

University of Bahrain

College of Business Administration

MBA Programme

The Day-Of-The-Week Effect
Statistical Analysis
On
The Kuwait Stock Exchange

By

Ebrahim H. Ebrahim

May 1999

University of Bahrain
College of Business Administration



The Day-Of-The-Week Effect

Statistical Analysis

On the Kuwait Stock Exchange

By

Ebrahim H. Ebrahim

May 1999

DECLARATION

I declare that this work is the result of my own investigation and that it has not already been accepted in substance for any degree, nor is it being currently submitted for any degree.

Signed:



Date: 21.6.99

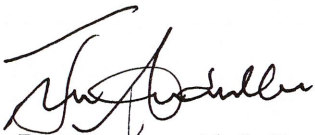
Ebrahim Hussain Ebrahim (Candidate)

The Thesis defense committee considers the Thesis titled:

"THE DAY-OF-THE-WEEK EFFECT/STATISTICAL ANALYSIS ON KUWAIT STOCK EXCHANGE"

Submitted by Ebrahim Hussain Ebrahim to the department of Business Administration and accepted for the Master of Business Administration in Management.

Thesis Defense Committee:



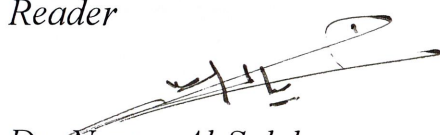
*Dr. Jassim Abdulla
Supervisor*

Department of Economics and Finance



*Dr. Hameeda Jassim
Reader*

Department of Economics and Finance



*Dr. Nazem Al-Saleh
Reader*

Department of Economics and Finance

ABSTRACT

ABSTRACT

This study tests the day-of-the-week effect on Kuwait Stock Exchange. The main objective of this study is to investigate whether the mean return of KSE Index is independent of the trading day of the week. It will also question the equality of the mean return of the Index across the trading days of the week (Saturday to Wednesday).

Several statistical techniques such as analysis of variance, Mann-Whitney test (non-parameters test) regression, in addition to a descriptive analysis were implemented to analyze and test the day-of-the-week effect.

The finding of this study rejects the null hypothesis of the equal mean returns of KSE Index across the days of the week and report the day-of-the-week effect on KSE. Such results have been reported and documented in previous studies. Although the day-of-the-week effect has been reported in this study, it has be found that 1.16% only of mean return variation is explained by the day-of-the-week effect.

ACKNOWLEDGMENT

ACKNOWLEDGEMENTS

My great thanks to God for blessing me with the accomplishments of this study. I would like to express my great appreciation and respect to Dr. Jassim Abdulla for his valuable consultation and assistance, which contributed effectively to producing this project in its present form.

Thanks are also due to Dr. Hameeda Jassim and Dr. Nadhem AL Saleh for their acceptance to be readers of my thesis. I would like to extend my thanks and appreciation to all other people who contributed to the accomplishment of this study, especially Dr. S. AL- Rokaibi and Ms. Wafa Rasheed of Kuwait Stock Exchange.

TABLE OF CONTENTS

TABLE OF CONTENTS

CHAPTER (I) INTRODUCTION

1.1	Introduction	1
1.2	Statement of problem	2
1.3	Purpose of this study	3
1.4	Scope of the study	3
1.5	Significance of the study	4
1.6	Limitations	4
1.7	Organization of the study	6

CHAPTER (II) LITERATURE REVIEW

2.1	Introduction	8
2.2	A background on Kuwait Stock Exchange	10
2.3	The day-of-the-week effect	17
2.4	Previous studies	23
2.5	Summary	31

CHAPTER (III) DATA AND METHODOLOGY

3.1	Introduction	32
3.2	Methodology and statistical tests	33
3.3	Data	37

CHAPTER (IV) EMPIRICAL RESULTS

4.1	Introduction	39
4.2	Descriptive analysis	39
4.3	Test of Homogeneity	42
4.4	Test of equal means of the Index return results	44
4.5	Test of mean of daily returns results	46
4.6	Regression analysis results	48
4.7	Summary on the Empirical Results	50

CHAPTER (V) CONCLUSIONS

REFERENCES	55
-------------------	-----------

LIST OF TABLES

LIST OF TABLES

Table 2.1:	Trading categories for listed shares.	16
Table 2.2:	Evidence of the day-of-the-week effect in different countries.	28
Table 4.1:	Summary statistics of return of KSE Index	39
Table 4.2:	Test of Homogeneity among the rate of return across the days of the week	42
Table 4.3:	Test of equal means of the Index return	44
Table 4.4:	Test of mean of daily returns	46
Table 4.5:	Results of regression analysis	48

CHAPTER I

INTRODUCTION

CHAPTER I

INTRODUCTION

1.1 INTRODUCTION

The day-of-the-week effect on stock return appears to be a world-wide phenomenon. This effect has been reported and an abundant empirical evidence has been accumulated in many studies during the last two decades. This evidence has been reported in the US Stock Market, Canada, UK, France, Italy, Japan, Australia, Singapore, Hong Kong, Korea, Malaysia, Thailand and Philippines.

This study represents an investigation of the day-of-the-week effect on the Kuwait Stock Exchange, and whether the market index returns variance is a function of the day of the week. The data used in this study represents the daily closing prices of the Kuwait Stock Exchange Index for the period of September 1992 to October 1998 (inclusive), which has been obtained from Kuwait Stock Exchange.

1.2 STATEMENT OF THE PROBLEM:

This project will attempt to answer the following question, “Does the day of the week have any effect on the Kuwait Stock Market Index return or not?”

This answer will be a valid information to most players of the stock market who try to design trading strategies in order to generate the best returns on the Kuwait Stock Exchange.

So, if the day-of-the-week effect on market index return can be reported in this study which represents the relationship between the day of the week and prices or market index return, the timing of buying and selling decisions will be adjusted according to the day of the week.

In particular, the main objective of this study is to question the following statements:

1. Stock market indicator returns are independent of the day of the week.
2. The mean returns of KSE Index are equal across the trading days of the week.

1.3 PURPOSE OF THE STUDY:

The study is an investigation of the day-of-the-week effect on the Stock Market indicator returns. To achieve its purpose, this study will attempt to address the following issues:

- a) Analysis of the day-of-the-week effect on the mean returns of the Kuwait Stock Exchange Index.
- b) Test the equality of the mean returns across the trading days of the week, and whether there is a significant difference between the mean returns across the days Saturday through Wednesday.

1.4 SCOPE OF THE STUDY:

The study scope is limited to the investigation of the day-of-the-week on the Kuwait Stock Exchange.

- 2 Kuwait Stock Market with its small number of listed companies could be considered a thin market.
- 3 It considers only the day-of-the-week-effect, ignoring other determinants, which might reduce the benefits of this study to practitioners.
- 4 It concentrates on the question of the-day-of-the-week-effect, but it does not consider the reasons of the existence of this anomaly.
- 5 The data tested in this research represents the daily closing prices of Kuwait Index without including the data for the daily closing prices of individual listed companies which could lead to different results.

1.7 ORGANISATION OF THIS STUDY:

Chapter 1 Introduction

This chapter includes statement of the problem, purpose, scope, limitations and organisation of the study.

Chapter 2 Literature Review

This part of the study is divided into three parts:

Section one A background on Kuwait Stock Exchange.

Section two Covers the general literature review on the day-of-the-week effect on stock prices.

Section three Covers previous studies on the day-of-the-week effects of some worldwide stock markets.

Chapter 3 Methodology

This chapter includes the methodology of the study and consists of hypothesis, data, data analysis techniques.

Chapter 4 Empirical Results

Data will be analysed using appropriate statistical techniques. The findings of the study will be related to the literature review in Chapter 1

Chapter 5 Conclusions

This part will include conclusions of this study based on its findings. Also recommendations will be stated to overcome some limitations on this study.

CHAPTER II

LITERATURE REVIEW

CHAPTER II

LITERATURE REVIEW

2.1 INTRODUCTION

Empirical research over the last decade has documented a persistent pattern of return and volatility for several financial assets, especially common stocks. Those studies focus on empirical regularities of asset return and their volatility in order to develop better equilibrium asset pricing models and to examine issues related to the efficiency of securities markets.

The day – of – the – week effect which implies that equity returns are not independent of the day of the week and the existence of any kind of relationship between stocks returns and the day of the week on stock market can compete or question the market efficiency theory which implies that that there are no ex-ante regularities in securities returns. Otherwise, market participants can utilize rules or such effects and relations to earn above than normal returns.

Fama (1970, 1976) defines a market as being weak-form efficient if current prices fully reflect the information contained in past prices. Weak-form efficiency implies that technical analysis of past stock prices has no value. In contrast, technical analysts base their activities on the belief that information contained in past prices is not fully incorporated in the current price. Such analysts believe that, by examining the history of prices, information can be obtained on future price movements.

This chapter will be divided into three main sections:

- 1- A background in the Kuwait Stock Exchange.
- 2- The day-of-the-week effect.
- 3- Previous studies in the day-of-the-week effect.

2.2 A BACKGROUND IN THE KUWAIT STOCK EXCHANGE

In August 1983, an Amiri Decree was issued concerning the reorganisation of the exchange as an independent financial institution, based according to up to date concepts and principles, managed by the exchange committee and by executive administration.

An Amiri Decree was issued in December 1986 concerning organising the trading activity and the clearing system in the Exchange. The decree handed over the duties of administration to the clearing chamber, to clear the transactions or register shares in the market and to specify the parties and rights of each deal.

STOCK EXCHANGE OBJECTIVES

- 1) The Kuwait Stock Exchange shall enjoy an independent judicial personality with the right of litigation in a mode facilitating the performance of its functions for the purpose of realising the objectives of its organisation in the best manner within the scope of regulations and laws governing the Stock Exchange operations.

- 2) The Stock Exchange shall within its activity act to direct and rationalise dealings in stocks and securities, within the scope of its powers in order to develop and stabilise dealing in securities in a manner securing safe, easy and accurate transactions so as to avoid any confusion in dealings.
- 3) The Stock Exchange, in pursuance of the research and studies concluded by it and its follow up of the security dealing process shall render appropriate advice and opinion to the competent government authorities regarding the financial status of the stock exchange member companies and means of promoting their efficiency for realisation of their relevant objectives.
- 4) The Stock Exchange shall participate with the competent authorities in order to realise co-ordination and integration among the financial and economic activities and the capital movement so as to assist in achieving the economic and financial development and stability of the state.
- 5) The Stock Exchange staff shall continue to develop the systems and methods of dealing in securities, besides introducing modern techniques such as those applied in advanced stock markets for the purpose of

achieving a sound financial position for the Kuwait Stock Exchange on both, regional and international levels.

- 6) The Stock Exchange shall act to encourage saving, promote investment awareness among citizens, protect depositors and create means for investment of funds in securities, in a manner beneficial to the economy.

The Kuwait Automated Trading System (KATS) was introduced in the Stock Exchange in 1996, where computers are used in every step of the transaction to provide speed and justice in share trading.

All information necessary for trading is available at your fingertips, greatly streamlining all aspects of securities trading. KATS software is based on the windows point and click technique, making the operation easy to learn and perform. Authorized brokers gave equal access to the Exchange via a KATS workstation, in their offices at the Exchange.

KUWAIT STOCK EXCHANGE INDEX

The Kuwait Stock Exchange adopts a formula for price index calculation that calculates an arithmetic average. This method is based on the internationally accepted standard for index computation. It automatically adjusts for dividends and distribution thereby more accurately reflecting process.

$$\sum_{i=1}^n \frac{[(Price_i / Base_i) \times Corrector_i]}{n} \times Multiplier$$

Where:

n is the number of stocks participating in the index

Price is the current market price for a stock

Base the closing price for a stock on the base date

Corrector to account for the effect of dividends and stock distributions. It is adjusted as follows:

Dividend

$$Corrector_{after\ dividend} = Corrector_{before\ dividend} * Price / (Price - Dividend)$$

Stock Distribution

$$Corrector_{after\ distribution} = Corrector_{before\ distribution} * [1 + (Distribution \% / 100)]$$

THE TRADED SECTORS

Shares of companies are listed according to its category in sectors. Eight

Sectors were listed in this respect these sectors are as follow:

1. Banking Sector
2. Investment Sector
3. Insurance Sector
4. Real-Estate Sector
5. Industrial Sector
6. Services Sector
7. Food Sector
8. Non Kuwaiti Companies Sector
9. Mutual Funds Sector

COMMISSION RATES & OTHER CLIENTS COSTS

The commission on transactions paid by the investor is calculated as follows:

A- For transactions less than 50,000 KD, the commission is 1.25 KD for each one thousand KD.

B- For transactions more than 50,000 KD, the commission is 0.001%

EXAMPLE: the commission of a 100,000 KD transaction is paid as follows:

- 62.5 KD for the first 50,000 KD.

- 50 KD for the second 50,000 KD.

(50,000* .001)

- Total commission for the transaction of 100,000 KD
112.5 KD.

Table 2.1: TRADING CATEGORIES FOR LISTED SHARES

CATEGORY NUMBER	CATERGORY IN FILS	CHANGING PRICE UNIT IN FILS	TRADING UNIT IN SHARES
1	1-50	0.5	80 000
2	51-100	1	40 000
3	101-250	2	20 000
4	251-500	5	10 000
5	501-1000	10	5 000
6	1000 & MORE	20	5 000

As shown on the above table, traded stocks are divided into six categories based on their prices and the number of shares per unit. For example, 20,000 shares in category 3 represent one unit, less than 20,000 shares will an odd lot. Also it shows the price change unit per category, a stock of category 1 can be quoted at 1.5 fils but a category 3 stock will be quoted at 250 fils or 255 fils and not 250.5 fils or 251 fils.

Each share cannot increase or decrease more than 5 price units per day. (e.g. a stock that trades at 300 fils can not exceed 325 fils or 275 fils per trading day.

2.3 THE DAY-OF-THE-WEEK EFFECT:

Market efficiency implies that there are no ex-ante regularities in security returns, otherwise market participants can utilize rules to earn above than normal returns. But seasonal regularities could be compatible with efficiency if caused by institutional arrangements such as differences in settlement procedures for trades at different times, seasonal in the riskless interest rate due to seasonal in the marginal efficiency of capital or money seasonal induced by government financing cycles.

In recent years it has been found that stock markets returns in a number of countries (UK, US, Canada, Japan, Finland and Australia) are not completely random. A common form of non-randomness is that the returns exhibit a significantly lower return over weekends - "the weekend effect". It is interesting to note that, although US Treasury bills show a weekend effect, US financial futures in the stock market index and UK gold returns do not. The non-randomness in stock returns apparently contradicts the widely accepted view that stock markets are at least weakly efficient for frequently

traded shares. This challenges one of the central results of finance theory and has, therefore, attracted considerable attention. [J.L.G. Board AND C.M.S. SUTCLIFFE, 1988]

The day-of the-week effect is an empirical regularity that refers to the observation that equity returns are not independent of the day-of-the-week. It is defined as the statistical inequality of mean returns across the days of the week. This effect was first documented by Observe (1962) and has subsequently been examined in numerous studies. (Stephen A. Easton and Robert W. Faff 1994)

Simultaneous to the empirical investigations of the day-of-the-week effect, efforts were also directed toward explaining the underlying causes of this effect. For example, attempts have been made to explain this effect with specialist related basis, with measurement error possibilities and with settlement procedure practices.

Given the differences in the settlement procedures and in other institutional aspects of capital markets in different countries around the world, the

uniformity of the empirical evidence on the day-of-the week effect observed around the world is truly remarkable.

Ever since Cross (1973) observed that, on average, Monday's stock returns are negative and Friday's stock returns are positive, a number of other studies have documented a day-of-the-week effect in US and around the world.

Recent studies, examining intra-day patterns of securities returns, find that the negative Monday returns occur mostly over the non-trading weekend period (See Rogalski 1984, Harris 1986 and Smirlock and Stark 1986). Other studies have improved our understanding of the nature of this weekend effect. For example, Keim and Stambaugh (1984) and Harris (1986) find size and day-of-the-week interaction. Also, Rogalski (1984) and Pettengill (1989) reported that the Monday and the weekend effect are different in January than over the other months. They find that Monday returns are, on average, positive in January and negative for the rest of the year.

Many explanations for the day-of-the-week/weekend effect have been investigated and rejected. For Example, this effect is not the result of measurement errors in recorded prices (see Gibbons and Hess 1981, and Keim and Stambaugh 1984); it is not caused by a delay between trading and settlement dates due to cheque clearing (see Gibbons and Hess 1981) and it is not due to a specialist induced bias (see Keim and Stambaugh 1984 and Fortin 1990). (Goerge Athanassakos and Michael J. Robinson, 1994)

Other possible explanations for this effect involve information flows and dividend effect. Dyl and Maberly (1988) find evidence that unfavorable news has a higher probability of being released over the weekend than the rest of the week, and this result may partially explain the observed negative average return on Monday. Also, although the dividend induced bias on daily returns are too small to totally explain the day-of-the-week phenomenon, dividend may partially explain the weekend effect, as Lakonishok and Smidt (1988) and Phillips-Patrick and Schneweis (1988) document a clustering of ex-dividend days on Monday. (Goerge Athanassakos and Michael J. Robinson, 1994)

Although an active strategy of shorting stocks on Friday afternoon and repurchasing them on Monday will not earn positive returns, after commission costs, it is still possible to take advantage of this anomaly (see Haugen 1986 pp 497-498). The conventional wisdom is to delay purchase planned for Thursday or Friday until Monday afternoon and accelerate any sales planned for Monday to Friday afternoon. On puzzling aspect of the weekend effect is that it has continued to persist over time even though investors have the ability to modify their weekend trading patterns to conform to conventional wisdom. (Goerge Athanassakos and Michael J. Robinson, 1994)

Most of the empirical work on the day-of-the-week effect rests on a foundation of simple econometric models with strong statistical assumptions. Unfortunately, these foundations are rarely evaluated systematically. An exception is the work by Connolly (1989). Using US data, Connolly examined the sensitivity of inferences about the day-of-the-week effect as an analysis of the statistical foundation of the existing research.

Jaffe and Westerfield (1985) and Condoyanni (1987) amongst others have examined the extent to which the day-of-the-week effect in markets other than US may be attributable to the correlation (contemporaneous or lagged) between their returns and returns in the US markets. Using classical statistical analysis, Jaffe and Westerfield (p441) concluded that foreign investors confront a day-of-the-week effect in their respective stock markets that is independent of the day-of-the-week effect in the US. (Stephen A. Easton and Robert W. Faff, 1994)

2.4 PREVIOUS STUDIES

[Keim and Stambaugh (1984) found significantly negative Monday returns and significantly positive last trading of the week returns, dating back to 1928 for the S&P index. Like Gibbons and Hess (1981), and most investigators after them, Keim and Stambaugh relied on F-tests to reject the equality of returns across the days of the week, like the previous studies, the day-of-the-week effect is defined as the statistical inequality of mean returns across the days of the week. Keim and Stambaugh also investigated this effect across 10 portfolios of different size firms. Their findings strongly suggested an inverse relationship between the strength of the day-of-the-week effect and the size of the firms in a portfolio. Rogalski (1984) demonstrated that the significant negative Monday returns witnessed on the S&P and the Dow Jones industrial Average (DJIA) were actually caused by what he called the “non-trading weekend effect”. Similar evidence was also uncovered by Smirlock and Starks (1986) for their 1974-1983 sub-period and by Harris (1986).

For every single one of their 10 sub-periods dating back to 1897, Lakonishok and Smidt (1988) rejected the hypothesis that all days-of-the-week produce equal returns on the DJIA. Connolly (1989) suggested that in studies of stock return anomalies where large data sets are employed, such as, Lakonishok and Smidt (1988) and Keim and Stambaugh (1984), the F-tests tend to reject the null hypothesis too often. To overcome the possible distortions caused by the sample size, he presented procedures for computing critical F-values. Connolly also concluded that the day-of-the-week effect has virtually “disappeared” in the U.S. equity markets after the mid-1970’s. This conclusion is partially supported by findings of their most recent sub-periods in studies by Keim and Stambaugh (1984), Rogalski (1984), Smirlock and Starks (1986), and Condoyanni, O’Hanlon, and Ward (1987).

Simultaneous to the empirical investigations of the day-of-the-week effect, efforts were also directed towards explaining the underlying causes of this effect. For example, attempts have been made to explain this effect with specialist related biases, with measurement error possibilities, and with settlement procedure practices. Miller (1988) argued that while over the

weekend, the self-initiated sell orders tend to exceed the self-initiated buy orders, during the week, the broker-influenced buy orders tend to exceed the sell orders. According to Miller, this intuitively appealing phenomenon causes prices to fall over the weekend, and possibly on Monday, if specialists attempt to reduce their inventory of stocks. As the week progresses, the excess demand for stocks created by broker-influenced buying tends to move the stock prices higher. Dyl and Holland (1990) have presented empirical evidence which is supportive of Miller's arguments. Lakonishok and Maberly (1990) also found a relatively larger trading activity by individual investors on Mondays.

Outside of the United States (U.S.), with two exceptions, namely, those of the Madrid Stock Exchange in Spain, and the Taiwan Weighted index of Taiwan, the day-of-the-week effect has been documented in every equity market examined for this effect. In order to conserve space, the findings of 15 relevant studies are summarized in Table 1. While the objectives of the studies covered in Table 1 encompassed much more than the investigation of the day-of-the-week effect, this table is prepared with the solitary goal of

providing information relating only to the evidence of the day-of-the-week effect.

In spite of the differences in the test periods, an examination of Table 1 leads to the obvious conclusion that the inequality of mean stock market returns across the days of the week, is very much a worldwide phenomenon. In the U.S., Canada, the U.K., Hong Kong, and Malaysia, Monday returns are generally significant, negative, and lowest of the week. These undesirable statistical characteristics in Japan, Australia, Korea, Philippines, as well as, in France and Italy are found on Tuesdays. In the case of Singapore, while Aggarwal and Rivoli (1989) and Wong, Hui, and Chan (1992), found the lowest mean return on Mondays, Condoyanni, O'Hanlon and Ward (1987), and lee, Pettit, and Swankoski (1990), found the lowest mean return on Tuesdays.

One of the explanations offered for the lowest returns on Tuesdays in the capital markets of the Far Eastern countries is the time zone hypothesis. However, the evidence on the stock market patterns in Hong Kong,

Malaysia, as well as, in Italy and France challenge the merits of the time zone difference argument. Given the differences in the settlement procedures and in other institutional aspects of capital markets in different countries around the world, the uniformity of the empirical evidence on the day-of-the-week effect observed around the world is truly remarkable.]

(Kamath R. and Sitthichanikasen P., 1995)

* **Table 2.2 EVIDENCE ON THE DAY-OF-THE-EFFECT IN DIFFERENT COUNTRIES**

Author (s) and the publication year	Country for which day-of-the-week effect was investigated	Study period	Was day-of-the-week effect supported	Findings
Theobald and price 1984	U. K.	6/1975 - 5/1981	Yes	Monday's negative means return was found to be significantly different from other days.
Jaffe and Westerfield, 1985	U.S. A. Japan	7/1962 - 12/1983 1/1970 - 4/1983	Yes Yes	Lowest (negative) mean return on Mondays Lowest (negative) mean return on Tuesdays, negative mean return on Monday also.
	Canada U. K. Australia	1/1976 - 11/1983 1/1950 - 11/1983 3/1973 - 11/1982	Yes Yes Yes	Lowest (negative) mean return on Mondays. Lowest (negative) mean return on Mondays. Lowest (negative) mean return on Tuesdays, negative mean return on Monday also.
Jaffe an Westerfield, 1985	U. S. A. Japan	1/1970 - 4/1983 1/1970 - 4/1983	Yes Yes	Lowest (negative) mean return on Mondays. Lowest (negative) mean return on Tuesdays, negative mean return on Monday also.
	Japan	1/1970 - 4/1983	Yes	Lowest (negative) mean return on Tuesdays, negative mean return on Monday also.
Santesmases, 1986	Spain	1/1979 - 12/83	No	First trading day (Tuesday) mean return negative and lowest while Friday mean return highest for the index.

* Cited form Kamath & Sittichaiakasem (1995: 1209 – 1211), The International Journal of Finance. VOL 7 NO. 2, 1995

TABLE 2-2 Continued

Author (s) and the publication year	Country for which day-of-the-week effect was investigated	Study period	Was day-of-the-week effect supported	Findings
Condoiyanni, O'Hanlon and Ward, 1987	U. S. A.	1/1969 - 12/1984	Yes	Significant negative mean return on Mondays
	Canada	1/1969 - 12/1984	Yes	Significant negative mean return on Mondays
	U. K.	1/1969 - 12/1984	Yes	Significant negative mean return on Mondays
	France	1/1969 - 12/1984	Yes	Significant negative mean return on Tuesdays
	Australia	1/1981 - 12/1984	Yes	Significant negative mean return on Tuesdays
	Japan	1/1969 - 12/1984	Yes	Significant negative mean return on Mondays
	Singapore	1/1969 - 12/1984	Yes	Significant negative mean return on Tuesdays
Lee and Chang, 1988	Korea	1/1976 -6/1985	Yes for 5 of the 10 different size portfolios	Day-of-the-week effect found for non-trading periods but not for trading periods.
Kim, 1988	U. S. A.	1/1980 - 12/1984	Yes	Monday mean return negative and lowest for the week.
	U. K.	1/1980 - 12/1984	No	Monday mean return negative and lowest for the week.
	Canada	1/1980 - 12/1984	Yes	Monday mean return negative and lowest for the week.
	Korea	1/1980 - 12/1984	Yes	Tuesday mean return negative and lowest for the week.
	Japan	1/1980 - 1984	Yes	Tuesday mean return negative and lowest for the week.
	Australia	1/1980 - 12/1984	Yes	Tuesday mean return negative and lowest for the week.

Table 2-2 Continued

Author (s) and the publication year	Country for which day-of-the-week effect was investigated	Study period	Was day-of-the-week effect supported	Findings
Aggarwal and Rivoli, 1989	Hong Kong Malaysia Philippines Singapore U. S. A.	9/1976 - 6/1988	Yes	Monday mean return lowest for the week.
		9/1976 - 6/1988	Yes	Monday mean return lowest for the week.
		9/1976 - 6/1988	Yes	Tuesday mean return lowest for the week.
		9/1976 - 6/1988	Yes	Monday mean return lowest for the week.
		9/1976 - 6/1988	Yes	Monday mean return lowest for the week.
Jaffa, Westerfield and Ma, 1989	U. S. A. U. S. A. U. S. A. U. K. Japan Canada Australia	1/1930 - 6/1962	---	Generally speaking, the negative mean return on Mondays virtually disappears if the stock market had a positive movement in the previous week.
		7/1962 - 12/1981	---	
		1/1950 - 11/1983	---	
		1/1970 - 4/1983	---	
		1/1976 - 11/1983	---	
		3/1973 - 11/1982	---	
Lee, Pettit and Swankoski, 1990	Hong Kong Japan Korea Singapore U. S. A. Taiwan	1/1980 - 12/1988	Yes	Negative returns on Mondays and/or Tuesdays in all but Taiwan. Positive mean returns on all days in Taiwan.
		1/1980 - 12/1988	Yes	
		1/1980 - 12/1988	Yes	
		1/1980 - 12/1988	Yes	
		1/1980 - 12/1988	Yes	
		1/1980 - 12/1988	No	
Soinik and Bousquet, 1990 Barone, 1990	France Italy	1/1978 - 12/1987	Yes	Persistent negative mean return on Tuesday.
		1/1976 - 8/1989	Yes	Negative means return on Monday and Tuesday (lowest for the week) and highest mean return on Friday.
Siemba, 1990	Japan	1949 - 1988	---	Very strong pre-holiday effect.
Kato, 1990	Japan	1974 - 1987	---	For all size portfolios, Tuesday mean returns are the lowest and Wednesday mean returns are the highest.
Wong, Hui and Chan, 1992	Singapore Malaysia Hong Kong Thailand Taiwan	1/1975 - 5/1988	Yes	Negative mean returns in Singapore, Malaysia, and Hong Kong. Negative mean return in Thailand. High positive return on Fridays in all but Taiwan market.
		1/1975 - 5/1988	Yes	
		1/1975 - 5/1988	Yes	
		1/1975 - 5/1988	Yes	
		1/1975 - 5/1988	No	

i. Two different indices were used for Japan.
There was no Monday trading in Spain until June,

2.5 Summary

The day-of-the-week effect is an empirical regularity that refers to the observation that equity returns are not independent of the day of the week. It is defined as the statistical inequity of mean returns across the day of the week. This effect was first documented by Observe (1962) and has subsequently been examined in numerous studies.

A number of empirical studies, which reported the-day-of-the-week, have been covered in this chapter. Those studies have been conducted on USA, UK, Japan, Australia, Spain, France, Singapore, Hong Kong, Malaysia, Philippines, Korea, Italy, and Thailand.

CHAPTER III

DATA AND METHODOLOGY

CHAPTER III

DATA AND METHODOLOGY

3.1 INTRODUCTION:

This part of the study describes the methodology used in conducting the study, the study hypothesis, and the data used.

However, it should be noted that studies mentioned in chapter II have been conducted in a significantly different environment than Kuwait in many aspects:

- i). The size of those markets.
- ii). The development of those markets.

3.2 METHODOLOGY AND STATISTICAL TESTS:

To investigate the day-of-the-week effect across the five trading days (Saturday To Wednesday) we will be using a number of statistical techniques, which basically will measure the returns variance across the week days. The same will be used once again to test the mean return variances for each day against others of the week, and test the mean return variances for each day when compared to each other day of the week.

The following regression for the whole period is run to test whether there is any statistically significant difference among index returns on different days of the week:

(1)

$$R_{it} = \beta_1 \text{Saturday} + \beta_2 \text{Sunday} + \beta_3 \text{Monday} + \beta_4 \text{Tuesday} + \beta_5 \text{Wednesday} + \varepsilon$$

Where:

Saturday = 1 if day t is Saturday and 0 otherwise,

Sunday= 1 if day t is a Sunday and 0 otherwise

and so on

The OLS coefficients $B1$ to $B5$ are the mean returns for Saturday through Wednesday respectively. The Stockastic disturbance term is indicated by ε .

The null hypothesis to be tested in this study is:

i). $H_0: B_1 = B_2 = B_3 = B_4 = B_5$ (2)

H_0 : There is no day of the week effect in KSE

H_1 : There is a day of the week effect in KSE

The rejection of the null hypotheses shown in this equation would suggest that the mean returns of five trading days are not equal.

ii). By isolating Saturday, we test for the equality of mean returns of the other four trading days as follows:

$H_0: B_2 = B_3 = B_4 = B_5$ (3)

$H_0: B_1 = B_3 = B_4 = B_5$ (4)

$H_0: B_1 = B_2 = B_4 = B_5$ (5)

$H_0: B_1 = B_2 = B_3 = B_5$ (6)

$H_0: B_1 = B_2 = B_3 = B_4$ (7)

The failure to reject the null hypothesis of equation (4) would suggest that while the mean returns of Saturday through Wednesday are statistically equal, the Sunday mean return is significantly different from that of the other days.

Similarly, we will isolate Sunday, Monday, Tuesday and Wednesday respectively and repeat the test. the failure to reject the null hypotheses of equation (5), (6), (7) and (8) respectively, would suggest that the Sunday, Monday, Tuesday and Wednesday mean return is significantly different from that of the other days of the week.

Skewness

Skewness statistics is a question of normality measure of location and measures of variation are fundamentally important statistical descriptions. It describes the overall shape of distribution. Distribution of actual data can assume almost any shape. A simple measure of the extent to which a distribution is skewed is based on the relationship between the median and the mean while is called the Pearsonian coefficient of skewness, its formula is

$$\text{Skewness} = \frac{3(\text{mean} - \text{median})}{\text{Standard Deviation}}$$

For a perfectly symmetrical distribution the value of sk is 0,

Its value must fall between -3 and 3.

Analysis of variance:

With the Anova analysis, we will test whether the Mean return of the trading days are different from each other and measure whether they are significant at certain levels. If the null hypothesis is true and if the assumptions we made are valid, the sampling distribution of this statistic is the F distribution. The null hypothesis will be rejected when F is large.

3.3 DATA:

To investigate the day-of-the-week effect in this study, the daily observations of the KSE Index are employed. The data set represents the daily closing of KSE Index for the period September 1992 to October 1998, which have been obtained from Kuwait Stock Exchange database.

Kuwait Stock Exchange Index

$$\sum_{i=1}^n \frac{[(Price_i / Base_i) \times Corrector_i]}{n} \times Multiplier$$

Where:

n is the number of stocks participating in the index

Price is the current market price for a stock

Base the closing price for a stock on the base date

Corrector to account for the effect of dividends and stock distributions.

It is adjusted as follows:

Dividend

$$Corrector_{after\ dividend} = Corrector_{before\ dividend} * Price / (Price - Dividend)$$

Stock Distribution

$$Corrector_{after\ distribution} = Corrector_{before\ distribution} * [1 + (Distribution \% / 100)]$$

Unconditioned logarithmic returns of all observation for the period tested are calculated as follows:

$$R_{\text{index}_t} = (\log(\text{index}_t) - \log(\text{index}_{t-1})) * 1000$$

Where R_{index_t} refers to the return on KSE Index on day t

Index t refers to KSE Index price on day t

Index $t-1$ refers to KSE Index price on day t-1

CHAPTER IV

EMPIRICAL RESULTS

CHAPTER IV

EMPIRICAL RESULTS

4.1 INTRODUCTION:

This chapter includes the analysis and findings of this study. Statistical measures, techniques and significance testing were used to test the hypothesis of equal mean return for weekdays. This includes a descriptive analysis, analysis of variance and the results of the regression test. Non-parametric techniques were also used (Mann-Whitney test).

4.2 DESCRIPTIVE ANALYSIS

The summary statistics for the daily closing price changes of the Kuwait Stock Exchange Index are shown in table 4.1.

Table 4.1 Summary statistic of return of KSE Index

Statistics	Days				
	Saturday	Sunday	Monday	Tuesday	Wednesday
Mean	0.083622	-0.016090	0.030605	0.042725	-0.014880
Median	0.080551	0.000000	0.021379	0.031782	0.000000
Maximum	1.893420	0.840054	1.168920	0.865863	1.311595
Minimum	-1.653650	-1.314937	-0.770957	-1.124399	-0.928676
Std. Dev.	0.359376	0.310535	0.277847	0.282676	0.285806
Skewness	-0.165611	0.545638	0.525186	-0.384936	0.112645
Kurtosis	11.04882	5.302172	5.568599	5.066456	6.088300
Jarque-Bera	627.3009	63.01563	76.36809	47.81897	94.68497
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	232	233	238	236	237

The mean return across the trading days of the week, Saturday through Wednesday are 0.083622, -0.016090, 0.042725 and -0.014880. Even though there is no significant difference across the week, Sunday has the lowest mean, and Saturday has the highest mean.

The standard-deviation (used as measure of volatility) of mean return across the week days are almost the same, but Saturday has the highest volatility (0.359376) and Monday has the lowest volatility (0.277847). It is very important to note that Saturday has the highest mean return and the highest volatility across the week. It is sometimes hypothesized that the standard deviation of returns should be higher the first day of the week than on the other days since more news or information can be announced during the three calendar days.

At the same time it should be noted that all payments for purchase at KSE should be paid at $T + 1$ whereby all proceeds of sale are paid on Saturdays only through the Kuwait clearing company, therefore these specific settlement procedures could affect the distribution of daily stock returns.

Numerous studies have documented that the average return in the USA is significantly negative on Mondays and is abnormally large on Fridays. Jaffe

and Westerfield (1985) find this “Weekend Effect” also in Canada and the UK, but find the Tuesday returns to be negative and lower than Mondays in Australia and Japan.

Even though most of those studies have reported negative returns on Mondays, this investigation has reported positive returns on Saturdays. Saturday is the first trading day on Kuwait Stock Exchange when compared to other stock worldwide stock markets. It is also reported in this study that Sunday (the second trading day of the week) has the lowest mean returns, which is in line with a number of previous finding of Jaffe and Westerfield, 1985, on Japan, and on Australia, Kim (1988) on Korea, and Japan, and Australia, Aggarwal and Rivoli (1989) on Philippines, Soinlk and Bousquest (1990) on France, Barrane (1990) on Italy, Kato (1990) on Japan.

Such results could help market players to design a trading strategy, based on the above results selling on Saturdays and buying on Sundays could be a very good trading strategy, but a special attention should be paid to the effect of transaction cost which might make this strategy ineffective. At the same time these results might help if it is necessary to trade.

To question the normality of distribution of returns across the week, skewness and kurtosis were calculated. As shown in table 4.1, skewness figures ranged between -0.384936 and 0.54568 . Which indicates a kind of normal distribution, the kurtosis figures ranged between 5.066456 and 11.04882 , which is higher of those of normal distribution of -3 and $+3$.

Results obtained from the parametric test assume normality, so these results should be read with caution.

4.3 TEST OF HOMOGENEITY

The results reported in the above section might be due to the differences between the variances of the rate of return of the day of the week. Therefore a homogeneity test is carried out to test whether the variance of the rates of return are significantly different from the each others.

Table 4.2 Test of Homogeneity among the rate of return across the days of the week.

RIndex		
Days	Statistic	
	Levene Statistic	Sig. level
Sat. Vs. Others	16.381	0.000
Sun. Vs. Others	0.987	0.321
Mon. Vs. Others	1.013	0.314
Tue. Vs. Others	1.003	0.317
Wed. Vs. Others	1.008	0.316

The results on table 4.2 when testing the Homogeneity of the variance of rate of return across the days of the week, shows that there is no significant difference on rate of returns of Sundays when compared to other days of the week. Monday against the other days of the week, Tuesday to other days of the week and Wednesday versus other days of the week, but it is clearly confirms the significant differences on the variance of rate of return of Saturday when compared to other days of the week (0.000).

This confirms that the volatility is not the same across the week.

4.4 TEST OF EQUAL MEANS OF THE INDEX RETURN RESULTS

To further investigation the results reported in section 4.2, the mean return of each day of the week is compared against the other days. Both parametric and non-parametric techniques are used to test whether there is a significant difference of mean returns across the days of the week. Results are reported in table 4.3.

Table 4.3 Test of equal means of the Index return

Days	Test			
	ANOVA		Mann-Whitney	
	F	Sig.	Z	Sig.
Sat. Vs. Others	4.061	0.044	-4.190	0.000
Sun. Vs. Others	0.246	0.620	-2.201	0.028
Mon. Vs. Others	0.253	0.615	-0.302	0.762
Tue. Vs. Others	0.251	0.617	-1.123	0.262
Wed. Vs. Others	0.252	0.616	-2.794	0.005

The results of both tests confirm the significant difference of mean returns of the Index on Saturday against other days of the week (0.044 and 0.000).

While the non-parametric test results confirm the significant difference of mean returns of the Index on Sunday and Wednesday against the other days of the week, the ANOVA result shows that there is no significant difference against other days of the week. Such results reject the null hypothesis of equal means of the Index return across days of the week, which confirms that the rate of return of the Index depends on the day of the week in line with the results reported earlier in section 4.2. Also the significant F value for Saturday against other days of the week confirms the conclusion that there is a day-of-the-week effect in the KSE.

4.5 TEST OF MEAN OF DAILY RETURNS RESULTS

Since the homogeneity of variance is a precondition for the ANOVA, which did not hold as reported earlier, the Mann-Whitney test is used in this section to test whether there is significant difference of mean return for each day of the week against others.

Table 4.4 Test of mean of daily returns
Mann-Whitney test

Days	Statistic	
	Z	Sig.
Sat. Vs. Sun.	-3.889	0.000
Sat. Vs. Mon.	-2.951	0.003
Sat. Vs. Tue.	-1.965	0.049
Sat. Vs. Wed.	-4.466	0.000
Sun. Vs. Mon.	-1.260	0.208
Sun. Vs. Tue.	-2.100	0.036
Sun. Vs. Wed.	-0.251	0.802
Mon. Vs. Tue.	-0.911	0.363
Mon. Vs. Wed.	-1.630	0.103
Tue. Vs. Wed.	-2.479	0.013

Table 4.4 shows that mean returns of Saturday is significantly different than those of other days of the week, 0.000 against Sunday's, 0.003 against

Monday's, 0.049 against Tuesday's and 0.000 against Wednesday's.

At the same time when the results on table 4.4 shows that there is no significant difference on mean returns of Sunday against Monday and Wednesday, it shows that it is significantly different than Tuesday at 0.036.

Mean returns of Tuesdays are significantly different than the mean return of Wednesday at 0.013.

Such results lend further support to those reported in section 4.2 which therefore reject the null hypothesis of equal mean returns across the days of the week.

4.6 REGRESSION ANALYSIS RESULTS

A Multivariate analysis is used to test how the-day-of-week effect explains the variation in the rate of return of the market Index . The regression analysis results are shown in table 4.5.

Table 4.5 Results of Regression Analysis

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	0.083622	0.019990	4.183256	0.0000
SUNDAY	-0.099713	0.028239	-3.530971	0.0004
MONDAY	-0.053017	0.028091	-1.887338	0.0594
TUESDAY	-0.040897	0.028150	-1.452844	0.1465
WEDNESDAY	-0.098502	0.028120	-3.502884	0.0005
R-squared	0.014965	Mean dependent var		0.025078
Adjusted R-squared	0.011600	S.D. dependent var		0.306257
S.E. of regression	0.304475	Akaike info criterion		0.463789
Sum squared resid	108.5578	Schwarz criterion		0.485344
Log likelihood	-267.7078	F-statistic		4.447514
Durbin-Watson stat	1.524600	Prob(F-statistic)		0.001431

It appears that the rates of return across the days of the week are different except of Tuesdays.

As shown in the above Saturday, Sunday, Monday and Wednesday is significantly different from zero. Looking at the adjusted R-squared, which although it is highly significant ($F = 4.447514$, significant at 0.001431), it is quite low.

As shown in table 4.5, the adjusted R-squared is 0.0116, which means that the day-of-the-week effect explains only 1.16% of the variation in the rate of return of the market index. 98.84% of the variation of the rate of return is explained by other factors than the-day-of-the-week effect. This variation of the rate of return on KSE Index could be investigated further by testing the settlement procedure or by testing the information pattern of KSE.

SUMMARY OF THE EMPIRICAL RESULTS:

By conducting different statistical measures to investigate the day-of-the-week effect on Kuwait Stock Exchange Index, it has been found that the mean of KSE Index return is different among the trading days of the week, which reject the null hypothesis of equal mean return across the days of the week, and confirms the existence of the day of the week effect on Kuwait Stock Exchange even though this effect explains only 1.16% of return variation.

CHAPTER V

CONCLUSIONS

CHAPTER V

CONCLUSIONS

The main objective of this study is to investigate the day-of-week effect on Kuwait Stock Exchange Market Index returns. The day-of-the-week effect implies that market indicators returns are not independent of the day of the week as has been reported in various studies on world-wild stock markets. The data used in this study represents the daily closing prices of KSE Index for the period from Sept. 1992 to October 1998, which was obtained from the Kuwait Stock Exchange database.

Various statistical techniques have been used, including parametric test (analysis of variance), non-parametric test (The Mann-Whitney test), Regression Analysis in addition to a descriptive analysis, to investigate the day-of-the week effect on KSE Index returns and to question the equality and homogeneity of KSE Index mean returns.

It has been found as shown in the descriptive analysis that the KSE Index mean returns on Saturdays are significantly different from KSE Index mean return on other days of the week.

It has been found as shown in the descriptive analysis results, section 4.2 Chapter four, that the KSE Index mean returns on Saturdays (The first trading day of the week on Kuwait Stock Exchange) are significantly different from KSE Index mean returns on other days of the weeks, This is exactly in line with findings of other various studies on a number of world-wide stock markets, even though it is positive and not negative when compared to the other findings of those studies. Sunday mean returns were found negative and lowest across the trading days of the week similar to findings of those studies.

When testing the homogeneity of the rate of return variances it has been found that rate of return variance on Saturday is significantly different from zero when compared to other across the week.

Also it has been found that the mean return on Saturdays is significantly different against mean returns of other days of the week. Both parametric and non-parametric techniques have been used in this study support the above findings.

The mean returns of the KSE Index on Saturdays were significantly different when compared to mean returns of each day of the week as reported in table 4.4.

The above findings have been supported by the regression analysis results, which confirmed the significant difference of mean return variance among the trading days of the week. It has been found that rate of return variances are significantly different from zero for Saturday, Sunday, Monday and Wednesday. Even though the day-of-the-week effect has been confirmed in this study, this effect can explain only 1.16% of the variations of mean return across the days of the week.

Finally, this study concludes:

1. In relation to the hypothesis that the rate of returns of KSE Index are independent of the day of the week was rejected.
2. In relation to the hypothesis of equal rate of returns of KSE Index among the days of the week was rejected.

In order to overcome the limitations of this study and to make its findings more valuable to investors the following recommendation are being made:

1. Future studies should further test the day-of-the-week effect on the sub-indices of the Kuwait Stock Exchange.

2. Future studies should apply to the individual listed companies on the Kuwait Stock Exchange.
3. The sample period of the study (1992-98) could be divided into sub-periods which can be compared to each other.
4. This study has indicated that the Saturday's returns have proved to be positive and significantly different from other days of the week, this factor needs further investigation to further verify this phenomenon.

REFERENCES

REFERENCES:

1. Balaban ERIC, (1995,2; 139-134), *Day of the week effects: new evidence from an emerging stock market*, *Applied Economics letter*, 1995-2.
2. Board J.L.G. and Sutcliffe C.M.S., (1988: 199-211), *The weekend effect in UK stock markets return*, *Journal of Business Finance & Accounting*, 15 (2) Summer 1988.
3. Eastern A>S. and FAFF R.W., 1994, 4: 99-110) *An Investigation of the robustness of the day-of-the-week effect in Australia*, *Applied Financial Economics*, 1994,4.
4. Hilliard J.E., (1992: 1159-1171), *A note o weekday, Intraday, and overnight patterns in the interbank foreign exchange and listed currency options markets*, *Journal of Banking and Finance* 16, 1992, North-Holland.
5. Chan K.C., Grp B.E. and Pan M.S., (1992: 289-307), *AN Empirical Analysis of Stock Prices in major Asian markets and the United States*, *The Financial Review*, 1992, VOL.27 No2.
6. Finn F., LYNCH A. and Moore S., (December 1991: 129 –144), *IntraWeek Regularities in Security Returns: Further Australian Evidence*, *Australian Journal of Management*, 16,2, The University of New South Wales.
7. Agrawal A.and Tandon K., (1994: 83-106), *Anomalies or illusions? Evidence form Stock Markets in eight countries*, *Journal of International money and Finance*, 1994 – 13.
8. Solnic B. and Bausquet L., (1990: 461-468) – *Day of-the-week effect on the Paris Baurce*, *Journal of Banking and Finance* 145, North-Holland.
9. Lee l., Pettit E. and Swankoski k., (1990: 295-283), *Daily Return Relationships Among Asian Stock Markets*, *Journal of Business Finance and Accounting*, 17 (2).

10. *Athanassakos Grand Robinson K.J., (September 1974: 833-855), The day-of-the-week Anomaly: The Toronto Stock Exchange Experience., Journal of Business Finance and Accounting, 21 (6).*
11. *Kamath R and Sitthichanikasen P., (1995: 1206 – 1222), An investigation of the Day-of-the-week effects an Nascent Stock Market: The Thailand Experience, The International Journal of Finance, 1995, VOL 7, No. 2.*