

THE ANOMALIES OF THE STOCK MARKET

Nurza Mohamed Yusoff

Department of Economics, Faculty of Management & Muamalah
Kolej Universiti Islam Antarabangsa Selangor
nurza@kuis.edu.my

ABSTRACT

This study devoted to extending the determination of day of the week effect existing in a KLSE composite of Malaysia. The approach adopted within this study is to start with a parametric test followed by non-parametric test which is to test the existence of the day of the week effect. Daily data from January to December consist of 70 observations were used to estimation. The model used is the standard dummy variables model for the day of the week effect. Results showed that Monday had a positive higher return in the stock. It was concluded that there is reverse weekend effect in determining the day of the week effect.

Keywords: *day of the week effect, stock market, Monday effect, anomalies*

1.0 INTRODUCTION

1.1 The anomalies of the stock markets

A large number of papers over the last twenty years report anomalies in the data on stock returns. By definition, an anomaly is an incident that cannot be explained by the most usual theory. In the case of stock returns, anomalies happen with respect to the efficient markets theory, which predicts the lacks of systematic patterns in stock returns that permit trading strategies to earn excess returns. The major calendar anomalies identified by previous studies include higher average returns in January (the January effect) or at the beginning of the year (the turn of the year effect), lower returns on Mondays than other days (the weekend effect), higher returns at the ends and beginnings of months (the turn of the month effect), higher returns on days preceding national holidays (the pre-holiday effect), and serial correlation of returns that varies across days of the week. At the same time as these anomalies are well-known, their strong remains a controversial issue. The conflicting evidence exists, whether these anomalies are universal or appear only in certain time periods or only for the returns on small stocks. Robustness is also questionable because early studies generally ignored econometric problems and relied on ordinary least squares results.

1.1.1 Day of the week effect

The day of the week effect refers to returns not being homogeneously distributed over days of the week. There have been many documentation of the day of the week effect but researchers have not been able to explain its cause precisely. Previously without being affected by the extensive researchers that have been conducted, the expected returns for stocks that vary according to week day was difficult to understand. These studies are not conscious of any theory which would predict negative Monday returns or positive Friday returns. It's often a question why should order imbalance depend on the day of the week effect. The fact that most economically active activities are carried out on a five day basis week (Monday through Friday) enforces the organized security markets and firm trading on them to follow this pattern of being open Monday to Friday and closed on weekends directly.

In addition, the amount of time devoted to investment decision making varies with the day of the week where institutional investors and must advisors work primarily from Monday to Friday, while individuals make many of their decisions over the weekend. The day of the week effect could be caused by measurement errors. These errors in this could be caused upwardly biased quotes at Friday's closing price. Keim and Stambaugh (1984) indicates that Fridays closing price is subject to random errors that are, on average, positive and Monday's return is subject to random errors that are, on average negative. Larger than average positive errors on Friday will tend to be followed by larger negative errors in Monday's return. U.S data is found to display a higher than average correlation between returns on these two days.

1.4 The Economy and Development of stock exchange

1.4.1 Malaysia

The Kuala Lumpur Stock Exchange is a self-regulatory organization which governs the conduct of its members and member stock broking companies in securities dealings: enforces the listing requirements which spell out the listing and disclosure standards to be maintained by public listed companies; and which also responsible for the surveillance of the market place. KLSE was established in 1973 to provide a central market place for buyers and sellers to transact business in the shares, bonds and various other securities of Malaysian listed companies. A strong link exists between the KLSE and stock exchange in Singapore (SES) at that time as Malaysian incorporated companies.

A significant milestone for the KLSE was achieved in 1990 with the delisting of Singapore incorporated companies from the KLSE and vice versa for Malaysian companies listed on the SES. This move heralded the growth of the KLSE as a stock exchange with a truly Malaysian identify. The KLSE shares are listed on the Main Board and the Second Board was formed in 1988. The Main Board consists of listed companies with minimum paid up capital of RM 50 million and comprising ordinary shares of RM1 each. The Second Board, which lists companies with paid up capital of at least RM10 million but less than RM50 million, has now been categorized into Consumer Products, Industrial Products, Construction, Finance and Trading or services.

This move will increase the transparency of the market and also allow for easy reference in view of the increasing number of companies listed on the Second Board. The number of listed firms on KLSE has increased by 141.9% and the total capitalization jumped by 244.1% within a decade from 1989 to 1999. However, the total capitalization was high as RM777.36 billion 1996 that is before crisis. The economy had expanded strongly in the year 2004. A moderate growth was being marked in the year 2005 and 2006. The real growth was increased by 7.1% in 2004 from a relatively lower rate of 5.3% in 2003. Following a robust growth in first of 2004 averaging 8 percent, the pace of economic activity slowed in the third quarter to 6.7 percent. In the year 2004 GNI (atlas method) was at \$ 117.1 billion (In current US). GNI per capita was at \$ 4650.0 (Current US). Table 1 below presented the trend of gross domestic product of Malaysia.

Table 1: Trend of gross domestic product of Malaysia

Year	GDP	US Dollar Exchange	Inflation Index (2000=100)
1980	54,285	2.17 Ringgit	51
1985	78,890	2.48 Ringgit	64
1990	119,082	2.70 Ringgit	70
1995	222,473	2.50 Ringgit	85
2000	343,216	3.80 Ringgit	100
2005	494,544	3.78 Ringgit	109

Source: International Monetary Fund

1.2 Problem statements

There have been numerous studies that focused on the anomalies such as the day of the week effect, holiday effect and monthly effect and few have been conducted to observe these anomalies in the selected emerging countries such as Indonesia, South Korea and China. Hence, this study aims to view the extent that these anomalies affected the emerging stock markets. Most of the results presented in previous studies focus on developed capital market like US have significant negative Monday return. Study done by Lee et. al. (1990) most of the emerging capital market countries show a negative significant Monday return except Korea. In the most recent period Brusa et. al.(2003) found that the Monday return for Argentina, Chile, UK, Hong Kong and Australia is negatively insignificant. The difference between the studies is inconsistently resulting. It is also observed that most of literature on stock market anomalies is strongly concentrated in the US case. Hence this study will focus in the context of Malaysia.

1.3 Research question and Objectives of Study

The main question that arises here is it day of the week effect in a sample of Malaysia stock markets exist? To answer this question, this paper wants to study the existences of day of the week effect in a sample of Malaysia stock markets.

1.4 Significance of Study

The stock market anomalies which is the day of the week effect one of the interesting to study because the existence of significant day of the week effect would be very useful for developing profitable trading strategies. The study also will give relevant information for an international investor perspective and to track the newest development on the day of the week effects on stock markets. The findings of the study will strongly support the proposition that the weekly seasonal effect and have important implications for financial managers, financial analysts and investors. The understanding of seasonality should help develop appropriate investment strategies

1.5 Organization of Study

This study is organized into five chapters. The introductory first chapter is followed by the literature review in chapter two is expected to serve as a foundation and guideline for the

development of the model of this study. Following the literature review, chapter three describes the methodology and then details the data series used. Empirical results are presented in chapter four. Finally in the chapter five, concluding remarks and summary of this study are provided.

2.0 LITERATURE REVIEW

The day of the week effect continues to be one of the more interesting stock market anomalies to study because the existence of significant day of the week effect would be very useful for developing profitable trading strategies. Investors could buy stocks on days with abnormally low returns and sell stocks on days with abnormally high returns. Published research for the United States and Canada finds that daily stock market returns tend to be lower on Mondays and higher on Fridays (French (1980), Gibbons and Hess (1984), Rogalski (1984), Smirlock and Starks (1986).

In contrast, daily returns in Pacific Rim countries tend to be lowest on Tuesdays (Jaffe and Westerfield (1985), Dubois and Louvet (1996), Brooks and Persaud (2001)). French (1980) notes that if stock returns are based on calendar time rather than trading time, returns on Mondays should be roughly three times those on the other days of the week. The findings of French (1980) and Gibbons and Hess (1981) that average returns on Mondays are negative and significantly lower than those on the other days of the week presented a challenge to the efficient markets theory.

Several explanations for the weekend effect have since appeared. Lakonishok and Levi (1982) attribute at least part of the effect to settlement practices and check clearing conventions that make purchasing stock on Fridays attractive, but this rationale is questioned by Dyl and Martin (1985) who find an even stronger weekend effect for periods with different settlement practices. Jaffee and Westerfield (1985) also doubt on the settlement practices rationale by finding similar day of the week effect in the stock returns of other countries with different settlement practices.

Five another hypothesis is that stocks are more likely to go exdividend on Mondays, thereby lowering prices and returns, but Lakonishok and Smidt (1988) and Branch and Echevarria (1991) report results inconsistent with this argument. It has been suggested that stock returns could be lower on Mondays if firms typically wait until the weekend to release bad news, but this should not occur if markets are efficient because agents would anticipate firm's behavior and discount stocks accordingly. Some analysts favor a psychological explanation.

Miller (1988) suggests that negative returns on Mondays are due to individuals selling rather than institutions. He argues that individuals are more likely to sell on Mondays because they need the weekend to decide to sell, uninfluenced by brokers who are unlikely to recommend selling. Rystrom and Benson (1989) attribute the negative Monday returns to people feeling less optimistic on Mondays and thus more inclined to sell. Dyl and Holland (1990) and Lakonishok and Maberly (1990) report some support for this argument in that odd-lot selling, which is indicative of individuals' transactions, is higher on Mondays.

Connolly (1989), however, argues that previous findings of the weekend effect depend heavily on the assumption that returns are normally distributed with a constant variance. Using estimators that are robust with respect to violations of these assumptions, he finds

much weaker evidence of a weekend effect, particularly after 1975. Chang et al. (1993), using procedures similar to Connolly, also report that there is little evidence of an effect in the returns on a portfolio of larger companies for the period 1986 to 1990. They do find, however, evidence of a weekend effect in the stock returns of European markets.

Agrawal and Tandon (1994) also find day of the week effect in the returns in non-U.S. countries but several countries display the lowest returns on Tuesday rather than on Monday. They report that day of the week effect disappear in the 1980s. Lakonishok and Maberly (1990) examined the relationship between the week-end effect and the stock trading behavior of investors. The results showed that individual investors tend to trade more on Mondays and also tend to increase the number of selling transactions relative to buying transactions than institutional investors, thereby partly explaining the low and negative Monday returns.

Sias and Starks (1995) also examined the relationship between the day of the week effect and the trading behavior of investors by comparing the daily returns of portfolios primarily held by institutional investors and portfolios primarily held by individual investors. Their results showed that stocks with high institutional holdings clearly exhibit greater seasonal effects compared to those held by individual investors. Thus, their findings implicated institutional investors with the day of the week anomaly and generally contradicted the findings obtained by Lakonishok and Maberly (1990) which concluded that the weekend effect is primarily caused by individual investors.

3.0 METHODOLOGY

3.1 Description of Data

This study uses mainly daily data on the KLSE (KLSE Composite) and also uses time series data for Malaysia stock markets prices. All data utilized in this study are based on daily returns stock markets. The period of this study including 70 months from January 2000 to December 2005.

3.2 Sources of Data

For the purposes of this study secondary data will be collected. The secondary data can be obtain through library research by reading materials such as books, journals, through internet searching and other references. However, the daily stock prices were obtained from the daily of KLSE. The data source was the Yahoo Finance website (<http://finance.yahoo.com/intlindices?e=asia>). The daily returns r_t , of a stock indices can be calculated as follows:

$$r_t = \ln(P_t / P_{t-1}) - 1; \quad (1)$$

Where: r_t is daily returns and P_t and P_{t-1} = closing prices of the index at period t and $t-1$

The mean is one of the common measures of location often called as central tendency or center. It is the arithmetic average and is used to calculate the average of the daily returns. The formula of mean is

$$\bar{x} = \sum_{i=1}^n x_i / n \quad (2)$$

The standard deviation is one of the measure spread, alternatively referred to as dispersion or variability. It is important especially for a distribution which is normally distributed. It

improves interpretability by removing the variances square and expressing deviations in their original units. There is approximately 68% of the measurement located within one standard deviation of the mean and approximately 95% of the measurements located within two standard deviation units of mean thus the standard deviation is used to measure the average distribution around the mean. The formula of the standard deviation is

$$S = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}} \quad (3)$$

Where: S is sample standard deviation, \bar{x} is sample mean, x_i is i^{th} value of the variable x and n is number of observations.

3.3 Methodology

There are two general classes of tests of statistical significance parametric and non-parametric. Parametric test are more powerful because their data are derived from ratio and interval measurements. Non-parametric tests used to test hypothesis with nominal and ordinal data or when certain assumptions of the parametric test are violated.

3.3.1 Parametric test

Parametric techniques are the tests of choice if their assumptions are met. Assumptions for parametric tests include the following ;(i) The observations must be independent i.e.; the selection of any one case should not affect the chances for any other case to be included in the sample, (ii) The observations should be drawn from normally distributed underlying populations, (iii) These populations should have equal variance, (iv) The measurement scales should be at least interval so that arithmetic operations can be used with them.

3.3.1.1 Normality test

Normality test means that test to make normality for normally distributed variables zero covariance or correlation that means that independent of the variables. In the other side, normality test will be come out with the assumption that the variant of the central limit theorem stated that even if the number of variables is not very large or if these variables are not strictly independent, their sum will may still be normally distributed.

With this assumption, the probability distributions of the estimators can be easily derived because one of property of the normal distribution is that any linear function of the normally distributed variables is itself normally distributed. Normally test can be done with using *Jarque-Bera (JB) test*. The *Jarque-Bera test* of normality is an asymptotic or large sample test. It is also based on the OLS residuals. This test first computed the Skewness (S) and Kurtosis (K) that measures of the OLS residuals and uses the following test statistic.

$$JB = n [S^2/6 + (K - 3)^2/24] \quad (4)$$

The hypotheses are as follows:

H_o : Residuals are normally distributed

H_A : Residuals are not normally distributed

If the P value of the computed chi-square statistic in an application is sufficiently low, one can reject the hypothesis that the residuals are normally distributed. But if the P value reasonable high, one does not reject the normality assumption.

3.3.1.2 T-test

A test of significance of regression coefficients. A test of significance is a procedure by which sample results are used to verify the truth or falsity of a null hypothesis. A statistic is said to be statistically significant if the value of the test statistic lies in the critical region. In this case the null hypothesis is rejected. The formula of t-test is expressed below:

$$T\text{-test} = (\bar{x} - \mu) / (S / \sqrt{n}) \quad (5)$$

The rejection area is $t > t_{\alpha/2, n-1}$

Where: μ = population mean ($\mu = 0$); α = level of significances

If the null hypothesis is being rejected, to mean daily returns are significantly different from zero. The null hypothesis is H_0 is the mean daily returns are equal across day of the week (Monday to Friday) where H_A is the mean daily returns are different across day of the week.

3.3.1.3 P-value

P-value is the probability of obtaining a result at least as "impressive" as that obtained, assuming the null hypothesis is true, so that the finding was the result of chance alone. The fact that p-values are based on this assumption is crucial to their correct interpretation. More technically, the p-value of an observed value t_{observed} of some random variable T used as a test statistic is the probability that, given that the null hypothesis is true, T will assume a value as or more unfavorable to the null hypothesis as the observed value t_{observed} . "More unfavorable to the null hypothesis" can in some cases mean greater than, in some cases less than, and in some cases further away from a specified center.

3.3.3.2 Non-parametric tests

The branch of statistics known as non-parametric statistics is concerned with non-parametric statistical models and non-parametric tests. Nonparametric models differ from parametric models in that the model structure is not specified a priori, but is instead determined from data. The term nonparametric is not meant to imply that such models completely lack parameters; rather, the number and nature of the parameters is flexible and not fixed in advance. Nonparametric models are therefore also called distribution free.

- A histogram is a simple nonparametric estimate of a probability distribution
- Stochastic kernels are commonly used in density estimation
- Nonparametric regression and semi parametric regression methods have been developed based on kernels, splines, and wavelets.

Non-parametric (or distribution-free) inferential statistical methods are mathematical procedures for statistical hypothesis testing which, unlike parametric statistics, make no assumptions about the frequency distributions of the variables being assessed.

3.4.1 Kruskal-Wallis (KW) one-way analysis of variance

In statistics, the Kruskal-Wallis one-way analysis of variance by ranks (named after William Kruskal and Allen Wallis) is a non-parametric method. Intuitively, it is identical to a one-way analysis of variance, with the data replaced by their ranks. Since it is a non-parametric method, the Kruskal-Wallis test does not assume a normal population; unlike the analogous one-way analysis of variance. The 1-way ANOVA procedure will be used if the distribution of the five different samples is normal. Otherwise, we will employ the non-parametric 1-way ANOVA, Kruskal–Wallis test to document the existence of day-of-the-week effects:

$$KW = \frac{12}{n(n+1)} \sum_{i=1}^k \frac{R_i^2}{n_i} - 3[n+1] \quad (6)$$

where k is the number of trading days' return ($k=5$), n is the total number of sample observations, n_i is the sample sizes in i trading day, and R_i is the rank sum of the i trading day. For large sample size, the test statistics KW will follow a χ^2 distribution with $(k - 1)$ degrees of freedom. In this case, it will be four degrees of freedom. The null hypothesis would be rejected if large value for KW is observed. The hypotheses are as follows:

H_0 : No differences exist in the returns across the days of the week.

H_A : Have a differences exists in the returns across the days of the week.

If the null hypothesis is rejected, this implies that there is a day of the week effect. To find out which two trading days' mean return are different, a Turkey–Kramer test will be used if the 1-way ANOVA is used to detect the difference across the days of the week. Otherwise, a non-parametric, Wilcoxon rank sum test will then be performed to examine the pairs of groups which are significantly different.

3.4 Model

In statistics, regression analysis is used to model relationships between variables, determine the magnitude of the relationships between variables, and can be used to make predictions based on the models. In this study we use the dummy variable method to further examine the significance of the various days' returns during the sample period. If public holiday falls on the trading day on the period of study, the subsequent day return should be omitted. For instance, if Tuesday is a holiday, the return for the succeeding day, Wednesday is not included in the sample. To test the day of the week effect, the following model is calculated:

$$R_t = \beta_0 + \beta_1 d_{2t} + \beta_2 d_{3t} + \beta_3 d_{4t} + \beta_4 d_{5t} + \varepsilon_t \quad (7)$$

Where R_t is the return of the stock index on the day t . The dummy variables, d_{it} represent the day of the week which the return is observed such as d_{2t} indicates Tuesday, d_{3t} = Wednesday, d_{4t} = Thursday and d_{5t} = Friday. The coefficient β_0 measures the mean return for Monday and the coefficients β_1 through β_4 measure the difference between the expected return for each of the other days of the week and the expected return for Monday.

4.0 DISCUSSION AND RESULTS

4.1 Discussion of Kruskal-Wallis test results

Table 2 shows the result of the Kruskal-Wallis test using SPSS. The values of χ^2 statistics are insignificant at 5% level for all the markets. These results seem to contradict with the existence of day of the week effects in most of the earlier studies. These results strongly indicate that the KLSE index exhibit insignificant differences in its daily returns according to the days of the week. The results are generally inconsistent with the parametric test results, thereby confirms that insignificant day of the week effect occur in Malaysia stock market.

Table 2: Results of Kruskal-Wallis (KW) tests

Index	χ^2 Statistics	P-Value	Null hypothesis	Index	χ^2 Statistics
KLSE	2.152	0.708	Do not reject	KLSE	-0.736

4.1.1 Discussion of Day of the week effect results

To further test the robustness of these results by estimating the regression equation (7). The obtained results are summarized in Table 3 and indicate that the day of the week effect is not evident in Malaysia stock markets since the yield for each day of the week is not especially different than that of other days. Table 3 illustrates the result of regression equation (7) which enables us to examine whether Monday return are different from individual returns on the other days of the week. The results in Table 3 indicate that the average Monday returns, represented by coefficient β_0 , are significantly positive for Malaysia stock markets. The result is not consistent with studies on the Monday effect done in the U.S and the U.K stock market.

Table 3: The results of the regression analysis examining the day of the week effect

Index	β_0	β_1	β_2	β_3	β_4
KLSE	0.000206	-0.000891	0.000420	-1.87E-05	0.000420
t-statistics	0.0006	-1.0061	0.4741	-0.0211	0.1471

**Significance at 10% level

The coefficients β_1 through β_4 , represents the differences between the returns for other days of the week and Monday return. All of the coefficients are statistically insignificant at 10% significance level. This fact tells that the return for the most important representative Malaysia markets is independent of the day of the week. This result does not coincide with those obtained in most empirical studies where average Monday returns are usually significantly less than the average returns for the other days of the week.

5.0 CONCLUSION

The studies have investigated the day to day behavior of stock market returns for Malaysia. As the data were found to be non-normal, thus non parametric tests were employed to investigate the evidence of day of the week effects. Although Malaysia not follows the general pattern of higher average stock returns on the last trading days of the week and lower than average returns on the first. In the case of the entire period, Tuesday and Thursday yield negative average returns with Monday returns again being the highest.

The result for this study is that Monday yields the highest daily average returns for this study which conclude that is “reverse weekend” effect as in Brusa, Liu and Schulman (2000). A Kruskal Wallis test was carried out to substantiate the evidence of day of the week effect. From the test results, it was clearly seen that there is no conclusive evidence of the day of the week effect on the various stock markets. The results for Jarque Bera test that the daily percentage returns distribution for Malaysia stock markets are not normally distributed. It shows that the p-value is lower than 0.05 and fail to reject H_0 and the residuals are not normally distributed.

Moreover to further test the robustness of these results by estimating the regression equation (7), for the dummy variable regression the day of the week effect is not evident in Malaysia stock markets since the yield for each day of the week is not especially different than that of other days. However, all of the coefficients are statistically insignificant at 10% significance level. As a conclusion, the study highlighted that there is a reverse weekend effect in determines the day of the week effect where average return on Monday tend to be positive, is a unique features of the selected emerging countries and the normal distribution is rejected. The results are consistent with the findings documented for reversal Monday effect in the US stock market after 1988, the study done by Brusa et. al. (2000)

5.3 Limitations of the study

The results reported in this study may not provide an accurate and time view of the performance of KL due to limitations are; (i) The period of this study included only 5 years which was considered too short to reflect the actual performance of KLSE. The period may not be sufficient enough in order to determine a reliable result. (ii) The study restricted to daily data only. (iii) The study only controlling one anomaly which is Day of The Week Effect. (iv) The study sample involves only four stock markets. Therefore, the finding of this study cannot be used to generalize the stock return pattern for the entire emerging country stock markets. (v) This study also ignored all the right issues, bonus issue, and dividend of shares and replacement of shares in analyzing the anomalies.

5.4 Recommendation for future study

Given the finding and a number of possible limitation in which might mitigate the robustness of the findings, future study should give serious consideration to confirm the findings and eliminate or to mitigate these limitations. In the course of this study, several areas on the Day of The Week effect study for future research were recommend or could be considered may be necessary to examine: (i) This study is basically only in Malaysia. Future research may extend the analysis data such as developed countries, developing countries and less developed countries. (ii) To link the Day of The Week effect with investors mood and their

perception.(iii)To examine the Day of The Week effect in responses the dissemination of information.(iv)To examine the transactions costs effects on investment strategy.(v)A study using longer study period (i.e.; 10 years) in order to have a clearer result.(vi)A study using monthly data, weekly data or dividends only instead of daily data.(iv)A study included the other calendar anomalies such as holiday effect, temperature effect, Month-of-the year effect or January effect, Summer effect and Political-cycle effect. Hopefully the recommendations as well as the finding of this study will be useful for the investors, portfolio managers and student of finance in their decision making.

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