole official stock market in Qatar. It was established in 1995 and officially opened and started its operations on 26 May 1997. The main objectives included developing the market structure as to serve the economic development plans and enhancing and organizing the procedures followed in the trading of stocks in the country. Another important target of the market was the taking part in efforts made to improve the investment climate in the state of Qatar, with the aim of attracting more foreign investment to the country. A final objective was that of helping to amend the legislation as to allow non-Qatari's to invest in the local stock market.

From the time of its inception to date the QSC has witnessed many structural and institutional changes directed towards promoting its development and efficiency. Securities trading were manual at the trading halls and the clearing and settlement department. The transformation into a Central Registration System was implemented in August 1998. Trading became fully electronic on 11 March 2002. The number of listed companies has increased from 17 in 1997 to 42 companies by the end of the first quarter of 2008. These companies cover four sectors: banking (nine), insurance (five), industrial (seven) and the service sector (21). At the end of 2007, the total market capitalization had reached QR 347.7 billion (US\$95 billion), a remarkable increase of 3,554 percent compared to QR 9.4 (US\$2.6) billion in 1997. That was attributed mainly to the increase in the number of listed companies and to the increase in share prices of the listed companies. Trading of shares is done through seven brokerage firms. The average daily volume of shares traded increased by 10,400 percent between 2000 and 2007 to reach 13.5 million shares and the average daily number of executed transactions increased from 50 to 7,190 during the same period.

The QSC Price Index was launched with the base year of 1997-1998, with a base value of 100, and was modified in 2002 to the base value of 1,000. The price index comprises 20 listed companies covering all economic sectors and it is a market value weighted average index. These companies are selected on the basis of market capitalization,

volume of turnover and the strength of the companies' fundamentals. Over the years the QSC has had its share of crisis engendered by excessive speculation, resulting in excessive volatility. It has been observed that the QSC general share price index tripled between 2002 and 2004 and went up by almost 50 percent in 2005, and dropped by almost the same percentage in 2006. At the end of 2007, the QSC Price Index had increased by 34.3 percent compared to 2006. And, the price index reached its lowest level of 5,944 points in April 2007 before it climbed up again. In terms of the sectorial index, it appears that the banking sector has witnessed the largest change over the period 2002-2007, followed by the insurance sector.

3. Data and methodology

The data used in this paper are from the daily series of Qatar Exchange's value weighted price index over the period from 1 February 2002 to 4 May 2008. A total of 1,557 daily observations were obtained. In addition, we collected data on stock price indexes for the four major sectors representing the market. These are the financial, industrial, services and insurance sectors.

The QSC has adopted different price limits since its establishment. It started with 5 percent up and down and in July 2006 the QSC changed the limits to 10 percent up and down.

The rate of return of the stock market index is computed on the basis of the daily indexes as follows:

$$R_t = \text{Log} \left(\frac{SPI_t}{SPI_{t-1}} \right) \quad (1)$$

where:

R_t is the rate of return on the index on day t .

SPI_t is the natural logarithm of stock price index on day t .

SPI_{t-1} is the natural logarithm of stock price on the $(t - 1)$ day.

To test our hypothesis that the removal of the restrictions on foreign participation increased the volatility of the QSC, we first do simple analysis of variance, where we test the null hypothesis of variance equality between the two sub-periods before and after the removal of restrictions on foreign participation.

Second, we utilize the EGARCH model of Nelson (1991) to test the hypothesis that the return rate volatility is highly persistent which means that, periods of high volatility are followed by periods of high volatility and periods of low volatility are followed by periods of low volatility. This implies that volatility could be used as a predictor of volatility in the next periods. This model has been also proposed to incorporate the leverage effect. The conditional variance in this model depends on both the sign and the magnitude of returns, and therefore, is asymmetric in its response to positive and negative returns (GARCH technique was also implemented, however, the results indicate the unsuitability of the technique for the data under study).

Stochastic volatility models have been proposed and used extensively to estimate and forecast asset return volatility. Previous research found that in order to properly estimate volatility, we need to account for the persistence of the volatility and to capture the fast mean reverting volatility (Engle and Lee, 1992; Tauchen, 2004). Mean reverting

volatility means that there is a normal level of volatility and eventually volatility will return to that level.

The EGARCH model, unlike the linear GARCH models, uses logged conditional variance to relax the positiveness constraint of model coefficients and easily interprets the persistence of shocks as conditional variance. The exponential GARCH (1,1) is specified as follows:

$$R_t = \alpha_0 + \alpha_1 R_{t-1} + \varepsilon_t \tag{2}$$

where $\varepsilon_t \sim N(0, \sigma_t^2)$:

$$\log(\sigma_t^2) = \alpha + \beta \log(\sigma_{t-1}^2) + \gamma \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| + \delta \frac{\varepsilon_{t-1}}{\sigma_{t-1}} + \mu D \tag{3}$$

where, α , β , γ , δ and μ are constant parameters. $\log(\sigma_t^2)$ is the one period ahead volatility forecast which implies an exponential leverage effect rather than quadratic. In addition, the forecast of conditional variance is guaranteed to be positive. α is the mean level, $\log(\sigma_{t-1}^2)$ is the past period variance. EGARCH model allows for leverage effect. If δ is negative, leverage effect exists. That is an unexpected drop in price (bad news) increases predictable volatility more than an unexpected increase in price (good news) of similar magnitude. If γ is positive, then the conditional volatility tends to rise when the absolute value of the standardized residuals is larger.

To capture the effect of the institutional change (i.e. the removal of restrictions on foreign participation in the stock market) on the volatility of the QSC market, we added a dummy variable to the conditional variance equation. The dummy variable D takes a value of zero for the period before the removal of restrictions, and a value of one to the period after.

4. Empirical results

Before modeling the stock market return volatility, we performed diagnostic statistical tests to check the characteristics of the return series under investigation. The summary of the descriptive statistics is shown in Table I.

During this period, the mean daily return for the whole index was slightly positive (0.12 percent), however, not significantly different from zero. The maximum return was around 6 percent and a minimum was around -8 percent. The standard deviation calculated from daily returns was 1.35 percent. The data were leptokurtic (kurtosis was 5.85). The normality hypothesis for the standardized residuals of the estimated model was rejected at the 99 percent level of confidence according to the Jarque-Bera statistic (Table I).

Statistics	Composite	Industry	Insurance	Services	Bank
Mean	0.0013	0.001	0.0011	0.001	0.0015
Maximum	0.060	0.081	0.075	0.086	0.089
Minimum	-0.08	-0.09	-0.099	-0.08	-0.067
SD	0.0135	0.017	0.017	0.014	0.015
Skewness	-0.07	0.159	-0.46	-0.11	-0.235
Kurtosis	5.85	6.11	8.002	6.05	5.92
Jarque-Bera	534.9	643	1,098	609	574.9
Probability	0.0000	000	0000	0000	0.0000

Table I.
Descriptive statistics of
QSC composite index
return and different
sector indices (2002-2008)

To apply EGARCH model, we should accept the hypothesis of volatility clustering in relation to the returns series under investigation. The computation of the kurtosis or/and the skewness, helps provide relevant empirical evidence about the presence of volatility clustering. The presence of leptokurtic return series suggests the presence of volatility clustering on the data. From our summary statistics (Table I), our return series data proved to be leptokurtic.

After the identification of temporal dependency, the conditional volatility of the QSC index of the time series of daily returns can be modeled by the application of EGARCH (1,1) model.

Moreover, the results on the Augmented Dickey-Fuller (ADF) test statistics, which is used to check for stationarity of the return index shows the results to be stationary. Results were not different when applied to the indexes representing the different sectors of the market (Table II).

4.1 Analysis of variance

The results of the analysis of variance suggest an increase of the mean level of the volatility for the general return series of QSC after foreigners were allowed to trade in the market after 4 April 2005. We divided the sample period into two sub-periods: the first period (1 February 2002 until 3 April 2005) before foreigners was allowed to trade on 4 April 2005. The second period spans from 4 April 2005 until 4 May 2008. Table III shows the results of the different statistical tests of equality of variance. All the different tests reject the null hypothesis of equal variances over the two sub-periods under investigation.

4.2 Estimation of EGARCH model

Table IV (panel A) presents the results of EGARCH (1,1) model with a dummy variable reflecting the removal of trade restrictions. The term of conditional volatility, the persistence parameter β is 0.852. This result suggests that the degree of persistence in volatility is high which indicates that once volatility increases it is likely to remain high over many periods. The positive and significant γ confirm the presence of volatility clustering. Therefore, conditional volatility tends to rise when the absolute value of the standardized residuals is large. The coefficient δ is insignificant implies symmetry in return volatility, that is volatility during booms is not different than volatility during recession. These results are not in line with the previous research done in developed markets. This might be due to the lack of liquidity and sophisticated investors

	<i>t</i> -statistic	<i>p</i> -value ^a
<i>ADF test statistic</i>		
General index	-26.4	0.00
Industry	-29.94	0.00
Insurance	-33.09	0.00
Services	-26.9	0.00
Banking	-5.118	0.00
Test critical values: 1 percent level	-3.434	

Notes: ^aOne-sided *p*-values; null hypothesis: indexes rate of return has a unit root; ADF test includes a constant term

Table II.
Unit root test of QSC
daily stock return index

<i>Statistics</i>	<i>Before 3 April 2005</i>	<i>After 3 April 2005</i>
Mean	0.0025	0.00018
Max.	0.060	0.055
Min.	-0.042	-0.08
Std	0.011	0.016
Skew.	0.69	-0.17
Kurt.	6.81	4.70
JB	544.7	96.69
No.	797	778
<i>Hypothesis variance before = variance after</i>		
<i>Test</i>	<i>Value</i>	<i>Significance</i>
F-test	2.25	0000
Siegel	7.72	0000
Bartlett	125.83	0000
Levene	67.41	0000

Table III.
Summary statistics and equality of variance before and after foreigners are allowed to trade in QSC

Notes: Analysis of the difference in variance between the two periods were done for the indexes based on industry classification, results are the same in terms of significance; therefore, to preserve space we do not show these results

	α	β	γ	δ	μ	Z
<i>A – whole sample with dummy variable reflects foreign participation in QSCQ</i>						
Coefficient	-1.91	0.852	0.630	0.0579	2.292	
SE	0.397	0.037	0.090	0.0486	2.7449	
Z-stat.	-4.815	22.849	6.996	1.193	0.835	
Prob.	0.0000	0.0000	0.0000	0.233	0.40	
Rsqr	0.226					
DW	1.96					
F	28.068					
<i>B – whole sample with dummy variables of foreign ownership and a dummy variable reflect the price limit set by the exchange</i>						
Coefficient	-2.776	0.769	0.6166	0.07127	2.7113	-0.5870
SE	0.765	0.072	0.1213	0.06959	3.5847	4.006
Z-stat.	-3.629	10.749	5.081	1.0242	0.7564	-0.147
Prob.	0.0000	0.0000	0.0000	0.3057	0.449	0.884
Rsqr	0.23					
DW	1.86					
F	17.99					

Table IV.
Results of the GARCH model specification with dummy variables

in the market. Finally the coefficient on the dummy variable is insignificant, which implies that liberalizing the QSC did not lead to an increase in market volatility.

During the period of the study, the stock market authorities have undertaken some measures to reduce market volatility and to protect small investors from the fluctuation in stock prices. One of these measures was changing price limits. Price limit is a market mechanism that specifies the upward or downward price movements in which prices are allowed to move within a single day. Price limits are implemented in most stock markets around the world, and considered effective in setting bounds on volatility especially in emerging markets. It also becomes common for stock markets around the world whose use was increased after October 1987 (Kim and Yang, 2004). The usefulness of price limit

mechanism relate to the argument that in times of high uncertainty in the market, the price limits stop price resolution process and give time to investors to digest new information and evaluate their investment decision. In addition to that it has been argued that in days of high market uncertainty price limits defines the bounds of price movement and so they create artificial bounds for volatility (Ma *et al.*, 1989).

To see whether the change in the price limits affects the mean of the conditional volatility, we added additional dummy variables. Dummy variable 2 reflects the period where the price limit was 10 percent. It takes the value 1 after 7 July 2006 and 0 otherwise. The results of the EGARCH model with dummy variable on price limit are shown in panel B of Table IV.

All the coefficients in the model are significant at a 95 percent level. The coefficient on the dummy variable related to foreign participation is still insignificant. The coefficient on the dummy variable 2, which reflects the period following the change in price limit is also insignificant reflecting no effect on in the mean of the conditional volatility. From a policy perspective, it seems that there was no justifiable reason to increase the price limit to 10 percent.

5. Conclusion

In general, previous research find that while financial liberalization in developed stock markets tends to reduce volatility, volatility tends to increase for emerging markets.

It is frequently contended that the removal of the restriction on foreign participation in the QSC, in the middle of 2005, was the cause of the increase in its volatility. Therefore, this study aimed to help clarify this issue. We studied the effect of the removal of restriction on foreign participation in the QSC on the mean level and the volatility structure of the QSC. To proceed with our analysis, daily data on stock price index was collected from the QSC. Analysis of the data revealed the suitability of using the EGARCH (1,1) type model. Before using the EGARCH technique a simple analysis of variance with regard to the two sub-periods, were conducted. Results indicated an increase in the level of volatility after the removal of restrictions on foreigners participation.

Using the EGARCH model with a dummy variable, however, revealed no significant change in stock market conditional volatility. Results suggest that the degree of persistence in volatility is high, which implied that once volatility increased it remained high over a long run. In addition, conditional volatility tended to rise when the absolute value of the standardized residuals was large. While, contrary to what has been found in the literature, the return volatility seemed to be symmetric.

To check for robustness, we replicated the analysis by taking into account the effect of price limits on our results. The results did not reveal any change in the significance of the coefficients. The coefficient on the dummy variable related to time limit was found to be insignificant. Our results therefore, suggest that the QSC policy of changing price limits was not based on need, since the change in the price limit did affect volatility.

Future research should consider selecting shorter time intervals. For example, using intraday trading data to measure volatility might provide more accurate results.

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Further reading

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