



**UNIVERSITI PUTRA MALAYSIA**

**MARKET EFFICIENCY IN THE  
KUALA LUMPUR STOCK EXCHANGE:  
FURTHER EVIDENCE USING GARCH MODEL**

**VICTORIA SAMUEL ARU BOL**

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**By**

**VICTORIA SAMUEL ARU BOL**

**Thesis Submitted in Fulfilment of the Requirement for the Degree of Master of  
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Abstract of this is presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

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**Chairman: Professor Mohammad Bin Yusoff, Ph.D.**

**Faculty: Economics and Management**

The recent Asian currency crisis has revived the debate about the efficacy of the weak-form efficient market hypothesis as an appropriate tool for testing the volatility of the stock markets. This is because the idea that securities markets are efficient is a fundamental factor that affects not only the investment decisions but also all financial dealings in financial business. This study tested the weak-form version of efficient market hypothesis using the generalized autoregressive conditional heteroskedastic (GARCH) model on the monthly data of returns of stocks of listed under Kuala Lumpur Stock Exchange Market for the period 1994-99.

In the pre-crisis results, GARCH effect was evident in 24 out of 30 companies (80%), suggesting that homoskedasticity (constant variance) hypothesis is rejected. In addition, the diagnostic test results indicated that the residuals were found to be uncorrelated for 26 out of 30 companies, while only 19 companies (63%) found to be to be normally distributed.

The results of GARCH model during the crisis period were less evident, only 14 out of 30 companies (slightly less than 50%) exhibit GARCH effect. Beside this, during the crisis period, only 20 out of 30 companies were not normally distributed, whereas 28 out of 30 companies have shown no autocorrelation, suggesting that weak form market hypothesis cannot be rejected. The results suggest that the characters of time series of the two periods have changed substantially during the crisis period but as the diagnostic test has shown, we cannot reject the weak form efficient market hypothesis for both periods.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan ijazah Master Sains

**KECEKAPAN PASARAN DI BURSA SAHAM KUALA LUMPUR: BUKTI LANJUTAN DENGAN MENGGUNAKAN MODEL GARCH**

Oleh

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Krisis matawang yang tercetus di Asia baru-baru ini telah menghidupkan semula perdebatan berkenaan dengan hipotesis kecekapan pasaran berbentuk lemah (weak-form) sebagai alat untuk menguji ketidakpastian dalam pasaran saham. Hal ini demikian kerana pasaran sekuriti yang cekap bukan sahaja merupakan faktor asas kepada keputusan pelaburan, bahkan juga mempengaruhi segala aktiviti kewangan dalam perniagaan kewangan. Kajian ini menggunakan model penggandaduaan autoregresif heterokedastisiti bersyarat (GARCH) untuk menguji hipotesis kecekapan pasaran yang berversi bentuk lemah (weak-form) dengan berdasarkan data pulangan stok bulanan syarikat yang disenaraikan di pasaran Bursa Saham Kuala Lumpur (KLSE) dari tempoh 1994 hingga 1999.

Keputusan tempoh pra-krisis menunjukkan kesan GARCH wujud bagi 24 buah syarikat daripada 30 buah syarikat dengan cadangan bahawa hipotesis homokedastisiti (varians malar) berjaya ditolak. Tambahan pula, ujian diagnostik membuktikan sisaan

bagi 26 buah syarikat daripada 30 buah syarikat adalah tidak berkorelasi, manakala hanya 19 buah syarikat (63%) didapati bertabur secara normal.

Akan tetapi, kesan GARCH ini hanya wujud di antara 14 buah syarikat daripada 30 buah syarikat (hampir mencapai 50%) untuk tempoh di sepanjang krisis. Tambahan lagi, keputusan daripada penganggaran model GARCH juga menyatakan sisaannya juga tidak berkorelasi bagi 28 buah syarikat daripada 30 buah syarikat semasa di sepanjang krisis, manakala sisaan bagi 20 buah syarikat daripada 30 buah syarikat didapati tidak bertaburan normal. Keputusan ini membuktikan bahawa kecekapan pasaran berversi bentuk lemah (weak-form) tidak berjaya ditolak. Ini jelas menunjukkan bahawa ciri-ciri siri masa untuk kedua-dua tempoh ini telah berubah semasa krisis. Namun demikian, seperti yang telah ditunjukkan oleh ujian diagnostik, kajian ini mendapati bahawa kecekapan pasaran berversi bentuk lemah (weak-form) tidak berjaya ditolak.

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I certify that an Examination Committee met on 18<sup>th</sup> May 2001 to conduct the final examination of Victoria Samuel Aru Bol on her Master of Science thesis entitled "Market Efficiency in the Kuala Lumpur Stock Exchange: Further Evidence Using GARCH Model" in accordance with Universiti Putra Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulation 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of Examination Committee are as follows:

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This thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science.



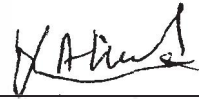
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## DECLARATION

I hereby declare that this thesis is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.



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(Victoria Samuel Aru Bol)

Date: 18 May 2001

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# **CHAPTER I**

## **INTRODUCTION**

### **Background**

The idea that securities markets are efficient is a fundamental factor that affects not only the investment decision process, but also all financial dealings in financial business. In an efficient market, the prices of securities do not diverge substantially from the justified economic values the investors expect of them. This is because economic values of securities are determined primarily by investor's expectations about earnings and risks, as investors try to understand the future uncertainty. If the market price of securities deviates from estimated economic value, then, investors will act to bring the desired equilibrium. In this way, when new information is received in an efficient marketplace, causing a revision in the estimated economic value, security prices will adjust to this new information quickly and, on the average, correctly.

The current debate in the theory of efficient market hypothesis reflects the importance of the indirect relationship between the efficient market and other factors such as allocation of resources. This is because business sectors as well as the household sector is affected by any disequilibrium in this relationship. The assumption stresses that, while business firms should invest in projects that offer the highest rates of returns, concurrently, households should invest directly or indirectly in financial claims that offer the highest yields for a given level of risk so that the allocation efficiency, which depends on both the information and operation efficiency, is satisfied.

Informational efficiency is the ability of investors to obtain accurate information about the relative values of different securities. For information efficiency, market prices of securities are the best indicators of relative values because market prices reflect all relevant information about the securities. When new information about a particular security is received in an efficient market, market prices adjust very quickly because there are thousands or (millions) of investors gathering information in quest for quick profits. Investors try to make large profits by identifying overpriced securities and selling them before the price drops or by purchasing under-priced securities before the price begins to rise. The actions of such investors ensure that market prices reflect all available information. Capital market instruments are defined as long-term financial instruments with an original maturity of greater than one year. As the name implies, the proceeds from the sales of capital market instruments are usually invested in assets of more than permanent nature such as industrial plant, equipment, building and inventory.

Stock market's performance is generally affected by many different factors, which include economic and political environment in the country, interest rate movement, liquidity or the movement in money supply in the economy. This makes the economic performance of a country the most fundamental factor, which determines the performance of a particular stock market. All these macro and micro factors that are interrelated, by exerting their influence on the performance and profitability of individual companies, will in turn, affect their stock prices in the market.



### **The Problem Statement**

In the mid of 1997, the effect of the East Asian crisis on Malaysian economy tolled the alarm bell for the beginning of currency turmoil in the region which was linked to the failure of these countries in defending their currencies against speculators. The speculators themselves took the action when they felt that the depreciation of these countries' currencies was due to economic problems after almost a complete decade of high growth. The crisis led to a depreciation of the Malaysian currency, the Ringgit, by about 50 percent, that is to say, from its par value of RM2.5 per US dollar before July 1997, to about RM4.88 per US dollar in January 1998. Between July 2, 1997 and September 2, 1998, the currency plummeted to a record low of RM4.86 to the U.S. dollar (on January 7, 1998). This domestic currency depreciation was accompanied by a steep fall of Malaysian stock market when the Kuala Lumpur stock exchange composite index (KLSE, CI) fell from its high of 1077.3 point in June 30, 1997 to its low of 256 points in September 1, 1998. In addition, other macroeconomic variables were also affected as well. The real output growth rate fell, the trade and payments balance deteriorated, and the capital flight intensified, hence, reducing the country's foreign reserves drastically.

In regards to capitalization, both the Main and the Second Boards experienced a dramatic decline when comparing the pre-crisis and crisis sub-periods. As seen in Tables 2.1, while the number of firms listed on the Main Board grew from 410 firms in 1996 to 444, 454 and 474 firms in 1997, 1998 1999 respectively, the total capitalization fell sharply from RM 746 billion in 1996 to RM 354.2 and RM 353.4 billion in 1997 and 1998 respectively. However, capitalization slightly rose from RM

353.4 billion to RM 527.6 billion in 1999. Similar changes took place in relation to the Second Board. According to Table 2.2, while the number of listed firms under this board rose from 208 firms in 1996 to 264, 282 and 283 firms in 1997, 1998 and 1999 respectively, the total capitalization, however, fell from RM 60.8 billion in 1996 to RM 21.1 billion, RM 21.6 billion and RM 25.1 billion in 1997, 1998 and 1999 respectively. All these drastic changes were a clear indication of severe effects of the currency crisis that struck the Kuala Lumpur Stock Exchange in September 1997. This study is, therefore, to investigate the effect of the downfall of Malaysian stock market on informational market efficiency.

Thus, this study will focus on the effect of recent currency crisis on KLSE by using the weak-form efficient market hypothesis on the data of KLSE. The weak-form efficient market hypothesis (EMH) assumes that successive one-period stock returns are independently and identically distributed. In other words, if security prices are determined in a market that is weak-form efficient, historical price and volume data should play no significant role in predicting future price changes because they should already be reflected in current prices. If the weak form of the EMH is true, then past price changes should be unrelated to future price changes. In other words, a market can be said to be weakly efficient if the current price reflects all past market data so that past history of price information is of no value in evaluating future changes in price.

In contrast to the weak-form efficient market hypothesis, semi-strong form of market efficiency involves, apart from known and publicly available market data, all

publicly available data such as earnings, dividends, stock split announcements, new product developments, financing limitations, and accounting changes. A market that quickly incorporates all such information into prices is considered to display semi-strong efficiency. In other words, a market is said to be semi-strongly efficient if current prices reflect all available information. It is to be noted here that semi-strong market efficiency encompasses the weak form of the hypothesis since market data largely form a substantial set of all publicly available information. Tests of semi-strong form hypothesis are tests of the speed of adjustment of stock prices to announcements of new information because a semi-strong efficient market implies that investors cannot act on new public information after its announcement and expect to earn above-average risk-adjusted returns. If lags exist in the adjustment process of stock prices to certain announcements, and investors can exploit these lags advantageously in order to earn abnormal returns, such a market cannot be considered efficient in semi-strong sense. A more comprehensive form of market efficiency is the strong-form market efficiency, which emphasizes that stock prices fully reflect all information, both public and nonpublic. This implies that no any group of investors should be able to earn, over a reasonable period of time, abnormal rates of return by manipulating a publicly available information in an extraordinarily manner. This applies specifically to all information such as nonpublic information, which includes information that may be restricted to certain groups such as corporate insiders and specialists on the exchanges. The EMH refers to a monopolistic access of information by certain groups in the market. It encompasses the weak and semi-strong forms, hence representing the highest level of market efficiency.

According to Jones (1997), one way of testing the weak-form efficiency is to statistically test the independence of stock-price changes and if the tests suggest that price changes are independent, the implication would be that knowing and using the past sequence of information is of no value to an investor. The second way is to test specific trading rules that attempt to use past price data to see whether such tests legitimately produce risk-adjusted returns beyond that available from simply buying a portfolio of stocks and holding it until a common liquidation data. After testing the pure statistical nature of price changes and deducting all costs, the test would suggest whether the market is or not weak-form efficient. The first version of EMH to be tested empirically (Fama, 1970) was the weak-form efficient market hypothesis.

Comparing the three forms of EMH, Fama pointed out that since strong-form tests of EMH are concerned with whether individual investors or groups have monopolistic access to any information relevant for price formation, "one would not expect such an extreme model to be an exact description of the world, and it is probably best viewed as a benchmark against the importance of deviations from market efficiency can be judged" Fama (1970: 414). In regard to semi-strong and weak-form market efficiency, Fama pointed out that, while in the less restrictive semi-strong form tests the information subset of interest include all obviously publicly available information, in the weak-form test the information subset is just historical price or return sequences. According to Fama; while the weak-form tests of the efficient market model are the most "voluminous", the results are fairly in strong support. A further evidence for the efficiency of the weak-form tests of the efficient market hypothesis are provided by Lee *et al* (1998); Milionis and

Moschos (2000) and Chappell and Eldridge (2000) most of which support it. This evidence, therefore, makes the weak-form efficient market hypothesis test a natural candidate for testing the effect of the resulting decline in assets prices and stock market due to the recent East Asian crisis on the Kuala Lumpur Stock Exchange.

### **The Objectives of the Study**

This study is to investigate the weak-form efficient market hypothesis (EMH) of Kuala Lumpur Stock Exchange market. The study mainly aims at achieving the following objectives:

1. To examine the weak form efficient market hypothesis using GARCH model on Kuala Lumpur Stock Exchange
2. To determine the effects of financial crisis on efficient market hypothesis.
3. To suggest policy recommendations to policymakers.

### **The Importance of the Study**

The purpose of this study is to examine the weak-form efficient market hypothesis using data from the Kuala Lumpur stock exchange (KLSE) for the period 1994-99. The last decade has witnessed conflicting views about the weak-form efficient market hypotheses. In this regard, many studies on KLSE accepted the weak-form efficient market hypothesis while others rejected it. Fama (1970) defines the weak-form efficient market hypothesis as the one which always reflects the historical prices, therefore, making prices the central issue which is being affected by the same fundamental factors that influence the economy. Thus, any decrease or increase in the stock prices can

introduce many changes in the economy concerned. This study is, thus, to investigate the effects of recent economic crisis on the prices of Kuala Lumpur stock exchange market. Since successive price changes in a weak-form efficient market are independent of one another, the price should follow a random walk hypothesis.

This study is different from the previous ones in that it is testing the weak-form efficient market hypothesis using the GARCH model. The findings will add to the increasingly growing body of literature on KLSE and a guide for other emerging markets in developing countries. As many researchers in efficient market hypothesis tend to prove the validity of efficiency, this study will add the effect of changes in economics on EMH. In addition, the study will employ the period of downfall in assets returns resulting from currency crisis to identify whether the information can still be reflected in prices in such a situation.

### **The Research Organization**

The study begins with the introductory chapter explaining the issues related to efficient market theories, the problem in emerging market, and the objective of study. Chapter II comprises the background of Kuala Lumpur stock exchange while chapter III describes theoretical framework which includes the early efficient market models and forms of efficient market hypothesis: weak form, semi-strong, and strong form, implications of the capital market efficiency, and a review of empirical studies and the summary of the chapter. Chapter IV will comprise the methodology including the model estimation and

techniques that are used to investigate the capital market efficiency hypothesis. It describes steps for estimating the GARCH technique.

Chapter V presents the discussion of the estimation results of the study. It will also present the statistical decision concerning the research questions along with evidence from appropriate statistical procedure assessing whether the data support or fail to support the research questions. Chapter VI summarizes of the findings in the light of the study's theoretical and empirical framework, their implications, and recommendations for future research and limitations of this study.

## **CHAPTER II**

### **THE KUALA LUMPUR STOCK EXCHANGE MARKET**

#### **Background**

Like many other national institutions, the Kuala Lumpur Stock Exchange (KLSE) was an offspring of the political development in West Malaysia and Singapore in the middle of 1960s. The first stock exchange for stock trading was a joint one for both Malaysia and Singapore. Thirty years after the formation of the Singapore Stock Exchange Market in 1931, the Malaysian Stock Exchange was formed in March 1960. After a three-year business since when the first trading of shares took place on 9 May 1960, the Malaysian Stock Exchange was renamed as the Malaysian Stock Exchange after the formalization of the Malaysian Federation in 1963. When Singapore was proclaimed as an independent state on 9 August 1965, the Malaysian Stock Exchange was renamed for the second time as the Stock Exchange of Malaysia and Singapore. This arrangement continued until June 1973 when the two countries stopped the use of single currency and began the operation as separate exchanges of both respective countries in which trading of listed shares of both countries was conducted in two different currencies. After 1976, the KLSE Board officially became the KLSE and was administered jointly by bodies such as the Capital Issues Committee, Foreign Investment Committee, and Registrar of Companies, Takeover Panel and KLSE. On the 26<sup>th</sup> of April 1994, the KLSE was given its present name, the Kuala Lumpur Stock Exchange (KLSE) with stipulated objectives of assuming the responsibility for maintaining liquidity of trading securities issued by listed companies by providing an orderly trading on new issues and secondary markets for outstanding shares.



Table 2.1 Capitalization, Volume and Listing on the Main Board of KLSE, 1985-99

Year	Market Capitalization (RM bil.)	No. of Firms Listed	Volume (bil. Units)
1985	70.13	284	2.9
1986	64.49	289	2.3
1987	75.27	293	5.3
1988	98.72	300	4.0
1989	155.75	306	10.2
1990	2.75	271	13.1
1991	159.81	292	12.1
1992	242.90	317	18.6
1993	606.03	329	43.1
1994	492.94	347	58.7
1995	551.00	369	30.9
1996	746.00	410	47.4
1997	354.2	444	62.3
1998	353.4	454	52.07
1999	527.6	474	79.99

Source: Ariff, Shamsheer and Nassir, (1998).

(\*) indicates the beginning of crisis in 1997.

The KLSE whose shares are listed on the main board and second board for (smaller companies) that could not list on the Main Board, was formed in 1988. With a minimum paid-up capital of RM20 million widely held by public, the Main Board, which lists shares of companies that are generally large, is characterized by healthy financial performance. The companies listed under the Second Board, although smaller, are diversified firms with potential of future profits. After listing, the companies must abide by the KLSE rules and regulations governing its operations and any non-compliance is met with severe measures such as suspension or de-listing from the Board.