Equitisation and stock-market development

Loc, T.D.

Chapter 9

Testing Anomalies in Stock Returns for the Vietnamese Stock-Market

9.1. Introduction

As presented in Chapter 8, the Vietnamese stock market is not efficient in the weak form. This evidence implies that stock price anomalies could be present in the market so that investors can earn abnormal returns by using a trading strategy based on past information. Among such anomalies, the day-of-the-week and overreaction effects are seen as the most important patterns and have been extensively studied and documented in the financial literature for the last decades. However, no study has been found on this issue for the Vietnamese stock market. This chapter tries to enrich the literature by testing for the existence of these effects in the Vietnamese stock market.

The remainder of this chapter is organised as follows. Section 9.2 deals with the day-of-the-week effect on stock returns and stock volatility. Then, the stock market overreaction is investigated in Section 9.3. Finally, Section 9.4 concludes the chapter.

9.2. Day-of-the-week effect on stock returns and stock volatility

The day-of-the-week effect indicates that returns are abnormally higher on some days of the week than on other days. Specifically, results derived from many empirical studies have documented that the average return on Friday is abnormally high, and the average return on Monday is abnormally low. In this section, the day-of-the-week effect on both returns and volatility is closely examined for the VNINDEX (the market index of the Vietnamese stock market).

9.2.1. Empirical literature review

This sub-section reviews the findings from empirical studies on the day-of-the-week effect in both developed and emerging stock markets. Because it is not possible to list all the relevant studies here, the review just focuses on those which are supposed to be re-presentable for this field. For the reason of convenience, the empirical evidence on the daily seasonal anomaly in developed and emerging stock markets are separately examined. A summary of these studies is given in Table 9.1 and Table 9.2.

Day-of-the-week effect in developed stock markets

It is observed that the day-of-the-week effect on stock returns is primarily reported for the U.S. stock market. Indeed, French (1980), Gibbon and Hess (1981), Condoyanmi et al. (1987), Jaffe and Westerfield (1985), Dubois and Louvet (1996) document that the mean return is significantly negative on Monday, but it is significantly positive on Friday. Similarly, a daily seasonal anomaly is found in the Canadian stock market with a negative Monday and positive Friday effect as observed in the U.S. stock market [Jaffe and Westerfield (1985), Condoyanmi et al. (1987), Dubois and Louvet (1996) and Kiymaz and Berument (2003)].

In Europe, the day-of-the-week effect is observed in all developed stock markets. In fact, a significant negative Monday effect is reported for the U.K., Germany, France, and Switzerland, and a significant positive Friday effect is observed in France [Jaffe and Westerfield (1985), Condoyanmi et al. (1987), Dubois and Louvet (1996) and Kiymaz and Berument (2003)]. In addition, a significant negative mean return on Tuesday is reported for the U.K. Germany, France, Austria and the Netherlands [Jaffe and Westerfield (1985), Condoyanmi et al. (1987), Balaban et al. (2001)]. Moreover, a negative Friday effect is abnormally identified for Germany and Austria [Balaban et al. (2001)].

Turning to stock markets in the Pacific Rim region, it is evident that the highest mean return is observed on Friday while the lowest mean return occur on Tuesday for both the Japanese and Australian stock markets occur on Tuesday [Jaffe and Westerfield (1985), Condoyanmi et al. (1987) and Dubois and Louvet (1996)]. The findings of negative Tuesday effect in these markets are completely different from those derived from the empirical studies in the U.S. stock market. According to Jaffe and Westerfield (1985), the negative Tuesday effect in the Japanese and Australian stock markets could result from the time zone differences between such markets and the U.S. market. However, their empirical evidence indicates that the time zone difference could only explain the daily seasonal anomaly in the

Australian stock market, but it is not able to explain the day-of-the-week effect in the Japanese one.

It is clear that the day-of-the-week effect is present in all papers that are reviewed above. Further, some studies have tried to bring various explanations for the day-of-the-week effect. Lakonishok and Levi (1982) argue that the day-of-the-week effect can be partly derived from the delay between trading and settlements in stocks and in clearing checks. Specifically, they explain that the buyer will have eight calendar days before losing funds for stock purchases on a business day other than Friday based on rules of the U.S. stock market while for Friday purchases, the buyer will have ten calendar days. In other words, the buyer has two more days of interest earning. Therefore, the buyer would be willing to pay extra for stocks bought on Fridays. Another explanation for the daily seasonal anomaly, proposed by Fortune (1991) is that companies and governments tend to release good news during market trading when it is easily absorbed, and keep bad news until the close on Friday when investors can not react to the information until the Monday opening. Furthermore, according to Keim and Stambaugh (1984), measurement errors would partly contribute to the weekend effect. They hypothesise that the low Monday returns could result from positive "errors" in prices on Friday. However, none of these studies can provide satisfactory explanations for the daily seasonal anomaly (Chen et al., 2001; Oguzsoy and Guven, 2003).

It is important to note here that most surveyed studies investigate the daily seasonal anomaly for the periods before 1990. In the most recent period, Kohers et al. (2004) find that the day-of-the-week effect has disappeared in most developed stock markets. Specifically, they document that the daily seasonal anomaly is observed in the U.S., Japan, the U.K., France, Germany, Canada, Italy, the Netherlands, Switzerland, and Australia for the period from 1980 to 1990, but conversely it is no longer in all markets, except Japan, during the period between 1991 and 2002. These findings indicate that long-term improvements in market efficiency would have diminished the day-of-the-week effect on stock returns.

Beside day-of-the-week effect on stock returns, the day-of-the-week effect on stock volatility is also documented in the literature. Indeed, Balaban et al. (2001) find that day-of-the-week effect on volatility is present in Austria, Belgium, Denmark, France, Italy, Norway, Switzerland, and the U.S. for the period from July 1993 to July 1998. Specifically, a significant negative effect is observed on Tuesday for Belgium, Denmark, France, Italy and Switzerland, on Wednesday and Thursday for Italy, and on Friday for Italy and Norway while a positive effect on Tuesday is reported for Austria, on Thursday for Austria, Denmark and the U.S. In addition, Berument and Kiymaz (2001) show that the lowest and highest volatility occurs on Wednesday and Friday respectively for returns of the S&P 500. Furthermore, Kiymaz and Berument (2003) document the highest Monday volatility for Japan and Germany, the highest Thursday volatility for the U.K., and the highest Friday volatility for the U.S. and Canada.

Day-of-the-week effect in emerging stock markets

A number of empirical studies on the daily seasonal anomaly have been recently conducted in emerging stock markets. In Eastern European stock markets, Poshakwale and Murinde (2001) report that the day-of-the-week effect does not exist in Budapest and Warsaw stock exchanges during the period of 1994-1996. Moreover, Ajayi et al. (2004) find that the day-of-the-week effect is present in only four of eleven studied markets (Estonia, Lithuania, Russia and Slovenia). Specifically, the significantly negative Monday effect is observed in Estonia and Lithuania while positive Monday and Friday effects are found in Russia and Slovenia respectively. Furthermore, regarding the Turkish stock market, Balaban (1995) documents that mean return is significantly highest on Friday for the period from January 1988 to August 1994. Then, Oguzsoy and Guven (2003) reexamine the daily seasonal anomaly in this market by extending the studied period to November 1999 and find that the Turkish stock market exhitbits the significant negative effect on Monday and Tuesday and positive effect on Friday.
Turning to the Asian region, it is surprising to find that the day-of-the-week effect is not present in the Taiwanese stock market for the early stage from 1975 to 1988 [Wong et al. (1992)], but it exists in the recent periods, from January 1990 to June 1995 with a significantly negative mean return on Tuesday [Choudhry (2000)] and from December 1989 to January 1996 with the negative average return on Wednesday [Brooks and Persand (2001)]. Moving to the South Korea stock market, the empirical evidence on daily seasonal anomaly is mixed. Indeed, Choudhry (2000) report that the day-of-the-week effect exists in South Korea with a negative effect on Tuesday while Brooks and Persand (2001) find no evidence to support the presence of day-of-the-week effect in this market. The difference in findings between the two studies may result from the different methods used in these studies because the data employed in these studies are almost the same. In China, Mookerjee and Yu (1999) document that a significant positive effect on Thursday and Friday is present in the Shanghai Securities Exchange, but the daily seasonal anomaly does not exist in the Shenzhen Securities Exchange for the period between April 1991 and April 1994. Finally, the Indian stock market exhibits a positive effect on Friday [Choudhry (2000)].

Table 9.1: Summary of empirical studies on the day-of-the-week effect in developed stock markets

Study	Methodology	Data	Main findings
French (1980)	The OLS method with dummy variables for each day of the week	Daily returns of S&P 500 for the period between 1953 and 1977	Significant negative Monday effect and positive Wednesday, Thursday and Friday effect
Gibbons and Hess (1981)	The OLS method with dummy variables for each day of the week	Daily returns of the S&P 500, the value- and equal-weighted portfolios constructed by the Center for Research in Securities Prices (CRSP) over the period from Jul. 2 1962 to Dec. 28, 1978	Negative mean return on Monday
Jaffe and Westerfield (1985)	The OLS method with dummy variables for each day of the week	Daily returns for stock market index of Japan, Canada, Australia, the U.K., and the U.S (S&P 500) during the period of 1970-1983, 1976-1983, 1973-1983, 1950-1983, and 1962-1983 respectively.	Significant negative Monday effect in the U.S., Canada and the U.K.; negative Tuesday effect in Japan and Australia and the U.K.; and positive Friday effect in all the markets, except the U.K.
Condoyanni, et al. (1987)	The OLS method with dummy variables for each day of the week	Daily returns for stock market index of the U.S., Canada, the U.K., France, Australia, Japan and Singapore for the 1969-1984 period (except Australia from 1980-1984)	A significantly negative Monday mean return to be observed in the U.S., Canada and the U.K, but a significantly Monday positive effect in Japan; a significantly negative Tuesday effect to be present in France, Australia, Japan and Singapore; and a significantly positive Friday effect for Canada, France, Australia and Singapore

Table 9.1: Continued

Dubois and Louvet (1996)	Parametric and non-parametric tests with the null hypothesis that mean returns of each day in the week are equal	Daily returns for 11 stock market indexes in 9 developed countries (Canada, the U.S., Japan, Hong Kong, Australia, Germany, France, Switzerland, and the U.K. from Jan. 2, 1969 to Dec. 30, 1992	Significant negative Monday effect for the stock market indexes in Canada, the U.S., Germany, France, the U.K., Switzerland and Hong Kong; negative Tuesday effect for Japan and Australia; and positive Friday effect for most the markets
Berument and Kiymaz (2001)	The OLS, GARCH (1,1) and modified GARCH (1,1) models with dummy variables for each day of the week in both return and variance equations	Daily returns of the S&P 500 during the period from Jan. 1973 to Oct. 1997	The day-of-the-week effect to be present in both market returns and volatility: the significantly lowest and highest mean returns on Monday and Wednesday, and the lowest and highest volatility on Wednesday and Friday respectively
Balaban, et al. (2001)	GARCH(1,1)-M with dummy variables for each day of the week in both return and variance equations	Daily returns of stock market indexes for 19 countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Italy, Japan, the Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, the U.K., and the U.S. over the period from Jul. 20, 1993 to Jul. 1, 1998.	Day-of-the-week effect on returns to be present in Austria, Germany, Hong Kong, Japan, the Netherlands, and New Zealand with specific results as follows: significant negative Tuesday effect to be found in Austria, Germany, and Netherlands; positive Tuesday effect in Japan; negative Friday effect in Austria and Germany Day-of-the-week effect on stock market volatility to be observed in Austria, Belgium, Denmark, France, Italy, Norway, Switzerland, and the U.S.: significant negative effect on Tuesday for Belgium, Denmark, France, Italy and Switzerland, on Wednesday and Thursday for Italy, and on Friday for Italy and Norway; positive effect on Tuesday for Austria, on Thursday for Austria, Denmark and the U.S.

Table 9.1: Continued

Kiymaz and Berument (2003)	The OLS, GARCH (1,1) and modified GARCH (1,1) models with dummy variables for each day of the week in both return and variance equations	Daily return for stock market indexes in four developed countries (the U.S., Canada, the U.K., Germany and Japan for the period from Jan. 1988 to Jun. 2002.	A significantly negative Monday mean return in Canada, Japan and the U.K.; the significantly highest volatility of market returns to be observed on Monday for Japan and Germany, on Thursday for the U.K., and on Friday for the U.S. and Canada
Kohers, et al. (2004)	ANOVA and Kruskal-Wallis tests to test the null hypothesis that mean return is equal across days of the week	Daily return for stock market indexes of 11 developed countries (the U.S., Japan, the U.K., France, Germany, Canada, Italy, the Netherlands, Switzerland, Hong Kong, and Australia) during the period from Jan. 1980 to Jun. 2002.	Daily seasonal anomaly to be present in all the markets (except Hong Kong) for the period from 1980 to 1990, but conversely the day-of-the-week effect to be no longer in all cases (except Japanese case) over the 1991-2002 period The first period: a significantly negative Monday effect to be observed in the U.S., the U.K., France, Canada, Italy, the Netherlands, and Switzerland; a negative Tuesday effect in Japan, France, Italy, Switzerland and Australia The second period: a significantly negative Monday return exhibited in Japan The main conclusion to be drawn from this study as that long-term improvements in market efficiency would have diminished the day-of-the-week effect on stock returns

Table 9.2: Summary of empirical studies on the day-of-the-week effect in emerging stock markets

Study	Methodology	Data	Main findings
Wong et al. (1992)	Non-parametric tests for the difference in mean returns across days of the week	Daily data for stock market indexes of Singapore, Malaysia, Hong Kong, Taiwan and Thailand over the 1975-1988 period	Day-of-the-week effect to be present in all market (except Taiwan) with specific results as follows: the negative Monday effect in Singapore, Malaysia and Hong Kong; the negative Tuesday effect in Thailand, and Friday positive effect in the four markets
Balaban (1995)	The standard OLS method	Daily data of the Istanbul Securities Exchange Composite Index for the period between Jan. 4, 1988 and Aug. 5, 1994	Significant positive Wednesday and Friday effect
Wong and Yuanto (1999)	Non-parametric test and the standard OLS method	Daily returns of the Jakarta Composite Index (Indonesia) over the period from Apr. 1, 1983 to May 30, 1997	Significant negative and positive effect for Tuesday and Friday respectively
Mookerjee and Yu (1999)	The OLS method with dummy variables for each day of the week	Daily stock market indexes of the Shanghai and Shenzhen securities exchanges for the period from Dec. 19, 1990 and Apr. 3, 1991 respectively to Apr. 11, 1994	Significant positive Thursday and Friday effects in the Shanghai securities exchange, but no day-of-the-week effect in the Shenzhen securities exchange for the whole studied period
Choudhry (2000)	GARCH (1,1) model	Daily returns for stock market index of India, South Korea, Taiwan, Indonesia, Malaysia, the Philippines, and Thailand during the period from Jan. 1990 to Jun. 1995	Significant negative Monday mean return in Indonesia, Malaysia and Thailand; negative Tuesday mean return in South Korea, Taiwan and Thailand; and positive Friday mean return in India, Malaysia, the Philippines and Thailand Significant positive Monday effect on volatility in all markets except India, negative Friday effect in the Philippines

Table 9.2: Continued

Brooks and Persand (2001)	The OLS model with and without including market risk factors	Daily returns for stock market indexes of South Korea, Malaysia, Thailand, Taiwan, and the Philippines over the period between Dec. 1989 and Jan. 1996	Day-of-the-week effect existing in three of the five markets (Malaysia, Thailand and Taiwan): a positive Monday mean return in Thailand and Malaysia, and a negative Wednesday effect in Taiwan Average risk levels varying across the days of the week that partly explain for the day-of-the-week effect
Poshakwale and Murinde (2001)	GARCH-M model	Daily data of stock market indexes in Hungary and Poland for the period from Jan. 1 and Apr. 16, 1994 respectively to Jun. 30, 1996	No day-of-the-week effect in these markets
Chusanachoti and Kamath (2002)	The standard OLS and GARCH (1,1) methods	Daily returns for the index of the Stock Exchange of Thailand during the period from Jan. 1990 to Dec. 1998	The significant lowest and highest mean return for Monday and Friday respectively, a negative effect also to be observed for Tuesday and Thursday
Oguzsoy and Guven (2003)	The standard OLS method	Daily returns of the Istanbul Securities Exchange Composite Index for the period from Jan. 18, 1988 to Nov. 30 1999	Significant negative mean return on Monday and Tuesday, but positive mean return on Friday
Lian and Chen (2004)	The standard OLS and GARCH models	Daily returns for stock market index of five ASEAN countries (Indonesia, Malaysia, the Philippines, Thailand and Singapore) over the period from Jan. 1992 to Aug. 2002, including three sub-periods: pre-crisis, crisis and post-crisis	Pre-crisis period: significant negative Monday effect in Malaysia, Singapore and Thailand; positive Friday effect for Indonesia, and positive Wednesday and Thursday for the Philippines Crisis period: No daily seasonal anomaly for all markets Post-crisis period: significant negative Monday and positive Friday effect in Thailand, and significant negative Tuesday effect in the Philippines

Table 9.2: Continued

Ajayi, et al. (2004)	The standard OLS method	Daily returns of 11 stock market indexes in Eastern European countries (Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia and Slovenia) for the period from the inception of each market index to Sep. 6, 2002 (the longest and shortest period as from Sep. 1, 1994 and Jul. 20, 1999 respectively to Sep. 6, 2002)	Significant negative Monday effect in Estonia and Lithuania, positive Monday effect in Russia, negative Tuesday effect in Lithuania, and positive Friday effect in Slovenia

In ASEAN, the day-of-the-week effect is likely to be present in all stock markets for a certain period. Indeed, the Singapore stock market exhibits a negative Monday and positive Friday effect for the period of 1975-1988 and only a negative Monday effect for the period from January 1992 to January 1997 [Wong et al. (1992), and Lian and Chen (2004) respectively], but no day-of-the-week effect for the period from February 1997 to August 2002 [Lian and Chen (2004)]. The findings indicate that improvements in market efficiency over time may have faded away the daily seasonal anomaly effect on stock returns. In Thailand, Wong et al. (1992), Choudhry (2000), Chusanachoti and Kamath (2002) and Lian and Chen (2004) find that the mean returns are significant negative on Monday and Tuesday, but positive on Friday. These results are consistent with those obtained from the studies in the developed stock markets. Moreover, Brooks and Persand (2001) report a significantly positive Monday effect for Thailand over the period from December 1989 to January 1996. Similar to these ASEAN stock markets, the negative Monday and positive Friday effects are observed in the Malaysian stock market [Wong et al. (1992), Choudhry (2000)]. Furthermore, Wong et al. (1992), Wong and Yuanto (1999), Choudhry (2000), and Lian and Chen (2004) find that the negative effect on Monday and Tuesday and positive Friday effects exist in the Jakarta Composite Index (Indonesia). Finally, the empirical evidence on the day-of-the-week effect in the Philippines stock market is mixed. Specifically, Choudhry (2000) and Lian and Chen (2004) report the positive Friday and negative Tuesday mean returns for the period from January 1990 to June 1995 and from October 1998 to August 2002 respectively while Brooks and Persand (2001) show no day-of-the-week effect in the Philippines stock market. Like the case of South Korea, the difference may due to the different methods employed in these studies.

It is clear that the daily seasonal anomaly in emerging stock markets has received special attention recently. However, no study has been found on this issue for the Vietnamese stock market. Therefore, it provides a fertile area for research.

9.2.2. Data and methodology

The data used to investigate the daily seasonal anomaly in the Vietnamese stock market is the daily returns series of the market index (VNINDEX) that is derived from the daily market index series as described in chapter 8. Descriptive statistics on day-of-the-week returns for the index are summarised in Table 9.3.

To test for the presence of a day-of-the-week-effect on stock returns and stock volatility in the Vietnamese stock market, a set of regression models are employed in this study. The first model, which is employed to examine the day-of-the-week-effect on stock returns, is the OLS (Ordinary Least Square) regression with the following form:

Table 9.3: Summary statistics on stock returns by day of the week

	Monday	Tuesday	Wednesday	Thursday	Friday
Observations	141	144	142	141	141
Mean	-0.00040	-0.00050	0.00028	0.00047	0.00081[b]
Median	-0.00075	-0.00038	-0.00022	-0.00006	-0.00006
S.D.[*]	0.00463	0.00489	0.00428	0.00458	0.00439

[*]: Standard deviation
[b]: Significant at the and 5% level using t-test.

$$R_{it} = \alpha_1 D_{1t} + \alpha_2 D_{2t} + \alpha_3 D_{3t} + \alpha_4 D_{4t} + \alpha_5 D_{5t} + \varepsilon_t \qquad \varepsilon_t \approx N(0, h_t) \qquad (9.1)$$

where R_{it} is the log return of the market index; D_{1t}, D_{2t}, D_{3t}, D_{4t} and D_{5t} are dummy variables for Monday, Tuesday, Wednesday, Thursday, and Friday respectively (i.e., D_{1t} = 1 if observation t falls on a Monday and 0 otherwise); and ε_t is an error term and assumed to be independently and identically distributed (iid).
It is likely to be that the assumption of homocesdaticity (the variance of the errors is constant over time) is usually violated in the context of financial time series. Moreover, according to Brooks (2002), if the assumption is not satisfied and the OLS model is still employed, the standard errors could be wrong and thus any inferences drawn from the model could be misleading. To deal with this issue, Engle (1982) proposed the class of ARCH models (ARCH stands for "autoregressive conditional heteroscedasticity") in which the variance of errors allows to evolve over time as a function of past errors. Then, Bollerslev (1986) generalised the ARCH models as GARCH that allows the conditional variance to be dependent upon earlier own lags. In this study, the simplest form of GARCH [GARCH (1,1)] is employed. To examine the day-of-the-week effect on the market returns, the GARCH (1,1) takes the following form:

$$\begin{aligned} &R_{it} = \alpha_1 D_{1t} + \alpha_2 D_{2t} + \alpha_3 D_{3t} + \alpha_4 D_{4t} + \alpha_5 D_{5t} + \varepsilon_t \qquad \varepsilon_t \approx N(0, h_t) \\ &h_t = \omega + \delta h_{t-1} + \gamma \varepsilon_{t-1}^2 \end{aligned} \qquad (9.2)$$

If any significant coefficients (α_i) are found in the simple OLS and GARCH (1,1) models, which are mentioned above, the hypothesis of day-of-the-week-effect can be accepted. However, it is worth to note here that these models ignore risk factors that can be varied across the days of the week in explaining the seasonality in stock returns. To take into account risk factors while testing day-of-the-week-effect, the so-called "market model", which was empirically applied by Brooks and Persand (2001), is also used in this study. Specifically, in the market model, the market risk of the VNINDEX is represented by the returns on the World Price Index. The market model under the OLS form can be expressed by the following equation:

$$R_{it} = \sum_{i=1}^{5} \alpha_i D_{it} + \sum_{i=1}^{5} \beta_i D_{it} RMI_{it} + \varepsilon_t \qquad \varepsilon_t \approx N(0, h_t) \tag{9.3}$$

where RMI_{it} is the returns on World Price Index that are used as proxy for the market risk of the VNINDEX, and all terminology is remained as for Equation 9.1. Furthermore, the market model under GARCH is formulated and tested by combining Equation 9.3 (return equation) with Equation 9.2 (variance equation).

Finally, to test for the presence of day-of-the-week-effect on stock volatility, this study employs the GARCH (1,1) with additive dummy variables for each day of the week in the conditional variance equation (hereafter it is called as volatility model), which was used in studies of Berument and Kiymaz (2001) and Kiymaz and Berument (2003). To avoid the problem of collinearity in the regression model, only four out of five days in the week are included in the variance equation as the dummy variables. Specifically, the conditional variance Equation 9.2 is modified as follows:

$$h_t = \omega + \beta_1 D_{1t} + \beta_2 D_{2t} + \beta_3 D_{3t} + \beta_4 D_{4t} + \delta h_{t-1} + \gamma \varepsilon_{t-1}^2 \tag{9.4}$$

where D_{1t}, D_{2t}, D_{3t} and D_{4t} are dummy variables for Monday, Tuesday, Thursday, and Friday respectively (Wednesday is not included in the Equation 9.4). The volatility model is conducted for two cases: without and with including market risk by jointly estimating Equation 9.1 and 9.4, and 9.3 and 9.4 respectively.

In short, in order to investigate the presence of seasonality in stock returns and stock volatility, this study employs a set of six models, including the simple OLS, GRACH (1,1), market model with OLS, market model with GARCH (1,1), volatility model without market risk, and volatility model with market risk. Specifications of these models are summarised in Table 9.4.

9.2.3. Empirical results

The results of day-of-the-week effect on returns and volatility in the Vietnamese stock market are presented in Table 9.5. The results of the OLS model (Model 1) show that the average return on Friday is significantly higher than other days of the week. In other words, the Friday effect is presence in the VNINDEX. The market model with the OLS form (Model 3) confirms that mean return of the INDEX is still significant positive at the five percent level on Friday. Moreover, it is observed that all beta coefficients in Model 3 are insignificant. On the basis of these results, it can be concluded that day-of-the-week effect (Friday effect) is presence in the stock returns and that average market risk levels (proxied by World Price Index) are likely to be the same across the days of the week.

Table 9.4: Specifications of six employed models

Name	Specifications
Model 1 (OLS)	$R_{it} = \alpha_1 D_{1t} + \alpha_2 D_{2t} + \alpha_3 D_{3t} + \alpha_4 D_{4t} + \alpha_5 D_{5t} + \varepsilon_t$
Model 2 [GARCH (1,1)]	$R_{it} = \alpha_1 D_{1t} + \alpha_2 D_{2t} + \alpha_3 D_{3t} + \alpha_4 D_{4t} + \alpha_5 D_{5t} + \varepsilon_t$ $h_t = \omega + \delta h_{t-1} + \gamma \varepsilon_{t-1}^2$
Model 3 (Market model with OLS)	$R_{it} = \sum_{i=1}^{5} \alpha_i D_{it} + \sum_{i=1}^{5} \beta_i D_{it} RMI_{it} + \varepsilon_t$
Model 4 [Market model with GARCH (1,1)]	$R_{it} = \sum_{i=1}^{5} \alpha_i D_{it} + \sum_{i=1}^{5} \beta_i D_{it} RMI_{it} + \varepsilon_t$ $h_t = \omega + \delta h_{t-1} + \gamma \varepsilon_{t-1}^2$
Model 5 (Volatility model without market risk)	$R_{it} = \alpha_1 D_{1t} + \alpha_2 D_{2t} + \alpha_3 D_{3t} + \alpha_4 D_{4t} + \alpha_5 D_{5t} + \varepsilon_t$ $h_t = \omega + \beta_1 D_{1t} + \beta_2 D_{2t} + \beta_3 D_{3t} + \beta_4 D_{4t} + \delta h_{t-1} + \gamma \varepsilon_{t-1}^2$
Model 6 (Volatility model with market risk)	$R_{it} = \sum_{i=1}^{5} \alpha_i D_{it} + \sum_{i=1}^{5} \beta_i D_{it} RMI_{it} + \varepsilon_t$ $h_t = \omega + \beta_1 D_{1t} + \beta_2 D_{2t} + \beta_3 D_{3t} + \beta_4 D_{4t} + \delta h_{t-1} + \gamma \varepsilon_{t-1}^2$

It is important to note here that the conclusion above is based on the OLS method, which ignores the time-varying volatility (ARCH effect) that is suspected to be presence in the observed series. If ARCH effect exists in the market returns, the GARCH (1,1) model should be applied. To check for the presence of ARCH effect, the Lagrange Multiplier (LM) test, proposed by Engel (1982), is conducted, using 5 lags[30]. The results of ARCH-LM test strongly indicate that ARCH effect is presence in the Model 1 and Model 3 since the test statistics of the two models are

[30] We also perform several lag orders and the basic results remain the same.

296.493 and 294.993 respectively while the LM-critical value is 15.086 at the one percent level significant. Clearly, due to ARCH effects in the series, GARCH (1,1), which takes into account time-varying variance, is more appropriate than the OLS method in testing for the daily seasonal volatility in the market returns. Results of GARCH estimates without and with including risk factors are summarised in the second and fourth column. The findings of GARCH model without including risk factors (Model 2) reveal that a negative Tuesday effect exists in the market returns, but the positive Friday effect in the first model (OLS) disappears. Furthermore, results derived from the market model with GARCH (1,1) (Model 4) are consistent with results of Model 2 that the negative Tuesday effect is present in the VNINDEX returns. These results combined with insignificant betas for all days of the week in Model 4 confirm again that the mean market risk levels do not have any significant changes across the days of the week.

Finally, to investigate the day-of-the-week effect on stock volatility, the GARCH (1,1), with dummy variables for each day of the week in the conditional variance equation are performed for two cases, without and with including the market risk (Model 5 and Model 6 respectively). The last two columns reports results of these models. With respect to market returns, results of both Model 5 and Model 6 consistently indicate that the estimated coefficients of the Tuesday and Thursday dummy variables are negative and statistically significant at the five percent level. Such results are somewhat different to compared ones where the significantly Thursday effect is never observed. Returning to the main objective of the last two models, the results for the conditional variance equations strongly reject the hypothesis of day-of-the-week effect on stock market volatility for the Vietnamese stock market.

In summary, the day-of-the-week effect exists in the VNINDEX return. Specifically, a negative Tuesday effect is observed in the GARCH (1,1) method. Moreover, when the GARCH (1,1) with dummy variables for each day of the week to be added in the conditional variance equation are conducted, a negative Tuesday and Thursday effect are present in the market returns. However, no evidence is found to support the hypothesis of day-of-the-week effect on stock market volatility in the VNINDEX.

9.3 Testing for the short-term overreaction hypothesis

The stock market overreaction hypothesis states that extreme movements in stock returns will be followed by extreme movements in the opposite direction (De Bondt and Thaler, 1985). If this hypothesis holds, investors can earn abnormal returns by simply using a contrarian strategy. Therefore, empirical studies of stock market

Table 9.5: Day-of-the-week effect on the VNINDEX returns and volatility

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Conditional mean equation						
Monday	-0.040	-0.030	-0.038	-0.035	-0.033	-0.035
	(-1.021)	(-1.388)	(-0.984)	(-1.691)	(-1.647)	(-1.718)
Tuesday	-0.050	-0.046	-0.051	-0.048	-0.039	-0.041
	(-1.226)	(-2.337)[b]	(-1.241)	(-2.474)[b]	(-2.042)[b]	(-2.15)[b]
Wednesday	0.028	-0.017	0.028	-0.021	-0.023	-0.024
	(0.779)	(-0.805)	(0.762)	(-0.959)	(-1.169)	(-1.227)
Thursday	0.047	-0.041	0.047	-0.042	-0.043	-0.044
	(1.216)	(-1.878)	(1.213)	(-1.949)	(-1.975)[b]	(-2.021)[b]
Friday	0.081	-0.033	0.079	-0.037	-0.038	-0.041
	(2.192)[b]	(-1.505)	(2.103)[b]	(-1.600)	(-1.899)	(-1.870)
Beta-Monday			0.101	0.072		0.062
			(1.266)	(1.151)		(1.006)
Beta-Tuesday			0.037	0.039		0.018
			(0.405)	(0.880)		(0.390)
Beta-Wednesday			0.001	0.039		0.032
			(0.003)	(0.836)		(0.667)
Beta-Thursday			0.020	-0.008		-0.010
			(0.238)	(-0.155)		(-0.203)
Beta-Friday			0.060	0.037		0.039
			(0.645)	(0.762)		(0.821)
ARCH-LM tests (5 lags)	296.493	3.024	294.993	2.897	3.797	3.337
Conditional variance equation						
ω		0.015		0.016	0.004	0.007
		(4.731)[a]		(4.895)[a]	(0.579)	(0.972)
ε^2_{t-1}		0.727		0.749	0.705	0.738
		(6.501)[a]		(6.507)[a]	(6.551)[a]	(6.631)[a]
h_{t-1}		0.345		0.333	0.378	0.351
		(6.393)[a]		(6.204)[a]	(7.441)[a]	(6.933)[a]
Monday					0.013	0.010
					(1.327)	(1.103)
Tuesday					0.018	0.013
					(1.152)	(0.945)
Thursday					0.018	0.016
					(1.089)	(0.991)
Friday					0.000	0.000
					(-0.003)	(-0.019)

Notes: [a, b] significant at the 1% and 5% level respectively, t-values in parentheses.
The Chi-square critical values at 1% and 5% are 15.09 and 11.07 respectively

overreaction provide important implications for both academics and practitioners. The overreaction hypothesis has been tested both from a long-term and a short-term perspective. Specifically, DeBondt and Thaler (1985, 1987), Chopra *et al*. (1992) find long-term stocks return reversals while Otchere and Chan (2003), Wang *et al*. (2004) and Ma *et al*. (2005) report some evidence of short-run overreaction. This section tries to find empirical evidence of the short-term overreaction for the Vietnamese stock market by using weekly return data of all stocks listed on the market from May 2002 to August 2005.

9.3.1. Literature review

The stock market overreaction has been extensively studied for the U.S. market in the last decades, but not for emerging countries (Antoniou and Galarriotis, 2005). The first empirical evidence to support the hypothesis of stock market overreaction comes from De Bondt and Thaler (1985). Using monthly return data for the New York Stock Exchange common stocks during the period from January 1926 to December 1982, they form two portfolios, namely winner and loser, based on abnormal returns of stocks and monitor them for a period of three years (tracking period). As a result, the portfolio of prior losers significantly outperforms the portfolio of prior winners by 24.6 percent. According to De Bondt and Thaler (1985), the evidence implies that the stock market is not efficient in the weak form. In a follow-up study, De Bondt and Thaler (1987) also find systematic stock price reversals for the U.S. However, they argue that the stock price overreaction can not be attributed to size and risk measurement effects.

Moreover, the stock market overreaction for the U.S. is confirmed by Howe (1986). Indeed, using weekly returns data obtained from the CRSP for the period of 1963-1981, he reports that stocks with good news (large positive returns) significantly underperform the market during a 50-week period after the event while stocks with bad news (large negative returns) significantly outperform the market during the 20-week period. Additionally, the differences in cumulative average return between the stocks with bad news and stock with good news are positive for the whole tracking period. In addition, similar studies conducted by Brown and Harlow (1988), Chopra et al. (1992) and Ma et al. (2005) provide strong evidence to support for the presence of overreaction in the U.S. stock market.

In anther study, Zarowin (1990) reexamines the evidence of stock price overreaction as reported by De Bondt and Thaler. Using a similar data set that De Bondt and Thaler employ, he finds a significantly positive difference in abnormal returns between the loser and winner portfolios for the U.S. stock market. Contrary to the findings of De Bondt and Thaler (1987), he argues that this result is due to the size of losers to be smaller than winners', but it does not result from investor overreaction. In addition, similar evidence is given by Clare and Thomas (1995) who investigate the stock market overreaction for the U.K. by using monthly stock returns data over the period from 1955 to 1990.

Lo and MacKinlay (1990b) examine whether contrarian profits are mainly due to stock market overreaction by employing weekly returns of 551 stocks from the CRSP's data over the period from July 1962 to December 1987. They find that stock returns are usually positive cross-autocorrelation indicating that a contrarian strategy would be established in order to make abnormal returns even if no stock overreacts to information. Specifically, the authors point out that the contribution of stock price overreaction to profitability of contrarian strategies would be minor while the lead or lag relation among stock returns is the major source of contrarian profits.

Similar to Lo and MacKinlay (1990b), Jegadeesh and Titman (1995) investigate the overreaction, delayed reaction and contrarian profitable strategy for the U.S. stock markets from 1963 to 1990. They report that stock prices overreact to firm-specific information, but underreact to common factors. Contrary to findings of Lo and MacKinlay (1990b), Jegadeesh and Titman (1995) document that most of profit obtained from a contrarian strategy is attributed to stock price overreaction while a very small portion of such profit is due to lead-lag relationship among stock returns.

Contrary to most empirical studies mentioned above, Davidson III and Dutia (1989), by using a sample of virtually all stocks listed on New York Stock Exchange (NYSE) and American Exchange (AMEX) from 1963 to 1985, report evidence against the hypothesis of stock price overreaction. Specifically, they document that prior winners continue to be winners and losers keep on losing for at least one year. In other word, the stock prices are delayed reaction to information.

Further, Baytas and Cakici (1999) investigate the overreaction hypothesis for seven developed stock markets (the U.S., Canadian, the U.K., Japanese, German, French and Italian stock markets) by using stock return data over the period between 1982 and 1991. As a result, they find empirical evidence to support the hypothesis of overreaction for all markets, expect the U.S.

In emerging stock markets, Da Costa (1994) investigates the overreaction for the Brazilian stock market during a period from 1970 to 1989. Using both the market adjusted and the CAPM adjusted models, he reports that the prior loser portfolio significantly outperforms the market by 17.63 percent while the prior winner one underperforms the market by 20.25 percent for the 24-month period from the formation of portfolios. In anther study, Bowman and Iverson (1998) test for the presence of short-run overreaction in the New Zealand stock market by employing weekly return data for the period from 1967 to 1986. The main findings of the study indicate that the hypothesis of short-run overreaction can not be rejected for the New Zealand stock market. Specifically, the abnormal return of prior loser and winner stocks in the week after the portfolios formation are 2.4 percent and -1.5 percent respectively.

In Asia, Otchere and Chan (2003) examine the short-run overreaction for the Hong Kong stock market by using the daily return data over the period from March 1996 to June 1998. In general, the empirical evidence obtained from this study indicates that overreaction is present in the Hong Kong stock market. Specifically, price reversals of winners and losers are more pronounced in the period of the pre-financial crisis in Asia than in the crisis period. However, after accounting for transaction costs the authors find that investors can not earn abnormal returns based on a contrarian trading strategy. Furthermore, Wang et al. (2004) examine the short-run overreaction effect for the Chinese stock market by using weekly return data of 301 individual stocks for the period from August 1994 to July 2000. They find significant evidence of the short-run overreaction for the Chinese stock market. Specifically, for the whole sample of 301, the prior loser portfolio significantly outperforms the market by 0.55 percent while the prior winner one significantly underperforms the market by 0.52 percent in the consecutive week after the portfolios formation.

In a recent study, Antoniou et al. (2005) investigate the presence of contrarian profits and sources of such profits for the Athens Stock Exchange (ASE) by employing weekly price data for all stocks listed on the ASE over the period from January 1990 to August 2000. Results of this study are similar to that of Jegadeesh and Titman (1995) on the U.S. stock market. Specifically, the authors document presence of contrarian profits in the ASE for both cases: without and with risk and market frictions adjustment. Furthermore, they report that the contribution of stock price overreaction to firm specific information to such profits is larger than the delayed reaction to the common factors.

In summary, stock market overreaction is detected in many markets, including developed and emerging ones. Moreover, some evidence of the delayed reaction in stock prices is found for the U.S. market. On the basis of this survey, it is expected that the stock price overreaction or underreaction could be present in the Vietnamese stock market, which is proved to be inefficient in the weak form.

9.3.2. Data and methodology

Data

The data used in this section comprises the weekly continuously compounded returns, which are derived from the weekly stock price observations as described in chapter 8, for all stocks listed on the Ho Chi Minh Stock Exchange during the period from May 2nd, 2002 to August 24th, 2005. The number of stocks listed on the stock market over the time is shown in Table 9.6.

Table 9.6: Number of stocks listed on the market over the time

Time	May. 2, 2002	Dec. 25, 2002	Dec. 31, 2003	Dec. 29, 2004
Number of stocks	16	19	22	26

Methodology

To determine whether the short-run overreaction is present in the Vietnamese stock market, this study employs the method which is used by Wang et al. (2004). Following this method, first the abnormal returns for each stock are calculated by using the market adjusted model as follows:

$$AR_{i,t} = R_{i,t} - R_{m,t} \tag{9.5}$$

where $AR_{i,t}$ is the abnormal return on stock *i* for week *t*, $R_{i,t}$ is the actual return on stock *i* for week *t* and $R_{m,t}$ is the return on the market index for week *t*.

The stocks are then ranked in descending order on the basis of $AR_{i,t}$, and winner and loser portfolios are formed. Due to limitation of the number of stocks traded on the market, only the top seven stocks are grouped to the winner portfolio, and the bottom seven stocks are assigned to the loser portfolio. Next, the winner and loser portfolios are monitored over the next 12 weeks. The mean abnormal returns for each week following the formation of the portfolios are computed for both the winner and loser portfolios by using the following equation:

$$AR_{p,t} = \frac{1}{7}\left(\sum_{i=1}^{7} AR_{i,t}\right) \tag{9.6}$$

where $AR_{p,t}$ is the mean abnormal return for each portfolio (p = W for the winner and p = L for the loser portfolio) at week t. Subsequently, the average cumulative abnormal returns (ACAR) are calculated for each test period (tracking period) as follows:

$$ACAR_{p,t} = \frac{1}{n}\sum_{t=1}^{n} AR_{p,t} \qquad (9.7)$$

where $ACAR_{p,t}$ is the average cumulative abnormal returns for each portfolio (p = W for the winner and p = L for the loser portfolio) at observed week t and n is the tracking period (*n = 2,3, 4, 8 and 12*). Finally, tests of the overreaction hypothesis are based on the difference of average cumulative abnormal returns between the winner and loser portfolio which is given as follows:

$$ACAR_{D,t} = ACAR_{L,t} - ACAR_{W,t} \qquad (9.8)$$

If $ACAR_{D,t}$ is insignificantly different from zero, the null hypothesis of overreaction is rejected. However, a significant positive or negative value of $ACAR_{D,t}$ implies that overreaction or underreaction respectively exists in the stock market.

9.3.3. Empirical results

Empirical results of the overreaction tests are presented in Table 9.7 and Table 9.8. Specifically, Table 9.7 reports differences in the mean abnormal returns between winner and loser portfolios for each week following the formation of the portfolios while the differences in mean cumulative abnormal returns for each tracking period between these portfolios are summarised in Table 9.8. It can be readily observed in Table 9.7 that the winner portfolio outperforms the market by 1.28 percent while the loser portfolio underperforms the market by 1.44 percent for the week when the portfolios are formed. Especially, the empirical results suggest that the overreaction hypothesis can not be accepted for all single-weeks following the formation of the portfolios. However, it is found that the differences in the mean abnormal returns between winner and loser portfolios are likely to be negative, indicating that the stock prices are delayed reaction. For instance, the winner stocks continue to outperform the market by 0.11 percent, and the loser stocks underperform the market by 0.36 percent for the week T + 5. The resultant return of -0.47 percent on the difference between winner and loser portfolios is marginally significant (p-value equal to 6 percent).

Further, a comparison of mean cumulative abnormal returns between the winner and loser portfolios, presented in Table 9.8, reveals that losers tend to continue to be losers for all test periods (n = 2, 3, 4, 8, and 12). In other word, the differences in mean cumulative abnormal returns between the loser and winner portfolios

($ACAR_D$) are negative, but all of them are statistically insignificant difference from zero. The findings indicate that the hypothesis of overreaction is strongly rejected for the Vietnamese stock market. In contrary, stock prices seem to be delayed reaction.

Table 9.7: Differences in the mean abnormal returns between winner and loser portfolios following the formation of the portfolios

Week	Winner	Loser	Loser - winner	
	AR	AR	AR	*p*-value
F	0.0128	-0.0144	-0.0272	0.00
T+1	-0.0007	-0.0047	-0.0040	0.44
T+2	-0.0041	-0.0024	0.0018	0.62
T+3	0.0002	0.0002	0.0000	0.99
T+4	-0.0033	-0.0039	-0.0006	0.79
T+5	0.0011	-0.0036	-0.0047	0.06
T+6	0.0001	-0.0001	-0.0003	0.87
T+7	0.0019	-0.0022	-0.0042	0.19
T+8	0.0001	-0.0036	-0.0037	0.27
T+9	-0.0004	-0.0020	-0.0016	0.48
T+10	-0.0025	-0.0044	-0.0019	0.17
T+11	-0.0011	-0.0037	-0.0026	0.51
T+12	0.0004	-0.0011	-0.0015	0.43

Note: F is the formation (observation) week; p-value is based on one-sample t test of the null hypothesis that the differences in the mean abnormal returns between winner and loser portfolios are zero.

In summary, based on the findings derived from the tests of the differences in abnormal returns between the winner and loser portfolios, it can be concluded that the overreaction effect is not present in the Vietnamese stock market. However, it should be noted here that the observed period of the sample may be too short to correctly identify overreaction. Therefore, further research which is based on longer observation periods is needed to come to an unambiguous conclusion regarding possible overreaction effects on the stock market in Vietnam. Concerning another aspect of the issue, to wit the phenomenon of trending in the sense that stock prices tend to move in the same direction for some periods, also known as the "momentum" effect (Jegadeesh and Titman, 1993; Chan *et al.,* 1996; Rouwenhorst, 1998), the findings of the study are likely to support the hypothesis that such an effect is present in the Vietnamese stock market.

Table 9.8: The difference in mean cumulative abnormal returns between the winner and loser portfolios

Week	$ACAR_L$	$ACAR_W$	$ACAR_D$	*p*-value
T+2	-0.0071	-0.0049	-0.0023	0.75
T+3	-0.0069	-0.0047	-0.0022	0.77
T+4	-0.0108	-0.0079	-0.0029	0.76
T+8	-0.0204	-0.0046	-0.0158	0.30
T+12	-0.0316	-0.0082	-0.0234	0.22

Note: p-value is based on one-sample t test of the null hypothesis that the difference in the mean cumulative abnormal returns between winner and loser portfolios is zero

9.4. Conclusions

This chapter is devoted to further investigating some special issues regarding the EMH for the Vietnamese stock market. First, the day-of-the-week effect is examined by using a set of regression models. Then, the Chapter deals with the stock market overreaction that has been widely documented in the financial literature, especially for the U.S. market.

The empirical results derived from the regression models generally indicate that the day-of-the-week effect is present in the Vietnamese stock market. Specifically, the negative Tuesday effect on market returns are found when the GARCH (1,1) model is employed. Furthermore, the empirical evidence obtained from the GARCH (1,1) with day-of-the week dummy variables to be added in the conditional variance equation documents that a negative effect is observed for Tuesday and Thursday. However, the empirical findings fail to support the hypothesis of day-of-the-week effect on stock market volatility for the Vietnamese stock market.

Moreover, the tests of the differences in abnormal returns between the winner and loser portfolios reveal that the short-run overreaction does not exist in the Vietnamese stock market. However, it is observed that the stock prices are likely to be delayed reaction to information. However, the limitation of this study regarding the issue is that the studies period is too short (about three years), and the sample of observed stocks are not large.