Revisiting the Day-of-the-Week Effect in the Stock Exchange of Thailand

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ABSTRACT

The authors revisited the day-of-the-week (DoW) effect in the Stock Exchange of Thailand, using the daily return data on the SET, SET50 and mai index portfolios from September 2, 2002 to August 31, 2015. The DoW effect was found for the SET and SET50 index portfolios, but not for the mai index portfolio. The SET and SET50 returns were significant and negative on Monday and significant and positive on Friday. The positive Friday returns were very strong. Because the SET and SET50 stocks are trading on the main market while the mai stocks are on the mai market, the DoW effect in the Stock Exchange of Thailand can be considered a SET-market phenomenon. The authors examined and tested possible alternative explanations of the effect being proposed in the literature. The test is complete and is first for the Thai market. There is only one possible explanation—the order flow explanation. Buy-order flows from local institutes and foreign investors on Friday pressured prices upward and generated positive Friday returns, while sell-order flows from local institutes, foreign investors and local investors on Monday pressured prices downward and generated negative Monday returns

Keywords: Day-of-the-Week Effect, Weekday Effect, Anomaly

* The authors thank the Faculty of Commerce and Accountancy, Thammasat University for the research grant, the Stock Exchange of Thailand for the return and trading volume data, and Arnat Leemakdej, Jon Wongswan and Kasidit Tongplew for comments and suggestions.

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บทคัดย่อ

ผู้เขียนทวนสอบเหตุการณ์วันของสัปดาห์ในตลาดหลักทรัพย์แห่งประเทศไทย โดยใช้ข้อมูลรายวันของกลุ่มหลักทรัพย์ในดัชนีราคาหลักทรัพย์ SET ดัชนีราคาหลักทรัพย์ SET50 และดัชนีราคาหลักทรัพย์ mai ในช่วงเวลาตั้งแต่วันที่ 2 กันยายน พ.ศ. 2545 ถึงวันที่ 31 สิงหาคม พ.ศ. 2558 การศึกษาพบเหตุการณ์วันของสัปดาห์สำหรับดัชนีราคาหลักทรัพย์ SET และ SET50 แต่ไม่พบสำหรับดัชนีราคาหลักทรัพย์ mai อัตราผลตอบแทนของกลุ่มหลักทรัพย์ SET และ SET50 เป็นลบและมีนัยสำคัญในวันจันทร์ และเป็นบวกและมีนัยสำคัญในวันศุกร์ เนื่องจากหุ้นสามัญซึ่งเป็นสมาชิกของดัชนีราคาหลักทรัพย์ SET และ SET50 เป็นหุ้นซึ่งซื้อขายในตลาดหลัก ในขณะที่หุ้นสามัญซึ่งเป็นสมาชิกของดัชนีราคาหลักทรัพย์ mai เป็นหุ้นซึ่งซื้อขายในตลาด mai ดังนั้น เหตุการณ์วันของสัปดาห์จึงอาจพิจารณาว่าเป็นปรากฏการณ์ที่เกิดเฉพาะในตลาดหลัก ผู้เขียนตรวจสอบและทดสอบคำอธิบายทั้งหลายที่เป็นไปได้ ซึ่งมีผู้เสนอไว้ในอดีตเพื่ออธิบายเหตุการณ์วันของสัปดาห์ตามที่ผู้เขียนพบ การทดสอบทำครบถ้วนและถือเป็นครั้งแรกสำหรับประเทศไทย คำอธิบายที่เป็นไปได้มีเพียงคำอธิบายเดียวคือ คำสั่งซื้อขายของผู้ลงทุน เหตุการณ์วันของสัปดาห์ซึ่งมีอัตราผลตอบแทนที่เป็นบวกและมีนัยสำคัญในวันศุกร์เกิดจากคำสั่งซื้อของผู้ลงทุนกลุ่มสถาบันในประเทศและผู้ลงทุนชาวต่างประเทศ คำสั่งซื้อที่มีจำนวนมากในวันศุกร์ผลักดันราคาให้สูงขึ้นและทำให้อัตราผลตอบแทนสูงขึ้น เป็นบวกและมีนัยสำคัญ ในขณะที่อัตราผลตอบแทนที่เป็นลบในวันจันทร์เกิดจากคำสั่งขายจากผู้ลงทุนกลุ่มสถาบันในประเทศ ผู้ลงทุนชาวต่างประเทศ และผู้ลงทุนรายย่อยในประเทศ

คำสำคัญ : เหตุการณ์วันของสัปดาห์ เหตุการณ์วันทำการ พฤติกรรมผิดปกติ

* ผู้เขียนขอบคุณคณะพาณิชยศาสตร์และการบัญชี มหาวิทยาลัยธรรมศาสตร์ ที่สนับสนุนทุนวิจัย ขอบคุณตลาดหลักทรัพย์แห่งประเทศไทยที่ให้ใช้ข้อมูลอัตราผลตอบแทนและปริมาณการซื้อขายหลักทรัพย์ และขอบคุณอาณัติ ลีมัคเดช จอน วงษ์สวรรค์ และกษิดิศ ทองปลิว ที่ให้คำแนะนำ

INTRODUCTION

Expected return for Monday should be highest and three times those for other days of the week under the calendar-time hypothesis, while they should be the same for every trading day of the week under the trading-time hypothesis (French, 1980). However, empirical studies have rejected the two hypotheses for almost all the markets around the world and across sample periods. These findings constitute the day-of-the-week (DoW) effect, being one of the most important and widely-studied anomalies in finance. For example, French (1980) found for the U.S. market that the average return from 1953 to 1997 of the S&P composite index portfolio was negative on Monday. But it was positive for the remaining four weekdays. Chang, Pinegar, and Ravichandran (1993) found the DoW effect in international markets. More recent studies considered the DoW effect in emerging markets. Samples include Ajayi, Mehdian, and Perry (2004) for eastern European countries, Lim and Chia (2010) for ASEAN countries, and Stavarek and Heryan (2012) for central European countries.

Thailand is one of the largest and most important emerging markets. The DoW effect has been studied and tested for the country by several authors. The results are mixed, however. In an early study, Liu and Pan (1997)—using the SET index from January 1984 to December 1991, tested but could not find the effect, while Kamath, Chakornpipat, and Chatrath (1998)—using the SET and 10 industrial classified indices from January 1980 to December 1994, could find the effect. More recent studies (Holden, Thompson, & Rungsit, 2005; Chukwuogor & Feridun, 2006; Lean, Smyth, & Wong, 2009; Lim & Chia, 2010; Tangjitprom, 2011; Sattayatham, Sopipan, & Premanode, 2012) reported the DoW effect for the Thai market and recorded consistently that the average returns were positive and highest on Friday and negative and lowest on Monday.

Although the DoW effect has been extensively researched for the Stock Exchange of Thailand, some important aspects are not examined and few explanations of the effect are tested or offered. Turning first to the important aspects left unexamined, the stocks listed on the Stock Exchange of Thailand trade on the main market and the market-of-alternative-investment (mai) market. The listing criteria for the main market are (1) the firm having at least 300-million-baht paid-in capital and 1,000 investors, (2) the firm being managed by the same management for at least 3 years and (3) the firm earning net profit for at least 2 years in a row prior to the listing or it earning aggregate three-year profit of at least 50 million baht. In all cases, the net profit in the year prior to the listing must be over 30 million baht and the retained earnings must be positive. Less demanding, the listing criteria for the mai market are (1) the firm having at least 20 million baht paid-in capital and 300 investors, (2) the firm being managed by the same management for at least 2 years and (3) the firm earning net profit in the year prior to the listing and its retained earnings are positive. Due to the different listing criteria, the firms on the main market are large and established firms, while those on the mai market are new, small- or medium-sized firms. It is interesting and important to note that the compositions of order flows for the stocks on the SET and mai markets are very different. From September 2, 2002

to August 31, 2015, the daily average shares of trading volumes from (local institutes, proprietary traders, foreign investors, local investors) categories in the SET and mai markets were (7.66%, 8.69%, 25.30%, 58.35%) and (0.67%, 0.56%, 2.92%, 95.85%), respectively.

All the previous studies that tested for the DoW effect considered only the stocks trading on the main market. None considered the stocks on the mai market. Because the two boards share the same micro structure, testing for the effect by using the stocks on the SET and mai markets and comparing whether their results are similar or different will offer deeper insights and clearer understandings about the effect in the Stock Exchange of Thailand.

Turning next to the explanations, only Choudhry (2000) explained and tested that the effect was partly from the spillover from the Japanese market and Brooks and Persand (2001) did that it was partly due to the co-movement with the world market. Possible alternative explanations as were compiled by, for example, Thaler (1987), Pettengill (2003), and Philpot and Peterson (2011), have not been thoroughly reviewed.

In this study, the authors revisit the DoW effect for the Stock Exchange of Thailand. The study has three primary contributions. One, the data used are daily returns on the SET, SET50 and mai index portfolios. The SET index returns were considered in all the previous studies. The index is generally considered as being the representative of the stocks trading on the Stock Exchange of Thailand, although it includes only those stocks on the main market. The SET50 index is the value-weighted price index of the fifty largest and most active stocks on the main market, and the mai index is the value-weighted price index of all the stocks on the mai market. Together, the three indexes enabled the authors to examine the DoW effect for stocks of all major characteristics and groups and to acknowledge the effect's firm-size dependence (Brusa, Liu, & Schulman, 2000). Two, the authors examined and tested for possible alternative explanations of the effect. This thorough and complete set of tests has never been conducted for Thailand. The one in this study is first. Three, the data are from September 2, 2002 to August 31, 2015. The results reveal the stylized facts about the DoW effect for Thailand's recent market.

METHODOLOGY

To test for the DoW effect, the author followed previous studies, e.g. French (1980) and Gibbons and Hess (1981), to use the classical, linear regression model in equation (1).

$$r_t = \delta_{Mo} D_{Mo,t} + \delta_{Tu} D_{Tu,t} + \cdots + \delta_{Fr} D_{Fr,t} + \varepsilon_t \quad (1)$$

where r_t is the daily stock return on day t. $D_{d,t}$ is a dummy variable. It is 1 if day t falls on day d of the week. Day d = Mo (Monday), ..., Fri (Friday). ε_t is the regression error. The model in equation

(1) is estimated by the ordinary-least-square (OLS) technique. Because ε_t may be autocorrelated or heteroskedastic (Kamath et al., 1998), the standard errors of the coefficients δ_d and the hypothesis tests are based on the White (1980) heteroskdasticity-consistent covariance matrix.

The null hypothesis is equal average returns for the five weekdays, implying $\delta_{Mo} = \cdots = \delta_{Fr}$. The test is a Wald test. Under the null hypothesis, the Wald statistic is distributed as a chi-square variable with four degrees of freedom.

DATA

The data are daily returns on the SET, SET50 and mai index portfolios from September 2, 2002 to August 31, 2015 (3,176 observations). September 2, 2002 is the day the mai index began. The authors obtained the return data from the Stock Exchange of Thailand. The descriptive statistics are reported in Table 1.

The average returns of the SET and SET50 index portfolios are about the same of 0.04% and are slightly higher than the 0.03% return of the mai index portfolio. The mai index portfolio is most volatile. The three portfolio returns are negatively skewed and are fat-tailed. The Jarque-Bera test rejects the normality assumption at the 99-percent confidence level for the three indexes. Only the mai index return has significant, negative autocorrelation. The non-normal returns should not affect the estimation and results because OLS regression does not require a normality assumption. The White heteroskedasticity consistence covariance matrix should be able to accommodate significant autocorrelation of the mai index return.

Table 1: Descriptive Statistics

Statistics	SET Index	SET50 Index	mai Index
Average	0.0426%	0.0434%	0.0340%
Standard Deviation	1.3344%	1.4885%	1.9011%
Skewness	−0.8446	−0.6859	−18.1303
Excess Kurtosis	0.124358	11.4165	697.2518
Jarque-Bera Statistic	20,842.93***	17,496.88***	6.4509e+07***
AR(1) Coefficient	0.0288	0.0169	−0.0291*

Note: * and *** are significance at the 90- and 99-percent confidence levels, respectively.

EMPIRICAL RESULTS

Table 2 reports regression coefficients for the five weekdays and Wald statistics for the DoW hypothesis tests. Turning first to the SET and SET50 index portfolios, the Wald tests reject the equal-average-return hypotheses. The results for the two portfolios are similar. The Monday returns are negative and significant at the 90-percent confidence level, while the Friday returns are positive and significant at the 99-percent confidence level. The results for the SET and SET50 index portfolios are similar to the previous studies (Kamath et al., 1998; Choudhry, 2000; Sattayatham et al., 2012) which considered older sample periods. It is interesting and important to find that the hypothesis cannot be rejected for the mai index portfolio.

Table 2: Tests for Day of the Week Effects

Statistics	SET Index	SET50 Index	mai Index
$\delta_{Mo} \times 100$	–0.1216*	–0.1184*	0.0036
$\delta_{Tu} \times 100$	0.0131	0.0184	0.1196**
$\delta_{We} \times 100$	0.0897*	0.0788	0.0922*
$\delta_{Th} \times 100$	0.0166	0.0143	0.0693
$\delta_{Fr} \times 100$	0.2053***	0.2144***	–0.1174
Wald Statistic	20.1328***	16.7642***	4.4868

Note: *, ** and *** are significance at the 90-, 95- and 99-percent confidence levels, respectively.

DISCUSSION

The study confirmed the DoW effect still existed in the Stock Exchange of Thailand for the recent sample period. But it is exclusively for the stocks on the main market, not on the mai market. The DoW effect is an anomaly (French, 1980; Thaler, 1987). While it is important to explain why the anomaly exists, few studies did for Thailand except for Choudhry (2000) and Brooks and Persand (2001). Yet, their explanations were only partial and alternative explanations were not explored. The authors discuss the results and their possible explanations below.

Sullivan, Timmermann, and White (2001) proposed that the DoW effect could be an artifact from data mining. In this study, the authors argue that data mining cannot explain the DoW effect for the SET and SET50 index portfolios. If it were from data mining, the DoW effect should have disappeared once the sample periods changed. But the effect was consistently found by the previous studies (Holden, Thompson, & Rungsit, 2005; Chukwuogor & Feridun, 2006; Lean, Smyth & Wong, 2009; Lim &

Chia, 2010; Tangjitprom, 2011; Sattayatham, Sopipan, & Premanode, 2012) which used older sample periods and by this study which used the more recent sample period.

The researchers (Connolly, 1989; Chen, Lee, & Wang, 2002) noticed that misspecifications of the distribution and heteroskedasticity assumptions might be able to explain the DoW effect for U.S. stocks. In this study, the authors argue that the misspecifications cannot explain the DoW effect of the SET and SET50 index portfolios because of two reasons. First, Kamath et al. (1998) employed alternative estimation techniques and tests for the DoW effect in Thailand. All the techniques and tests gave similar results. Two, the authors re-computed the Wald statistics for DoW hypothesis tests based on the OLS covariance matrices. The resulting Wald statistics for the SET, SET50 and mai indexes were 20.0931, 16.4124 and 6.3496, respectively. Only the statistics for the SET and SET50 index portfolios were significant at the 99-percent confidence level. The one for the mai index portfolio was not. So, the results remained unchanged even when the OLS covariance matrices were used in the tests.

The DoW effect together with significant, positive Friday returns is consistent with at least two possible explanations. The first is the stock-settlement procedure proposed by Gibbons and Hess (1981) and the second is the check-clearing procedure proposed by Lakonishok and Levi (1982). The two explanations are similar. The Friday returns are higher because of the risk-free benefits over the longer settlement and check clearing periods. Buyers are willing to pay more for stocks on Friday, hence leading to higher closing prices and positive returns. These two explanations are not applicable to the DoW effect for the SET and SET50 index portfolios. Note that the market micro structures of the main market on which the SET and SET50 stocks are trading and of the mai market on which the mai stocks are trading are the same. If two explanations were correct, the test should have also found the DoW effect for the mai index portfolio.

The DoW effect together with significant, positive Friday returns for the SET and SET50 index portfolios may be explained by the mispricing of the SET and SET50 stocks on Friday. This explanation was offered by Keim and Stambaugh (1984). If it is the Friday mispricing, the price must reverse on Monday, constituting a significant, negative autocorrelation of the Friday return with the Monday return. In order to check for this explanation, let's consider the regression model in equation (2).

$$r_t = \delta_{Mo}D_{Mo,t} + \cdots + \delta_{Fr}D_{Fr,t} + \rho_{Mo}D_{Mo,t}r_{t-1} + \cdots + \rho_{Fr}D_{Fr,t}r_{t-1} + \varepsilon_t \quad (2)$$

where ρ_d is the autocorrelation coefficient of day t's return with day t–1's return, if day t is the d weekday. Weekday d = Mo (Monday), ..., Fri (Friday). If Keim and Stambaugh's explanation is correct, δ_{Mo} must be negative and significant. The estimates of autocorrelation coefficients are in Table 3. It turns out that ρ_{Mo}'s are positive for the SET and SET50 index returns. The Friday mispricing cannot be the explanation.

Table 3: Tests for Friday Mispricing Explanation

Statistics	SET Index	SET50 Index
ρ_{Mo}	0.2555*	0.2185
ρ_{Tu}	0.0087	0.0055
ρ_{We}	–0.0824	-0.0836
ρ_{Th}	0.0311	0.0048
ρ_{Fr}	0.0339	0.0281

Note: * is significance at the 90-percent confidence level.

In the psychology study (Pettengill, 1994), investors were pessimistic on Monday and optimistic on Friday. This investor behavior is consistent with the negative Monday return and positive Friday return of the SET and SET50 index portfolios in Table 2. However, the psychological link cannot explain the DoW effect of those stocks on the mai market. Because the investors trade stocks both on the main market and the mai market, pessimism and optimism effects on returns should be the same.

Information flow effects have been proposed as being possible explanations of the DoW effect. Information can be micro, firm-specific (French, 1980) or general and macro (Pettengill and Buster, 1994). While the general and macro information cannot explain the DoW effect of the SET and SET50 stock because if it did, the study should have also reported the DoW effect for the mai stocks, the micro, firm-specific information probably can. French (1980) suggested that firm might delay the announcement of bad news until the weekend to avoid market disruption. Under this explanation, the Monday return is negative. This implication is exactly what the authors reported for the SET and SET50 index portfolios in Table 2.

The negative Monday return may be explained by some reasons other than micro, firm-specific information, such as low activities of institutional investors on Monday—their strategic planning day (Wang & Walker, 2000). To test whether micro, firm-specific information is the explanation, the authors re-estimated equation (1) but substituted the Monday return calculated from Monday opening price to Monday closing price for the Monday return calculated from Friday closing price to Monday closing price. If the explanation is correct, the significance of negative Monday return should disappear. The results are in Table 4. From the table, the Monday returns are still negative. The significance is more pronounced and the negative δ_{Mo} coefficients are much larger than the ones in Table 2. Based on these findings, the authors conclude that the micro, firm-specific information during weekends cannot be the explanation.

Table 4: Tests for Micro, Firm-Specific Information Explanation

Statistics	SET Index	SET50 Index
$\delta_{Mo} \times 100$	–0.1791***	–0.1680***
$\delta_{Tu} \times 100$	0.0131	0.0184
$\delta_{We} \times 100$	0.0897*	0.0788
$\delta_{Th} \times 100$	0.0166	0.0143
$\delta_{Fr} \times 100$	0.2053***	0.2144***
Wald	33.7580***	26.6558***

Note: * and *** are significance at the 90-percent and 99-percent confidence levels, respectively.

The DoW effect and the positive Friday return are unique to the stocks trading on the main market. Possible mechanisms that drive the effect must be unique to the main market too. Based on this reasoning, at least two explanations emerge—the price pressure due to speculative short selling (Chen & Singal, 2003) and the price pressure due to order flows from certain trader groups (Miller, 1988; Abraham & Ikenberry, 1994).

Regarding the speculative-short-selling explanation, Chen and Singal (2003) proposed that speculative short sellers did not want to hold the positions and take risks over weekends. So, they bought stocks to close their short positions, drove the prices up and, therefore, led to significant, positive Friday returns. For the Thai market, short selling can be done by means of stock borrowing and lending (SBL). The SBL activities has been allowed by the Securities and Exchange Commission since January 1, 1998. The qualified stocks are those in the SET 100 index portfolio, which hosts the first one hundred largest and most active stocks on the main market.

In order to test for the speculative-short-selling explanation, the authors separated the full samples for the SET index from April 30, 1975 to August 31, 2015 and for the SET50 index from August 16, 1995 to August 31, 2015 into two sub-samples. The first sub-samples for the (SET, SET50) indexes covered (April 30, 1975 to December 31, 1997, August 16, 1995 to December 31, 1997), while the second sub-sample covered January 5, 1998 to August 31, 2015. The data were used in the estimation of the model in equation (1). The results are in Table 5. If the explanation is correct, the DoW effect should exist and the positive Friday return should be significant only in the second sub-sample during which the SBL activities are allowed.

Table 5: Tests for the Speculative-Short-Sellers Explanation

Statistics	SET Index		SET50 Index	
	SBL not Allowed	SBL Allowed	SBL not Allowed	SBL Allowed
$\delta_{Mo} \times 100$	−0.0899*	−0.2078***	−0.6000***	−0.2204***
$\delta_{Tu} \times 100$	−0.0801**	−0.0211	−0.3342*	−0.0261
$\delta_{We} \times 100$	0.0677*	0.1014*	0.0816	0.1002
$\delta_{Th} \times 100$	0.0334	0.0127	−0.2642	0.0034
$\delta_{Fr} \times 100$	0.1787***	0.2512***	−0.0744	0.2730***
Wald Statistic	34.5998***	36.6054***	6.0674	32.5959***

Note: *, ** and *** are significance at the 90-, 95- and 99-percent confidence levels, respectively.

From the table, the Friday returns were lower in the first sub-samples than in the second sub-samples for the two indexes. The Friday return in the second sub-sample was positive and significant. For the SET50 index, the return was not significant in the first sub-sample. The authors found the significant DoW effect for the two indexes in the first and second sub-samples in which SBL activities were prohibited and allowed. These findings led the authors to conclude that speculative short selling could not explain the DoW effect of the SET and SET50 indexes.

Because speculative short selling could not explain the DoW effect and significant positive Friday returns of the SET and SET50 index portfolios, let's turn next to the order flow explanation. The researchers (Miller, 1988; Abraham & Ikenberry, 1994) explained that the DoW effect in the U.S. stock market and significant, negative Monday return were due to increased trading activities of individual investors on Monday. With respect to their reasoning, if the order flows from certain investor groups are able to explain the DoW effect and significant positive Friday return for the SET and SET50 index portfolios, the flows must be net buy orders that are significantly higher for Friday than for any other weekdays.

The authors tested for the order flow explanation in two steps. In step one, the volume turnover ratio, i.e. the aggregate trading volume over market capitalization, was tested for the DoW effect. The model was the one in equation (1) with the turnover ratio substituting for the daily return. In step two, the net-buy to market-capitalization ratio was tested for the DoW effect for trader groups. If order flows were able to explain the DoW effect and significant, positive Friday return, the test necessarily found the DoW effect for the turnover ratio. Moreover, the trader groups had to show the DoW effect for their net-buy to market-capitalization ratios. And the ratio on Friday had to be positive and significant.

The authors obtained the data on buy and sell volumes of local institutes, proprietary traders, foreign investors and local investors from the Stock Exchange of Thailand. The results are in Table 6. From the table in the column Main Market, when the turnover ratio was the dependent variable, the DoW effect existed at a 99-percent confidence level. But when the net-buy to market-capitalization ratio was the dependent variable, the DoW effect was significant only for the proprietary traders. A closer examination reveals that the Friday ratio was significant but it was negative. This is not consistent with what the order flow explanation predicts. The Friday ratios were positive and significant for local institutes and foreign investors. The ratio of local investors was negative and significant.

The fact that proprietary traders were net seller on Friday cannot explain positive Friday returns. Sell orders pressured the price downward and generated negative returns. Positive Friday returns had to come from the buying pressure. The significant net selling of proprietary traders as well as local investors was balanced by the significant net buying of local institutes and foreign investors, so that the DoW effect and positive Friday returns of the SET and SET50 were consistent with the buy order flows from local institutes and foreign investors.

In order to ensure that the buy order flows from local institutes and foreign investors explained the DoW effect and positive Friday returns of the SET and SET50 index portfolios, the authors repeated the two-step test for the mai index portfolio. Because the DoW effect was not found for the mai portfolio, the mai turnover ratio and the mai net-buy to market-capitalization ratio regression results should support inexistence of the DoW effect. From Table 6 under column mai Market, the tests cannot find the DoW effect for any mai ratios. Moreover, the net-buy to market-capitalization ratios for all the weekdays and trader groups are not significant.

Recalling Table 2, the authors have yet to explain the significant negative Monday returns for the SET and SET50 index portfolios. The order flow explanation posits that the negative Monday return is a result from selling pressure. From Table 6, the net sellers are local institutes, foreign investors and local investors. But their net sell ratios are not significant. How can their selling pressure stock prices sufficiently downward to cause significant, negative Monday returns?

From Table 6, the trading is much thinner on Monday than any other days of the week. Monday's turnover ratio timed 10,000 is (2.58, 3.97, 4.76, 3.00) times lower. The differences are significant at the 99-percent confidence level. Foster and Viswanathan (1990) and Brooks and Kim (1997) explained Monday's thin trading as follows. Discretionary liquidity traders avoided trading stocks on Monday because they feared potential losses from their transactions against informed traders, whose trading might be based on private information received during the weekend. Wang and Walker (2000) added that institutional investors traded less on Monday because it was their strategic planning day. Despite little significance of the net selling on Monday, thin trading exacerbated the selling pressure that led to lower prices and negative returns (Brooks & Kim, 1997).

Table 6: Tests for the Order Flow Explanation

Statistics	Main Market					mai Market				
	Volume Turnover	Local Institutes	Proprietary Trader	Foreign Investors	Local Investors	Volume Turnover	Local Institutes	Proprietary Trader	Foreign Investors	Local Investors
$\alpha_{Mo} \times 10000$	33.6305***	−0.0084	0.0207	−0.0079	−0.0044	110.9320***	−0.0132	−0.0599*	−0.0631	0.1362
$\alpha_{Tu} \times 10000$	36.4807***	0.0054	0.0150	−0.2117	0.1913	119.9294***	−0.0832	−0.0102	0.0633	0.0302
$\alpha_{We} \times 10000$	37.6044***	0.0774	0.0190	0.0081	−0.1045	121.8382***	−0.4975**	−0.0781	0.0932	0.4825
$\alpha_{Th} \times 10000$	38.3968***	0.0421	0.0211	0.1166	−0.1798	128.8889***	−0.3188*	0.0083	0.2646	0.0459
$\alpha_{Fr} \times 10000$	36.6333***	0.1397***	−0.0785***	0.2152*	−0.2764**	124.4394***	−0.2933	0.0307	0.2860	−0.0234
Wald Statistic	26.1183***	4.4564	13.6749***	6.1657	7.2398	6.1677	4.3303	5.5148	2.3949	1.7248

Note: *, ** and *** are significance at the 90-, 95- and 99-percent confidence levels, respectively.

The early studies (Choudhry, 2000; Brooks & Persand, 2001) proposed that the DoW effect in Thailand was a spillover from developed markets such as the U.S. and Japanese markets. The authors re-examined the spillover explanation for Thailand for the more recent sample period by the model in equation (3).

$$r_t = \delta_{Mo}D_{Mo,t} + \delta_{Tu}D_{Tu,t} + \cdots + \delta_{Fr}D_{Fr,t} + \beta r_t^* + \varepsilon_t \quad (3)$$

where r_t^* is the return on the referenced market, from where the DoW effect spills. If the DoW effect is a spillover from the referenced market, adding the return r_t^* in the regression should completely remove the DoW effect for the SET and SET50 index portfolios.

Following Brooks and Persand (2001), the authors considered the Japanese and U.S. markets as the referenced markets. The referenced Japanese and U.S. market returns were constructed from the local-currency MSCI national indexes for Japan and the U.S. The index data were retrieved from the Bloomberg database. The U.S. returns were lagged one day because the U.S. market opens 12 hours later than does the Thai market. The results are in Table 7. The DoW effect still existed for the SET and SET50 index portfolios regardless of whether the Japanese or U.S. market was the referenced market. The authors concluded that the DoW effect was not a spillover from the Japanese or U.S. market.

Table 7: Tests for the Spillover Explanation

Statistics	Japanese Spillover		U.S. Spillover		Large-Stock Effect
	SET Index	SET50 Index	SET Index	SET50 Index	
$\delta_{Mo} \times 100$	–0.1050*	–0.0998	–0.1138*	–0.1180*	–0.0163***
$\delta_{Tu} \times 100$	0.0109	0.0160	–0.0090	0.0253	–0.0033
$\delta_{We} \times 100$	0.0722	0.0593	0.0879*	0.0469	0.0196***
$\delta_{Th} \times 100$	–0.0056	–0.0104	0.0045	0.0129	0.0039
$\delta_{Fr} \times 100$	0.2000***	0.2085***	0.2059***	0.2028***	0.0147***
β	0.3462***	0.3870***	0.2297***	0.3066***	0.8892***
Wald Statistic	22.4557***	18.8600***	22.0721***	17.0966***	20.3233***

Note: * and *** are significance at the 90- and 99-percent confidence levels, respectively.

The SET50 stocks are a subset of the SET stocks. Because the two indexes are value-weighted price indexes and the SET50 stocks are largest stocks, the SET50 return movement can explain more than 98.50% of the SET return movement over the September 2, 2002 to August 31, 2015 sample

period. Brusa et al. (2000) warned that the DoW effect could be firm-size dependent. So, the DoW effect of the SET index portfolio may as well be influenced by the SET50 stocks. The small SET stocks, which contribute little to the value-weighted SET index portfolio, may not have the DoW effect. And, the DoW effect is not the main-board phenomenon, but a large-stock phenomenon.

The authors used the model in equation (3) to distinguish the two phenomena by considering the SET return as r_t and the SET50 return as r_t^*. If the DoW effect is the main-board phenomenon, the Wald statistic must be significant. Otherwise, it is a large-stock phenomenon. The results are reported in Table 7 in the column Large-Stock Effect. The Wald statistic is significant, hence the authors concluded that the DoW effect was a main-board phenomenon.

CONCLUSION

In this study, the authors revisited the day-of-the-week effect in the Stock Exchange of Thailand using daily return data on the SET, SET50 and mai index portfolios. The study found the DoW effect for the SET and SET50 index portfolios but not for the mai index portfolio. Further tests revealed that the DoW effect was a main-board phenomenon. Only those stocks trading on the main market showed the effect.

The authors tested for alternative explanations of the DoW effect of the SET and SET50 index portfolios. Compared to the previous studies on the Thai market, the tests in this study are most complete. There is only one possible explanation—the order flow explanation. The buy order flows from local institutes and foreign investors drove the price up, hence constituting positive Friday returns and the DoW effect. The negative Monday return was from net selling of local institutes, foreign investors and local investors in a significantly thin market on Monday.

Interestingly, the next important questions are (1) why local institutes and foreign investors were net buyers and drove the prices upward on Friday and (2) why local institutes, foreign investors and local investors were selling on Monday.

As for question (1), Miller (1988) noticed for the U.S. market that brokerage recommendations were primarily positive and they tended to be released later in the week. Moreover, Khanthavit (1999) pointed out for the Thai market that institutional investors were larger, therefore more important to brokers than were small local investors, while Khanthavit (1998) reported that the institutional investors rebalanced their portfolios one day before the individual investors did. So, one possible hypothesis is that recommendations are released on Friday for most of the time and the recommendations reach local institutes and foreign investors first. As for question (2), because strategically traders were reluctant to trade on Monday (Foster & Viswanathan, 1990; Brooks & Kim, 1997), a hypothesis is that stock selling on Monday was from liquidity needs of the investors over the weekend (Kelly, 2013). The authors leave these hypothesis tests for future research.

REFERENCES

English

Abraham, A., & Ikenberry, D. L. (1994). The individual investor and the weekend effect. *Journal of Financial and Quantitative Analysis, 29*(2), 263–277.

Ajayi, R. A., Mehdian, S., & Perry, M. J. (2004). The day-of-the-week effect in stock returns: Further evidence from eastern European emerging markets. *Emerging Markets Finance and Trade, 40*(4), 53–62.

Brooks, C., & Persand, G. (2001). Seasonality in Southeast Asian stock markets: Some new evidence on day of the week effects. *Applied Economics Letters, 8*(3), 155–158.

Brooks, R. M., & Kim, H. (1997). The individual investor and the weekend effect: A reexamination with intraday data. *Quarterly Review of Economics and Finance, 37*(3), 725–737.

Brusa, J., Liu, P., & Schulman, C. (2000). The weekend effect, "reverse" weekend effect, and firm size. *Journal of Business Finance and Accounting, 27*(5–6), 555–574.

Chang, E. C., Pinegar, J. M., & Ravichandran, R. (1993). International evidence on the robustness of the day-of-the-week effect. *Journal of Financial and Quantitative Analysis, 28*(4), 497–513.

Chen, C. C., Lee, C., & Wang, A. M. L. (2002). A note on stock market seasonality: The impact of stock price volatility on the application of dummy variable regression model. *Quarterly Review of Economics and Finance, 42*(1), 155–162.

Chen, H., & Singal, V. (2003). Role of speculative short sales in price formation: The case of the weekend effect. *Journal of Finance, 58*(2), 685–705.

Choudhry, T. (2000). Day of the week effect in emerging Asian stock markets: Evidence from the GARCH model. *Applied Financial Economics, 10*(3), 235–242.

Connolly, R. A. (1989). An examination of the robustness of the weekend effects. *Journal of Financial and Quantitative Analysis, 24*(2), 133–170.

Chukwuogor, C. N., & Feridun, M. (2006). An econometric investigation of the day-of-the-week effect and returns volatility in fifteen Asia Pacific financial markets (1998–2003). *Applied Econometrics and International Development, 6*(1), 207–220.

Foster, F. D., & Viswanathan, S. (1990). A theory of interday variations in volume, variance and trading costs in securities markets. *Review of Financial Studies, 3*(4), 593–624.

French, K. R. (1980). Stock returns and the weekend effect. *Journal of Financial Economics, 8*(1), 55–69.

Gibbons, M. R., & Hess, P. (1981). Day of the week effects and asset returns. *Journal of Business, 54*(4), 579–596.

Holden, K., Thompson, J., & Rungsit, Y. (2005). The Asian crisis and calendar effects on stock returns in Thailand. *European Journal of Operational Research, 163*(1), 242–252.

Kamath, R. R., Chakornpipat, R.,, & Chatrath, A.(1998). Return distributions and the day-of-the week effects in the Stock Exchange of Thailand. *Journal of Economics and Finance, 22*(2–3), 97–106.

Keim, D. B., & Stambaugh, R. F. (1984). A further investigation of the weekend effect in stock returns. *Journal of Finance, 39*(3), 819–835.

Kelly, F. C. (2013). *Why you win or lose: The psychology of speculation* (Reprint). New York: Dover Publications.

Khanthavit, A. (1998). Information structure, trading behavior and stock prices in the Thai market. *Review of Pacific Basin Financial Markets, 1*(3), 321–353.

Khanthavit, A. (1999). Evaluating value of brokers' recommendations in the Thai stock market, *Asia Pacific Journal of Finance, 2*(2), 157–181.

Lakonishok, J., & Levi, M. (1982). Weekend effects on stock returns: A note. *Journal of Finance, 37*(3), 883–889.

Lean, H. H., Smyth, W. K., & Wong, W. (2007). Revisiting calendar anomalies in Asian stock markets using stochastic dominance approach. *Journal of Multinational Financial Management, 17*(2), 125–141.

Lim, S. Y., & Chia, R. C. (2010). Stock market calendar anomalies: Evidence from ASEAN-5 stock markets. *Economics Bulletin, 30*(2), 996–1305.

Liu, Y. A., & Pan, M. S. (1997). Mean and volatility spillover effects and Pacific-Basin stock markets. *Multinational Finance Journal, 1*(1), 47–62.

Miller, E. M. (1988). Why a weekend effect? *Journal of Portfolio Management, 14*(4), 43–48.

Pettengill, G. N. (1994). An experimental study of the "blue-Monday" hypothesis. *Journal of Socio-Economics, 22*(3), 241–257.

Pettengill, G. N. (2003). A survey of the Monday effect literature. *Quarterly Journal of Business and Economics, 42*(3–4), 3–27.

Pettengill, G. N., & Buster, D. E. (1994). Variations in the return signs: Announcements and the weekday anomaly. *Quarterly Journal of Business and Economics, 33*(3), 81–91.

Philpot, J., & Peterson, C. A. (2011). A brief history and recent developments in day-of-the-week effect literature. *Managerial Finance, 37*(9), 808–816.

Sattayatham, P., Sopipan, N., & Premanode, B. (2012), Forecasting the Stock Exchange of Thailand uses day of the week effect and Markov regime switching GARCH. *American Journal of Economics and Business Administration, 4*(1), 84–93.

Stavarck, D., & Heryan, T. (2012). Day of the week effect in central European stock markets. MPRA Paper No. 38431. Retrieved from: http://mpra.ub.unimuenchen.de/38431/1/MPRA paper 38431.pdf.

Sullivan, R., Timmermann, A., & White, H. (2001). Danger of data mining: The case of calendar effects in stock returns. *Journal of Econometrics, 105*(1), 249–286.

Tangjitprom, N. (2011). The calendar anomalies of stock return in Thailand. *Journal of Modern Accounting and Auditing, 7*(6), 565–577.

Thaler, R. (1987). Anomalies: Seasonal movements in securities prices II: Weekend, holiday, turn of the month, intraday effects. *Journal of Economic Perspectives, 1*(2), 169–177.

Wang, Y. J., & Walker, M. M. (2000). An empirical test of individual and institutional trading patterns in Japan, Hong Kong and Taiwan. *Journal of Economics and Finance*, 178–194.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica, 48*(4), 817–838.