SEASONALITY IN THE ASEAN EQUITY MARKETS: IS THERE CONTAGION EFFECT?

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Abstract

The objective of this study is to investigate the presence of contagion effect of seasonality in stock markets in the ASEAN region. The study employs the month-end closing prices of each country's broad based stock market indexes over the period of January 1988 to December 2005. The analysis begins with the re-examination of the existence of seasonality effect in each equity market, separately. Using Granger causality approach, the study finds evidence of causal linkages in the markets with Singapore as the leader in majority of the cases. The time-series regression analysis suggests the presence of contagion effect in that the stock returns in Singapore set the trend in three other markets (Malaysia, Thailand, and Indonesia). The study further investigates for causal linkages due specifically to seasonality effect. The results deviate from those of the general market performance with respect to the leader-follower linkages but lend strong support to the view that seasonality effect in some stock markets are contagious. Specifically, seasonality effect in Malaysian stock market tends to be pre-determined by its occurrences in Singapore and Thailand, which in turn tend to be pre-determined by seasonality effect in Indonesia and the Philippines, respectively. From investment standpoint, the findings imply that investors in the follower markets could rely on the trend in the leader markets in the same region in order to improve their chance to exploit the seasonality effect.

***Keywords**: Seasonality Effect, Contagion Effect, ASEAN Countries*

I. INTRODUCTION

Contagion effect of abnormal stock return pattern is rather a new issue in the literature of stock market anomaly. However, stock market seasonality, particularly the anomalous January effect, has long been an intriguing issue in empirical finance. To be more specific January effect has been the most closely examined anomaly of efficient market hypothesis since it was re-introduced in 1976. This is particularly true for major capital markets like the New York Stock Exchange (NYSE) where studies on this issue are both voluminous and lenient towards supporting the January effect anomaly (Rozeff & Kinney 1976; Keim 1983; Haugen and Jorion 1996). Even though studies done on other stock markets are less rigorous, Gultekin and Gultekin (1983) still find existence of January effect among others in several European countries, Australia, Japan, and Singapore. Several explanations exist for the January effect but the most compelling and tested explanation is tax-loss selling hypothesis. This hypothesis implies inexistence of seasonal month effect in the absence of tax on capital gains such as the case with the sample markets in this study, namely Malaysia, Singapore, Indonesia, the Philippines, and Thailand. However, there are evidences of January effect in such systems (Kato & Schallheim, 1985; Jones et al., 1987) and there are evidences against January effect when the tax motivation applies (Cox & Johnston, 1998; Mehdian & Perry, 2002). The fact that all of the stock markets selected in this study do not impose tax on capital gain is merely an additional edge in discussing seasonality effect, but by no means is the focus of the present study.

The main objective of this study is to investigate whether or not seasonality effect in a particular equity market is contagious to other equity markets. To some extent it is motivated by the growing evidence of integration in international financial markets (Narayan et al., 2004) but more so by a particular study by Masih and Masih (1999). The latter, which studies world's most advanced stock markets as well as four emerging Asian stock markets (Hong Kong, Thailand, Singapore, and Malaysia), finds that there are particular markets that set the trend for specific geographical regions particularly in the case of Southeast Asia region. Motivated by the argument that greater integration leads to greater contagion effect within the effected markets (Masih & Masih, 1999), the present study narrows the scope to focus on the contagion effect of stock market seasonality. It also focuses only on the ASEAN-5 (Malaysia, Thailand, Singapore, Indonesia, and the Philippines) to form ASEAN as a region particularly because these countries are proximate in an economic and geographic sense. This setting is ideal for testing the existence of contagion effect because it comprises of equity markets that are characterized as ones with poor and/ or lacking information dissemination and transparencies, thereby making monitoring of investments in these

equity markets very costly. That is, when a particular return pattern emerges in the leader/origin equity market(s), other equity markets follow suits (i.e., a contagion effect occurs) because investors in the other equity markets in the same region find it easier and cheaper to act based on pattern in the origin equity market rather than investigating for information. The remainder of the article is organized as follows. Section 2 reviews the existing literature on January and contagion effects. Section 3 describes the data and methodology. Section 4 presents the results and discussion on the results while, section 5 concludes and discusses the implications.

II. LITERATURE REVIEW

Of the voluminous studies on January effect, one that is most commonly cited could be that by Rozeff and Kinney (1976). Using the average monthly returns on the NYSE over a 70-year period between 1904 to1974, they find that except for the period of 1929 to 1940 the average return in January is higher than any other months. In a shorter study period between 1963 and 1979, Keim (1983) still finds evidence of January effect in a sample of securities traded in the NYSE. From 1926 until 1993, Haugen and Jorion (1996) find the January effect remains elegance with no significant sign of disappearing even after the reintroduction of the issue in 1976. This notion is very much supported by most recent evidence by Pietranico and Riepe (2004). Studies on January effect are relatively less rigorous on the other parts of the world but the market anomaly remains supported. For instance, evidence by Gultekin and Gultekin (1983) could be the most comprehensive with respect to January effect as an international phenomenon. They found significantly unusual market activity in January in the US as well as in several other European countries, Australia, Japan, and Singapore. With evidence in support of January effect is sufficiently established, interest of the later studies shift toward the explanations of the market anomaly.

Among the explanations offered for the January effect, the most frequently cited and tested is tax-loss selling hypothesis. On the surface of the tax-loss selling hypothesis alone Dyl (1977), Givoly and Ovadia (1983), Reinganum (1983), Keim (1983), Badrinath and Lewellen (1991), Dyl and Maberly (1992), Eakins and Sewell (1993), and Fant and Peterson (1995) argue that investors holding poor performing stocks will take short positions at the end of the year to reduce the net taxable capital gains. At the turn of the year stock prices rally as investors reenter the market creating upward price pressure and therefore, abnormal returns during the month. The tax-loss selling hypothesis implies January or seasonality effect should not be the phenomenon in the absence of tax on capital gain as is the case in Malaysia, Singapore, Thailand, Indonesia, the Philippines, and many other countries. Using six sectoral indexes of the Bursa Malaysia, Yong

(1991) finds results consistent with the tax-loss selling hypothesis as the market anomaly does not exist in Malaysian stock market. On the other hand, three separate studies (Abd-Karim, 2002; Abd-Rahim, 2003; Abd-Rahim et al., 2005) that use more recent data of 1980 to 2004 find strong evidence in favor of the January/February effect in the same market. This contradicting finding is not at all surprising because the link between January effect and tax-loss selling hypothesis is rather controversial. Kato and Schallheim (1985) find that January effect is presence in a sample of Japanese firms despite the no capital gains tax system in the country. Similarly, extending their search back to 1871 Jones et al. (1987) find the January effect in the US market has already existed since the pre-tax period. Evidence against tax-loss selling argument in a country with capital gains taxes is not negligible either. In a sample of firms listed in NYSE and American Stock Exchange (AMEX) over the period of 1888 to 1992, Cox and Johnston (1998) find that stocks with high potential for tax loss selling do not exhibit abnormal return in January. Similarly, using market indexes (Dow Jones Composite, NYSE Composite, and the S&P 500) Mehdian and Perry (2002) also find that after the 1987 market crash the January return is no more significantly different from returns of other months. Thus, this issue is still far from being solved because obviously there are other explanations to January effect besides tax-loss selling hypothesis. The list includes small firm hypothesis and "window dressing" or "performance hedging".[1]

While the search for explanations of the seasonality effect remains far from being exhaustive, this study, motivated by the findings of Masih and Masih (1999) and Narayan et al. (2004), is more inclined towards the implication on seasonality effect in stock markets that are increasingly becoming more integrated as a region. This notion comes parallel with the growing importance of free capital mobility arising from the introduction of various economic integration mechanisms such as the European Union (EU), North American Free Trade Area (NAFTA), and soon to be implemented ASEAN Free Trade Area (AFTA). Narayan et al. (2004) indicate that liberalization of barriers to trade (products) has also improved capital flows across national borders, resulting in the integration of the stock markets. Meanwhile, in their study which includes world's most advanced stock markets as well as four emerging Asian stock markets (Hong Kong, Thailand, Singapore, and Malaysia), Masih and Masih (1999) find that there is particular markets that set the trend for

[1] Lee, Porter, and Weaver (1998) compare the January return of December financial year end (FYE) and non-December FYE funds to determine whether the small-firm/January effect results from window dressing or performance hedging. They find that the effect is due to the latter. Whereas, Cuny, Fedenia, and Haugen (1996) find that relative to the benchmark (S&P 500 Stock Index) daily tracking errors of funds indicate that the fund managers behave conservatively at the end of the year but distinctively more aggressive at the beginning of the next year.

specific geographical regions. In the case of Southeast Asia region, the study finds that stock market fluctuations are mostly influenced by the regional rather than the advanced markets. The lesson from this imperfect integration, whereby the region is still characterized as one with leader-follower markets (Masih & Masih, 1999) is that, it indirectly creates an arbitrage opportunity among stock markets within the region. One of the opportunities comes from the potential contagion effect of stock market seasonality, defined as abnormally high return patterns in one equity market (leader/origin) that triggers similar abnormally high return patterns in other equity markets. In other words, this leader-follower linkage allows investors in the follower equity market to exploit any seasonality effect simply by observing the trend in the leader equity market.

III. METHODOLOGY

A. Definition variables and Data source

To examine seasonality effect in the selected stock markets, the present study uses macro-level data similar to the approach used by previous studies (c.f., Rozeff & Kinney, 1976; Yong, 1991; Johnston & Cox, 2002; Mehdian & Perry, 2002; Abd-Rahim, 2003; Gu & Simon, 2004). This approach offers advantages including minimizes the microstructure problem[2] introduced in individual and/or institutional stocks (Johnston & Cox, 2002), allows seasonality to be more easily detectable (Pandey, 2002), and avoids issues related to portfolio formation (Gu & Simon, 2004). This study uses monthly closing indexes, defined as the price index on the last trading day of the month, that are drawn from Thompson Financial Datastream. Selecting for each country one broad-based stock market index that can be considered an appropriate representative of the equity market condition and that have full 12-month data starting January 1988 provides this study with the following sample indexes: (1) the Exchange Main Board All Shares (EMAS) for Malaysia; (2) Jakarta Composite Index (JCI) for Indonesia; (3) Stock Exchange of Thailand Index (SET) for Thailand; (4) Singapore All Equities (SAE); and the Philippines Stock Exchange Composite Index (PCI) for the Philippines.[3] Throughout the study period, the monthly rate of return for the *i*th index for month *t* is given as;

$$R_{i,t} = \frac{PI_{i,t} - PI_{i,t-1}}{PI_{i,t-1}} x100\ \% \qquad (1)$$

where $PI_{i,t}$ is the closing price of the *i*th index in month *t*. For the purpose of identifying the seasonal month, we calculate for each equity market the average returns for month *t*;

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[2] They provide example like large bid-ask spread and clustering of data within industries.

[3] Note that for Malaysia and Singapore there are two broad indexes that fulfill the description. Nonetheless, since these indexes correlate highly, i.e. r = 0.979 between KLCI (Kuala Lumpur Stock Exchange Composite Index) and EMAS and r = 0.973 between Singapore Strait Times Index and SGALL, we assume that one index, i.e.., the broader of the two, is adequate to represent the equity market's condition.

$$\bar{R}_{i,t} = \frac{\sum_{y=1}^{n} R_{i,t,y}}{n_i} \quad (2)$$

where y is year 1988,..., 2005, t = month January, ...,or December and i is the country's broad based stock market index.

Next, in attempts to achieve its objective, the study sets the stage by re-examining the presence of seasonality effect. Then, using Granger causality approach, it investigates the presence of short-run linkages (based of returns) among returns of the sample equity markets to determine which stock markets act as the origin/cause and which get the spillover/effect. It next uses the direction of the Granger causality to examine the presence of contagion effect. Time-series multiple regressions are used to investigate both the seasonality effect and also contagion effect. To ensure that the data is appropriate for the time-series analysis, we begin our analysis by testing two basic assumptions of OLS, i.e., the normality of the distribution and the stationarity of the series.

Based on the Jarque-Bera (JB) statistic, normally distributed data has skewness value of zero ($S = 0.00$) and kurtosis of ($K = 3.00$) such that the JB statistic for normally distributed data should be zero. The null hypothesis (H_0: $JB = 0.00$) is rejected is $JB > c^2_{d.f.=2}$ (Gujarati 1995). As reported in Table 1, the JB statistics indicate that the normality distribution assumption is violated (JB = 13.83 to 6434.71). Nonetheless, such violation in normality assumption is normal for stock return series. Fortunately, in time-series analysis the assumption that is of more concern is the stationarity of the series, which in this study is determined by computing the Augmented Dickey-Fuller (ADF) which specifies that the null hypothesis (H_0: $\tilde{a} = 0$) that the series have a unit root is rejected if the ADF statistic is greater than the MacKinnon critical value. As shown in the last column of Table 1, the unit root hypothesis is consistently rejected ($p <$ 1%). The ADF values for all series are always greater than the critical value, indicating that the time-series data is suitable for time-series regression.

Table 1.

Normality of distributions and stationarity tests of return series; 1988:01 to 2005:12

Market	Mean	Median	Min.	Max.	St Dev	Skewness	Kurtosis	*JB*	*ADF*
Malaysia	0.008	0.007	-0.243	0.336	0.084	0.449	5.795	77.55	-3.77
Philippine	0.008	0.003	-0.272	0.393	0.091	0.499	5.665	72.88	-4.28
Indonesia	0.018	0.012	-0.315	1.001	0.114	3.146	28.988	6434.71	-4.22
Singapore	0.006	0.006	-0.189	0.261	0.06	0.101	5.331	49.27	-4.37
Thailand	0.009	0.008	-0.256	0.329	0.099	0.301	4.084	13.83	-3.77

Notes: In each test, d.f. = 18 months. All JBs are significant at 1 percent level. The McKinnon critical values for 1%, 5%, and 10% significant levels are -3.4639, -2.8458, and -2.5743, respectively.

B. Specification Model

We next form the first time-series regression model which initially is used by Pietranico and Riepe (2004) to detect seasonality effect;

$$R_{i,t} = \alpha_i + \beta_1(D^S_{i,t}) + \varepsilon_{i,t}, \quad (3)$$

where $R_{i,t}$ is the monthly return on the *i*th index at the end of month *t*, α_i is the intercept term for the *i*th index, β = estimated coefficient of the explanatory factor, $D^S_{i,t}$ is the seasonal month dummy variable for the *i*th index/ market, and e_i is the white error term for the *i*th index. The dummy variable in Eq. 3 is defined generally as follows;

$$D_S = \begin{cases} 1 & \text{if s month is the seasonal month for the respective market} \\ 0 & \text{otherwise} \end{cases} \quad (4)$$

The coefficient of the dummy variable is significantly positive if the return series exhibit an abnormally positive pattern in the seasonal month and thus a proof of the presence of seasonality effect in the sample markets.

In the spirit of Kanas (2005) and Narayan et al. (2004), the second time-series regression model attempts to trace the general contagion effect by extending Eq. 3 to include return series of the other ASEAN countries that using Granger Causality tests are identified as the leaders or origins of contagion effect on returns of the home market. The resulting time-series regression models in general can be written in the following form;

$$R^H_t = \alpha^H + \beta^H_1(D^H_t) + \beta_2(R^O_{1,t}) + \ldots + \beta_5(R^O_{5,t}) + \varepsilon^H_t \quad (5)$$

where α^H is the intercept term for the home equity market, R_t is the return on the index at the end of month *t*, *O* is the equity markets that are identified as the origins of the contagion effect, *H* is the home, equity market that is identified as potentially infected by the origin market, β is the response of H equity market's return to the respective O equity market's returns, D^H is the seasonal month dummy variables of the respective home market (Eq.4) and *e* is the white error term for the home equity market. The model in Eq. 5 predicts that monthly returns on stocks of a particular equity market (home) are explained not only by the pattern seasonal month, but also by the patterns of returns on stocks of the other ASEAN equity markets that have been identified to originate/trigger the pattern. In short, the return patterns in a particular "origin" equity market are transmitted or contagious to the other equity markets in the region. For instance, returns on Malaysia stocks are not only explained by the abnormal December/February returns but also the monthly returns on Thailand, Indonesia, the Philippines, and Singapore stocks. Eq. 5 nonetheless is only sufficient to represent the linkages among the stock returns of the five equity markets in general. To dictate specific linkages due to seasonality, Eq. 5 is modified to incorporate only returns of months that have been identified to exhibit seasonality effect, that is;

$$R_t^{*H} = \alpha^H + \beta_1 (R_{1,t}^{*O}) + \ldots + \beta_5 (R_{5,t}^{*O}) + \varepsilon_t^H \quad (6)$$

Before we could proceed with the tests, an issue that needs to be resolved is the identity of the seasonal months which could vary from one market to another. This is because in the case of Malaysia itself seasonality effect is less persistent with respect to the month when it occurs. It has shifted from January over the 1970-1988 period in Yong (1991) to January/February over the 1980-2000 period in Abd-Karim (2002) before more or less settle down at December/February over the period of 1992-2002 in Pandey (2002) and 1988-2004 in Abd-Rahim (2003) and Abd-Rahim et al. (2005). Overall, the tendency in Malaysia is toward February effect probably because it is more easily associated with the Chinese New Year (henceforth, CNY) effect. The argument is that the abnormal returns in January and/or February are the results of the behavior of Chinese investors, whose role in the Bursa Malaysia is vital, around these months. This argument is compelling because for the last 18 years from 1988 to 2005 the CNYs had been celebrated in either one of the two months, mostly (67%) in February.[4] The low average January returns are an initial indication of the CNY effect whereby these investors are cashing out for the celebration. At the beginning of the CNY, their enthusiasm when re-entering the equity market drives prices abnormally high, a reflection very much welcomed by the community as it indicates sign of fortune and prosperity in the New Year.

IV. EMPIRICAL RESULTS

As stated in earlier section, the identification of the seasonal month, i.e., month with potential seasonality effect, in each equity market is done based on the highest average monthly returns (Eq. 2) of the index over the 18-year study period. The trend of the average monthly returns for each country and the respective statistics are displayed in Figure 1 and Panel A of Table 2, respectively. The trend in Figure 1 shows that the seasonal month is more appropriately attributed to February in the case of Malaysia because it reports the highest monthly returns of 5.04%. For Thailand, the highest monthly return (5.40%) is in January whereas for Indonesia, the Philippines, and Singapore the highest monthly returns are in December (9.84% and 3.38%, respectively). The slight difference in terms of month with highest average returns in these countries disappears once we consider the month with the next highest returns. Both Malaysia and Thailand report the second highest average monthly returns in December whereas Indonesia, the Philippines and Singapore report the second highest average monthly returns in January. Briefly, except for Malaysia where the seasonal month seems to be more appropriately registered as December/February, for the rest of the ASEAN countries it will be registered as the January/December. Accordingly,

[4] For the past 18 years, the dates of Chinese New Years are as follows: 17/2/88; 6/2/89; 27/1/90; 15/2/91; 4/2/92; 23/1/93, 10/2/94; 31/1/95; 19/2/96; 7/2/97; 28/1/98; 16/2/99; 5/2/200; 24/1/01; 12/2/02; 1/2/03; 22/1/04; and 9/2/05.

if seasonality effect is to be determined by recognizing such prolonged effect (e.g., Silvapulle (2004) also discusses seasonality Australian market in the form of December/January and July/ August), the dummy variable in Eq. 4 must register these months as having a value of 1.

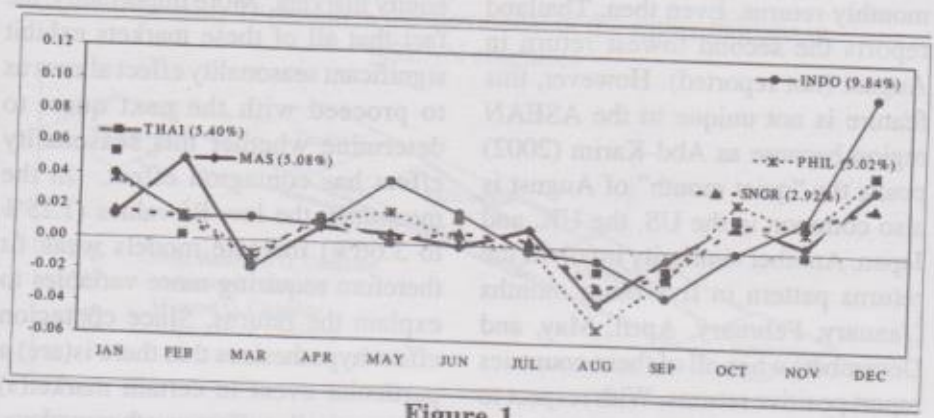


Figure 1.
Average monthly returns for each of the ASEAN equity markets
Jan 1988 to Dec 2005

Table 2.
Descriptive statistics and regressions for each of the ASEAN equity markets

Panel A. Descriptive statistics and correlations

Statistics	Min	Mon	Max	Mon	Total	MAS	THAI	INDO	SNG
Malaysia	-0.035	Aug	0.051	Feb	0.11	1			
Thailand	-0.017	Mar	0.054	Jan	0.139	0.566*	1		
Indonesia	-0.03	Aug	0.098	Dec	0.214	0.344*	0.364*	1	
Singapore	-0.025	Aug	0.029	Dec	0.083	0.674*	0.612*	0.351*	1
Philippines	-0.05	Aug	0.05	Dec	0.091	0.545*	0.579*	0.404*	0.641*

Panel B. Regression of monthly Returns of Domestic Equity Market on Seasonal Month Dummy

Parameter	Malaysia	Singapore	Thailand	Indonesia	Philippines
α	0.0004	0.0023	0.006	0.0076	0.0014
	-0.0587	-0.5127	-0.0785	-0.9089	-0.2146
β_{SD}	0.0454	0.0212	0.0512	0.0616	0.0421
	(3.0215)***	(1.9297)*	(2.8733)***	(3.0281)***	(2.5594)**
Adjusted-R^2	0.0364	0.0125	0.0326	0.0366	0.0252
F-Statistics	9.129***	3.724*	8.256***	9.170***	6.551**
Durbin-Watson	1.8879	1.8803	1.8614	1.7824	1.8095

*Note: In Panel A, * indicates significance at 5% level while abbreviations min = minimum, max = maximum, mon = month, MAS = Malaysia, THAI = Thailand, INDO = Indonesia, and SNG = Singapore. In Panel B, each cell contains coefficient followed by the (t-stat) and *, **, and *** indicates significance at 10%, 5%, and 1% levels, respectively.*

Next, as reported in Panel A of Table 2, all stock markets except Thailand consistently report August as the month with the lowest average monthly returns. Even then, Thailand reports the second lowest return in August (not reported). However, this feature is not unique to the ASEAN region because as Abd-Karim (2002) posits the "quiet month" of August is also common in the US, the UK, and Japan. Another similarity involves the returns pattern in five other months (January, February, April, May, and December) when all of these countries report positive returns. With respect to Malaysia, the results that we gather so far differ from those in Yong (1991) where the average monthly returns of January (March) stands highest (lowest) but are similar with those in Abd-Karim (2002), Pandey (2002), Abd-Rahim (2003), and Abd-Rahim et al. (2005). The "regionality" feature of these countries is evidenced by the correlations that are consistently positive and highly significant ($\alpha < 0.01$). Of the five equity markets, Indonesia seems to have a stock market that relatively least correlated (0.344 to 0.404) with the others.

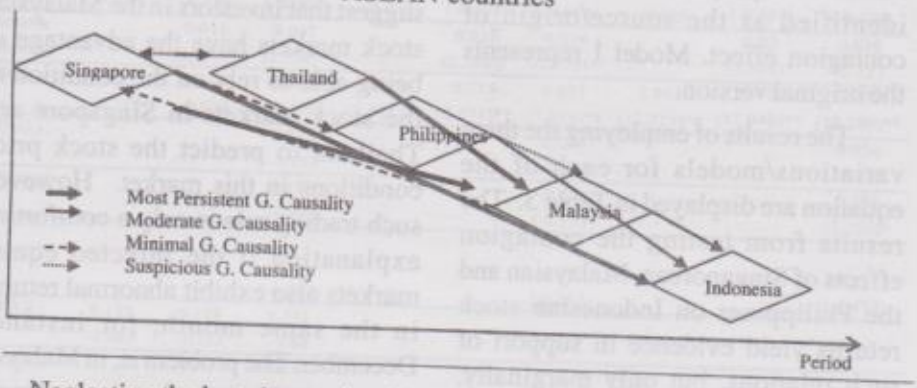
To quantify if the abnormal high returns that often occur during the same months in the respective domestic equity market, we regress the monthly returns on the seasonal dummy variable. As reported in Panel B of Table 2, the coefficients of the seasonal dummy variables are all highly significant including in the Singaporean equity market even though it is only significant at the conventional level. While evidence of seasonality effect is most prevalent in Malaysia and Indonesia, it is also as persistent during the 18-year studied period in the other equity markets. More importantly, the fact that all of these markets exhibit significant seasonality effect allows us to proceed with the next quest to determine whether this seasonality effect has contagion effect. In the meantime, the low R^2 values (1.25% to 3.66%) indicate models weak fit therefore requiring more variables to explain the returns. Since contagion effect hypothesizes that there is(are) a particular event in certain market(s) triggers similar effect on other markets, we must first determine which market triggers the contagion effect. One way to do that is by running Granger causality tests.[5]

The results of the Granger Causality tests are reproduced in the form of a diagram in Figure 2 to provide us with a clearer picture of the direction of the causality as well as the intense of the causality. Obviously, Figure 2 shows three important observations: (i) there are three most persistent Granger causalities running from stock prices in Thailand to Malaysia, Singapore to Malaysia, and Singapore to Indonesia; (ii) there are three more moderate Granger causalities involving the movements of equity markets in Malaysia and the Philippines followed by Indonesia and Singapore followed by Thailand; and (iii) there are four other Granger

[5] Details of results of the Granger Causality tests will be made available from the first author upon request.

causalities (from Singapore to the Philippines, Malaysia to Singapore, the Philippines to Malaysia, and Thailand to Singapore) with either minimal or suspicious intensity.

Figure 2.
Causality Direction in the movement of the equity markets in ASEAN countries



Neglecting the last observation for its minimal intensity/importance allows us to discharge two possibilities of bidirectional causalities (i.e. between Malaysia and Singapore and Thailand and Singapore) and consequently reach the following conclusions. First, the movement in the Singaporean equity market seems to precede all the other ASEAN equity markets except for the Philippines equity markets, such that Singapore should be identified as the location of the "outbreak" of the seasonality effect. In other words, to detect the contagion effect of stock market seasonality, returns on stocks traded in Singapore will be the explanatory factor for returns on Malaysia, Indonesian, and Thailand's stocks. The leading role of Singaporean equity market is expected given its sophistication and stability relative to the remaining equity markets in the region. Second, beside Singapore, Thailand equity market also Granger causes the Malaysian equity market such that returns on Thailand stocks also should play a role as explanatory factor for returns on stocks traded in Malaysian. Third, the Indonesian equity market seems to be lagging behind all the other ASEAN equity markets except Thailand. Thus, when it comes to detecting contagion effect in Indonesia, the regression model should include returns on stocks traded in all of the ASEAN countries except Thailand. In conclusions, the contagion effect of seasonality will be detected in three equity markets and in general can be represented with the following regression models:

$$R_t^{INDO} = \alpha^{INDO} + \beta_1(R_t^{SNG}) + \beta_2(R_t^{MAS}) + \beta_3(R_t^{PHIL}) + \varepsilon_t^{INDO} \quad (5a)$$

$$R_t^{MAS} = \alpha^{MAS} + \beta_1(R_t^{THAI}) + \beta_2(R_t^{SNG}) + \varepsilon_t^{MAS} \quad (5b)$$

$$R_t^{THAI} = \alpha^{THAI} + \beta_1(R_t^{SNG}) + \varepsilon_t^{THAI} \quad (5c)$$

For robustness, each of the models above may be adjusted to control for seasonality effect (Model II) as well as the lagged effects (Model III which is limited to 6 lags) of the returns on stocks of equity markets which are identified as the source/origin of contagion effect. Model I represents the original version.

The results of employing the three variations/models for each of the equation are displayed in Table 3. The results from testing the contagion effects of Singaporean, Malaysian and the Philippines on Indonesian stock returns yield evidence in support of such relations, but only marginally. Specifically, since none of the current as well as the lagged returns of these source markets report coefficients that are significant, it suggests that there is no contagion effect in these bearer markets. But, all this is with one exception, i.e., the Philippines current stock returns. In other words, if the specification employed in this study is a reasonable estimation of contagion effect, then the coefficient of variable PHIL that appears to be consistently positively significant suggest that there is contagion effect of seasonality coming from the Philippines stock market to the Indonesian stock market.

For the other two equity markets the results also suggest that there is indeed contagion effect and it is also contemporaneous. Except in one case (SNG_{-2}), the coefficient of the lagged variable "SNG" is never significant. These findings suggest that the movement of the Singaporean stock returns is infecting the movement of the Malaysian as well as Thailand stock returns, contemporaneously. Beside the contagion effect from Singapore, equity returns in Malaysia is also infected by the contemporaneous and 2-month lagged movement of the Thailand equity market. Intuitively, these findings suggest that investors in the Malaysian stock markets have the advantage of being able to rely on the condition of the stock markets in Singapore and Thailand to predict the stock price conditions in this market. However, such trading rule is only a comforting explanation if the infected equity markets also exhibit abnormal returns in the same month, for instance December. The problem is, in Malaysia the seasonality is in fact more closely associated with February. Could the significant coefficient of 2-month lagged returns in Thailand ($THAI_{-2}$) then be the only clue for these investors?

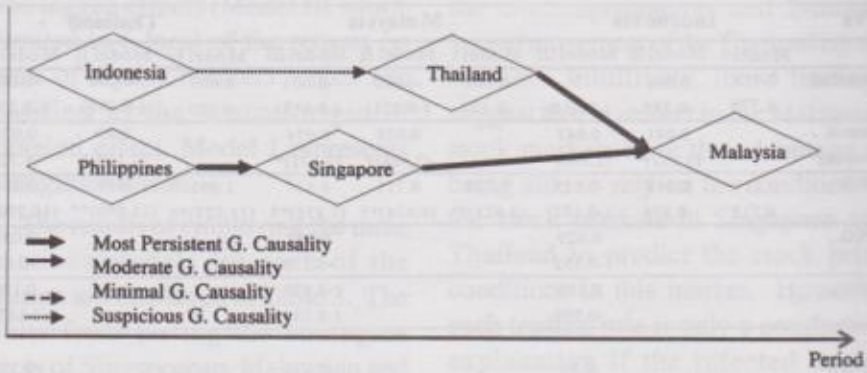
To answer this question, we run another Granger causality tests which use only returns of seasonal months as the variables. Specifically, the tests only involve returns in February and December in the case of Malaysia and January and December in the case of the remaining equity markets. As with the first test, the detail results are not reported and only the significant causalities are extracted and illustrated in the form of a diagram in Figure 3. Unlike the first test, this Granger causality test produces less significant causalities but whenever it does, the causality is always unidirectional. Except for Malaysian equity market which movement is still preceded by Singaporean and Thailand, the other relationships show some changes.

Table 3.
Regressions of seasonal month returns of home on the origin equity markets

IVs	Indonesia			Malaysia			Thailand		
	Model I	Model II	Model III	Model I	Model II	Model III	Model I	Model II	Model III
Constant	0.013	0.006	0	0.002	-0.003	-0.003	0.003	-0.002	-0.002
	-1.779	-0.789	(-0.004)	-0.437	(-0.621)	(-0.658)	-0.605	(-0.289)	(-0.338)
Season Dummy		0.041	0.047		0.028	0.024		0.03	0.026
		(2.153)*	(2.306)*		(2.568)*	(2.172)*		(2.120)*	-1.727
SNG	0.127	0.118	-0.025	0.734	0.715	0.637	1.005	0.98	0.954
	-0.718	-0.674	(-0.132)	(8.621)**	(8.474)**	(7.335)**	(11.323)**	(11.040)**	(10.590)**
SNG_{-1}			0.029			0.032			0.056
			-0.152			-0.373			-0.62
SNG_{-2}			0.186			-0.029			0.196
			-0.998			(-0.335)			(2.163)*
....									
SNG_{-6}			-0.04			-0.025			-0.131
			(-0.212)			(-0.285)			(-1.473)
MAS	0.197	0.198	0.211						
	-1.695	-1.712	-1.68						
MAS_{-1}			0.163						
			-1.303						
MAS_{-2}			-0.056						
			(-0.450)						
...									
MAS_{-6}			0.036						
			-0.285						
PHIL	0.351	0.326	0.363						
	(3.430)**	(3.190)**	(3.310)**						
$PHIL_{-1}$			0.105						
			-0.977						
$PHIL_{-2}$			-0.047						
			(-0.434)						
...									
$PHIL_{-6}$			0.092						
			-0.863						
THAI				0.203	0.202	0.209			
				(3.917)**	(3.950)**	(3.943)**			
$THAI_{-1}$						0.04			
						-0.758			
$THAI_{-2}$						0.18			
						(3.389)**			
...									
$THAI_{-6}$						0.025			
						-0.475			
Adj-R^2	0.176	0.19	0.199	0.491	0.504	0.537	0.372	0.382	0.395
F-Stats	16.282**	13.579**	3.364**	104.735	73.856**	17.145**	128.211**	67.398**	18.052**
D-W	1.932	1.941	1.951	2.196	2.154	2.24	2.05	2.04	2.043

*Note: Each cell contains the coefficient followed by the (t-stats). * and ** indicates significance at the 5% and 1% levels, respectively. The results for lag 3 to 5 are similar to that of lag 6, thus omitted to save space. Durbin-Watson statistics » 2.00 indicate no autocorrelations in the residuals.*

Figure 3.
Causality direction in the movement of the equity markets in ASEAN Countries



Instead of being the first, Singaporean equity market now is preceded by the Philippines. Similarly, Indonesia which appears at the bottom of the chain in the first test now precedes Thailand. These relationships are not totally unexpected because they conform rather well to the nature of the seasonality in these markets. For instance, Malaysian equity market moves last because seasonality takes place in February. Similarly with Thailand which is preceded by Indonesia most probably because seasonality in the country occurs in January.

To quantify whether the relationships that emerge from the Granger causality tests have certain intuitive meanings, we form and run the following regression models:

$$R_t^{*MAS} = \alpha^{*MAS} + \beta_1(R_J^{*SNG}) + \beta_2(R_t^{*THAIL}) + \varepsilon_t^{*MAS} \quad (6a)$$

$$R_t^{*SNG} = \alpha^{*SNG} + \beta_1(R_J^{*THAI}) + \varepsilon_t^{*SNG} \quad (6b)$$

$$R_t^{*THAI} = \alpha^{*THAI} + \beta_1(R_J^{*INDO}) + \varepsilon_t^{*THAI} \quad (6c)$$

Since the variables used in Eq. 6a to 6c already incorporate seasonality (Model I), we only adjust them to include the lagged effects (Model II which is limited to 6 lags) of the returns on stocks of equity markets for robustness.

Consistent with the results of the Granger causality tests, the results in Table 4 in general provide strong evidence of contagion effect particularly with respect to Malaysia where the seasonality effect to some extent is due to seasonality (return patterns) in Singapore and Thailand.

Table 4.
Regressions of seasonal month returns of domestic on the "origin" equity markets

Independent Variables	Malaysia		Independent Variables	Thailand		Independent Variables	Singapore	
	Model I	Model II		Model I	Model II		Model I	Model II
Constant	0.005 -1.817	0.003 -1.122	Constant	0.007 (2.2572)*	0.007 -1.909	Constant	0.002 -1.256	0.002 -1.429
SNG*	0.41 (3.592)**	0.466 (4.395)**	INDO*	0.134 (3.249)**	0.135 (3.244)**	PHIL*	0.303 (9.499)**	0.3 (9.303)**
SNG*$_{-1}$		-0.656 (-6.134)**	INDO*$_{-1}$		0.075 -1.809	PHIL*$_{-1}$		-0.046 (-1.422)
SNG*$_{-2}$		0.225 (2.099)*	INDO*$_{-2}$		-0.012 (-0.290)	PHIL*$_{-2}$		-0.01 (-0.297)
SNG*$_{-3}$		-0.047 (-0.435)	INDO*$_{-3}$		-0.013 (-0.315)	PHIL*$_{-3}$		-0.009 (-0.280)
SNG*$_{-4}$		-0.002 (-0.017)	INDO*$_{-4}$		-0.013 (-0.315)	PHIL*$_{-4}$		-0.009 (-0.280)
SNG*$_{-5}$		-0.007 (-0.070)	INDO*$_{-5}$		-0.013 (-0.315)	PHIL*$_{-5}$		-0.009 (-0.280)
SNG*$_{-6}$		-0.012 (-0.117)	INDO*$_{-6}$		-0.013 (-0.315)	PHIL*$_{-6}$		-0.009 (-0.276)
THAI*	0.164 (2.861)**	0.198 (3.681)**						
THAI*$_{-1}$		0.318 (5.807)**						
THAI*$_{-2}$		0.131 (2.394)*						
THAI*$_{-3}$		0.003 -0.054						
THAI*$_{-4}$		-0.01 (-0.181)						
THAI*$_{-5}$		-0.012 (-0.220)						
THAI*$_{-6}$		-0.01 (-0.189)						
Adjusted-R^2	0.128	0.296	Adjusted-R^2	0.042	0.034	Adjusted-R^2	0.293	0.288
F-Statistics	16.847**	7.276**	F-Statistics	10.553**	2.035	F-Statistics	90.233**	13.077**
D-Watson	1.988	1.998	D-Watson	2.331	2.371	D-Watson	1.489	1.505

*Note: ** and * indicate significant at the 1% and 5% levels, respectively. Durbin-Watson statistics » 2.00 indicate no autocorrelations in the residuals.*

The coefficients of the seasonal month returns of Singapore and Thailand are positive (except in one case) and significant up to lag 2. Intuitively, these results suggest that the abnormal performance of the stock markets in Singapore and Thailand are not confined to their national border. Instead they are contagious and infecting the neighboring equity market, which in this case is Malaysia. From investment standpoint, these contagious relationships indicate that during the seasonal months of December and February, prices of stocks traded in Malaysia seem to have responded significantly to the current up to the last two seasonal month returns in Singapore and Thailand. In other words, efficient investors in Malaysia should be able to win big the abnormal high returns in December$_{t-1}$/February$_t$

based on the performance of Singapore and Thailand equity markets since October$_{t-1}$/November$_{t-1}$ to the current period.[6]

We next turn to the results for Singapore and Thailand. In general, evidence of contagion effect is limited to current period since only the coefficients of the current returns are significant at the 5% level, thereby indicating that the contagion effects if ever exist is only limited to contemporaneous seasonal months. This is particularly evidenced in the case of Thailand. The resulting adjusted-R^2 suggests that the current seasonal month returns of Indonesia explain a mere 4.2% of the fluctuations in Thailand. Adding the lagged returns of Indonesia deteriorates the explanatory power of the model further to an insignificant level (p(F-stat) > 0.05). Singapore also suffers a reduction in the adjusted-R^2 after adding the lagged returns of the Philippines, but the effect is minimal (from 29.3% to 28.8%). The fact that such results involve equity markets that have the same seasonal months, i.e. December and January suggests that the contagion effect of seasonality in the Philippines on Singapore stock markets are rather short-lived while that of seasonality in Indonesia on Thailand stock markets are suspicious. In contrast, the contagion effect of stock market seasonality running from Singapore and Thailand to Malaysia is apparently meaningful because the causation begins two months in advance. In other words, investors in Malaysia can predict and accordingly exploit the seasonality in month t by observing the fluctuations of returns in Thailand and Singapore starting from month t-2 onward.

V. CONCLUSION AND POLICY IMPLICATION

This study examines the issue of contagion effect of seasonality in the Malaysian stock market as well as four other neighboring emerging equity markets in the ASEAN-5 region, i.e., Singapore, Thailand, the Philippines and Indonesia. A common characteristic of these markets is the tax exemption on capital gain, which by itself is significant in the literature on seasonality in stock market because tax-loss selling hypothesis has been a widely-accepted explanation of seasonality effect. The preliminary results suggest that seasonality effect in these markets is very similar. Except for Malaysia where seasonality effect is more appropriately associated with February effect because this month reports an exceptionally high average monthly return, acknowledging the seasonality effect in a slightly broader span (by including the month with the second highest returns) reduce the differences to almost nil. Specifically,

[6]Note that seasonality in Malaysia are attributed to December and February abnormal returns whereas in the other ASEAN countries January and December. Accordingly, in interpreting the regression results for Malaysia in Table 5, a contemporaneous relation refers to Dec/Feb Malaysia and Dec/JanOthers, 1-month lagged relation refers to Dec/Feb Malaysia and Nov/Dec Others, 2-month lagged relation refers to Dec/Feb Malaysia and Oct/Nov Others, and so forth.

while seasonality effect is associated with December/February effect in Malaysia, it now can be associated in December/January effect in other ASEAN countries. The results from our first regression models confirm that seasonality effect is significant in all of these countries including in Singapore. Given that the results are obtained from markets that exempt tax on capital gain provide valid evidence that reject the tax-loss selling hypothesis.

The rests of the tests are aimed at establishing evidence of contagion effect of seasonality in stock market. Using Granger causality tests on the overall returns data, we find evidence that some equity markets lead the others. The regression models that are formed based on the causality directions confirm that there are contagion effects in the general stock market performance. This finding is further investigated by conducting Granger causality tests using only seasonal month returns. The results suggest that both Singapore which is preceded by the Philippines and Thailand which is preceded by Indonesia set the trend of stock market movement in Malaysia. Finally, the results from regressions confirm that seasonality in both Singapore and Thailand has current and lagged contagion effect on seasonality in Malaysian equity market. For Singapore the contemporaneous contagion effects is coming from the Philippines whereas for Indonesia, the evidence is rather minimal. Overall, our analysis provides considerable evidence of contagion effect of stock market seasonality in the ASEAN region. From the investment standpoint, the contagion effect implies that decision should not solely based on the confined condition of one own market, but other markets in the region as a whole.

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