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Efficiency of Lebanese and Arab Gulf Financial Markets

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Abstract

Various studies have been made to test the efficiency of market in Lebanon and Arab Gulf States (AGS) theoretically and empirically, focusing mainly on building a model using the conventional finance. The purpose of this paper is to test the efficiency of AGS financial markets as well as the Lebanese one based on stationary method; furthermore it explores the reasons behind the non-efficiency in case it exists. However, to realize this objective, this paper overviews the different methods behind testing efficiency in order to choose and use the most common one, furthermore it studies also the Volatility using ARCH and GARCH and the Financial Characteristics behind each market, which leads to either enhance or reduce market efficiency so far. Findings prove that Lebanese, Abu Dhabi, Qatar, and Kuwait markets tend to be efficient in its weak form whereas Dubai, Saudi Arabia and Amman markets are non-efficient based on the average monthly data series and financial characteristics of the market over a specific period of time.

Keywords: Weak Form Market Efficiency, Volatility, Market Capitalization, Traded Volume, Unit Root Test, Random Walk Theory.

1. Introduction

Market Efficiency has been linked to many features in different domains. However, finance has been especially interested in “Informational efficiency”. Where market efficiency is considered as the moderate concept of perfect market, that’s to say rational way of thinking is widely spread between investors during investment decision process leading to efficiency in the financial markets.

Fama (1965) the founder of market efficiency theory, defines the efficient market as being a market where “prices fully reflect all known information in a way that even uninformed investors exchanging a diversified portfolio at the tableau of given prices by the market will obtain a rate of return as generous as that achieved by the experts”. In other terms, a market is efficient when the intrinsic value of the stocks reveals correctly the information. Fama’s definition of market efficiency has been largely supported by theoreticians (Malkiel, 1992).

Three main categories of the market can be considered (weak form efficiency, Semi strong form efficiency where all the publically information is considered in addition to some insider information, and the strong form efficiency where all public and private information are revealed in stock prices). Weak form efficiency market is the most important form followed by researchers, as the historical data and path of the stock is the main key behind predicting its future prices (Fama, 1970). Samuelson (1965) have stated that ,when future prices of securities in the market are being randomly assigned and not based on the historical trend of the stocks; the market is efficient in its weak form. In other terms, the market is efficient in the weak form when prices follow a random Walk process.

A large body of research, using econometric test including unit root analysis, and variance ratio frame work, suggests that Developed markets are being efficient in weak form (Choudhry, 1994; Chan and Pan, 1997; linowski, 2005; Maria, 2007; shiller and radikoko, 2014); whereas emerging markets tend to be non- efficient (Pant and Bishnoi, 2002; Smith, 2007; Vigg et al, 2008).

However, when market is efficient it usually attracts various investors to channel big amount of funds into numerous profitable projects enhancing economic growth. As results, efficiency is positively related to economic growth (King and Levine,1993; Pagano,1993; loayza and beck,2000;Equakun,2005).On the other hand, when markets tends to be “inefficient”, speculators are attracted to it ,as a result market fluctuations control all over, hence volatility increases and financial bubble is constituted (Ewah et al,2009).

The purpose of this paper is to investigate the efficiency of Arab Gulf State financial markets as well as Lebanese financial market .Furthermore this research investigates the financial characteristics for each market impacting efficiency, to realize this objective this paper overviews the main methods for testing efficiency, in addition to that this paper studies the Volatility and Financial Characteristics behind each market impacting its efficiency. The paper is organized as follows: Section 2 presents the related literature background. Section 3 overviews Market efficiency and the random walk model. Section 4 investigates the available methods for testing efficiency. Section 5 analyzes market Volatility. Section 6 presents efficiency test results and results analyses for Lebanese and Arab Gulf States financial markets, ending up with general conclusion in section 7.

2. Market efficiency in the literature

Wide researches analyze the market efficiency and its relation to economic growth for developed and emerging countries. However Lebanese and AGS financial market studies are limited as a result this study aims to bridge the presented gap.

Market efficiency has been examined mainly by the mid of 1970's by the famous Eugene Fama, who explained that capital market efficiency, means that the stock prices reflects fully and correctly all relevant information which implies that stock prices are responding to all the information set coming from sudden economic and political conditions by adjusting prices. Otherwise, many developed researches have appeared. Chan, Gup and Pan (1997) tested the weak form market efficiency for numerous international stock indices, collecting 384 monthly observations from 1962-1992. Using serial correlation and Run tests, they proved that weak form market efficiency exists clearly in all the studied markets. However, Choudhry (1994) has tended to analyze the weak form efficiency market for seven members of the OECD organization using co-integration test for monthly stock indices from 1953-1989. Results have confirmed the presence of efficiency in these seven countries. However, Portuguese stock markets has been analyzed over the period of 1993-2008 using serial correlation test for daily, weekly and monthly returns, where Portuguese stock market has been moving toward random walk (Maria,2007).

Subsequently, large literature has been considered on the other side for emerging markets based on various theoretical and empirical linkages. Mohammad Omran (2006) and Suzanne v. Farrar (2006) have studied the efficiency of Egypt, Jordan, morocco, turkey markets using variance ratio and auto correlation. Their research provides a limited support for week form efficiency in Middle Eastern emerging markets. However, Smith (2007) has tested the weak form market efficiency for five stocks in the middle east, using multiple variance ratio test, where it appeared that Lebanese and Jordan stock markets tends to be efficient in its weak form and follows random

walk ; whereas Kuwait and Oman doesn't appear to follow the random walk hypothesis. Nevertheless, Rengasamy Elango and Mohamad Hussein (2007) have studied the efficiency in Dubai, Saudi Arabia, Abu Dhabi, Qatar, Kuwait, Oman and Bahrein covering the period 2001- 2006 by utilizing the run test, KS test, auto-correlation in order to analyze the daily stock index return of these markets where large variations in return has appeared over the assigned period, indicating that the markets are not efficient in the weak form. furthermore; Batool Asiri (2008) and Rakain Gupta (2007) studies the presence of weak form efficiency in the Indian financial market over the period 1990-2006 based on monthly Data series ,using Autocorrelation and unit root test (phillips-perron, ADF and KPSS) where it appeared that the Indian market is not a weak form efficient one. However, obtaining different results for the same market in different studies doesn't mean that there exists contradiction in findings, but on the other side this difference may be due to the type of the used data over a certain period of time while applying different tests.

Unlike most of the existing literature that have been studying the efficiency in the middle eastern markets; this paper goes through an overview to investigate the different methods for testing efficiency in Lebanon and AGS financial markets in order to use the most convenient one to our study; However Volatility and financial characteristics of these markets will be taken into account in order to support the results obtained. All tests are carried out with E-views.

3. Market Efficiency and random walk Model

The term of random walk model has appeared in the beginning by Jules Regnault, (1863) and has begun to be extensively investigated and tested by Louis Bachelier, (1964). However, the period around 1990's new thoughts have been considered regarding behavioral Finance that was known as being the modern theory, where it started contradicting the Random walk theory, by focusing on the impacts of investors' behaviors. Some of the authors that denied the random walk in their articles were (Lo and MacKinley, 1999; Lo, Mamaynski and Wang, 2000). One from the most important models for testing the behaviors of the stock prices was the "Random walk model"; as TheRandomwalkhypothesisconsiders that futurechangesofprices cannot beanticipated. However, an increase of prices in a particular day does not mean an increase or diminish within the day after. Moreover in a random walk Market the series of stock market prices changes are independent, and the efficiency idea is based mainly on no excessive profit ; that means the series of stock market prices changes are independent, thus Historical data of prices can't be used to predict the future (Brealey et al, 2005).

In 2004, Cuthbertson and Nietzsche have tended to define random walk with a drift (δ) where the individual Stochastic series X_t behaves as:

$$X_t = \delta + X_{t-1} + \varepsilon_{t+1} / \varepsilon_{t+1} \sim iid(0, \sigma_\varepsilon^2) \quad (1)$$

Where the "Drift" can be considered as the weighted average of the probabilities of each price of the stock.

4. Methods for testing Market Efficiency

From the definition of efficiency, various statistical tests can be done in order to know whether Lebanese and Arab Gulf state markets are considered efficient or not, by analyzing the average monthly database regarding stock market indices.

A. Testing efficiency using Random Walk test

Cooray and Wiskremasingue (2005) used the unit root test in order to test for weak form efficiency in different countries (India, Sri-lanka, Bangladesh) where they found that these markets are efficient. Moreover, Smith (2006) has used the same method to to test for efficiency in its weak form through European countries, where it has recorded a great support for Random walk.

The most famous Random walk tests for Stationarity in the time series data are:

- Augmented Dickey fuller-ADF, Phillips-Perron test with $Y_t = \mu + \alpha t - 1 + \epsilon_t$ (2) and Zivot- Andrews tests were used in order to test for the same null hypothesis which is:
H0: Unit root is presented in the Data series understudy.
- Whereas KPSS test $Y_t = \xi_t + r_t + \epsilon_t$ where $r_t = r_{t-1} + u_t$ (3) tests for the null hypothesis which indicates that :
H0: No unit root or Stationarity in the time series understudy.

The results are decided based on the “Rule of thumb” that’s to say if the calculated value statistic is greater than the critical value ; Null hypothesis will be rejected thus stationarity exists for ADF and PP tests and vice versa for KPSS.

B. Testing efficiency using Serial correlation (auto correlation)

Serial Correlation test has been used in order to examine the linear dependency of lagged price changes of returns especially in USA (jarrett, 2008). However, Butter and Malaikhe (1992) have adopted serial correlation test for Kuwait and Saudi markets, where it appeared that weak form efficiency is not supported in these markets. Allahyani (2009) used also serial correlation and Run test to examine the weak form efficiency for Tehran stock exchange (TSE) using weekly data over the period 1999-2005, where no existence for weak form efficiency market appeared.

Serial correlation has been one from the most used Statistical tests to explore weak form efficiency of the market, where it tends to measure the dependence of a variable on its past values, that’s to say measuring the relationship between the current stock price and its previous value; Statistically, the hypothesis of weak form efficiency should be rejected if stock returns (price changes) are serially correlated (r_k is significantly different from zero) (Taylor, 2014).

$$\rho_k = \frac{\sum_{t=1}^n (r_t - \bar{r})(r_{t-k} - \bar{r})}{\sum_{t=1}^n (r_t - \bar{r})^2} \quad (4)$$

Where r_k is the serial correlation coefficient of daily returns of lag k ; n is the number of observations; r_t is the stock return over period t ; r_{t-k} is the stock return over period $t-k$; \bar{r} is the mean of stock returns, and k is the lag of the period. r_t is measured as follows:

$$r_t = \frac{p_t - p_{t-1}}{p_{t-1}} = \ln p_t - \ln p_{t-1} \quad (5)$$

Where, r_t is the index of stock market in the period t , and r_{t-1} is the index of stock market in the period $t-1$. This test is frequently performed to test the joint hypothesis that all the r_k , up to certain lags, are simultaneously equal to zero, instead of testing the statistical significance of any individual autocorrelation coefficient (Gujarati, 2003).

C. Testing efficiency using Co-integration

Co-integration is an econometric technique for testing the correlation between non-stationary time series variables. If two or more series are themselves non-stationary, but a linear combination of them is stationary, then the series are said to be co-integrated and a long run relationship exists, thus weak form market efficiency appears to take place and prices in turn reflects fully and correctly the available information which leads to an increase in the economic growth so far.

Two time series X_t and Y_t are co integrated when there exists a number α_1 in the linear equation:

$$y_t = \alpha_1 x_t + v_t \quad (6) \quad \text{such that } V_t \text{ is a stationary process.}$$

“Linear relationships involving integrated nonstationary time series are meaningful only if the time series are co integrated. There are various definitions of co integration; as originally proposed by Engle and Granger. A co integrating relationship between two or more time series each having unit roots (I(1)) is defined to exist if there is a linear combination that is stationary, i.e., I(0)” (Edward Herranz, 2017).

D. Testing efficiency using Run Test

“The run test, as a non-parametric test used to detect the frequency of changes in the direction of a time series. Runs test is a strong test for randomness in examining serial dependence in asset price movements.

Runs are defined as the number of sequences of consecutive positive and non-positive (negative or zero) returns. When the expected number of runs is significantly different from the observed number of runs, the test rejects the null hypothesis that returns are random (Gu and Finnerty, 2002). To perform this test, the number of actual runs (R) is compared with the expected runs (m)

$$m = \frac{N(N+1) - \sum_{i=1}^3 n_i^2}{N} \quad (7)$$

Where, N is the number of observations (daily returns), i is the sign of +, -, or 0, and n_i is the number of observations in each run.

Then, the standard normal Z-statistic is used to test whether the actual number of runs is consistent with the random walk hypothesis which means that weak form efficient market exists. The standard normal Z- statistic is calculated as follows (Taylor, 2014):

$$Z = \frac{R - m \pm 0.5}{\sigma_m} \sim N(0,1) \quad (8)$$

“Where R is the actual number of runs, and 0.5 is continuity adjustment. When the actual number of runs exceed (fall below) the expected runs, the result will be a positive (negative) Z value. A positive (negative) Z value indicates negative (positive) serial correlation in the return series” (Abraham, Seyyed and Alsakran, 2002).

E. Chosen Method

This paper tests for weak form market efficiency in Lebanon and Arab Gulf States by adopting the most commonly and famous method, which is the “Random Walk model” including the ADF, Phillips-Perron and KPSS tests to investigate the presence or the absence for a unit root in the assigned data series.

5. Volatility measure and formation

After testing for Stationarity of return series, estimating equation 1 and 2, regarding the Volatility of the market would be necessary. Volatility can be defined as a statistical measure of the dispersion of returns for a given market index or security. It can be measured by variance or standard deviation between returns from that same market index or security. When the volatility is higher, the security becomes riskier. A high volatility market is a market where prices tend to change a lot over relatively a short time. The volatility is associated with the risk, uncertainty and unexpected. In other terms, volatility can be referred to the amount of uncertainty or risk about the size of changes in the value of security. It is considered as the difference between market price and economic

fundamentals that rationally justify the value of the assets concerned. The beta is a measure of volatility of a portfolio or a security in comparison to the market as a whole.

Volatility measure of index series is based on the returns of the data ($R_t = \log p_t - \log p_{t-1}$). Generalized Autoregressive Conditional Heteroscedasticity (GARCH) formulation which has been first suggested by Bollersley (1986) and has become popular, specially, due to its explanatory power for dependence in volatility tests if the variance of returns is stationary and whether index eventually return back to the mean value. It tests then an equation specification for the mean of the return series (9) and an equation for the conditional variance (10) of the returns:

$$R_t = \log p_t - \log p_{t-1} = c + \varepsilon_t \quad (9)$$

$$\sigma^2_t = \omega + \alpha \varepsilon^2_{t-1} + \beta \sigma^2_{t-1} \quad (10)$$

Where $\varepsilon_t \sim N(0, \sigma^2_t)$ and $\sigma^2_t = E(\varepsilon^2_t)$.

This specification is often interpreted in a financial context, when an agent trader predicts variance of this period by forming a weighted average of a long term average (the constant), the forecasted variance from last period (the ARCH term: α), and information about volatility observed in the previous period (the GARCH term: β). If the asset return was unexpectedly large in either the upward or downward direction, then the trader will increase the estimate of the variance for the next period.

6. Data Background

6.1. Data Source

The Data used in the proceeding part for the empirical study has been based on "Average monthly market indices" for Lebanon, Dubai, Abu Dhabi, Saudi Arabia, Kuwait, Amman and Qatar covering different periods of time, assigned exclusively for each country through its section. However the used data has been collected from the market's site of each one, in addition for "Gulfbase.com".

A. Lebanese Financial market characteristics

"Beirut stock Exchange (BSE) is the second oldest stock market in the region, as it was established in 1920 by a decree of French commissioner. Initially, trading was restricted to gold and foreign currencies. In the early 30s, trading was expanded to encompass shares of private companies set up under the French mandate to operate and manage some public services and sectors (railways, communications, post...). It was then tantamount to privatization. Some of these corporate securities and shares were listed on both BSE and Bourse de Paris at the same time."

However, "Beirut Stock Exchange incorporates three types of markets:

- The official market: For companies incorporated for more than three years with a capital equivalent to USD three million at least, having distributed a minimum of 25 per cent of their share capital to the public and such percentage (25 per cent) being held by 50 shareholders at least.
- The junior market: For newly established companies with a capital equivalent to USD one million at least, having distributed a minimum of 25 per cent of their share capital to the public and such percentage (25 per cent) being held by 50 shareholders at least.
- Over the Counter market: For Lebanese companies with a capital equivalent to USD 100.000 at least. The shares of such companies are traded without being listed on the Beirut Stock Exchange".

Time series Data was collected from Beirut stock exchange (bse.com.lb) regarding average monthly market index over the period January 1997 till December 2017, testing for market efficiency and volatility

A.1. Stationarity Test Results

The presence of a unit root in the Lebanese market Index series is confirmed by the Augmented Dickey Fuller (ADF); Phillips-Perron and KPSS tests. The results of these tests are presented in table 1 indicating that taking the first differences, the Lebanese market Index series become stationary. In other terms, the series is integrated of order 1 (I (1)). The return series R_t is therefore stationary since $p < 5\%$.

Table 1: ADF, Phillips-Perron and KPSS test results for Lebanese monthly market Index series in log, from January 1997, to December 2017.

ADF test	Log (p)
Probability Calculated ADF in levels	0.1437
Probability Calculated ADF in first differences	0.0000
Phillips-Perron test	Log (p)
Probability in level	0.1339
Probability in first differences	0.0000
KPSS test	Log (p)
Probability in level	0.201
Probability in first differences	0.07

Source: Calculated by the author using Eviews.

A.2. Volatility test results and Financial Characteristics

Equation (11) represents GARCH (1, 1) model estimations for equation (10). The values in parentheses represent the coefficient probabilities.

$$\sigma_t^2 = 4.56E+12 + 0.1900\epsilon^2_{t-1} + 0.37416 \sigma^2_{t-1} \quad (11)$$

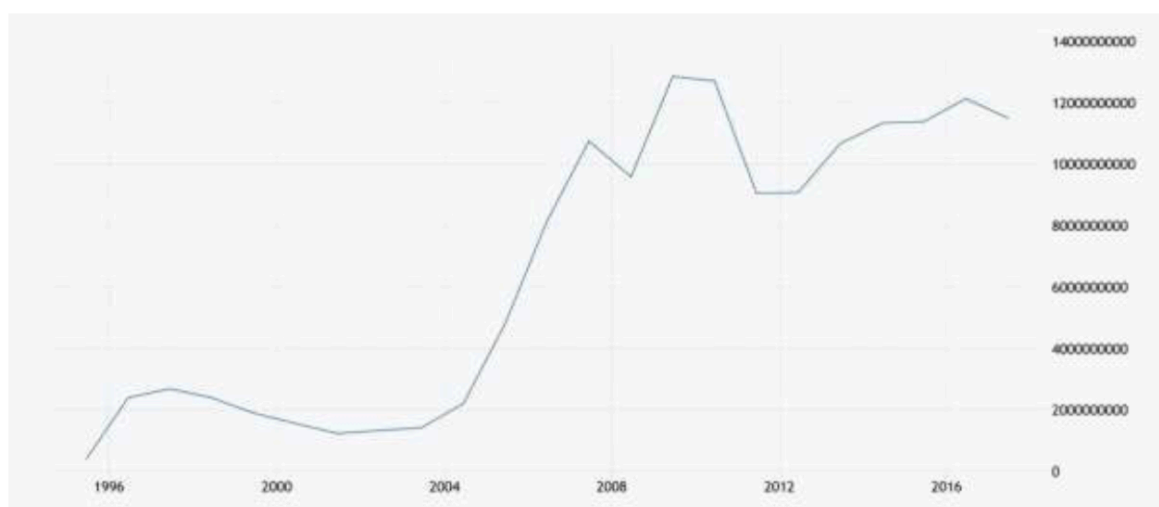
(0.606) (0.649) (0.8013)

According to probability values in equation (11), the ARCH and GARCH coefficients (α and β) are not significant since their respective probability is greater than 5%. The sum of ARCH and GARCH ($\alpha + \beta$) is 0.564, indicating that the Lebanese market volatility shocks are respectively low; however to insure more this point of view, studying the Lebanese market size in addition to the traded volume would be necessary.

A.3 Results Analyses

Graph 1 represent the Market Capitalization of the Lebanese Financial market from 1996 till 2018 .However, researches relate the persistence of low volatility and efficiency in the financial market (Andrew, 1997).

Graph 1: Beirut Stock exchange average yearly market capitalization (equities and funds) from 1996 to 2018.



Source: Calculated by the author based on Data for average yearly market capitalization collected from WORLD BANK/TRADINGECONOMICS.COM

Graph 1 shows that the Lebanese market capitalization Index acquires an upward trend; as there were no fluctuations from 1996 till 2018. However, a minimum of 1,000,000,000 USD recorded in 1996 to reach a peak of 13,000,000,000 USD in 2010 then it dropped down to reach almost 11,000,000,000 USD in 2018. Moreover, the total market capitalization has recorded 24.44% of the GDP lately according to BSE financial report, as it may be considered as a small size market; Furthermore, to investigate more in the Lebanese stock market, we can notice that the stocks traded represent a total value only 1.82% of the GDP, which is a very low percentage (BSE.com.lb). Therefore, the market efficiency of the Lebanese market is affected by the low level of volatility, in addition to the low level of traded volume (Nahlehb, 2010) which may return to many reasons related to the Lebanese investor; as the lack of transparency in the obtained results and reports that fears him, and other psychological reasons that are set below behavioral biases in finance.

B. Arab Gulf States

B.1. Stationarity Test results (Summary)

Table 3: ADF, Phillips-Perron and KPSS test results for Arab Gulf states monthly market Index series in log

	Dubai	Abu Dhabi	Kuwait	Qatar	Amman	Saudi Arabia
ADF test	Log (p)	Log (P)	Log (p)	Log (p)	Log (p)	Log (p)
Probability Calculated ADF in levels	0.0025	0.1785	0.2295	0.1114	0.0107	0.0232
Probability Calculated ADF in first differences	0.0000	0.0002	0.0266	0.0006		
Phillips-Perron test	Log (p)	Log (P)	Log (p)	Log (p)	Log (p)	Log (p)
Probability in level	0.0458	0.2095	0.7186	0.1107	0.0001	0.0243
Probability in first differences	0.0000	0.0003	0.001	0.0009		
KPSS test	Log (p)	Log (p)	Log (p)	Log (p)	Log (p)	Log (p)
Probability in level	0.0201	0.4177	0.4915	0.3565	0.0410	0.074
Probability in first differences		0.0421	0.0115	0.050		

Source: Calculated by the author using Eviews.

B.2. Volatility Test Results

Table 4: Volatility Test results For Arab Gulf States

	α	β	P_{α}	P_{β}	$\alpha+\beta$	Decision	Significance
Dubai	0.185131	1.22313	0.0415	0.0037	1.4081	Strongly Volatile	Significant
Abu Dhabi	0.0390	0.763	0.976	0.7861	0.802	Volatile	Not Sig
Kuwait	0.1069	0.634	0.050	0.012	0.7409	Volatile	sig
Saudi Arabia	0.4939	1.449	0.0356	0.029	1.942	Strongly volatile	Sig
Qatar	0.564	1.0002	0.0494	0.0452	1.566	Strongly Volatile	sig
Amman	0.9722	0.00075	0.2202	0.9075	0.479	weakly volatile	Not sig

Source: Calculated by the author using Eviews.

B.3. Dubai Financial market-DFM

In 2000 Dubai financial market has born as a public institution. Referring to Dubai financial market (www.dfm.ae), and in order to test for market efficiency using Unit Root Test before proceeding in the work, Dubai market index was collected starting from 2004 reaching 2018 order to test for market efficiency.

B.3.1. Test Results

As it appears in table 3, $p=0.0025$ that's to say less than 0.05 which means it's significant, thus H_0 is rejected and Dubai data series appears to be stationary at level, and weak form market efficiency is obtained; Phillips-perron also confirmed the same results.

However, Equation (12) represents GARCH (1, 1) model estimations for equation (10). The values in parentheses represent the coefficient probabilities.

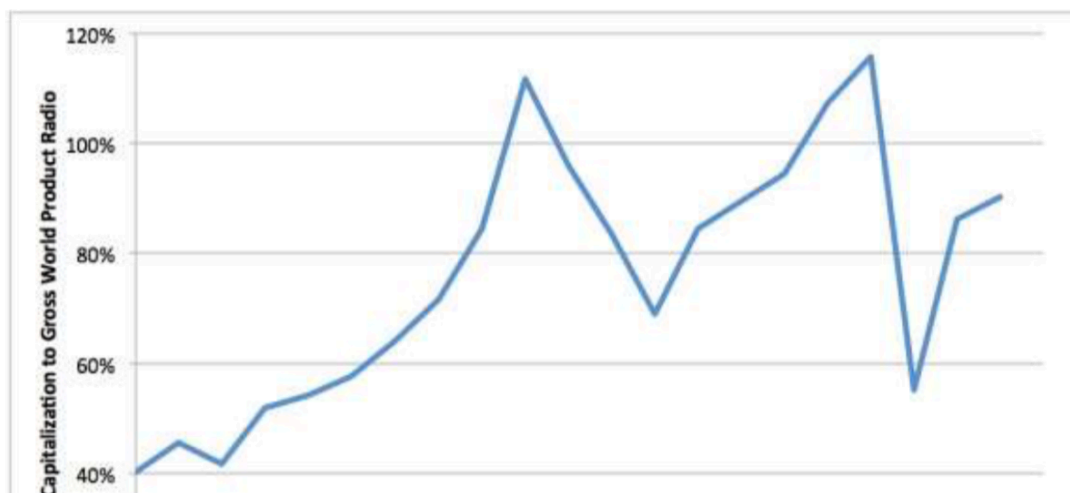
$$\sigma^2_t = 2.0931 + 0.185131 \varepsilon^2_{t-1} + 1.22313 \sigma^2_{t-1} \quad (12)$$

(0.9368) (0.0415) (0.0037)

B.3.2. Result analysis

According to probability values in equation (12), the ARCH and GARCH coefficients (α and β) are significant since their respective probability is less than 5%. The sum of ARCH and GARCH ($\alpha + \beta$) is 1.4081, indicating that the volatility shocks are strongly persistent. The figure below shows clearly the huge volatility in Dubai's market.

Figure 3: Dubai average yearly market capitalization from 1995 to 2011.



Source: Calculated by the author based on Data for average yearly market capitalization collected from www.dfm.ae

Nevertheless, to go deeply in the analysis of Dubai financial market, it can be seen that the value of market capitalization was about 308 billion U.S. dollar during 2017 according to data presented on (www.dfm.ae). However, referring to the figure 3, we can see that Dubai's market capitalization swings between 40 billion U.S. dollar as a minimum in 1995 to reach its peak 120 billion U.S. dollar in 2007, thus it can be said that Dubai acquires a big size financial market in addition to its traded volume that increased from 4,149 million \$ (2003) to 66,066 million \$ (2008) (table 4).

B.4. Abu Dhabi (ADX)/ UAE's index

On 15 November, 2000; Abu Dhabi securities exchange (ADX) was established; Average monthly Data regarding the variation of market index was collected covering 14 years (2004 till 2018), in order to test the efficiency of the market.

B.4.1. Test Results

Running the Augmented Dickey-Fuller test statistics, Phillips-Perron and KPSS using E views, results were obtained in table 3.

Since $p > 0.05$ ($=0.1785$) in ADF and ($p=0.2095$) in Phillips-Perron test, thus the series tends to be not stationary at level, thus the test is rerun at first difference to obtain $p < 0.05$ ($=0.0002$ and 0.0003) respectively, thus the series appears to be integrated of order 1; $I(1)$ which means that the series become stationary.

Equation (13) represents GARCH (1, 1) model estimations for equation (10). The values in parentheses represent the coefficient probabilities.

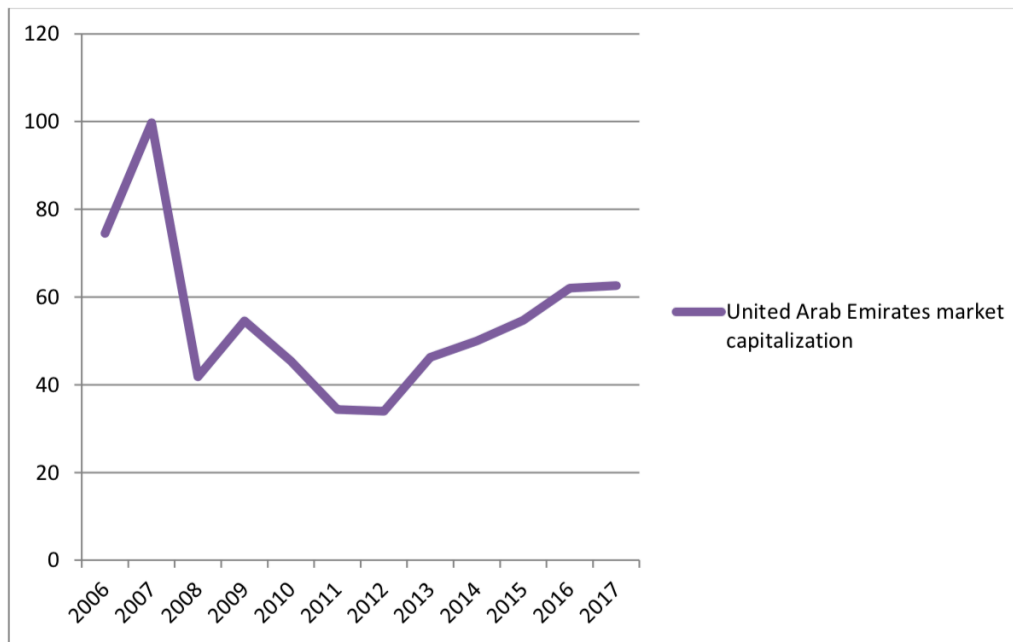
$$\sigma_t^2 = 2.5760 + 0.0390\varepsilon_{t-1}^2 + 0.763\sigma_{t-1}^2 \quad (13)$$

(0.889) (0.976) (0.7861)

B.4.2. Results Analysis

According to probability values in equation (13), the ARCH and GARCH coefficients (α and β) are not significant since their respective probability is more than 5%. The sum of ARCH and GARCH ($\alpha + \beta$) is 0.802; indicating that the volatility shocks are weekly persistent.

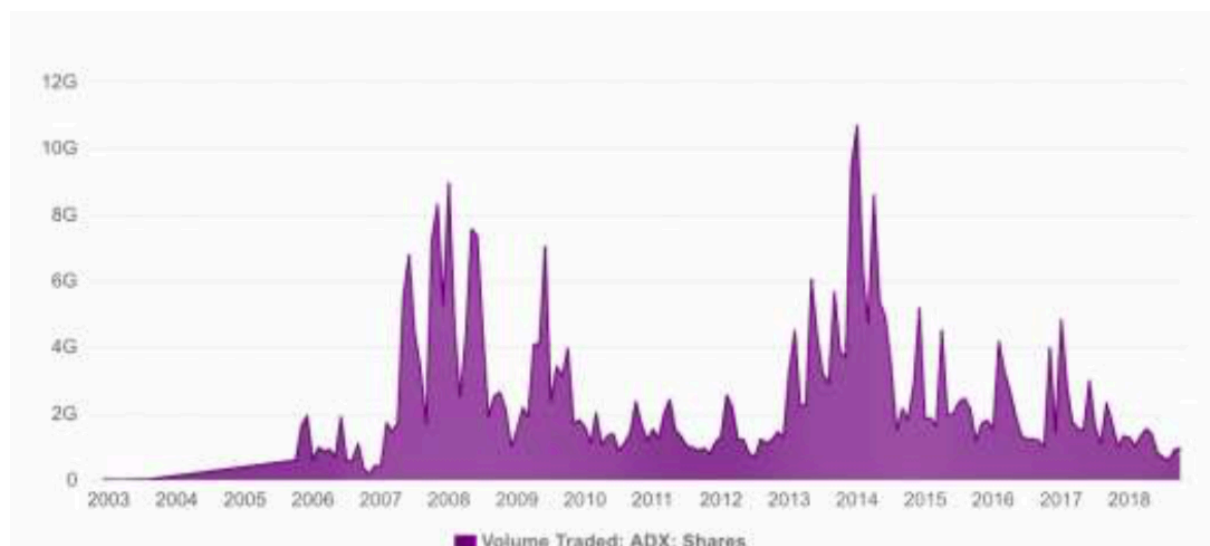
Figure 4: United Arab Emirates average yearly Market Capitalization from 2006-2017



Source: Calculated by the author based on Data for average yearly market capitalization collected from WWW.CEICDATA.COM/CEIC data

It can be graphically noted (figure 4) that Abu Dhabi market capitalization Index swings in times. In 2006, Abu Dhabi’s market capitalization was approximately 80 billion U.S, and then it fluctuated during the years between 99.723 billion U.S to reach 62.592 billion U.S at 2017 which can be considered as an acceptable sized market. Furthermore; moving to the Traded Volume as we can notice graphically (figure 5) that Abu Dhabi’s yearly average traded volume swings between 652 units in 2003 to records around 48,347 unit in 2008 (table 4) until it reaches 1,707,451,632 units .

Figure 5: ADX Volume traded (Shares) from 2003 to 2018



Source: Calculated by the author based on Data for traded volume of ADX collected from WWW.CEICDATA.COM/CEIC data

B.5. Kuwait financial market

Referring to the National bank of Kuwait (www.cbk.gov.kw) (S.A.K.P) Data; that was established at 30, June, 1969; average monthly market price index was studied covering 14 years, from 2004 till 2018 to test for market efficiency.

B.5.1. Test results

As it appears in (table 1); $p > 0.05$ at level thus the series tends to be non-Stationary; as a result it has been studied on the first difference level to obtain $p = 0.02 < 0.05$ in ADF TEST and 0.001 in PHILLIPS- PERRON TEST ,thus the series tends to be integrated at first difference (I(1)).

Equation (14) represents GARCH (1, 1) model estimations for equation (10). The values in parentheses represent the coefficient probabilities.

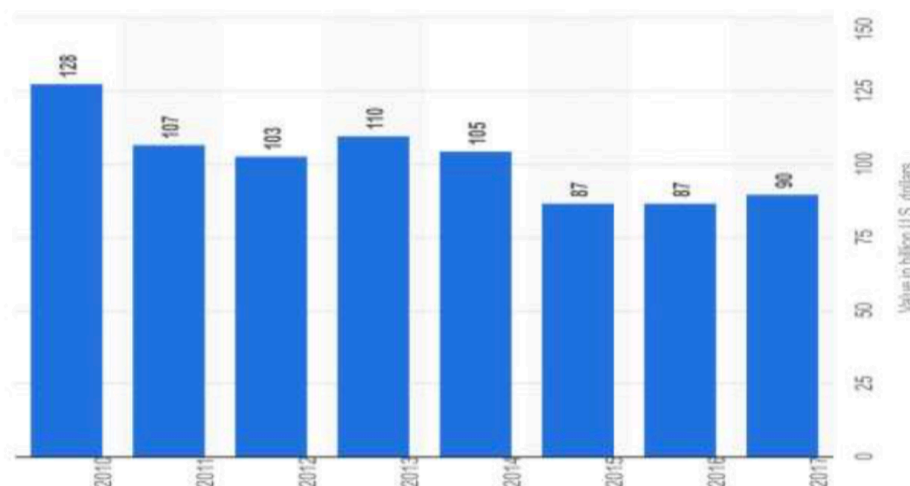
$$\sigma^2_t = 4.1472 + 0.1069\epsilon^2_{t-1} + 0.634\sigma^2_{t-1} \quad (14)$$

(0.1185) (0.050) (0.012)

B.5.2. Results Analysis

According to probability values in equation (14), the ARCH and GARCH coefficients (α and β) are significant since their respective probability is less than 5%. The sum of ARCH and GARCH ($\alpha + \beta$) is 0.7409, indicating that the volatility shocks are persistent.

Figure 6: Kuwait average yearly market capitalization from 2010 till 2017



Source: Calculated by the author based on Data for average yearly market capitalization collected from www.cbk.gov.kw

It can be graphically noted (figure 6) that the Kuwait market capitalization swings in time from 126 billion U.S in 2010 to record 90 billion U.S in 2017; which indicates that the size of Kuwait market can be considered almost big with respect to other markets. However referring to Kuwait financial report, we can see that the average yearly traded volume reached 1,485,068,937 units; however referring to table 4 we can see that the shares traded increased from 48,766 million in 2003 to 75,820 million in 2018 .Hence, Kuwait financial market can be considered as Volatile and almost a big size market in comparison with other similar markets.

B.6. Saudi stock exchange

Average monthly Data for Saudi stock market indices were collected for 15 years from 2003 till 2018 in order to test for weak form market efficiency in Saudi stock financial market.

B.6.1. Test Results

As presented in the table (3), Augmented Dickey-Fuller test was done with H_0 : Saudi stock exchange market has a unit root; as it appears in (table 1) $p=0.0232$ with ADF test and 0.0243 in PHILLIPS- PERRON TEST which is (< 0.05), thus it can be said that the null hypothesis is rejected and Saudi data series tends to be Stationary. Equation (15) represents GARCH (1, 1) model estimations for equation (10). The values in parentheses represent the coefficient probabilities.

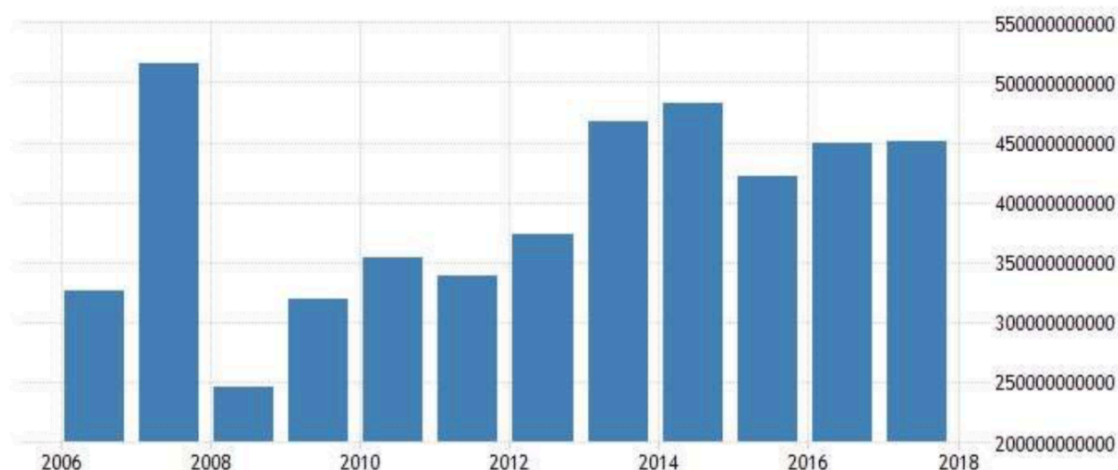
$$\sigma^2_t = 5.1801 + 0.4939\epsilon^2_{t-1} + 1.449\sigma^2_{t-1} \quad (15)$$

(0.042) (0.0356) (0.029)

B.6.2. Results Analysis

According to probability values in equation (15), the ARCH and GARCH coefficients (α and β) are significant since their respective probability is less than 5%. The sum of ARCH and GARCH ($\alpha + \beta$) is 1.942, indicating that the volatility shocks are strongly persistent.

Figure 7: Saudi average market capitalization from 2006 to 2018



Source: Calculated by the author based on Data for average yearly market capitalization collected from WORLD BANK/TRADINGECONOMICS.COM

Figure7 shows a wide variation for Saudi market capitalization, as it fluctuates from 330 billion U.S. in 2006 to reach its peak in 2008 with 530 billion U.S to reach around 450 billion U.S. in 2018. thus Saudi Arabia financial market can be considered as strongly volatile and large sized market with around an average of 109,410,453 unit as a yearly traded volume ,However referring to table 4 it can be clearly noticed that Saudi traded shares has increased from 5,531 million in 2003 to 54,442 million shares in 2008 therefore Saudi financial market is considered as a highly volatile and risky market.

B.7. Qatar Financial market

Based on the data obtained from (WWW.QE.COM.QA) that was established and started operating in 1997, and become one from the pioneer stock markets in the Gulf region. Average monthly Market indices were collected from 2006 till 2018 to test for market efficiency in its weak form.

B.7.1. Test results

Based on table (3), it can be seen that $p=0.1114 > 0.05$ (ADF TEST) and $p=0.1107$ (PHILLIPS- PERRON TEST) thus the series is not Stationary at level; thus we tended to make the first difference where $p=0.0006$ was obtained (<0.05) and $p=0.0009$ with PHILLIPS-PERRON, thus the series tends to be integrated of level one (I (1)).

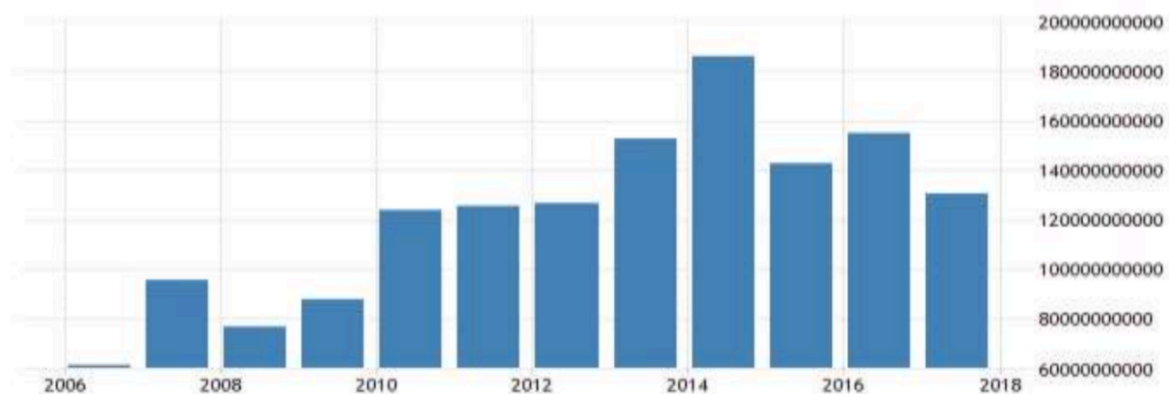
Equation (16) represents GARCH (1, 1) model estimations for equation (10). The values in parentheses represent the coefficient probabilities.

$$\sigma_t^2 = 3.064 + 0.564\epsilon_{t-1}^2 + 1.0002\sigma_{t-1}^2 \quad (16)$$

(0.607) (0.0494) (0.04520)

According to probability values in equation (16), the ARCH and GARCH coefficients (α and β) are significant since their respective probability is less than 5%. The sum of ARCH and GARCH ($\alpha + \beta$) is 1.566, indicating that the volatility shocks are strongly persistent.

Figure 8: Qatar average yearly market capitalization over the period 2006-2018



Source: Calculated by the author based on Data for average yearly market capitalization collected from WORLD BANK/TRADINGECONOMICS.COM

Based on figure 8; it can be seen that the size of Qatar's financial market varied between 62 billion U.S in 2006 to reach its peak of 185 billion U.S. in 2015, then it have declined to record 130 billion U.S. in 2018 with around 3,665,829 units as a yearly traded volume average. Nevertheless, from table 4 it can be noticed that in 2003 Qatar's yearly traded shares are 68 million to reach 3400 million shares in 2008.

B.8. Amman stock exchange

Amman stock exchange (ASE) average monthly Data that is used mainly to measure the performance in terms of return was collected for 11 years from 2007 till 2018 in order to test for market efficiency in the weak form.

B.8.1. Test results

As presented in table (3), it appears that $p=0.0107 < 0.05$ (ADF TEST) and $p=0.0001$ (PHILLIPS- PERRON TEST) thus H_0 is rejected, series is stationary and the market is efficient in its week form at the first level.

However, Equation (17) represents GARCH (1, 1) model estimations for equation (10). The values in parentheses represent the coefficient probabilities.

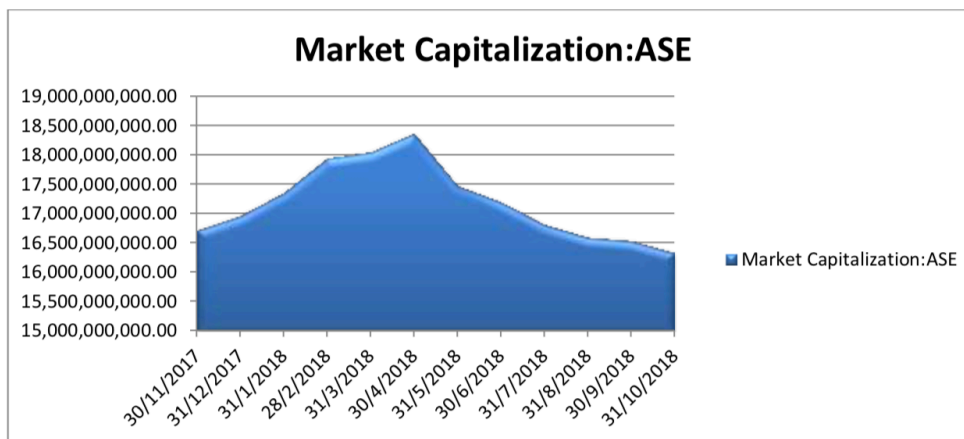
$$\sigma_t^2 = 3.1361 + 0.9722\epsilon_{t-1}^2 + 0.00075\sigma_{t-1}^2 \quad (17)$$

(0.7119) (0.2202) (0.9075)

B.8.2- Results Analysis

According to probability values in equation (17), the ARCH and GARCH coefficients (α and β) are not significant since their respective probability is greater than 5%. The sum of ARCH and GARCH ($\alpha + \beta$) is 0.479, indicating the absence of the volatility shocks

Figure 9: Amman stock exchange average monthly market capitalization during 2017-2018.



Source: Calculated by the author based on Data for average monthly market capitalization collected from WWW.CEICDATA.COM/Amman stock exchange

It can be graphically noted (figure 9) that Amman stock exchange varied between 16.5 million U.S at the end of 2017 to reach its peak of 18.369 million at April 2018 then it has decreased dramatically to reach 16.328 million at the end of 2018. In addition to that its average traded volume that has recorded 31,944 units in 2018 as it has increased from 276 million traded shares in 2003 to reach 3,881 million shares in 2008 (table 4).

Nevertheless, It can be said that although Amman has appeared as an efficient weak form market (at level) but this doesn't mean that it acquires all the conditions of efficient market; but on the other side its low market capitalization and low traded volume has been the reason behind; however this may be related to many reasons that might be considered under investor's behavioral biases which may be an indicator for many other psychological factors that would be contributing so far in these results.

Table 4: Arab Stock market development over the period 2003-2008

Country	Value Traded (\$ million)		Shares Traded (million)		Market capitalization (\$ million)			Number of listed companies		
	2003	2008	2003	2008	2003	%GDP	2008	%GDP	2003	2008
Abu Dhabi	3,336	61,280	652	48,347	55,519	67	61,887	22	30	65
Jordan	2,598	27,079	997	5,112	10,967	107	35,984	184	161	243
Bahrain	255	1,905	368	1,480	9,701	100	19,954	101	44	50
Morocco	2,211	14,231	35	222	11,556	26	63,420	70	52	80
Qatar	1,646	41,250	68	3,400	40,435	113	76,656	65	28	43
Dubai	11,628	69,880	4,149	66,066	35,109	42	65,217	24	13	65
Egypt	4,423	65,167	1,180	21,072	27,909	32	83,185	52	967	444
Kuwait	53,300	116,023	48,766	75,820	61,311	124	113,527	71	108	204
Oman	1,224	8,034	276	3,881	6,615	23	15,643	28	141	127
Saudi Arabia	158,568	483,122	5,531	54,442	157,164	73	246,809	46	70	127
Tunisia	152	1,425	13	148	2,194	10	6,381	15	45	53
AMEX	563,433	561,602	17,508	na	96,120	0.8	132,367	0.9	557	486

Source: WORLDBANK/TRADINGECONOMICS.COM

7. Conclusion

This paper presented the different methods to test efficiency of Lebanese and AGS financial markets in weak form, in addition to their financial characteristics which either enhances or reduces efficiency; nevertheless it investigates also the market volatility for the proceeding countries.

The overall results proved to show that Lebanon, Abu Dhabi, Qatar, Kuwait series data are integrated of order 1 (I (1)) thus they tend to be efficient in their weak form, whereas Dubai, Saudi and Amman are non- weak form efficient markets. However these results have been investigated deeply through analyzing their financial characteristics (market capitalization and traded volume) and Volatility for each of the above markets.

However, in our cases efficiency of the market doesn't necessary mean that historical data and path of the stocks are the main key behind predicting its future prices; but on the other side another components have entered in order to get a clear view regarding the efficiency of the market ,as "market capitalization" and "Traded Volume" that have been seen as the keystones in the analysis of Lebanon and Arab Gulf states markets; which has left us with other reasons that might lie behind the limited investing behavior of the traders, where Irrational way of thinking and behaving might be controlling which can be explained through lack of transparency in certain markets.

Nevertheless, the psychological part of the investor during decision making can't be denied, as it plays a big role during investment decisions where Irrationality is being spread all over leading to wrong behaviors so far, that can definitely leads to wrong decisions and big losses. Thus it can be insured that other factors are being contributing during decision making process and can be explained through behavioral biases and hidden under behavioral finance concepts.

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