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Seasonality in Southeast Asian Stock Markets: Some New Evidence on Day-of-the-Week Effects

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Summary

In this paper, we examine the evidence for a day-of-the-week effect in five Southeast Asian stock markets: South Korea, Malaysia, the Philippines, Taiwan and Thailand. Our findings indicate significant seasonality for three of the five markets. Market risk, proxied by the return on the FTA World Price Index, is not sufficient to explain this calendar anomaly. Although an extension of the risk-return equation to incorporate interactive seasonal dummy variables can explain some significant day-of-the-week effects, market risk alone appears insufficient to characterise this phenomenon.

J.E.L. Classifications: C22, C51, G14

Keywords: Day-of-the-week effects, seasonality, Southeast Asian stock markets, CAPM, empirical market model

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1. Introduction

Investigation into the existence or otherwise of "calendar effects" in financial markets has been the subject of a considerable amount of recent academic research. Calendar effects may be loosely defined as the tendency of financial asset returns to display systematic patterns at certain times of the day, week, month, year, or around market closures. One of the most important such anomalies is the day-of-the-week effect, which results in average returns being significantly higher on some days of the week than others. Studies by French (1980), Gibbons and Hess (1981), and Keim and Stambaugh (1984), for example, have found that the average market close-to-close return in the US is significantly negative on Monday and significantly positive on Friday. By contrast, Jaffe and Westerfield (1985) found that the lowest mean returns for the Japanese and Australian stock markets occur on Tuesdays.

At first glance, these results seem to contradict the efficient markets hypothesis, since the existence of calendar anomalies might be taken to imply that investors could develop trading strategies which make abnormal profits on the basis of such patterns. For example, holding all other factors constant, equity purchasers may wish to sell at the close on Friday and to buy at the close on Thursday in order to take advantage of these effects. However, evidence for the predictability of stock returns does not necessarily imply market efficiency for at least two reasons. First, it is likely that the small average excess returns documented by the above papers would not generate net gains when employed in a trading strategy once the costs of transacting in the markets has been taken into account. Therefore, under many "modern" definitions of market efficiency (e.g. Jensen, 1978), these models would not be classified as inefficient. Second, the apparent differences in returns on different days of the week may be attributable to time-varying stock market risk premiums. Thus it is important that researchers appropriately account for risk when considering the extent of calendar anomalies, which forms the motivation for this study.

The purpose of the present paper is to analyse day-of-the-week effects in the context of five Southeast Asian emerging markets in order to draw comparisons with the extant literature which employs data from developed markets. The paper then extends recent empirical work to consider whether any observed anomalies can be explained by reference to market risk in a CAPM-type framework, and in particular, how the risk varies through the week. The remainder of the paper develops as follows. Section 2 outlines the data and empirical methodology employed.

Section 3 presents the empirical results, while section 4 concludes. Tabulated results are contained in an appendix at the end of the paper.

2. Data and Methodology

Stock Indices were obtained from Datastream on a daily close-to-close basis for all weekdays (Mondays to Fridays) falling in the period 31 December, 1989 to 19 January, 1996 (a total of 1581 observations), for the following countries, together with the FTA World Price Index:

South Korea : South Korea Stock Exchange Composite Price Index

Malaysia : Kuala Lumpur Composite Price Index

Thailand : Bangkok Stock Exchange Price Index

Taiwan : Taiwan Weighted Price Index

Philippines : Philippines Stock Exchange Composite Price Index

For each index, a series of daily, continuously compounded log returns are calculated in the usual manner.

The return on the market index is regressed (separately for each country) on 5 dummy variables, representing each day of the week (Monday to Friday), to test for the difference in the mean rates of return across the days of the week:

$$R_t = \alpha_1 D_{1t} + \alpha_2 D_{2t} + \alpha_3 D_{3t} + \alpha_4 D_{4t} + \alpha_5 D_{5t} + \varepsilon_t \quad (1)$$

where, R_t is the log return of the market index, D_{1t} , D_{2t} ,..., D_{5t} are the dummy variables representing Monday, Tuesday,..., Friday respectively (so that D_{1t}=1 if day t is a Monday, zero otherwise and so on), ε_t is an iid error term. α_1 to α_5 represent the mean returns for Monday through Friday[2].

Although significant coefficients in (1) will support the hypothesis of seasonality in returns, it is important to note that risk factors are not taken into account. We have to allow for the possibility that the market can be more/less risky on certain days. Hence, low (high) significant returns in Equation (1) might be explained by low (high) risk. We thus test for seasonality using the empirical market model, whereby the market risk is proxied by the return on

[2] In order to allow for the possible presence of heteroscedasticity and serial correlation in the ε_t's, our t-statistics in all subsequent analysis are computed using robust standard errors following Newey and West (1987) and White (1980). Parzen weights are used and the window size is specified as one third of the available data.

the FTA World Price Index. The market model is given by the following equation, estimated separately for each country i

$$R_{it} = \alpha_i + \beta_i RME_t + \sum_{y=1}^{5} \gamma_y D_{it}^{y} + \varepsilon_{it} \quad (2)$$

where all terminology is as for (1), and in addition, RME_t is the return on the market portfolio, given by the return on the FTA World Index, which is used as a proxy for market risk. D_{it}^{y} are the seasonal dummy variables. If these dummy variables are insignificant where they were previously significant for (1), we can say that the seasonality is in the risk-return relationship. However, if they are still significant, then other risk factors should be considered.

However, (2) does not consider risk variation on any particular day, but rather it only gives the variation in mean returns on each day. In particular, the equation forces the risk-return relationship to be constant over all days of the week. Hence, in order to look at how risk varies across the days of the week, interactive dummy variables (seasonal dummy variables multiplied by the return on FTA World Index) are used to determine whether risk increases (decreases) on the day of high (low) returns. The risk equation can be written

$$R_{it} = \alpha_i + \sum_{y=1}^{5} \beta_{iy} D_{it}^{y} + \sum_{y=1}^{5} \gamma_{iy} [D_{it}^{y} RME_t] + \varepsilon_{it} \quad (3)$$

In this way, when considering the effect of market risk on seasonality, we are allowing for risk to vary across the days of the week.

3. Results

Table 1 in the appendix gives the results for estimation of equation (1), that is the average returns on each day of the week. The main features are as follows. Neither South Korea nor the Philippines have significant calendar effects[3]; both Thailand and Malaysia have significant positive Monday average returns and significant negative Tuesday returns; Taiwan has a significant Wednesday effect. The effects of incorporating the daily seasonal dummies into the empirical market model given by equation (2), are presented in table 2. It is evident that the incorporation of the risk-proxy in an additive fashion is insufficient to explain the day-to-day variation in average returns. In fact, any

significant day-of-the week-effects noted from table 1 still remain after the incorporation of the risk factor, apart from the negative Tuesday returns in Thailand. It is interesting to note that the market betas for all three countries are considerably less than unity, although all are significant in their respective regression equations.

Table 3 gives the results derived from estimation of equation (3). As can be seen, significant Monday effects in the Bangkok and Kuala Lumpur stock exchanges, and a significant Thursday effect in the latter, remain even after the inclusion of the slope dummy variables which allow risk to vary across the week, although the t-ratios fall slightly in absolute value, indicating that the day-of-the-week effects become slightly less pronounced. The significant negative average return for the Taiwanese stock exchange, however, completely disappears. It is also clear that average risk levels vary across the days of the week. For example, the betas for the Bangkok stock exchange vary from a low of 0.36 on Monday to a high of over unity on Tuesday. This illustrates that not only is there a significant positive Monday effect in this market, but also that the responsiveness of Bangkok market movements to changes in the value of the general world stock market is considerably lower on this day than on other days of the week.

4. Conclusions

This paper has investigated the presence of day-of-the-week effects in five Southeast Asian stock markets during the 1990s. Two of the stock return series, those of South Korea and the Philippines, did not show any significant evidence for the presence of this calendar anomaly. The other three markets had at least one day of the week when the average return was significantly positive or significantly negative. Very little of this can be accounted for by reference to market risk, as captured by the world stock price index. When the assumption that the risk of each market is constant throughout the week with respect to the world market is relaxed, some of the remaining day-of-the-week effects can be explained. However, some significant calendar anomalies remain. It is possible that these may be rationalised by reference to missing risk factors, such as unanticipated inflation, or unanticipated changes in exchange rates, the term structure, or default risk premiums, or (as Penman (1987) suggests), the release of news information only on certain days of the week.

[3] South Korea and the Philippines are therefore excluded from subsequent analysis, since there are no significant calendar anomalies to explain.

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Table 1: Values and Significances of Days of the Week

	South Korea	Thailand	Malaysia	Taiwan	Philippines
Monday	0.49E-3	0.00322	0.00185	0.56E-3	0.00119
	(0.6740)	(3.9804)**	(2.9304)**	(0.4321)	(1.4369)
Tuesday	-0.45E-3	-0.00179	-0.00175	0.00104	-0.97E-4
	(-0.3692)	(-1.6834)	(-2.1258)**	(0.5955)	(-0.0916)
Wednesday	-0.37E-3	-0.00160	0.31E-3	-0.00264	-0.49E-3
	-0.5005)	(-1.5912)	(0.4786)	(-2.107)**	(-0.5637)
Thursday	0.40E-3	0.00100	0.00159	-0.00159	0.92E-3
	(0.5468)	(1.0379)	(2.2886)**	(-1.2724)	(0.8908)
Friday	-0.31E-3	0.52E-3	0.40E-4	0.43E-3	0.00151
	(-0.3998)	(0.5036)	(0.0536)	(0.3123)	(1.7123)

Notes: Coefficients for equation (1) are given in each cell followed by t-ratios in parentheses; * and ** denote significance at the 5% and 1% levels respectively.

Table 2: Day of the Week Effects with the Inclusion of a Market Risk Proxy

	Thailand	Malaysia	Taiwan
Monday	0.00321	0.00185	0.54E-3
	(3.8392)**	(3.1959)**	(0.8038)
Tuesday	-0.00132	-0.00134	0.0014
	(-1.2246)	(-1.8567)	(1.1890)
Wednesday	-0.00164	0.222E-3	-0.00263
	(-1.3030)	(0.5679)	(-3.0044)**
Thursday	0.00105	0.00157	-0.00167
	(1.1232)	(2.3739)*	(-0.9300)
Friday	0.11E-3	-0.36E-3	0.80E-4
	(0.1748)	(-0.9136)	(0.0675)
RME	0.75046	0.7718	0.6730
	(2.9709)**	(6.1580)**	(2.3851)*

Notes: As for table 1.

Table 3: Day of the Week Effects with the Inclusion of Interactive Dummy Variables with the Risk Proxy

	Thailand	Malaysia	Taiwan
Monday	0.00322	0.00185	0.544E-3
	(3.3571)**	(2.8025)**	(0.3945)
Tuesday	-0.00114	-0.00122	0.00140
	(-1.1545)	(-1.8172)	(1.0163)
Wednesday	-0.00164	0.25E-3	-0.00263
	(-1.6926)	(0.3711)	(-1.9188)
Thursday	0.00104	0.00157	-0.00166
	(1.0913)	(2.3515)*	(-1.2116)
Friday	0.31E-4	-0.3752	-0.13E-3
	(0.03214)	(-0.5680)	(-0.0976)
Beta-Monday	0.3573	0.5494	0.6330
	(2.1987)*	(4.9284)**	(2.7464)**
Beta-Tuesday	1.0254	0.9822	0.6572
	(8.0035)**	(11.2708)**	(3.7078)**
Beta-Wednesday	0.6040	0.5753	0.3444
	(3.7147)**	(5.1870)**	(1.4856)
Beta-Thursday	0.6662	0.8163	0.6055
	(3.9313)**	(6.9846)**	(2.5146)*
Beta-Friday	0.9124	0.8059	1.0906
	(5.8301)**	(7.4493)**	(4.9294)**