Time Series Modelling for Share Price Behaviour of Top Five Palm Oil Industries: Bursa Malaysia (2004-07)

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Abstrak

Kajian ini telah berusaha untuk mengenalpasti satu model yang sesuai untuk harga saham lima syarikat minyak sawit mentah yang tersenarai di papan utama Bursa Malaysia yang mendapat pulangan terbanyak dengan menggunakan data mingguan dari Januari 2004 sehingga Disember 2007. Dengan merujuk pada penyelidikan terdahulu berkenaan faktor-faktor yang mempengaruhi turun-naik harga saham seperti Xu & Cai (2006), Serpkenci & Tigert (2006), Dror (2008) dan Tay & Ting (2006), sepuluh pembolehubah tidak bersandar seperti time, turnover by volume, EPS, P/E ratio, net sales atau revenues, dividend yield, price to cash flow ratio, Kuala Lumpur sector plantations price index, KLCI composite price index dan Malaysian inflation rate telah dikenalpasti untuk kajian ini.

Dalam penyelidikan ini, pola naik-turun harga saham lima syarikat minyak sawit mentah yang dipilih telah dikaji dengan sepenuhnya. Dari analisa, model "Autoregressive Integrated Moving Average" atau ARIMA dikenalpasti sebagai model terbaik untuk kelima-lima syarikat berkenaaan. Secara terperinci, ARIMA(1,1,2) sesuai untuk dua syarikat iaitu Sarawak Oil Palms BHD and Cepatwawasan Group BHD, ARIMA(0,1,0) sesuai untuk dua lagi syarikat iaitu Far East holdings BHD and IJM plantations BHD dan ARIMA(0,1,1) sesuai untuk BLD Plantations BHD. Hasil kajian menunjukkan bahawa terdapat beberapa persamaan dan perbedzaan dalam unsur-unsur yang mempengaruhi turun-naik harga saham. Hasil kajian juga menunjukkan bahawa Dividend yield, price to cash flow ratio dan Kuala Lumpur sector plantations price index, merupakan pembolehubah yang mempunyai pengaruh terbesar menentukan turun-naik harga saham dalam empat dari lima syarikat yang ditinjau.

Abstract

This Study has attempted to find a suitable model for the share prices of top-5 companies in terms of revenue, principally engaged in Palm Oil Industry and listed on Bursa Malaysia's Main Board using weekly data from January 2004 through December 2007. Using the pervious literatures such as Xu & Cai (2006), Serpkenci & Tigert (2006), Dror (2008) and Tay & Ting (2006) etc. regarding factors influencing share price behaviour, ten independent variables have been considered. They include: time, turnover by volume, EPS, P/E ratio, net sales or revenues, dividend yield, price to cash flow ratio, Kuala Lumpur sector plantations price index, KLCI composite price index and Malaysian inflation rate.

In this study the pattern of share price behaviour for the chosen palm oil industries has been completely explored. From the analysis, the Autoregressive Integrated Moving Average (ARIMA) models were the best fitted models for all the companies, with ARIMA(1,1,2) found to be suitable for two companies namely, Sarawak Oil Palms BHD and Cepatwawasan Group BHD, ARIMA(0,1,0) suitable for two other companies namely Far East holdings BHD and IJM plantations BHD and finally ARIMA(0,1,1) suitable for BLD Plantations BHD. The parameters affecting the share prices had some similarities and differences among companies. Dividend yield, price to cash flow ratio and Kuala Lumpur sector plantations price index, were the most influencing variables affecting the share prices of four companies out of five.

Chapter 1

INTRODUCTION

1.1 General Introduction

Fama's research appeared to show an unbiased reaction of stock prices to public information which is the basis of the early definitions of "efficiency" (Ball, 1994, p. 3). The concept of informational efficient capital markets is one of the most powerful contributions that financial economics has made to modern economic thought. There are three forms of market efficiency, namely weak-form, semi strong-form and strong form efficiency.

In the third and the last form of efficiency, the strong form efficiency Megginson et. al (2007) state that "asset prices reflect all information, public and private" (p. 383).

Datuk Peter Chin (2008) describes that Since 90 year ago; the palm oil industry has been flourishing to become one of the important industries which contribute to the economic and social development of the Malaysia. And he stated that Malaysia's "palm oil accounted for 10.3% or 15.82 million tonnes of the 154 million tonnes of oils and fats produced globally in 2007." And according to the Malaysian Palm Oil Board, 13.73 million tonnes have been exported in 2007 and this huge number even has been increased at the end of the year 2008 (Malaysian External Trade Statistics, 2008).

In this study, the researcher will look for the time series modelling of share price behaviour pertaining to Palm Oil industry in Malaysia's stock market named as Bursa Malaysia. In this regard five companies which play an important role in Palm Oil Industry will be chosen out of 45 companies listed on the main board of the plantation sector of the

Bursa Malaysia. The criteria which will be used in choosing these companies as a sample are their Net Sales. The information which is needed is last four year's (2004 to 2007) average weekly data of those companies share prices in Malaysia's stock market. There will be approximately 208 records which will help us in time series modelling of share prices.

1.2 Background of the Study

Many researchers, just to name a few Dunis and Morrison (2007) and Lux and Kaizoji (2006) have used time series modelling to describe the nature of changes in the stock markets.

The uniqueness of this study reveals while it is found that there is no study particularly examining the share price behaviour of the Malaysian Palm Oil industry. But several studies have been done studying the predictive value of different variables like the accounting measures (Eng et. al, 2005) and macroeconomic variables (Ibrahim and Aziz, 2003) on the stock price behaviour of Malaysian stock market and other stock markets. The background of the study and the literature related to the study will be reviewed thoroughly in chapter 2.

1.3 Problem Statement:

The plantation industry particularly oil palm industry is one of the main leaders of the Malaysia's economy. Basically, the palm oil industry has been blooming to become one of the important industries which contribute to the economic and social development of Malaysia since 90 year ago (Chin, 2008).

Share prices of companies change almost every day, there are several types of information affecting the share prices like historical data of the past behaviour or publicly available information so as time passes the share prices fluctuate. Modelling share price changes will help investors as well as companies themselves to get a useful insight to the nature of their share price behaviour and the performance of the company. There are several

studies conducted in order to study the predictive value of different variables like the accounting measures (Eng et. al, 2005) and macroeconomic variables (Ibrahim and Aziz, 2003) on the stock price behaviour of Malaysian stock market and other stock markets. But such a study has not been done particularly for the Malaysian palm oil industry's share prices.

There are several factors affecting the price fluctuations as markets are "efficient" (Fama, 1970) in terms of information and because of the subjective nature of these factors, we will include those factors that have been supported by previous studies.

1.4 Research Objectives

- To identify the top-5 Palm oil industries (without any allied products and business) in Malaysia over 2004 to 2007.
- To determine the average share price per quarter connected with the top-5 palm oil industries in Malaysia
- To study the factors influencing the average weekly share prices of Palm oil industries.
- To construct time series model for average weekly share prices for each Palm oil industry by considering:
  - i) time
  - ii) average turnover by volume per week
  - iii) average EPS per week
  - iv) average P/E ratio per week
  - v) average net sales or revenues per week,
  - vi) average dividend yield per week
  - vii) average price to cash flow ratio per week

viii) Kuala Lumpur sector plantations – average price index per week,

ix) Kuala Lumpur composite - average price index per week and

x) Malaysian average inflation rate per week

1.5 Inclusion Criteria

The basis of the inclusion criteria lies in two points:

1) The information was not available for some of the top palm oil industries before 2004.

2) The weekly average share price of the palm oil industries are considered for model construction with 208 data points (4years x 52 week) from the first week of Jan 2004 to the last week of 2007 according to Bickman and Rog (2008) and Sekaran (2003) is more than sufficient.

1.6 Research Questions

1. Which Autoregressive Integrated Moving Average model (ARIMA model) fits best for the data of selected companies?
   a. What are the significant variables affecting the weekly average share price of the selected companies?
   b. Which independent variables have been significantly affecting all the companies in terms of share prices?
2. How do the share prices of companies in Palm Oil companies change over a stipulated period of time?
   a. Do the share prices just react to the past stock prices (time-form efficiency)?
   b. Do the share prices react to the past stock prices and the publicly available information (semi-strong form efficiency)?

c. Do the share prices react to the past stock prices and all the publicly and privately available information (strong form efficiency)?

1.7 Benefits of the Research:

There are several benefits arising from the research related to the share prices of the stock markets. The first one is getting some information about the key factors affecting the behaviour of the share prices of companies studied. The information noted is a great source to help the management of the Palm Oil producing companies to make strategic decisions. As far as the stockholders wealth maximization is the relevant goal of the organizations (Ross et. al, 2008) the management can use any piece of information (the most influencing factors that affect their share prices) to make important decisions to reach to their ultimate goal.

The second important benefit is that the investors can evaluate and compare the performance of companies in terms of the factors affecting the stock prices so that they can identify the period in which the investors can accumulate or buy these stocks and make better investment decisions.

1.8 Definition of the Key Terms:

1.8.1 Share price

According to Megginson et. al (2007, p. 15) "the shares of a company's stock … are [those] owned by the stock holders" which their prices are called share's price.

1.8.2 Weak form efficiency

According to Ross et. al (2008) "a capital market is said to be weakly efficient if it fully incorporates the information in the past stock prices". They represent the weak form efficiency mathematically as:

$P_t = P_{t-1}$ + expected return + Random error

P_t = price today

P_{t-1} = the last observed price

(Ross et. al, 2008, pp. 373)

1.8.3 Semi-strong form efficiency

According to Ross et. al (2008) “a market is said to be semi strong form efficient if prices reflect (incorporates) all publicly available information” (p. 374)

1.8.4 Strong form efficiency

According to Ross et al. (2008) “market is said to be strong form efficient if prices reflect all information, public or private” (p. 374)

1.8.5 Net sales or revenues

According to Irene C. L. Ng (2008), “net sales or revenues is the price of the [product or] service multiplied by the quantity it’s sold” (p. 97).

1.8.6 Turnover by Volume

Turnover is the number of sales and it can be expressed by volume which means the number of the units sold.

1.8.7 Earnings per share

Earnings per share (EPS) is defined as, Net Income divided by the Shares outstanding. (Ross, Westerfield, Jaffe & Jordan, (2008), p. 53)

1.8.8 Price-Earning Ratio

According to Ross et. al (2008) one of the market key values price-earnings or PE ratio is defined as price per share divided by the earning per share (p. 53).

1.8.9 Dividend yield

According to Ross et. al (2008) “the amount of the dividend expressed as a percentage of the market price is called dividend yield”. (p. 142)

1.8.10 Stock Price to cash flow ratio

According to Bragg (2003) in order to calculate stock price to cash flow ratio we need to use the following formula:

$$\text{Stock price to cash flow ratio} = \frac{\text{Stock price X Number of the shares outstanding}}{\text{Earnings before interest, taxes, depreciation and amortization}}$$

Bragg (2003) expresses that "the ratio may be … used to determine the stock price that the company will probably achieve if it can reach a specific level of cash flow" (p. 66).

1.8.11 Inflation rate

According to McConnell and Brue (2005) "Inflation is a rise in the general level of prices… Inflation reduces the "purchasing power" of money but [it] does not mean that *all* prices are rising" (p. 141). The main measure of inflation in Malaysia is the consumer price index (CPI). The definition offered by Malaysia trade statistics website for CPI is as follow:

> "The Consumer Price Index (CPI) measures the percentage change through time in the cost of purchasing a constant "basket" of goods and services representing the average pattern of purchases made by a particular population group in a specified time period. The "basket" is of an unchanging or equivalent quantity and quality of goods and services, consisting of items for which there are continually measurable market prices over time. Changes in the costs of items in the basket are therefore due only to "pure" price movements, i.e. price movements that are not associated with changes in the quality and / or

quantity of the set of consumer goods and services in the basket" (Technical Notes CPI, 2008).

1.8.12 Kuala Lumpur Composite Index (KLCI)

Bursa Malaysia's website entailed that, the Kuala Lumpur Composite Index (from 1 February 2009 until 3 July 2009) or FTSE Bursa Malaysia KLCI (from 6 July 2009 onwards) is calculated by FTSE International Limited ("FTSE").

According to Bursa Malaysia's website,

> "FTSE will use the real time and closing prices sourced from Bursa Malaysia to calculate the FTSE Bursa Malaysia KLCI. Calculation is based on a value weighted formula and adjusted by a free float factor. The FTSE Bursa Malaysia KLCI values will be calculated and disseminated on a real time basis every 15 seconds.
>
> The FTSE Bursa Malaysia KLCI will be reviewed by the FTSE Bursa Malaysia Index Advisory Committee on a semi-annual basis in June and December. Full market capitalisation data as at the last trading day of May and November is used for the review. Any constituent changes will be implemented after close of business on the 3rd Friday in June and December." (FTSE Bursa Malaysia KLCI, 2008)

1.8.13 Kuala Lumpur Sector Plantation Index

According to Bursa Malaysia's website, Kuala Lumpur Sector Plantation Index is one of the Bursa Malaysia Index Series and it is derived from the companies listed in the

Main Board. There are 40 companies as the plantation index components. All Bursa Malaysia Indices are weighted by market capitalisation. The index computation is as follows:

$$\frac{\text{Current aggregate Market Capitalisation}}{\text{Base Aggregate Market Capitalisation}} \times 100$$

(Bursa Malaysia Index Series, 2008)

Chapter 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, the importance of Palm Oil industry will be highlighted by bringing an abundant literature proving the strategic role of the Palm Oil industry in Malaysia's economy.

In the proceeding part, the Malaysian stock market namely Bursa Malaysia's background, products and services will be explained. Considering the scope of this study, the researcher will focus on the main board of the Bursa Malaysia and particularly Plantation sector, giving some vital statistics.

Having some information about the Bursa Malaysia and the Palm Oil industry, the researcher focuses on the behaviour of the stock market and the Efficient Market Hypothesis is brought in. Implying that share prices are reacting to the information, the researcher will introduce a number of variables supported by proper literature to study the share price behaviour.

In the next section time series modelling of share price behaviour and the use of it is elaborated and ARIMA model will be introduced and the use of it is justified.

2.2 Malaysian Palm Oil Industry

The plantation industry particularly oil palm industry is one of the main leaders of the Malaysia's economy. The palm oil industries made impressive contribution as flourishing and important industries to the economic and social development of the Malaysia more than

90 years now (Chin, 2008). It's interesting to know that according to Datuk Peter Chin Fah Kui (2008, p. 15), this "industry provides direct employment to more than750, 000 people in 2008". According to the Department of Statistics Malaysia's website, "palm oil & palm oil-based products, ranked as the second largest export revenue earner with a total combined value of RM60.3 billion, contributed 9.8% to total exports during the period January – November 2008" (Malaysian External Trade Statistics, 2008). According to Datuk Peter Chin Fah Kui (2008) Malaysia's "palm oil accounted for 10.3% or 15.82 million tonnes of the 154 million tonnes of oils and fats produced globally in 2007." And according to the Malaysian Palm Oil Board, 13.73 million tonnes have been exported in 2007 and this huge number even has been increased at the end of the year 2008. (Refer to table 2.2.1)

Table 2.2.1
Malaysia's Import / Exports of Palm Oil (tonnes)

	Export		Import	
	2007	2008	2007	2008
Jan-December	13,734,752	15,405,889	267,569	561,034

Source: Malaysian Palm Oil Board (MPOB)

The importance of the role of the palm oil industry in Malaysia's economy encouraged the Malaysian government to take some actions in order to serve the country's palm oil industry. Government has assigned a premier agency named as the Malaysian Palm Oil Board (MPOB). According to the MPOB,

> "Its main role is to promote and develop national objectives, policies and priorities for the wellbeing of the Malaysian oil palm industry. It was incorporated by an Act of Parliament (Act 582) and established on 1 May 2000, taking over, through a merger, the functions of the Palm Oil Research Institute of Malaysia

(PORIM) and the Palm Oil Registration and Licensing Authority (PORLA). Each of these respective organisations has been involved in the oil palm industry for more than 20 years and it is to render more effective services as well as to give greater national and international focus to the industry that MPOB was instituted" (Corporate Profile).

Malaysian Palm Oil Council (MPOC) provides useful information about palm oil industry. It gives a brief history of oil palm tree which is originated from West Africa where it was growing natural and later developed into an agricultural crop. The Palm Oil describes that oil palm was first brought in to Malaya in early 1870's as a decorative plant. In 1917 the first commercial planting took place in Selangor, laying the foundations for the vast oil palm plantations and palm oil industry in Malaysia.

Basiron (2007) in his article named as "Palm oil Production through Sustainable Plantations" explains how palm oil is produced. He has described that in Malaysia plantation companies produce palm oil on estates owned by them. They usually operate mills in the process of extracting oil from the harvested fruit bunches. Small farmers with varying sizes of oil palm holdings sell the fruit bunches they have produced through dealers to nearby mills for oil extraction.

Oil palm plantation companies usually hope to join to the public listing companies on Bursa Malaysia, as the stock exchange is known. According to the list of the companies in Bursa Malaysia more than 40 companies in Plantation sector are currently listed on the Main Board, while hundreds operate as unlisted companies. According to Basiron (2007) "the profitable estate sector has attracted a growing number of smallholders to venture into oil palm cultivation" (p. 291). This may cause Independent smallholders, to switch to planting oil palm, instead of cultivating traditional crops such as rubber, coconut, cocoa or rice.

According to the Basiron (2007) this is predictable “due to the high profitability of oil palm compared to other crops” (p. 291). Table 2.2.2 is showing the Oil palm-planted area in Malaysia.

Table 2.2.2
Oil palm-planted area in Malaysia (ha)

	1980	1985	1990	1995	2000	2005	2005
	Planted area [ha]						Share
Private estates	495,412	666,099	749,608	1,230,302	2,024,286	2,412,745	60%
Organised smallholdings	347,856	469,592	650,782	1,230,302	789,558	895,764	22%
State schemes	–	–	–	196,628	242,002	318,292	8%
Independent smallholders	80,761	156,708	261,287	228,621	320,818	424,573	10%
Total	924,029	1,292,399	1,661,677	2,885,853	3,376,664	4,051,374	100%

Source: Malaysian palm Oil Board (MPOB)

2.3 Malaysian Stock Market (Bursa Malaysia)

In order to understand the nature of Malaysian stock market it is useful to have a certain amount of background knowledge on its history. This short history of Bursa Malaysia has been taken from the official Bursa Malaysia website and directly quoted below:

> In 1964, the Stock Exchange of Malaysia was established. With the secession of Singapore from Malaysia in 1965, the Stock Exchange of Malaysia became known as the Stock Exchange of Malaysia and Singapore. In 1973, currency interchange ability between Malaysia and Singapore ceased, and the Stock Exchange of Malaysia and Singapore was divided into the Kuala Lumpur Stock Exchange Berhad and the Stock Exchange of Singapore. The Kuala Lumpur Stock Exchange which was incorporated on December 14, 1976 as a company

limited by guarantee took over the operations of the Kuala Lumpur Stock Exchange Berhad in the same year.

On April 14, 2004, the name Kuala Lumpur Stock Exchange Berhad was changed to the name, Bursa Malaysia Berhad, following demutualization exercise, the purpose of which was to enhance competitive position of the stock market and to respond to global trends in the exchange sector by making us more customer-driven and market-oriented. On 18 March 2005, Bursa Malaysia was listed on the Main Board of Bursa Malaysia Securities Berhad.

Bursa Malaysia accomplished double achievements when the exchange received certifications for conformance to the ISO 9001:2000 Quality Management System and ISO 14001:2004 Environmental Management System standards on 5 October 2007.

Bursa Malaysia offers several products and services which consist of Equities, Derivatives, Exchange Traded Fund, Shariah-Compliant EFT, Offshore, Information Services, Islamic Capital Markets and Publications (Equities). Between these products and services Equities are the focus point of the researcher which according to Mobius (2007) they "offer written evidence of the security of ownership" (p. 3). Mobius (2007) describes later that those written evidences give the holder the right of the part ownership in a particular enterprise and he is entitled to a portion of interest in that enterprise. Shares Capital can be categorized under the types of equities which are defined by Stolowy and Lebas (2006) as "shares or stock certificates represent the capital; they are evidence of the contribution of the shareholders to the formation of the capital" (p. 359).

According to the Equities part on Bursa Malaysia's website, the different types of shares which are traded on Bursa Malaysia include ordinary shares and preferred shares. The

ordinary shares which also called equity shares are the main concern of this research which by definition of the Bursa Malaysia they "give holders the rights of ownership in the company, such as the right to share in the profits, the right to vote in general meetings and to elect and dismiss directors"(Equities). Beside all the rights given to the owner there are some obligations of ownership which will accompany them. This may result in the loss of an investor's money if the company is unsuccessful.

Table 2.3.1
Total Number of Listed Companies (as at 22 Jan 2009)

Year	Main Board	Second Board	MESDAQ Market	Total
2009	634	221	120	975
2007	636	227	124	987
2005	646	268	107	1021
2003	598	276	32	906
2001	520	292		812
1999	474	283		757
1997	444	264		708
1995	369	160		529
1993	329	84		413
1991	292	32		324
1989	305	2		307
1987	291	-		291
1985	284	-		284
1983	271	-		271
1981	253	-		253
1979	253	-		253
1977	256	-		256
1975	268	-		268
1973	262	-		262

Source: Bursa Malaysia

According to Bursa Malaysia's website there are 634 companies listed on the Main Board, 221 companies listed on the second board and 120 companies listed on the MESDAQ Market as at 22 Jan 2009 (refer to the table 2.3.1).

In order to be able to gather the required amount of data (related to the top five companies in palm oil industry) it is needed to focus on the Main Board due to the facts which will be explained below.

On each board (Main and Second) there are several companies grouped in the plantation sector. There are 45 companies in the plantation sector of the main board (refer to the table 2.3.3) and 4 companies in the plantation sector of the second board (refer to the table 2.3.2).

As far as the researcher is looking for at least 5 companies in palm oil industry (which is a subcategory of the plantation sector) it is needed to choose the Main board rather than Second board for this study. In addition to the reason above, according to the Listing Requirements for the Main Board and the Second Board**,** to be listed in the main board needs to firstly be listed in the second board so in order to be listed on the Main Board, companies need additional qualifications.

Table 2.3.2
Plantation Sector of the second Board

	STOCK CODE	NAME
1	7501	HARNLEN
2	9695	PLS
3	8419	PWE
4	7382	TANAMAS

Source: Bursa Malaysia

Table 2.3.3
Plantation Sector of the Main Board

	STOCK CODE	NAME
1	7054	AASIA
2	2313	AMOLEK
3	2291	ASIATIC
4	1899	BKAWAN
5	5069	BLDPLNT
6	2771	BSTEAD
7	8982	CEPAT
8	1929	CHINTEK
9	3948	DUTALND
10	3948WA	DUTALND-WA
11	5029	FAREAST
12	2372	GNEALY
13	5138	HSPLANT
14	2216	IJMPLNT
15	2607	INCKEN
16	1961	IOICORP
17	2445	KLK
18	2453	KLUANG
19	5027	KMLOONG
20	5027WA	KMLOONG-WA
21	1996	KRETAM
22	2003	KULIM
23	2003WB	KULIM-WB
24	5193	KURNIA
25	5193WA	KURNIA-WA
26	6572	KWANTAS
27	4936	MALPAC
28	5026	MHC
29	1902	MVEST
30	5047	NPC
31	2038	NSOP
32	5113	RSAWIT
33	2542	RVIEW
34	2569	SBAGAN
35	5126	**SOP**
36	5126WA	SOP-WA
37	5135	SWKPLNT
38	2054	TDM
39	8109	THGROUP
40	5112	THPLANT
41	9059	TSH
42	6327	TWSPLNT
43	2593	UMCCA
44	5019	UNICO
45	2089	UTDPLT

Source: Bursa Malaysia

Many studies have been done analyzing share prices of Malaysia's stock market, considering different factors. For instance Zainol et. al (2008) with the aim of providing "empirical evidence on the level of research and development (R&D)" (p.122) used Bursa Malaysia to report practices by public listed companies (PLC) in Malaysia. Zainol's et. al (2008) study is only for a specific year (i.e. 2004) and is limited to listed companies in the Main Board of Bursa Malaysia. In another research by Teng et. al (2007), the required sample to run the research has been taken from the set of private limited companies that are listed in the Federation of Malaysian Manufacturers Directory and public companies that are listed in Bursa Malaysia database (p. 386).

In another study by Yatim et. al (2006) in order to examine the association between external audit fees, and board and audit committee characteristics of 736 Malaysian listed firms, "a cross-sectional analysis of 736 firms listed on the Bursa Malaysia for the financial year ending in 2003" (p. 757) is required.

The researches described about are limited to the lack of enough resources it is almost definite that there are other studies done in this field but the scope of this short literature review is thus far explored only to this extent. The researcher hopes that any shortages or faults will be kindly overlooked.

2.4 Time Series Modelling for Share Prices Behaviour

Time series definitions are almost the same; it is defined by Chatfield (2004) as "a collection of observations made sequentially through time" (p.1). Brockwell and Davis (1991) define it as "a set of observations x_t, each one recorded at a specific time t" (p.1), where these observations can be share prices, which fluctuate through time.

Finance literature contains considerable number of studies that examine stock price behaviour (Ibrahim and Aziz, 2003). Perhaps, one important subject that has received increasing attention from economists, financial investors and policy makers is on dynamic linkages between several variables and stock returns.

A great number of researches have been done in relation to the time series modelling of the share prices' behaviour with different aims. For instance companies seeking to implement a quality management system use modelling share prices over a certain period of time to evaluate their performance (Ferreira et. al, 2008).

In another example of time series modelling usage, Dunis and Morrison (2007) used time series methods for modelling 10 year government bonds, in order to evaluate its performance. This kind of measuring is of interest to so many other researchers as in another paper by Lux and Kaizoji (2007), an investigation is made to find about the predictability of both volatility and volume for a large sample of Japanese stocks. The particular emphasis of their paper is on assessing the performance of "long memory time series models in comparison to their short-memory counterparts" (Lux & Kaizoji, 2007).

2.5 The Behaviour of the Stock Market

Predicting stock market prices or share prices has always been of interest of the researchers and they have been looking for the best period in which the investors can accumulate or buy the stocks. By share prices as defined by Megginson et al. (2007) we mean the price of "the shares of a company's stock that are owned by the stock holders" (p. G15) which is called the price of the shares issued.

Fama's research had a permanent effect on our knowledge of and approach toward stock markets, and financial markets. His research time after time appeared to show an unbiased

reaction of stock prices to public information which is the basis of the early definitions of "efficiency" (Ball, (1994), p. 3). The concept of informational efficient capital markets is one of the most powerful contributions that financial economics has made to modern economic thought. There are three forms of market efficiency. The first one is weak-form efficiency. Megginson et. al (2007) state that "In markets characterized by weak-form efficiency, asset prices incorporate all information from historical record" (p. 382). According to Ross et al. (2008) "a capital market is said to be weekly efficient or to satisfy weak form efficiency if it fully incorporates the information in past stock prices" (p. 373). In order to examine this hypothesis the researcher needs to gather the needed historical prices of a typical stock. In this study the historical stock prices will be chosen form top five companies in Palm Oil Industry. Ross et. al (2008) believe that historical information is the easiest type of information for one to gather in order to predict the future prices of stocks. As far as everyone can do that, the investors can earn huge profits which are not true in the real world.

In the second form of efficiency, which is the semi strong-form efficiency Megginson et. al (2007) believe that "asset prices incorporate all publicly available information" (p. 382). So if a market is semi-strong form efficient the prices will reflect all the publicly available information which Ross et. al (2008) explain that information may include "published accounting statements for the firm as well as historical price information" (pp. 374). This implies that the semi-strong form efficiency will encompass the weak form efficiency using the historical data. So in addition to historical data of the past behaviour of the stock prices we need to use the publicly available information such as the net sales or revenues of the companies chosen.

In the third and the last form of efficiency, the strong form efficiency Megginson et. al (2007) believe that "asset prices reflect all information, public and private" (p. 383).

Share prices change over time, due to the efficient market hypotheses asset prices reflect information (Megginson et. al, 2007) and as far as information is released the prices will change which seems to be an ongoing process as time passes. The direction and nature of these changes is depending on the nature of the information. Below some of the crucial variables affecting the share prices are identified and the literature related to those variables is presented.

2.5.1 Net Sales (Revenues)

In a study by Xu and Cai (2006), "the association between equity prices and reported revenues and revenue growth for high-tech companies before and after the bubble burst of the market in spring 2000" (pp. 348) is re-examined. They find that "for all firms in general during the pre- and post-2000 periods, the adjusted R^2 is the highest for the model regressing stock prices on sales revenue" (Xu & Cai, (2006), p. 349). This proves that sales revenue outperforms other key performance measures earnings and cash flows and is the most value relevant.

Serpkenci and Tigert (2006) in another study explore possible reasons for the slow-down in the rate of Wal-Mart's sales growth as well as in the stock market, implying that there is a link between them.

2.5.2 Turnover by Volume

Many studies show that the volume traded influences the subsequent stock prices. Stickel and Verrecchia (1994) believe that there is a predictable perception on that "volume is the fuel for stock prices" (p. 57) then they study the nature of the influences made by trading volume on subsequent price changes. Their evidence indicates that "large price changes on days with

weak volume support tend to reverse, at least partially, the next day" and on the other hand they found out that, " large price increase with strong volume support tend to be followed by another price increase the next day" (Stickel & Verrecchia, (1994), p. 66).

In a recent study by Dror (2008) about Bond and stock prices and trading volume change around credit rating announcements, he states that "the abnormal volume is greater for dividends with imputation tax credit" which will lead to "price differences across the markets on the ex-dividend day"(p. 224).

In another study conducted by Tay and Ting (2006) they investigate the distribution, conditional on trading volume, duration between trades, and the sign of trades of high-frequency price changes on four stocks traded on the New York Stock Exchange. Their finding show that "the probability of larger price changes increases with volume, but only for trades that occur with longer durations. Durations affect prices, with a stronger effect when volume is high." (Tay & Ting, (2006), p. 841).

According to (Stickel & Verrecchia, (1994); Dror, (2008); Tay & Ting, (2006)), we expect a positive relationship between turnover by volume and share price.

2.5.3 Earnings per Share (EPS)

One of the important accounting information is earnings per share (EPS). There are some studies regarding the importance of EPS. For instance Balsam and Lipka (1998) examine the market values earnings per share as a "meaningful measure of performance" (p. 234). They found out that all the three types of earnings per share namely basic, primary and fully diluted earnings per share are useful to investors, with slight difference in diluted earnings per share which seems to be more informative to investors in comparison to the two other types.

According to the Balsam and Lipka's (1998) findings if users of accounting information want just one measure of performance then the best choice will be the diluted earnings per share, and as far as the accounting information used in this study will be more than one the other types of earnings per shares will be informative enough for this study.

In another study conducted by Jordan et. al (2007), EPS is presented as a significant measure of performance of the entities because the market expects the entities to meet their potential earnings and if they don't meet the expected earnings, a precipitous drop in stock price cannot be avoided. So it can be concluded that there is some kind of positive relationship between earnings per share (which are earnings divided by the total number of the shares) and the share prices.

2.5.4 Price- to-Earnings (P/E ratio)

There is a great number of evidence from different researchers emphasizing the role of price- to-earnings (P/E ratio) on the return of stocks. Beneda (2003) compares return on stocks with high P/E ratios with those ones with low P/E ratios in the long run (over 14 years). She calls them growth stocks and value stocks respectively. The results of the study show that "the average return of high-P/E stocks outperforms that of low-P/E stocks over long periods" (Beneda, (2003), p 122). Her research implies that there is a positive relationship between P/E ratio and share prices, which are totally understandable, while stockholders interest in owning the stocks with higher potential of growth.

In another article conducted by Tse (2002), a methodology for investigating the behaviour of the P/E ratio on real state stocks is presented. He says that "the results have important implications with respect to the predictability of P/E ratios" (p. 112).

2.5.5 Dividend Yield

As mentioned in chapter one According to Ross et. al (2008) “the amount of the dividend expressed as a percentage of the market price is called dividend yield”. (p.142)

According to Kazi (2008) who is in his paper identifies the systematic risk factors for the Australian stock market by applying the cointegration technique of Johansen, dividend yield is one of the significantly influencing variables which manipulate the Australian stock market returns in the long-run.

In another study Su et. al (2007) investigate about “the current debate on Taiwan stock price behaviour concentrated on the question of whether stock prices are driven by fundamentals” (p. 141). Their results indicate that there exists a significant cointegration relationship between stock prices and dividends.

According to Ross et. al (2008) there are 3 different positions on the nature of the relationships between dividends and stock prices. The *first* position is grounded in the homemade dividend argument of Modigliani and Miller which tells that dividend policy is irrelevant to the stock prices given that the future earnings and future cash flows are held constant. The *second* position argues that because of the tax effects, a firm’s stock price is negatively related to the current dividend when future earnings and cash flows are held constant. Finally the *third* position states that because of stockholders’ desire for current income, a company’s stock price is positively related to the current dividend, even when future earnings (or cash flows) are held constant (Ross et. al, 2008). According to different positions we can expect any kind of relationships between share price and dividend yield.