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ANATOMY OF BEHAVIOURAL RISK SEASONALITY IN EQUITY MARKET

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Abstract

This research offers insight on calendar seasonality from behavioural perspectives with evidence from the Malaysian equity market. First, the behavioural perspectives on human behaviour and behavioural risk seasonality are discussed. Then, empirical tests on the calendar seasonality of behavioural risks with control of fundamental variables are examined on 238 Malaysian firm individual stock returns using the panel regression method. The analyses are performed on calendar months and half-yearly sub-samples to examine the behavioural risk seasonality. The finding supports the presence of behavioural risk seasonality in Malaysia and provides valuable theoretical and practical insights. The results provide useful insights for both theory and practice. For theory, the human behaviour cycle partly provides a behavioural justification on the calendar seasonality behaviour of equity market throughout the year. For investment practices, this research highlights the behavioural calendar-based investing strategy that is valuable to measure and manages behavioural risk seasonality impacts on equity portfolio.

Keywords: Behavioural finance, behavioural risk, calendar seasonality, calendar style investing, risk aversion seasonality.

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1. Introduction

Calendar anomalies have long been puzzled in finance literature since the 1930s with persistence occurrence and significant economic impacts in almost every country even in most developed stock exchanges in the world (Corhay et al., 1987; Doeswijk, 2008; Gultekin & Gultekin, 1983; Jacobs & Levy, 1988; Tadepalli & Jain, 2018). Calendar anomalies research concentrate on identification of positive or negative returns based on respective months in a year due to non-fundamental forces (Washer et al., 2016). On global average, stock return premium is close to zero from May continues to October and only generates premium in November up to April (Doeswijk, 2008). These calendar anomalies still an object of curiosity in finance theory and practice (Burton et al., 2013). Understanding market anomalies is important because theoretically, they contradict the conventional theory of asset pricing. In practice, it is important for portfolio and risk management (Schulmerich et al., 2015). Research evidence from modern finance perspectives based on rational decision and investment practices are well documented globally but do not provide a complete justification to calendar anomalies. The chronological summary of literature on calendar anomalies is documented in Tadepalli and Jain (2018). The modern finance views, in particular, the risk and value considerations appear insufficient to explain calendar anomalies (Jacobs & Levy, 1988). On the other hand, behavioural finance evidence is limited and incomplete. In behavioural finance perspectives, assuming an imperfect human, investors are at best bounded rational in behaviour and decision (Simon, 1955). In line with this human behaviour theory, both rational considerations and irrational forces (Keynes, 1936) influence investors' trades. This bounded rational force would induce heterogeneity in investors' opinions and investing decisions (Miller, 1977). Divergence in investors' opinions and behaviour cause many behavioural anomalies in financial markets. Based on these premises, the calendar anomalies could be the manifest of heterogeneity in investors opinion and risk taking behaviours that are induced by irrationality forces due to psychology, sociology, and biology forces on human (Ahmad et al., 2017).

1.1. Behavioral perspectives on investors and market behavior

In behavioural theoretical lenses, the foundations for investor behaviour are informed by bounded rational theory complemented with theory of mind. The *bounded rational theory* provides the theoretical underpinning on the presence of various behavioural heuristics and biases in human thinking and behaviour (Simon, 1955). As a complement, the *theory of mind* justifies the dual process of human mind that comprises rational (i.e. cognitive logic) and irrational (i.e. cognitive heuristics and affective bias) basis of decision-making (Carmerer et al., 2004). In addition, the *circalunar rhythms of human behaviour hypothesis* inform that many organisms structure their behaviour and psychology by the regular cycle generated by the moon on monthly timing (Raible et al., 2017). Further, human mood is subjected to seasonality variation in responses to geophysical and lunar cycle (Foster & Roenneberg, 2008; Murray et al., 2001). The financial market behaviour is postilated by the *adaptive market hypothesis* (AMH) which is idealized by Lo (2004). Due to bounded rationality in investor and asset prices behaviours, financial markets behaviour is expected to be adaptively efficient. Ideally, the presence of repetitive and predictable calendar-based return patterns violate the efficient market hypothesis of Fama (1970).

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1.2. Empirical evidence

A calendar anomaly refers to the unusual market behaviour in different calendar months, which provides signal of good or bad times to invest. Key calendar effects are elaborated herein. *January effect* – The January anomaly was earlier highlighted in Wachtel (1942) with the idea that higher stock returns behavior during January due to tax-motivated selling pressure by institutional investors couple with aggressive trading by individual investors (Haug & Hirschey, 2006). *February effect* – Fields (1934) noted that stock returns tend to increase prior to holidays. This can be corroborated with Chinese New Year holiday effect consistently occurred in countries with high Chinese populations (Ahmad, 1998; Wong et al., 1990). *May effect* – The May effect refers to aggressive selling due to Halloween effect, which causes lower returns in May (Bouman & Jacobsen, 2002). *October effect* - The October effect (Cadsby, 1989) indicates stocks prices declining during the month of October which is expected due to psychological biases due to historical market crashes occurred in the month of October. *December effect* – A calendar anomaly noted by Fields (1934) and Ariel (1987; 1990) which indicate tocks perform better in December due to tax-gain selling (Chen & Singal, 2003). *Quarterly effect* – Sakakibara et al. (2013) pointed to the quarterly effect as the *Dekansho-bushi effect* based on the ideas that people work harder in first six months of a year and motivation slowing down in last six months of a year. This creates the quarterly effects, which observed that stock returns relatively higher during January to June versus July to December periods. The existing research investigation focused only to fundamental justification and neglecting the behavioral origin of calendar anomalies due to seasonality in human behavior.

The psychology of calendar effects has been less discovered. Theoretically, several calendar effects were due to investors psychological factors (Brahmana et al., 2012), in particular overreaction behaviour during a particular month (Park, 2013). In addition, neuroscience and cognitive psychology studies have documented the presence of seasonal patterns in human brain responses (Meyer et al., 2016). In connection to stock market behaviour, stock trading seems to follow times due psychology forces yet they influence trading. For instance, optimism in first half of the year is the psychology stimulus for January effect and Deaknso-bushi effect. Repeatedly seen that the stock market is higher in January due to aggressive buying and lower in December due to aggressive selling. On holiday occasion, investors' trade excitement is higher due to positive mood or emotion leads to higher buying interest and consequently higher stock returns. Dekanso-bushi effect hypothesize that people are more optimistic in the first-half of the year and risk-taking activity in the stock market is higher (Sakakibara et al., 2013). Happiness on holidays is the psychology stimuli for the February effect and the December effect. Happiness influence individual choice (Mogilner et al., 2012). Higher stocks return during the months of February due to Chinese New Year effects have been continuously observed in high Chinese populated financial markets (Kling & Gao, 2005). Pessimism is the psychology stimulus for May effects in which investors' optimism in May is lower (Doeswijk, 2008). This can be reconciled with existing evidence, on average, stock prices are higher during winters (November until April) and relatively lower during summer months (May until October). Variations in human mood during winter and summer months are the psychology stimulus for differences in risk-returns relationships during winter and summer months across the globe (Kamstra et al., 2003; Kramer & Weber, 2011). Illusion of fear is the psychology stimulus for October effect. The industry player noted that October is the scariest month for investors due to the past experiences that profound stock market crashes occurred

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all in October (i.e. Black Tuesday, October 29, 1929), and Black Monday, October 19, 1987). These October crashes cause illusion of fear to many traders believing that bad things happen in October (Gärling et al., 2009).

2. Problem Statement

Some scholars have indicated and argued that human behaviour could provide insights on seasonality behaviour in financial markets since in the 1980s but less attended. For instance, De Bondt and Thaler (1987) provides evidence connecting overreaction with stock market seasonal behaviour. Jacobs and Levy (1988) call for behavioural explanations to calendar anomalies pointing to the possibility that human behaviour cycle could be the root cause behind calendar seasonality in financial markets. Haug and Hirschey (2006) offer behavioural explanations to the January effect due the aggressive trading behaviour of individual investors. Doeswijk (2008) provides the optimism cycle hypothesis as the psychological reasons to the May effect. Brahmana et al. (2012) offers the psychological rational on irrational financial decision making with the idea that cognitive and affective biases from human mind are the stimuli for psychological biases that cause the day-of-the-week effect. In recent article, Kaplanski and Levy (2017) documented the presence of seasonality in the perceived risk due to sentiment variations in investing society. This research documented significant positive association between the magnitude of seasonality and the prevalence of seasonal affective disorder that is responsible for seasonal fluctuations in risk-aversion of investors and consequently creates seasonality in financial markets. So far, the fragmentation of evidence on this topic and lack of consensus underlies the complexity of the calendar anomalies. In particular, the modern finance justifications remain incomplete and unreconciled with behavioural finance perspectives. Calendar anomalies due to investor behaviour is an evidence of investor bounded rationality. Consequently, the possibility that calendar anomalies are affecting the financial markets is an evidence highlighting non-efficiency of financial markets. To date, there is a need to explore calendar anomalies issue in sufficient depth (Rossi, 2015). This line of research is important but lacking in Malaysia. Malaysia equity market is important to the global investing community and understanding the Malaysian seasonality is important for investment strategies in this market. Historical statistics (2004-2017) indicated that on average, Malaysian stock market traders are comprising of 71 percent local investors (70 percent institutional and 30 percent retail) and 29 percent foreign investors. The statistic also shows higher presence of retail and foreign investors, which has been associated with noise trading behaviour due to information disadvantage (Richards, 2005) that causes irrational behaviours in Malaysian stock markets. In the calendar seasonality literature, in contrast to western literature, growing new evidence of higher returns is spotted to be in the month of February not in January (Fountas & Segredakis, 2002). Previous scholar argued that significant higher average returns for February is driven by the Chinese New Year (cultural factors) which mostly has been in the month of February (Ahmad & Hussain, 2001; Wong et al., 1990; Yong, 1989).

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3. Research Questions

The research questions are as follows; RQ1. Do risk-returns seasonality present in Malaysia equity market? RQ2. Do behavioural risk seasonality present in Malaysia equity market? RQ3. What are the psychology rationales for behavioural risk seasonality in Malaysia equity market?

4. Purpose of the Study

This research revisits this issue and provokes an examination of the significance of behavioural analyses on calendar anomalies. This research extends the behavioural justifications on calendar anomalies in equity markets in two folds. First, a behavioural theoretical perspective is linked with the calendar anomalies. Second, the empirical analysis covers six major calendar anomalies and these empirical evidences are synthesized with behavioural theories and evidences. The research finding offers behavioural insights on calendar effect. The findings established evidence of seasonality of behavioural risks in line with behavioural changes in investor psychology behaviour (mood) that induce variances in risk-taking behaviours during the winter versus summers months and on pre-holiday session. The results provide logical psychology justifications on seasonality in equity market behaviour due to seasonality of investor behaviour induced by psychology, sociology, and biology forces in human. Understanding calendar anomalies offers both theoretical and practical merits. Theoretical relevance, deeper understanding on calendar anomalies and its rationale in inducing market non-efficiency. In practice, simple calendar investment strategies have attracted strong attention among academic researchers and investors for decades. In practice, investment strategies based on calendar give higher risk-adjusted returns compared to buy-and-hold strategy (Swinkels & van Vliet, 2012).

5. Research Methods

To recap, in behavioral perspective, investors' decision will be influenced by rational (fundamental) and irrational (behavioral) as represented in equation 1. In reference to Tuyon and Ahmad (2018), the stock return model with fundamental and behavioral risks are presented in equation 2. Where, β_t represents the sensitivity of stock *j* to the respective risk factor *k.* The risk measures incorporate both fundamental factor and behavioral factors.

$$R_{it} = \alpha_t + f\ (Fundamental\ risk + Behavioral\ risk) + \ \varepsilon_{it} \quad (1)$$

The multifactor stock returns determinants model is developed with risk factors derived based on theory reasoning as suggested by Chen et al. (1986). Apart from general economic factors, firm fundamental and behavioral factors are included. The economics fundamental risk is proxies by Coincident Index (CI_{it}), Leading Index (LEI_{it}) and Lagging Index (LAI_{it}). The firm fundamental risk is proxies by dividend yield (DY_{it}), earning per shares (EPS_{it}) and price earnings ratio (PER_{it}). The behavioral risk proxies by emotion (EI_{it}), and sentiment (SI_{it}).

$$R_{it} = \alpha_0 + \beta_1 DY_{it} + \ \beta_2 EPS_{it} + \beta_3 PER_{it} + \beta_4 CI_{it} + \beta_5 LEI_{it} + \beta_6 LAI_{it} \ + \beta_7 SI_{it} + \beta_8 EI_{it} + \varepsilon_{it} \quad (2)$$

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Where, R_{it}= the respective firm *i*'s stock return in month, *t*; α_0 = constant term; DY_{it} = the individual firm *i*'s dividend yield for respective month, *t*; EPS_{it}= the individual firm *i*'s earning per shares in month, *t*; PER_{it}= the individual firm *i*'s price earnings ratio in month, *t*; CI_{it}= coincident index in month, *t*; LEI_{it}= leading index in month, *t*; LAI_{it} = lagging index in month, *t*; SI_{it} = investors' sentiment (proxy by consumer sentiment index = CSI, business condition index = BCI, Malaysia equity futures = FKLI) in month, *t*. EI_{it} = investors' emotion index (proxy by volatility of the stock market index = VOL) in month, *t*. The firm fundamental risk (DY, EPS, and PE) are obtained from Bursa Malaysia and the original data is in quarterly frequency but placed in monthly aggregated frequency (i.e., January, February, and March is using the same first quarter value). The economics fundamental risk (CI, LAI, and LEI) is obtained from Malaysia Statistics Department. The behavioural variables, the investor sentiments proxies (CSI, BCS, and FKLI) is obtained from MIER and Bursa Malaysia. The quarterly data for CSI and BCS is transformed to monthly frequency using interpolation method. The investor emotion (Bursa Malaysia composit index volatility, VOL) is taken from Bursa Malaysia. In empirical tests, calendar sub-sample analysis is undertaken to capture the respective monthly risk return-relationships (i.e. *January, February, March, April, May, June, July, August, September, October, November, and December*). The size dummy (big, medium, and small stocks) is used to split the analysis into three sub-samples based on different size groups. In addition, the half-yearly analysis is also performed; first-half of the year (January to June) and second-half of the year (July to December). Test of proposed multifactor model follow the combination of Brennan et al. (1998) to perform asset pricing based on individual data. In empirical analysis, the panel regression method is used. Asset pricing test using panel regression model is possible as discussed in Petersen (2009). The fixed effect model is pre-assumed since the equity data is stacked according to homogeneous size (big, medium, and small). The fixed effects model refers to a panel regression model with firm group means is fixed as opposed to a random effects model where the firm group means is assuming to be random. The fixed effect model makes an assumption of homogeneity across units. Coefficient covariance method chosen is White cross section estimators because they are robust to contemporary heteroscedasticity and cross section dependence, which is pre-assumed to presence in any panel of firms' datasets.

6. Findings

The interpretation of findings is organised as follows. First, the descriptive statistic is inspected to understand the statistical properties of the data. Second, the risk and return seasonality estimations for monthly and half-yearly is elaborated. Finally, the behavioural risk seasonality and its psychology rational is discussed.

6.1. Descriptive analysis

The empirical analysis is performed on 238 stocks that are continuously traded in Bursa Malaysia stock exchange from 1996:01 to 2014:12 in the respective industry category have been obtained from Bloomberg's database in Bursa Malaysia. This sample represents about 26 percent of the stock traded in Malaysia stock exchange (currently about 900 listed firms). The 238 stocks provide representations of all industry sectors in Malaysia (i.e. trade & services, consumer product, plantation, property, industrial products, construction, finance, and technology). In the analysis, these stocks are grouped according to size

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group as per Bursa Malaysia classification. In particular; 24 big firms (MC: <12M), 95 medium firms (MC: 0.97M – 12M), and 119 small firms (MC: >0.97M). The overall sample descriptive statistics is as summarized in Table 01. The average performance of the 238 stocks for 18 years period of analysis indicated that the stock behaviour is very volatile with extreme dispersion in returns and risk; maximum return (1.2238), mean return (-0.0036), minimum return (-2.5744), and standard deviation (0.1302). In addition, it is also noted that, the firm and economic fundamentals are generating a positive mean values but the stock returns generating a negative mean value. This provides earlier signals that the stock trading behaviour is possibly driven by not only fundamental risk but also non-fundamental risk (behavioural risk). Another characteristic of the variable series is the normality. In this regards, the skewness and kurtosis statistics provide evidence that variable series employed are all not normally distributed. The correlation analysis among variables as tabulated in Table 02 provides the association of the fundamental and behavioural risks proxies to the stock returns for the overall sample. Analysis on overall sample provides a general perspective of the average association of fundamental and behavioural risk factors to stock returns. It is important to stress that all of the risk variables are associated with the stock returns. Important to note, the cross-correlations statistic indicates that the data employed is free from higher correlations among the independent variables and thus the estimated model would be free from multicollinearity problem.

Table 01. Descriptive statistics

	Maximum	Mean	Minimum	Standard Deviation	Skewness	Kurtosis
R	1.2238	-0.0036	-2.5744	0.1302	-0.5033	18.704
DY	5.0337	0.0086	-4.8106	0.2091	0.7129	65.492
EPS	8.7963	0.0004	-9.3806	0.2823	-1.7981	144.460
PE	9.3208	-0.0036	-8.7940	0.3082	1.1692	101.280
CI	0.0363	0.0017	-0.0361	0.0094	-0.2165	5.4975
LEI	0.0379	0.0016	-0.1825	0.0171	-4.7023	50.609
LAI	0.0859	0.0029	-0.0452	0.0168	0.5974	6.0597
BCI	0.2190	0.0020	-0.2274	0.0543	0.2479	8.0265
CSI	0.1214	-0.0032	-0.2025	0.0396	-0.7857	7.4874
FKLI	0.2938	-0.0002	-0.2808	0.0695	-0.2641	7.3452
VOL	0.9621	0.0028	-1.3843	0.3604	-0.0247	3.7823

Notes: This table summarizes the descriptive statistics of the overall sample (aggregate data). Data represents the overall sample that comprises of monthly stock returns (R), firm fundamental (DY, EPS, PE), economic fundamental (CI, LEI, LAI), and behavioural risk proxies (BCI, CSI, FKLI, VOL).

Table 02. Correlation matrix

Variables		Fundamental Risks						Behavioural Risks			
		Firm Fundamental			Economic Fundamental			Sentiment		Emotion	
	R	DY	EPS	PE	CI	LEI	LAI	BCI	CSI	FKLI	VOL
R	1.000										
DY	-0.496	1.000									
EPS	0.032	-0.009	1.000								
PE	0.575	-0.520	-0.481	1.000							

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CI	0.026	-0.075	0.040	0.034	1.000						
LEI	0.161	-0.168	0.020	0.137	0.402	1.000					
LAI	0.038	-0.070	0.010	0.040	0.083	0.085	1.000				
BCI	0.124	-0.130	0.000	0.101	0.149	0.126	0.041	1.000			
CSI	0.100	-0.095	0.008	0.074	0.164	0.273	0.006	0.239	1.000		
FKLI	0.514	-0.326	0.022	0.313	0.098	0.328	-0.033	0.189	0.134	1.000	
VOL	-0.141	0.188	0.023	-0.160	0.000	-0.079	-0.093	-0.115	0.032	-0.187	1.000

Notes: This table summarizes the correlation of fundamental and behavioural factors to stock returns for overall sample (aggregate data). Data represents the overall sample that comprises of monthly stock returns (R), firm fundamental (DY, EPS, PE), economic fundamental (CI, LEI, LAI), and behavioural risk proxies (BCI, CSI, FKLI, VOL).

6.2. Risk-returns seasonality analysis

In the empirical test, the risk-returns seasonality analysis is performed on two sub samples namely; monthly and half-yearly. The monthly analysis is performed to examine the seasonality or risk-returns across different months in a year. The half-yearly analysis is performed to access the seasonality behaviour of stock returns in the first-half (January to June) and second-half (July to December) of the year.

Summary of risk and returns behaviour across calendar months are reported in Table 03 and the same figures are illustrated in Figure 01. On a month-to-month perspectives, homogeneously high stock returns in the months of January, February, April, and July and lower stock returns in the months of March, May, and August. It is also evident that February recording the highest returns for all stock size and August indicated the lowest returns for all stock size. Noted that during winter's months, on average, return is high and risk is low. For big firms, winter average return is slightly higher (0.0198) compared to summer average return (0.0108). For medium firms, winter average return (0.0185) is lower than summer average return (0.0189). Same pattern is observed for small firm where winter average return (0.0218) is lower than summer average return (0.0247).

In terms of risk, the high (low) risk-high (low) returns principle is observed only in winter month and not in summer month. In addition, risk is also varying with stock size where big stock carries low risk, medium stock with medium risk, and small stock come with high risk profile. Graphically, it is also evident that the risk in the later part of half-year is slightly higher compared to the earlier part of half-year. Big firms behaviour, the effect of fundamental risk is higher and the behavioural risk effect is lower. This evidence can be corroborated with the ideas that institutional investors with investment principles are mostly based on rational justifications mostly hold these big stocks. In another view, the effect of fundamental risk on small and medium sized firms is low and behavioural risk influence is higher. This evidence can be linked to the facts that these stocks are highly hold by retail investors who are more prone to behavioural biases and thus behavioural risks influence are relatively greater compared to fundamental risk influence.

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Summary of calendar anomaly for overall and half-yearly data – by firm size is reported in Table 04. On a half-yearly perspective, the Dekanso-bushi effect pattern is also confirmed in this sample of Malaysia equity market. A graphical representation of the mean raw returns presented in Table 4. During the first-half, return is high and risk is low. Meanwhile in second-half, return is low and risk is high. Heterogeneity of fundamental and behavioural risks is spotted. For big stocks, in first-half of the year (higher fundamental risk), and in second-half of the year (lower fundamental and higher behavioural risks). Risk factor explanatory statistic (R^2) is higher in the second-half relative to the first-half of the year. This indicates higher risk factors influence on stock returns in the last six months of the year. Generally, the seasonal variations in risk-returns relationships are statistically significant that confirm the validity of half-yearly seasonality in risk-returns behaviours. Meanwhile for medium and small stocks, the opposite patterns are displayed. Where in first-half of the year (lower fundamental risk and higher behavioural risks). Meanwhile in second-half of the year (higher fundamental and lower behavioural risks). However, risk factor explanatory statistic (R^2) is higher in the second-half relative to the first-half of the year. This indicates higher risk factors influence on stock returns in the last six months of the year.

Table 03. Summary of risk-return means behaviours across calendar months

		Big			**Medium**			**Small**	
Months/Size		**Mean**	**Std. D.**		**Mean**	**Std. D.**		**Mean**	**Std. D.**
December		0.0254	0.0787		-0.0145	0.1165		-0.0342	0.1521
January		0.0229	0.0896		0.0234	0.1091		0.0035	0.1494
February		0.0276	0.1124		0.0240	0.1052		0.0285	0.1833
March		-0.0031	0.0791		-0.0121	0.1308		-0.0211	0.1378
April		0.0146	0.1058		0.0288	0.1601		0.0018	0.1734
May		-0.0071	0.0845		-0.0165	0.1211		-0.0341	0.1458
June		-0.0027	0.0915		-0.0025	0.1358		0.0091	0.1434
July		0.0052	0.0924		0.0127	0.1183		0.0179	0.1268
August		-0.0305	0.1150		-0.0441	0.1387		-0.0494	0.1500
September		-0.0087	0.1154		-0.0189	0.1419		-0.0132	0.1553
October		0.0141	0.1038		-0.0041	0.1421		0.0001	0.1529
November		0.0022	0.1198		-0.0033	0.1596		-0.0065	0.2182
First half of the year		0.0086	0.0955		0.0073	0.1370		0.0026	0.1583
Second half of the year		0.0013	0.1066		-0.0120	0.1381		-0.0142	0.1631

Notes: Mean is the average returns for the whole equity portfolio. While the standard deviation (Std. D.) is a proxy for risk of the equity portfolio. The mean raw return and standard deviation is reported by stock sizes (big, medium, small) across different calendar months and for half-yearly basis (i.e. first-half = January to June, second-half = July to December).

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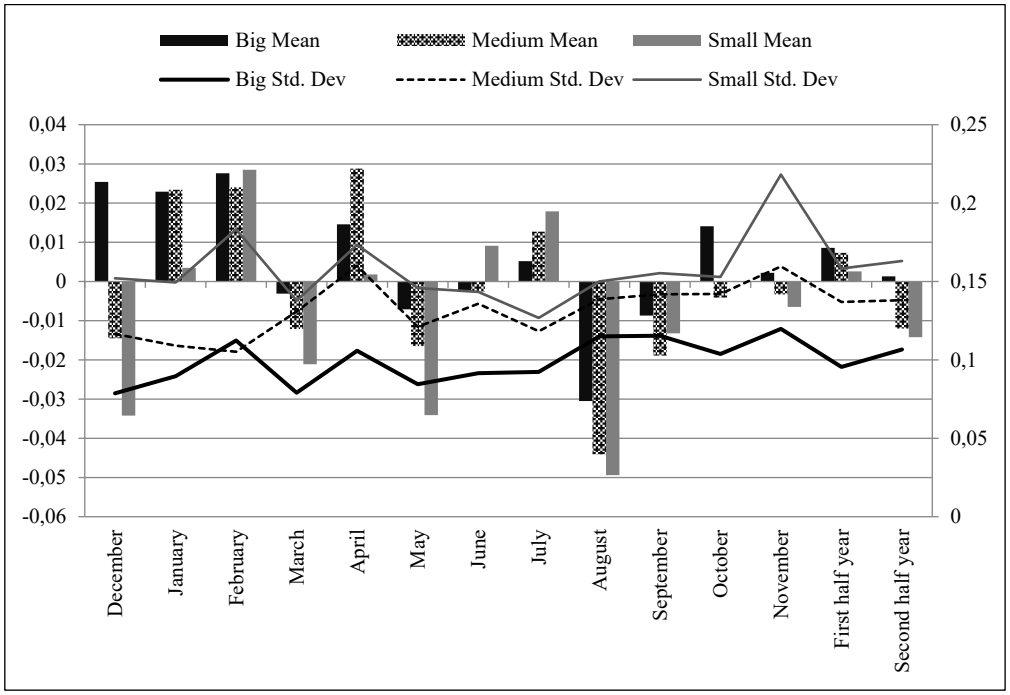

Figure 01. Mean returns and risk behaviour across different calendar months

Note: This figure illustrates average mean returns and risk behaviour of different stock size (big, medium, and small) across different calendar months. The data is as presented in Table 5. Winter months (December, January, February, March) and summer months (May, June, July, August, September). First-half year (Jan to June) and second-half year (June to December). Scale: Right (mean raw returns), and Left (Std. Dev.)

Analysis on the heterogeneity of behavioural risks impacts on stock returns is reported in Table 05. During winter months, the general pattern of behavioural risk impact on stock returns is lower compared during summer months. On the other hand, as for medium and small stocks, behavioural risks are relatively lower during winter and higher during summer months. This indicates the presence of homogeneity in behavioural risks impacts on different stocks, which are held by different investors' profile. This is consistent with empirical evidence and claims that during these calm and happy months, people are less influenced by bad mood hence less behavioural biases and rational justification weighted more investors investing decisions.

Table 04. Calendar anomaly for overall and half-yearly data – by firm size

Panel A: Big Stocks					
Variables/Months	**Overall**	**First half of the year**	**Second half of the year**	**Test for Equality**	
				Return	Risk
C	0.0009	0.0008	0.0029	2.6653***	1.2454***
DY	0.0011	-0.0031	0.0022		
EPS	0.6143***	0.6913***	0.6116***		
PE	0.6103***	0.6245***	0.6009***		
CI	-0.3098***	-0.1365	-0.5312**		
LEI	0.1593***	0.1759	-0.0634		
LAI	-0.0902**	-0.1266*	0.0232		
BCI	0.0022	-0.0068	0.0500		
CSI	-0.0442**	-0.0470	-0.0285		
FKLI	0.4821***	0.4025***	0.5347***		
VOL	0.0077***	0.0073	0.0075		

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Adjusted R^2	0.6986	0.6921	0.7106		
Panel B: Medium Stocks					
Variables/Months	Overall	First half of the year	Second half of the year	Test for Equality	
				Return	Risk
C	-0.0007	0.0016	-0.0028	10.3623***	1.0155
DY	-0.0371***	-0.0727***	-0.0573***		
EPS	0.4370***	0.2966***	0.3101***		
PE	0.4469***	0.3101***	0.3392***		
CI	-0.4970***	-0.0921	-1.0935**		
LEI	0.1104***	0.1250	-0.0931		
LAI	0.0798**	0.0285	0.5788**		
BCI	0.0518***	0.0427	0.0362		
CSI	-0.0562***	-0.1341**	0.1034		
FKLI	0.5723***	0.7778***	0.6954***		
VOL	0.0023	0.0135	0.0003		
Adjusted R^2	0.5766	0.5189	0.5329		
Panel C: Small Stocks					
Variables/Months	Overall	First half of the year	Second half of the year	Test for Equality	
				Return	Risk
C	-0.0023***	-0.0002	-0.0028	8.5361***	1.0617***
DY	-0.0920***	-0.1067***	-0.0573***		
EPS	0.1891***	0.0495***	0.3101***		
PE	0.2117***	0.0640***	0.3392***		
CI	-0.6135***	-0.2922	-1.0935**		
LEI	0.0627	0.0536	-0.0931		
LAI	0.1803***	0.2256	0.5788**		
BCI	0.0657***	0.0202	0.0362		
CSI	0.0229	-0.1267	0.1034		
FKLI	0.7925***	1.0975***	0.6954***		
VOL	0.0035	0.0228*	0.0003		
Adjusted R^2	0.4914	0.5186	0.5329		

Notes: The panel regression estimation chosen is FE model. The asterisk; *, **, and *** denotes 10%, 5%, and 1% level of significant based on *p*-value. Test for equality statistics used; Returns (t-test) and Risk (F-test).

Table 05. Calendar anomaly for monthly data - by firm size

Month	C	DY	EPS	PE	CI	LEI	LAI	BCI	CSI	FKLI	VOL
Panel A: Big stocks											
12	0.00	0.00	0.53***	0.49***	-0.20	0.17	-0.45	0.09	-0.17	0.38***	-0.01
1	0.00	0.01	0.70***	0.72***	-0.27	0.19	-0.08	0.09	-0.17**	0.25**	-0.02
2	0.00	-0.01	0.60***	0.69***	-0.47	0.18	-0.06	0.00	0.01	0.42***	0.01
3	0.01	-0.01	0.54***	0.55***	0.09	-0.7***	-0.23	-0.03	0.14**	0.56***	0.04**
4	0.01**	-0.04	0.60***	0.56***	0.04	0.22	0.15	-0.10	-0.15**	0.47***	0.03***
5	0.00	0.01	0.55***	0.55***	-0.24	-0.02	0.04	-0.18**	0.00	0.50***	0.00
6	0.01*	-0.01	0.67***	0.69***	-0.82	0.60	0.18	0.05	0.08	0.35***	0.04
7	0.00	0.01	0.63***	0.72***	-0.60	-0.52	-0.09	-0.10	-0.24	0.53***	0.03
8	0.01**	0.02	0.56***	0.51***	-0.22	-0.15	0.60*	0.24**	0.21	0.53***	0.00
9	-0.01*	0.01	0.78***	0.77***	-5.35**	0.09	1.43*	-0.37**	-0.90**	0.28***	0.01
10	-0.01	-0.04*	0.71***	0.69***	0.19	-1.21**	-0.76*	-0.24	0.40**	0.90***	-0.01
11	0.00	0.01	0.77***	0.79***	0.02	-0.36	-0.42	0.05	-0.17	0.46***	0.00
Panel B: Medium stocks											
12	0.00	-0.1***	0.15**	0.17**	0.27	-0.30	1.12	-0.50**	0.89***	0.24	0.01
1	0.01	-0.2***	0.15***	0.15**	-0.05	0.01	0.09	0.04	-0.20	0.43***	-0.04**
2	0.00	-0.07*	0.61***	0.64***	-0.5***	-0.13	-0.12	-0.02	0.01	0.59***	0.00
3	0.02***	-0.05**	0.20	0.21	-0.47	-0.18	0.01	-0.2***	-0.10	1.10***	0.04***
4	0.01**	-0.1***	0.35***	0.33***	-0.46	0.32	0.01	-0.17	0.03	0.69***	0.01

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5	-0.01	0.00	0.64***	0.62***	-0.69	-1.46*	0.74	0.13	-0.04	0.26*	0.01
6	0.01***	-0.02	0.32**	0.34**	-1.2***	-0.57	0.37*	0.07	0.22***	0.98***	0.05***
7	0.00	-0.12**	0.31**	0.31**	-1.7***	0.49	0.49	-0.21	-0.18	0.57***	0.01
8	0.02*	0.00	0.67***	0.67***	-1.20	-0.85	1.54**	0.63***	0.22	0.49**	0.01
9	-0.01**	-0.04**	0.30***	0.30***	-2.86	-0.09	1.24**	-0.18	-0.63**	0.73***	0.00
10	-0.02*	-0.05**	0.41***	0.41***	-0.13	0.09	-1.1***	-0.12	0.19	0.93***	0.00
11	0.01	0.00	0.78***	0.76***	-0.20	-0.52	-1.05	0.06	-0.33	0.61***	-0.01
Panel C: Small stocks											
12	-0.01	-0.2***	0.06**	0.06**	1.47	-1.09**	2.69***	-0.74**	1.16***	0.31	0.05
1	0.01	-0.2***	0.04	0.04**	0.20	-0.44	0.01	0.14	-0.11	0.22	-0.04*
2	0.00	-0.1***	0.26***	0.29***	-0.73*	0.66	-0.33	-0.15	0.09	1.14***	-0.01
3	0.04***	-0.1***	0.01*	0.03**	-1.8***	-0.12	0.98***	-0.4***	0.16	1.17***	0.10***
4	0.01	-0.77	0.06**	0.03*	-0.27	0.99	0.23	-0.62**	0.23	1.06***	0.00
5	-0.02	-0.1***	0.09*	0.13***	-1.46	-2.40	0.16	0.14	-0.09	1.05***	0.05
6	0.02***	-0.03**	0.12***	0.14***	-2.64**	-0.74	1.04***	0.17	0.37***	1.06***	0.04
7	0.00	-0.2***	0.10***	0.07***	-1.07	1.07*	0.46	-0.10	-0.07	0.67***	0.01
8	0.02**	-0.06	0.32***	0.38***	-2.83*	-1.44	2.73***	0.86***	0.23	0.83***	0.01
9	-0.01	-0.1***	0.07***	0.09***	-1.55	-0.04	1.15**	-0.34**	-0.30	0.92***	0.00
10	-0.1***	-0.1***	0.11***	0.11***	0.62	1.14**	-2.0***	-0.16	0.35**	0.95***	-0.02**
11	-0.02	-0.11**	0.32**	0.33*	1.32	-2.1***	-1.32*	-0.13	-0.28	1.55***	-0.1***

6.3. Behavioural risk seasonality and psychology rational

Calendar anomalies may be partly due to cognitive and affective biasness on part of investors' decision (Gärling et al., 2009). In particular, mood (positive and negative) is an affective state that is susceptible to be affecting investors and consequently the stock market behaviour. Throughout the calendar month, investors' mood cycle is partly induced by the winter and summer season that is affecting the human psychology behaviour. In addition, in certain month, investors' mood is also driven by happiness feeling during holidays particularly the Chinese New Year and Christmas. These perspectives are proven valid in the present context of this research. In behavioural perspective, investors' mood state is related to level of optimism and affecting investing behaviour. Good mood makes investors more and risk-taker than do individual in a bad mood (Baker & Nofsinger, 2002; Duxbury, 2015; Gärling et al., 2009; Kaplanski et al., 2015; Kramer & Weber, 2011; Shu, 2010). In the analysis, on monthly perspectives, during winters months, on average, returns are high and risk is low. On the other hand, during summer months, on average, returns are low and risk is high. Winter is the coldest of the four temperature seasons and summer is the hottest season of the year. In Malaysia environment, the country will be affected by the rainy northeast monsoon that will be most severely affecting the North East coast of peninsular Malaysia (December, January, February, and March). During summer season, Malaysia is having a hot season (June, July and August). Holidays also induce good mood to investing society during February and December, which confirmed the February effect as well as the December effect. In the half-yearly analysis, also indicates higher returns in earlier part of the year. This is in line with half-yearly optimism cycle and the Dekanso-bushi effect hypotheses (Sakakibara et al., 2013). This provides confirmation evidence on investors' optimism cycle is higher in the first half of the year due to overly optimistic expectations in earlier part of the year. Accordingly, the anatomy of behavioural risk seasonality is summarized in the following equations and Table 06. The possible calendar-based style investing is to buy in summer (during low price) and sell in winter (during high price).

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Winters and holidays > *high positive mood > high optimism > high behavioural risk > high returns*

Summers and illusion *of fear > low positive mood > low optimism > low behavioural risk > low returns*

Table 06. Behavioural anatomy of calendar seasonality

		Winter (*Coldest*)		**Summer (*Hottest*)**
Months*		***Northern hemisphere*** **(Dec, Jan, Feb, Mar)**		***Northern hemisphere*** **(May, Jun, Jul, Aug, Sep)**
Mood		High positive mood state		Low positive mood state
Optimism		High optimism state		Low optimism state
Behavioural risk patterns		High (*high behavioural risk*)		Low (*lower behavioural risk*)
Equity returns		Higher (*higher premium*)		Lower (*lower premium*)
Equity behaviour in Malaysia		Dec (*big stocks*), Jan, Feb (*all stocks*)		May, Aug, Sep (*all stocks*)

Note: *Based on astronomy and meteorology views of seasons globally. The meteorological temperature seasons is referred from https://en.wikipedia.org/wiki/Season, https://en.wikipedia.org/wiki/Summer, https://www.metoffice.gov.uk/weather/learn-about/weather/seasons/, https://seasonsyear.com/Malaysia

So far, for few studies have investigated the psychology justification for market behaviour seasonality. Earlier research has documented the cultural factor (i.e. CNY) which influence the investor and market behaviour (Ahmad & Hussain, 2001; Wong et al., 1990; Yong, 1989). In more recent evidence, scholar have documented that variation mood in human mood during day-of-the week is partly the psychological justification for daily anomaly in financial market behaviour (Brahmana et al., 2012). This research adds to this literature with evidence that investor optimism during different month due to variation in mood as induced by different mood state during different seasons (i.e. winter and summer) as well as more optimism during first-half of the year compared to the second-half of the year.

7. Conclusion

This study theoretically connects behavioural risks seasonality with calendar anomalies and empirically tests the ideas in Malaysia equity market. The research aims to provide the behavioural theoretical and empirical justifications on calendar anomalies. Based on behavioural perspectives and evidence about bounded rational of human mind structure and seasonality of human behaviour. The research extends behavioural insights on calendar seasonality behaviours in equity markets. The findings support the seasonality of behavioural risks in line with behavioural changes in investor psychology behaviour (mood) that induce variances in risk-taking behaviours during the winter versus summers months and on pre-holiday session. The results provide logical psychology justifications on seasonality in equity market behaviour due to seasonality of investor behaviour induced by psychology, sociology, and biology forces in human. This research offers behavioural insights on calendar anomalies that are important to inform finance theory and practice. In theoretical implications, this research offers psychological insights on calendar anomalies and its roles on market efficiency. In practical implications, the findings offer investment strategy insights for portfolio hedging and calendar-based trading strategies. The investigations never complete at this stage and invites wider and deeper understanding of many behavioural anomalies (under/overreaction, under/overconfidence, momentum, herding, and etc.) in financial markets rooted

within the human psychology. Understanding human psychology behaviour could complement modern finance perspectives for a better awareness of financial markets anomalies in the financial world with bounded rational investors that is partly forming an adaptive market behaviour.

References

Ahmad, Z. (1998). Stock market seasonality and Chinese New Year effects in the Far Eastern markets. *Capital Markets Review, 6*(1&2), 85-99.

Ahmad, Z., & Hussain, S. (2001). KLSE long run overreaction and the Chinese New-Year effect. *Journal of Business Finance Accounting, 28*(1-2), 63–105.

Ahmad, Z., Ibrahim, H., & Tuyon, J. (2017). Institutional investor behavioral biases: Syntheses of theory and evidence. *Management Research Review, 40*(5), 578-603.

Ariel, R. A. (1987). A monthly effect in stock returns. *Journal of Financial Economics, 18*(1), 161–174.

Ariel, R. A. (1990). High stock returns before holidays: Existence and evidence on possible causes. *Journal of Finance, 45*(5), 1611-1626.

Baker, H. K., & Nofsinger, J. R. (2002). Psychological biases of investors. *Financial Services Review*, *11*(2), 97-116.

Bouman, S., & Jacobsen, B. (2002). The Halloween indicator, "Sell in May and go away": Another puzzle. *American Economic Review, 92*(5), 1618-1635.

Brahmana, K. R., Hooy, C. W., & Ahmad, Z. (2012). Psychological factors on irrational financial decision making: Case of day-of-the week anomaly. *Humanomics, 28*(4), 236-257.

Brennan, M. J., Chordia, T., & Subrahmanyam, A. (1998). Alternative factor specifications, security characteristics, and the cross-section of expected stock returns. *Journal of Financial Economics, 49*(3), 345-373.

Burton, E. T., Shah, S. N., & Shah, S. (2013). *Behavioral finance: Understanding the social, cognitive, and economic debates*. John Wiley & Sons.

Cadsby, C. B. (1989). Canadian Calendar Anomalies and the Capital Asset Pricing Model. In R. M. C. Guimaraes, B. G. Kingsman and S. J. Taylor (Eds.), *A reappraisal of the efficiency of financial markets* (pp. 199-226). Springer-Verlag.

Carmerer, C. F., Lowenstein, G., & Prelec, D. (2004). Neuroeconomics: Why economics needs brains. *Scandinavian Journal of Economics, 106*(3), 555-579.

Chen, H., & Singal, V. (2003). A December effect with tax-gain selling? *Financial Analysts Journal, 59*(4), 78-90.

Chen, N. F., Roll, R., & Ross, S. A. (1986). Economic forces and the stock market. *Journal of Business*, 383-403.

Corhay, A., Hawawini, G., & Michel, P. (1987). Seasonality in the risk-return relationship: Some international evidence. *Journal of Finance, 42*(1), 49–68.

De Bondt, W. F., & Thaler, R. H. (1987). Further evidence on investor overreaction and stock market seasonality. *Journal of Finance, 42*(3), 557-581.

Doeswijk, R. Q. (2008). The optimism cycle: Sell in May. *De Economist, 156*(2), 175–200.

Duxbury, D. (2015). Behavioral finance: Insights from experiments II: Biases, moods and emotions. *Review of Behavioural Finance, 7*(2), 151–175.

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *Journal of Finance, 25*(2), 383.

Fields, M. J. (1934). Security prices and stock exchange holidays in relation to short selling. *Journal of Business, 7*(4), 328-338.

Foster, R. G., & Roenneberg, T. (2008). Human responses to the geophysical daily, annual and lunar cycles. *Current Biology, 18*(17), R784-R794.

Fountas, S., & Segredakis, K. N. (2002). Emerging stock markets return seasonalities: The January effect and the tax-loss selling hypothesis. *Applied Financial Economics*, *12*(4), 291-299.

Gärling, T., Kirchler, E., Lewis, A., & Van Raaij, F. (2009). Psychology, financial decision making, and financial crises. *Psychological Science in the Public Interest, 10*(1), 1-47.

Gultekin, M. N., & Gultekin, N. B. (1983). Stock market seasonality: International evidence. *Journal of Financial Economics, 12*(4), 469-481.

Haug, M., & Hirschey, M. (2006). The January effect. *Financial Analysts Journal, 62*(5), 78-88.

Jacobs, B. I., & Levy, K. N. (1988). Calendar anomalies: Abnormal returns at calendar turning points. *Financial Analysts Journal, 44*(6), 28-39.

Kamstra, M. J., Kramer, L. A., & Levi, M. D. (2003). Winter blues: A SAD stock market cycle. *American Economic Review, 93*(1), 324-343.

Kaplanski, G., & Levy, H. (2017). Seasonality in perceived risk: A sentiment effect. *Quarterly Journal of Finance, 07*(01), 1650015-1 - 1650015-21.

Kaplanski, G., Levy, H., Veld, C., & Veld-Merkoulova, Y. (2015). Do happy people make optimistic investors? *Journal of Financial and Quantitative Analysis, 50*(1-2), 145-168.

Keynes, J. M. (1936). *The general theory of employment, interest, and money*. Macmillan.

Kling, G., & Gao, L. (2005). Calendar effects in Chinese stock market. *Annals of Economics and Finance, 6*(1), 75-88.

Kramer, L. A., & Weber, J. M. (2011). This is your portfolio on winter. *Social Psychological and Personality Science, 3*(2), 193–199.

Lo, A. W. (2004). The adaptive market hypothesis. *Journal of Portfolio Management*, 15-29.

Meyer, C., Muto, V., Jaspar, M., Kussé, C., Lambot, E., Chellappa, S. L., Degueldre, C., Balteau, E., Luxen, A., Middleton, B., Archer, S. N., Collette, F., Dijk, D. -J., Phillips, C., Maquet, P., Vandewalle, G. (2016). Seasonality in human cognitive brain responses. *Proceedings of the National Academy of Sciences*, *113*(11), 3066-3071.

Miller, E. M. (1977). Risk, uncertainty, and divergence of opinion. *Journal of Finance, 32*(4), 1151-1168.

Mogilner, C., Aaker, J., & Kamvar, S. D. (2012). How happiness affects choice. *Journal of Consumer Research, 39*(2), 429–443.

Murray, G., Allen, N. B., & Trinder, J. (2001). A longitudinal investigation of seasonal variation in mood. *Chronobiology International, 18*(5), 875–891.

Park, J. H. (2013). Calendar effect: do investors overreact to the seasonality of the US hotel industry? *International Journal of Tourism Sciences, 13*(1), 80-102.

Petersen, M. A. (2009). Estimating standard errors in finance panel data sets: Comparing approaches. *Review of Financial Studies, 22*(1), 435-480.

Raible, F., Takekata, H., & Tessmar-Raible, K. (2017). An overview of monthly rhythms and clocks. *Frontiers in Neurology*, *8*(189), 1-14.

Richards, A. (2005). Big fish in small ponds: The trading behaviour and price impact of foreign investors in Asian emerging equity markets. *Journal of Financial and Quantitative Analysis, 40*(1), 1-27.

Rossi, M. (2015). The efficient market hypothesis and calendar anomalies: A literature review. *International Journal of Managerial and Financial Accounting, 7*(3-4), 285-296.

Sakakibara, S., Yamasaki, T., & Okada, K. (2013). The calendar structure of the Japanese stock market: The 'sell in May effect' versus the 'Dekansho-Bushi effect'. *International Review of Finance, 13*(2), 161-185.

Schulmerich, M., Leporcher, Y. M., & Eu, C. H. (2015). *Applied asset and risk management*. Springer Berlin Heidelberg.

Shu, H. C. (2010). Investor mood and financial markets. *Journal of Economic Behavior & Organization, 76*(2), 267-282.

Simon, H. A. (1955). A behavioral model of rational choice. *Quarterly Journal of Economics, 69*(1), 99-118.

Swinkels, L., & van Vliet, P. (2012). An anatomy of calendar effects. *Journal of Asset Management, 13*(4), 271-286.

Tadepalli, M. S., & Jain, R. K. (2018). Persistence of calendar anomalies: Insights and perspectives from literature. *American Journal of Business, 33*(1/2), 18–60.

Tuyon, J., & Ahmad, Z. (2018). Psychoanalysis of investor irrationality and dynamism in stock market. *Journal of Interdisciplinary Economics, 30*(1), 1-31.

Wachtel, S. B. (1942). Certain observations on seasonal movements in stock prices. *Journal of Business, 15*(2), 184-193.

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Washer, K. M., Nippani, S., & Johnson, R. R. (2016). Santa Claus rally and firm size. *Managerial Finance, 42*(8), 817–829.

Wong, P. L., Neoh, S. K., Lee, K. H., & Thong, T. S. (1990). Seasonality in the Malaysian stock market. *Asia Pacific Journal of Management, 7*(2), 43-62.

Yong, O. (1989). Seasonality effect in the Kuala Lumpur stock exchange. *Malaysian Management Review, 24*(3), 37-44.