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Panel Analysis of Calendar Anomalies in the South African Stock Market

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Abstract: Calendar anomalies are paramount in explaining stock returns dynamics. This study determines whether day of the week, turn of the month, holiday and January seasonality exists in the South African stock market. The Johannesburg stock exchange indices data comprised of Top 40, All Shares, Basic Materials, Industrials, Consumer Goods, Health Care, Consumer Services, Telecommunications, Financials and Technology covering the period 1995-2018. Pooled panel with Arellano robust standard errors model was employed. The pooled panel model with Arellano robust estimates results for the day of the week revealed positive Monday, turn of the month effect, post-holiday and October effects. The study recommends that investors trade on Mondays to earn the highest return during the week. Investors have the potential to earn excess returns when they invest on turn of the month period. For the holiday strategy, investors should trade on the day after the holiday since will entail more profits from the investment. Investors can earn more money through trading in October than in January. The existence of calendar anomalies in the South African equity market invalidates efficient market hypothesis. The novelty of the study lies in the use of sectorial indices in assessment calendar anomalies in a developing stock market.

Keywords: Equity; day of the week; turn of the month; holiday; January

JEL Classification: C12; C23; D53; G12; G14

1. Introduction

Investment opportunities exist in equity markets and investors are faced with investment decision problem of devising profitable calendar anomaly trading techniques that assist them in choosing among these options present in stock markets.

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Literature evidence has suggested that investors' decision-making process is associated with inefficiencies creating some biases which result in suboptimal investment strategies given the dynamism of equity markets (Weigand, 2014). Lack of an objective investment trading strategy derail the achievement of an investor's financial objectives and this will be reflected in dismal performance of investments (Pompian, 2012). Investment decisions mistakes by investors are a result of cognitive and emotional biases which manifest themselves in a number of ways (Kahneman, 2011). One such is conservatism bias where the investor fails to incorporate or update investment decisions when new information is available (Pompian, 2012). Conservatism bias will entail that investors hold equities for long even when they are no longer providing favourable returns. Confirmation bias is when investors believe and place more confidence on information they have collected and will ignore bad news and information about pursued equity investments which increases their risk exposure resulting in holding a batch of poor diversified stock portfolio (Pompian, 2012). In an illusion of control bias, investors put a higher personal probability of success than the objective one resulting in insufficient diversification and loss of investment. The highlighted biases point to the fact that objective investment decision making is inevitable.

The famous efficient market hypothesis (EMH) alludes that information about the market is already incorporated in the stock prices and no profitable opportunities exist in the market (Fama, 1965; Fama *et al*., 1969; Fama, 1970). However, calendar anomalies such as the day of the week, turn of the month, holiday and January have been found in equity markets (Norvaisiene *et al*., 2015; Winkelried & Iberico, 2018; Halari *et al*., 2018). There is scarcity of studies that combinedly model the day of the week, turn of the month, holiday and January anomaly using the panel data models. Hence, the objective of this study was to establish whether the seasonal anomalies are present in the South Africa equity market using panel data modelling approach. The rest of the article is organised as follows: section 2 provides the reviews the literature for day of the week, turn of the month, holiday and January anomalies, section 3 looks at the methodology, section 4 reports the findings and section 5 highlight the conclusions and recommendations.

2. Literature Review

The EMH provides insight into the forecasting of stock prices by observing whether there is random walk behaviour that shows non-existence of a predictable pattern (Mishkin & Eakins, 2018). The trend with which stock market prices are expected to move is considered to be equally likely to go up or down, illustrating the randomness of security values (Mishkin & Eakins, 2018). An attempt to establish patterns by technical analysts is interpreted as a futile effort because of the random walk feature in financial securities (Fama, 1970). However, deviation of empirical

evidence and EMH have highlighted that anomalies exists (Kuhn, 1970). Furthermore, anomalies in stock markets dispute the validity of the EMH (Brooks & Persand, 2001). Anomalies entail that a financial theory has been breached (Reinganum, 1984). Sanaullah *et al*. (2012) confirmed the existence of factors that contribute to market inefficiencies. Various studies on day of the week, turn of the month, holiday and January anomalies have presented unique outcomes in different financial markets.

Alagidede and Panagiotidis (2009) examined the effect of Monday, Wednesday and Friday on Ghana equity returns for period 1990-2004. The study revealed leverage effects which supported that bad news triggered high volatility than good news. The authors found positive Monday, Wednesday and Friday effect on returns. The study stated that the day of the week seasonality disappeared after taking into account varying time.

Ariss *et al*. (2011) studied the day of the week seasonality in Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates equity markets for 1994-2008 period. The returns were a function of Monday, Tuesday, Wednesday, Thursday, Saturday and Sunday independent variables. The model results highlighted positive Monday, Tuesday, Wednesday and Thursday impact on returns. Wednesday effect (United Arab Emirates), Wednesday effect (Bahrain), Thursday effect (Kuwait), Tuesday effect (Oman), Wednesday effect (Qatar) and Wednesday effect (Saudi Arabia). The authors suggested that investor's mood explained the Wednesday effect as investor are willing to buy and hence pushing the prices up.

Zhang *et al*. (2015) investigated the day of the week in the Taiwan foreign exchange market and their focus was on how the anomaly impact informed and uninformed investors. The data employed was for United States dollar and Taiwan dollar exchange rate for years 2001 to 2010. The study examined the relationship between return and independent variables Monday, Tuesday, Wednesday, Thursday and Friday. Negative impact of Monday and Thursday on returns was observed as well as positive Tuesday and Wednesday. Information released was found to explain the day of the week effect in the Taiwan foreign exchange market.

Yan *et al*. (2016) studied the day of the week seasonality in Taiwan equity markets for sample period 2009-2014. Negative Monday to Friday effects on returns for short covering and positive effects Monday to Friday for short selling. The authors highlighted that short selling and covering trading were more pronounced in highly priced stocks with high market capitalisation and institutional holdings. The study suggested that when returns are low and high, traders will short cover and sell respectively.

Derbali and Hallara (2016) examined the day of the week effect in the Tunisia equity market using daily returns computed using data for period 1997 to 2014. The results showed negative Tuesday and positive Wednesday, Thursday and Friday effects on

returns. The impact on volatility were positive for Monday, Wednesday, Thursday and Friday and negative for Tuesday. The observance of the varying daily returns patterns suggested inefficiencies in the Tunisia stock market.

Jebran and Chen (2017) investigated daily seasonality in Pakistan equity market for period 2008-2013. Empirical findings noted positive Friday and negative Monday and Thursday effects on return. For the volatility equation, positive Friday and Monday, and negative Tuesday and Thursday effects on volatility were observed. Authors advised that investors who utilises trend and pattern analysis can employ trading strategies that consider the daily returns behaviour of the Islamic equity market in order to generate abnormal returns on their investments.

Winkelried and Iberico (2018) assessed the day of the week effect in Argentina, Brazil, Chile, Colombia, Mexico and Peru equity markets. The period of analysis was restricted to 1995-2014. The average returns for Monday and Friday were found to be negative and positive respectively. The day of the week anomaly was a unique characteristic to emerging stock markets which could not be attributed to spill-over from developed stock markets such as the US. The authors suggested new explanation and review of existing theories for day of the week effect.

Ülküa and Rogers (2018) inspected the factors affecting Monday anomaly in Korean, Taiwan and Thailand stock markets for 2001-2015. The study examined the determinants of Monday return using individual, foreign and institutional variables. The authors observed that institutional investor contributed to the Monday effect negatively. The results showed that individual investors were not the drivers of the Monday effect. Another key calendar anomaly is the turn of the month (TOM) effect.

Oguzsoy and Guven (2006) analysed the TOM in Turkish equity market for the period 1988-1999. The results showed positive and negative TOM effects. For the 5-day TOM period the effect on returns was positive whilst for the 4-day period it was negative. The Turkish equity market is highly volatile, emerging and dynamic which made it not easy to be followed reactively hence financial decisions made about it lacks efficiency because of the level of adequacy and accuracy of the data used in decision making. Days surrounding the turn of the month period play a crucial role in the strength of the TOM. Investors should be actively in understanding the market so as to establish opportunities that provide abnormal returns.

Mangala and Sharma (2007) examined the presence of TOM on the Indian equity market for period 1994-2005. The study highlighted that average returns for TOM was positive and significantly higher than non-TOM days. TOM effect was suggested to be in existence as supported by findings and its presence was well noted in April, August, November and December months. EMH was observed to fail to explain Indian stock market price behaviour. Average returns at TOM and earlier days of month were observed to be above the rest of the days' returns. Therefore, a trading strategy based on TOM would allow the investor to beat the market. The

authors recommended that an informed investor have higher performance than an ignorant one. The study emphasised the importance of TOM in scheduling activities for buying and selling of stocks.

Jebran and Chen (2017) studied the impact of TOM on return and risk. The analysis focussed on the Pakistan equity market for the sample period 2008-2015. Results illustrated a positive TOM effect on equity returns. Furthermore, there was a positive impact of TOM on the volatility of equity returns. The existence of the TOM anomaly points to the inefficiency of the Pakistan equity market. The study recommended investment trading styles that takes into account TOM seasonality to realise excess returns. International and local investors can improve returns by adding Pakistan equities in their portfolio baskets. Empirical literature has also provided insight into the holiday anomaly.

Ariss *et al.* (2011) analysed the presence of Ramadan in Bahrain, Oman, Kuwait, Qatar, Saudi and United Arab Emirates equity markets for sample data spanning from 1994 to 2008. The Ramadan volatility of returns were significantly different from Non-Ramadan days. Risk is reduced during Ramadan days due to less speculative trading. The authors suggested that the opportunities presented by the Ramadan holiday anomaly was confined to the local investors and international investors are faced with equity ownership restrictions.

Kaplanski and Levy (2012) inspected the pre- and post-holiday effect on Israel equity returns for 1990-2008 sample period. The study examined the relationship between returns and independent variables namely lagged return, day of the week, turn of the year, pre-holiday, post-holiday and Yom Kippur. Significant positive pre-holiday impact on returns was found. The authors placed emphasis on investor sentiments, where good and bad times are associated with positive and negative mood respectively. The results noted that from a past event when a tragic occasion and a holiday coincided, the effects of both were felt but however those of the tragic occasion were dominant. Explanations of the pre-holiday results were attributed to atmospheric conditions and traders' emotions.

Teng and Liu (2013) ascertained the link between Taiwan equity returns and pre-holidays. The analysis covered the sample period 1971-2011. Positive pre-holiday effect on returns were exhibited in the Taiwan stock market. The high significant yields pre-holiday observed were attributed to the good mood of investors. Investors good drive them to purchase equities before the holiday which put pressure on stock prices and hence leading to higher returns.

Al-Khazali (2014) researched on the presence of Ramadan holiday anomaly in 15 Muslim oriented stock markets from Bahrain, Egypt, Indonesia, Jordan, Kuwait, Malaysia, Morocco, Oman, Pakistan, Qatar, Saudia Arabia, Turkey, Tunisia, United Arab Emirates (Abu Dhabi) and United Arab Emirates (Dubai). The sample data covered 1989-2012 period. Evidence of Ramadan holiday anomaly is found. Results

show a strong effect as a result of the Ramadan in the first two-thirds of the period. The last third showed declining holiday impact due to the global crisis. This was consistent with previous findings which were not significantly impacted by the perceptions on the structure or distribution of data. The study recommended that risk averse investors can increase investment returns by carrying trading activities in Ramadan days.

Alrashidi *et al.* (2014) tested the relationship between equity returns and Ramadan holidays in the Kuwait stock market utilising data covering years 2004-2009. The results obtained highlighted that the Ramadan had no impact on the levels of yields for the sample space assumed. However reduced variability was a striking difference noted during the Ramadan period.

Yuan and Gupta (2014) analysed the impact of holiday on stock returns for China, Hong Kong, India, Japan, Malaysia, South Korea and Taiwan for sample data covering 1999-2012. Pre- and post-holiday dummy variables were determinants of equity returns. A significant positive pre- and post-holiday effects on returns were observed in studied markets. The yields were very excessive as compared to the non-holidays. The risk-adjusted yields obtained from the markets increased notably. Investors can forecast returns based on the holiday anomaly and hence can earn abnormal returns. The high returns are associated with high risk for the Chinese Lunar New Year holiday.

Al-Ississ (2015) investigated the effect of Ramadan holiday on stock returns for Egypt, Indonesia, Jordan, Kuwait, Malaysia, Morocco, Pakistan, Qatar, Saudia Arabia and Turkey equity markets. The relationship between dependent variable returns and independent variables Ramadan holiday, world index, day of the week, month of the year and lagged return was tested. Positive Ramadan anomaly in last five days and negative on the 21st-24th days were displayed in the equity markets. The study findings suggested that the effect of Ramadan holiday on returns vary based on the days. The study concluded that the Ramadan holiday was influenced by emotions of investors.

Yuan *et al.* (2015) researched on the link between returns and pre-holiday in Chinese stock market for period 1997-2011. The analysis was expanded to sectors that included financials, health care, industrials, telecommunication, utilities, consumer discretionary, energy and consumer staples. Different sectors produced unique results though overall results for the mean and volatility equations exhibited positive pre-holiday effects. The results indicate that there is pre-holiday anomaly in the Chinese equity market. The high pre-holiday returns are not associated with high risk for small and large stocks. However, for value stock the increased returns reflect increased risk. The study recommended that buying equities two days prior to the holiday and selling a day before a holiday provide an investor an opportunity to earn profits from their investment.

Bergsma and Jiang (2016) scrutinised the impact of holiday on equity returns for years 1995-2011. The authors concentrated on China, Hong Kong, Indonesia, Israel, Malaysia, Pakistan, Singapore, South Korea, Sri Lanka, Taiwan and Thailand stock markets. The relationship between returns and pre-holiday, post-holiday and January was assessed. Positive pre- and post- cultural New Year holiday. Results revealed that returns for cultural New Year days are significantly higher than other days. This was explained by the tranquillity and calm which existed during such holidays. Empirical findings suggested that holiday effect was influenced by the mood of investors.

Gavriilidis *et al.* (2016) appraised the relationship between returns and Ramadan holiday in Bangladesh, Egypt, Indonesia, Malaysia, Morocco, Pakistan and Turkey equity markets for period 1990-2014. Empirical evidence proved that positive Ramadan effect on absolute market returns and negative Ramadan on squared market return. The presence of Ramadan holiday effect suggests that the herding behaviour is strong. The description of Ramadan holiday effects was attributed to investor sentiments. The authors advised that religious holiday play contributes to the behaviour of investors. The findings are useful to investors interested in Muslim equity markets.

Qadan and Kliger (2016) tested the pre-holiday effect in Israel equity market for period 1990-2015. The determinants of equity return were short trading anomaly and pre-holiday. Positive pre-holiday effect on return. Preholiday days provided significantly higher returns as compared to other days. The study also portrayed the exorbitant returns preholiday as well as declining variability in the yields. Active traders had the scope of outperforming equity market.

Yang (2016) investigated the presence of holiday anomaly in Taiwan equity market during the 2002-2013 period. The return was predicted by volume, buy and sell imbalance, margin purchase, short sales, trust, dealer, January, Thursday holiday, two days holidays before weekend, holidays in June and holidays in winter variables. Positive two days holidays before weekend and June holidays, negative winter and Thursday holidays. Investor have positive mood two days holidays before weekend while winter is associated with negative attitude. Investors can benefit from holiday patterns. The author suggested that investors participated more in short-selling raising the yields. Emotions also led to the observed returns and low variation.

Seif *et al.* (2017) examined the holiday seasonality in Turkey, Taiwan, South Africa, Poland, Mexico, Malaysia, Hungary, Czech Republic and Brazil equity markets utilising data for 1973-2014 period. The link between equity return variable and predictors namely day of the week, pre-holiday and post-holiday was tested. Holiday seasonality was not modelled in the volatility equation. Pre- and post-holidays results resembled positive effects on returns. Returns prior to post holidays were compared to those on ordinary dealing days. Results showed strong holiday anomaly as

compared to non-holidays. Post-holiday impacts dominated pre-holiday effects. The study recommended that a long position on days before and after holidays would be profitable to investors.

Chancharat *et al.* (2018) assessed the pre- and post-holiday effects on returns in the Thailand equity market for 1992-2016 period. Pre- and post-holidays dummy variables were used as determinants of returns. Findings illustrated a positive pre- and post-holiday effect on returns. The pre-holiday returns were higher than the post-holiday. The study refuted the EMH in the Thailand stock market. The authors recommended that adaptation of holiday investment strategy will improve returns for investors.

Halari *et al.* (2018) inspected the Ramadan effects on stock returns in Turkey, Jordan, Jordan and Indonesia for sample data covering years 1995-2014. The analysis was expanded to consumer, chemical, utilities, industrial and financial sectors. The mean equation revealed a positive Ramadan effect on returns whilst the volatility demonstrated a negative impact. The authors suggested that Ramadan holiday improves stock returns and reduces the associated risk. The study recommended that investors invest when Ramadan and January concurrently occur. The January anomaly has also been documented as an investment trading strategy.

Mehta and Chander (2009) evaluated January seasonality in the Indian equity market using sample period 1997-2007. The relationship between returns and months of the year. The results revealed no January effect in India. Positive November and December effect were present. The anomalous patterns observed in India under sample period cannot be attributed to foreign investments movement. The study recommended that investors can include the identified anomalies in their investment strategy to take advantage of the excess returns present.

Shiu *et al.* (2014) tested the January anomaly in the Taiwan equity market for data covering sample period 2001-2010. The data was subdivided into post-liberalisation with foreign investment restrictions period 2001-2004 and 2005-2010 post-liberalisation without foreign investment restrictions period. The returns were predicted by independent variables namely market returns, turnover, size, January, institutional shareholding, foreign investor shareholding, investment trust shareholding, dealer shareholding, and interaction of January and shareholding. The whole sample period highlighted positive market returns, turnover and January coefficients whereas size, institutional shareholding, investment trust shareholding, interaction of January and institutional shareholding, and interaction of January and investment shareholding were negative. The period 2001-2004 had positive coefficients for market returns, turnover, January coefficients and size with negative significance in institutional shareholding, investment trust shareholding, interaction of January and institutional shareholding, and interaction of January and investment shareholding. The period 2005-2010 revealed positive significant effects for market

return, turnover, and interaction of January and foreign investor shareholding whilst size, institutional shareholding, investment trust shareholding, interaction of January and investment trust shareholding showed negative coefficients. The January effect is explained by the institutional, investment trust and foreign shareholding. The post-liberalisation without foreign investment restrictions significantly reduced the January effect in the Taiwan equity market. The study suggested that foreign shareholdings promotes efficiency in the equity market.

Halari *et al*. (2018) studied the impact of January and Ramadan on returns of Muslim equity markets namely Indonesia, Jordan, Pakistan and Turkey. Data for the years 1995 to 2014 was used for the analysis. The assessment was expanded to finance, industrial, utility, consumer and chemical sectors. The study established how January, its interaction with Ramadan, financial crisis impacted on the returns and volatility. A negative effect on returns for January and interaction of January and Ramadan was observed whilst positive impact on volatility was noted. The sectorial analysis highlighted positive impact of interaction of January and Ramadan on return as well as January effect for Turkey's economic sectors except chemical. Additionally, negative January, and interaction of January and Ramadan were found in Indonesia, Jordan and Pakistan. The financial crisis had a positive impact on returns. The volatility equation exhibited a positive impact of interaction of January and Ramadan on return as well as January effect while the financial crisis reduced volatility in the sectors. The study confirmed the January effect and its occurrence with the Ramadan reduces returns while increasing volatility in the economic sectors. Investors interested in the Muslim equity markets can benefit from the January and Ramadan interactions. This study assessed calendar anomalies in the South African equity market using pooled panel models with Arellano robust standard errors.

3. Materials and Methods

The pooled panel models for the day of the week, turn of the month, holiday and January anomalies are specified as follows:

$$\boldsymbol{R}_{it} = \boldsymbol{\alpha} + \sum_{k=2}^{5} \beta_k X_{k,it} + \boldsymbol{\epsilon}_{it} \text{ (Day of the week)} \quad (1)$$

Where $\boldsymbol{R}_{it}$ is a vector of daily cross-sectional time returns, $\boldsymbol{\alpha}$ denotes the intercept for Monday effect on pooled daily returns. β_2, β_3, β_4 and β_5 are coefficients measuring additional impact on pooled daily returns of Tuesday, Wednesday, Thursday and Friday respectively. $X_{1,it}, X_{2,it}, X_{3,it}, X_{4,it}$ and $X_{5,it}$ are cross-sectional time dummy variables taking values of 1 for days Tuesday, Wednesday, Thursday and Friday respectively.

$$\boldsymbol{R}_{it} = \boldsymbol{\alpha} + \beta_1 X_{1,it} + \boldsymbol{\epsilon}_{it} \text{ (Turn of the month)} \quad (2)$$

Where $\boldsymbol{R}_{it}$ is a vector of daily cross-sectional time returns. $\boldsymbol{\alpha}$ denotes the intercept for measuring the rest of the days in a month effect on pooled returns. β_{1i} is a coefficient measuring the additional effect on pooled returns emanating from the turn of the month days. $X_{1,it}$ is a cross-section time dummy variable with value 1 for turn of the month days that are defined as the last trading day of the previous month and the first three trading days of the next month.

$$\boldsymbol{R}_{it} = \boldsymbol{\alpha} + \beta_1 X_{1,it} + \beta_2 X_{2,it} + \boldsymbol{\epsilon}_{it} \text{ (Holiday)} \quad (3)$$

Where $\boldsymbol{R}_{it}$ is a vector of daily cross-sectional time returns. $\boldsymbol{\alpha}$ denotes the non-holiday effect on pooled returns. β_{1i} and β_{1i} measures the additional impact on pooled returns derived from pre-holiday and post-holiday respectively. $X_{1,it}$ and $X_{2,it}$ are cross-sectional time dummy variables takes values 1 for pre and post holidays respectively. The pre-holiday is defined as a trading day before a holiday and post-holiday is a trading day after a holiday.

$$\boldsymbol{R}_{it} = \boldsymbol{\alpha} + \sum_{k=2}^{12} \beta_k X_{k,it} + \boldsymbol{\epsilon}_{it} \text{ (January)} \quad (4)$$

Where $\boldsymbol{R}_{it}$ is a vector of monthly cross-sectional time returns. $\boldsymbol{\alpha}$ measures the January effect on pooled monthly returns. $\beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}, \beta_{11}$ and β_{12} are coefficients for additional impact on pooled month returns emanating from February, March, April, May, June, July, August, September, October, November and December respectively. $X_{2,it}, X_{3,it}, X_{4,it}, X_{5,it}, X_{6,it}, X_{7,it}, X_{8,it}, X_{9,it}, X_{10,it}, X_{11,it}$ and $X_{12,it}$ are cross-sectional time dummy variables taking values of 1 for months February, March, April, May, June, July, August, September, October, November and December respectively.

JSE financial data covers the period 1995 to 2018 and were sourced from IRESS database, a financial data firm. Data comprises of the Top 40 (J200), All shares (J203), Basic materials (J510), Industrials (J520), Consumer goods (J530), Health care (J540), Consumer services (J550), Telecommunications (J560), Financials (J580) and Technology (J590). Eviews 10 and R software were used to analyse the data. In estimation of the specified panel data models, the panel unit root, Hausman, Breusch Pagan tests were employed and the models were diagnosed using cross section dependence, heteroscedasticity and serial correlation tests.

4. Empirical Findings and Discussions

This section focused on the results of the day of the week, turn of the month, holiday and January seasonality for the South African equity market. In carrying out the panel unit root tests, the null hypothesis, that there is unit root in the panel dataset, against the alternative hypothesis that the panel data does not have unit roots, is tested.

Table 1. Panel Unit Root Tests at Level Results for Seasonal Anomalies

Method	**Day of the week**		**Turn of the month**	
	Intercept	Intercept and trend	Intercept	Intercept and trend
LLC	-297.804**	-178.965**	-125.419**	-178.055**
IPS	-251.163**	-131.685**	-103.427**	-111.946**
ADF	184.207**	2633.91**	2072.91**	2633.91**
PP	184.207**	401.921**	489.241**	2633.91**
	Pre-holiday		**Post-holiday**	
	Intercept	Intercept and trend	Intercept	Intercept and trend
LLC	-104.771**	-148.171**	-104.771**	-148.171**
IPS	-109.945**	-119.161**	-109.945**	-119.161**
ADF	1902.10**	2633.91**	1902.10**	2633.91**
PP	184.207**	184.207**	184.207**	184.207**
	January			
	Intercept		Intercept and trend	
LLC	Incomputable		-45.3649**	
IPS	Incomputable		-32.8633**	
ADF	Incomputable		759.738**	
PP	Incomputable		184.207**	

**Significant at 1% level

The Levin, Lin, and Chu (LLC), Im, Pesaran, and Shin (IPS), Augmented-Dickey-Fuller (ADF), and Phillips-Perron (PP) panel unit root test results for the day of the week, turn of the month, pre-holiday, post-holiday, and January anomalies of JSE are presented in Table 1. As shown in Table 1, the test statistic for the four panel unit root tests have probability values that are less than the threshold of 0.01 probability. Therefore, at under 1% significance level, the null hypothesis is rejected, and it is concluded that the day of the week, turn of the month, pre-holiday, post-holiday and January returns panel data do not have unit roots. The findings indicate that the random walk model is weak, and therefore the seasonal anomalies on the JSE are predictable, contrary to the EMH (Fama, 1970; Paolella, 2019). The implication of stationarity is that seasonal anomalies on the JSE can be modelled in random, fixed or pooled panel frameworks (Brooks, 2014; Biørn, 2017).

Table 2. Preliminary Tests for Panel Data Model Selection

Test	Day of the week	Turn of the month	Holiday	January
Hausman	Random (p-value > 0.05)			
Breusch Pagan	Pooled (p-value > 0.05)			
Fisher	Pooled (p-value > 0.05)			
Cross section dependence	Correlation (p-value < 0.05)			
Heteroscedasticity	Heteroscedasticity (p-value < 0.05)			
Serial correlation	Correlation (p-value < 0.05)			
Conclusion	Pooled panel data model with Arellano's robust errors			

Table 2 showed that the pooled panel model is appropriate for the calendar anomalies. We found that the cross-section dependence, heteroscedasticity and serial correlation test were significant at the 5% level of test. According to Torres-Reyna (2007), the pooled panel model must take cognisance of the presence of correlation and heteroscedasticity and therefore a pooled panel data model with Arellano's robust errors was estimated for the calendar anomalies.

Table 3. Day of the week pooled OLS panel model estimation results

Coefficients					
	Estimate	**Std. Error**	**Test statistic**	***p*-value**	
Monday	0.00072959	0.00006229	11.7135	< 2.2e-16	***
Tuesday	-0.00021860	0.00012395	-1.7636	0.077799	.
Wednesday	-0.00035681	0.00013496	-2.6438	0.008201	**
Thursday	-0.00022600	0.00008636	-2.6170	0.008873	**
Friday	-0.00084417	0.00006165	-13.693	< 2.2e-16	***
R^2=0.00034285 F=5.00606***					
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Table 3 presents the pooled OLS panel model with Arellano's robust errors estimation results for the day of the week effect. The estimated OLS model account for serial correlation and heteroscedasticity (Arellano, 2004). The R^2 value shows that 0.034% of variation in daily returns on the JSE indices that is explained by the variation of trading days returns from Monday to Friday. Moreover, the *F*-test rejected the null hypothesis that the coefficient of the dummy variables representing trading days from Monday to Friday are equal to zero at 5% level suggesting that modelling daily returns of the JSE is improved by incorporating the daily seasonality. Under the EMH, it is expected that the average returns of JSE indices on a particular trading day to be equal to each other (Fama, 1970). However, the estimated trading days coefficients are different from each other with Monday having a positive sign whilst the rest of the trading days have negative signs. Monday returns are significant at 5% level since the *p*-value is less than 0.05. The coefficient of 0.00072959 on

Monday represent the average return that stock market participants would require either for not trading on other trading days or when non-Monday days have zero average return. An insignificant coefficient of -0.00021860 on Tuesday highlights that investor would require a return 0.00021860 less than that on a Monday. The insignificant Tuesday maybe explained by high volumes of trades by market participants (Kiymaz & Berument, 2003). Wednesday has a significant coefficient of -0.00035681 which shows that holding other things constant, the premium that an investor on the JSE would require is 0.00035681 lower than the Monday premium. Likewise, significant Thursday and Friday coefficients of -0.000226 and -0.00084417 shows that the premium required is respectively 0.000226 and 0.00084117 less than on a Monday. The premium required by JSE investors is highest on Monday, the start of the trading week and is at its lowest on Friday the end of the trading week. The decreasing average returns from Monday to Friday is consistent with declining mood hypothesis which is explained by deteriorating JSE investors' mood during the trading week (Birru, 2018).

The results show complete reversal of the day of the week effect on the JSE with Monday yielding significantly higher returns than the rest of the trading days and Friday having the lowest returns. The reversal in day of the week corroborates with Nawaz and Mirza (2012) who highlighted a shift in traditional day of the week effect with Mondays now having higher returns compared to Friday. The major players on the JSE are institutional investors such as pension funds (27four, 2013; Moleko & Ikhide, 2016), the findings can be explained by suggestions of enlarged trading undertakings by institutional investors over the retail investors leading to positive and higher Monday returns as compared to Friday returns (Nawaz & Mirza, 2012).

Using the lenses of JSE's settlement system which allows trades to be settled after 3 days of the transaction known as the T+3. The findings highlight a T+3 cycle where returns on a Monday, the first trading day decline until Wednesday and then at close of the cycle the returns improve on Thursday. Delay in settlement of trades explains the returns on Friday which declines putting a buying pressure on securities and the effects of the buying behaviour drives the prices of stocks and consequently high returns on a Monday as suggested in (Lakonishok & Levi, 1982).

The panel results for day of the week effect illustrate that the average returns on the JSE are not equal. Therefore, the EMH is nullified for day of the week effect. Brooks and Persand (2001) reported positive Monday effect in the Asian stock markets and Bhattacharya *et al*. (2003) for the Indian stock market. However, the current findings used a panel approach as compared to the OLS. Ajayi *et al*. (2004) found positive significant Monday effect in the Russian stock market despite using OLS, a different methodology as the present study. The Wednesday effect findings are consistent with observations in the US, Turkish and Tunisia equity markets (Kato, 1990; Oguzsoy & Guven, 2003; Derbali & Hallara, 2016). The JSE Thursday effect results are

internationally supported as Bhattacharya *et al*. (2003) found its existence in India equity market, Alberg *et al*. (2008) in Tel Aviv stock market, Derbali and Hallara (2016) in Turkey stock market, Vasileiou (2017) in US equity market and Zhang *et al*. (2017) in Chinese stock market. In the vein of our findings, global evidence showed Friday effects in US, Turkish and Latin American equity markets (Lakonishok & Levi, 1982; Liano & Gup, 1989; Birru, 2018; Demirer & Karan, 2002; Oguzsoy & Guven, 2003; Winkelried & Iberico, 2018).

The panel model results for day of the week are inconsistent with Mbululu and Chipeta (2012) who found Monday effect in one sector index, Basic Materials the discrepancies are attributed to the Kolmogorov-Smirnov methodology and sample period of 1995-2011. Moreover, other yesteryear studies for instance Coutts and Sheikh (2002), Loffe (2008) found no day of the week on the JSE. Despite Bhana (1985) confirming the traditional day of the week effect, our findings show new insight that the conventional day of the week effect is now irrelevant but the reversal day of the week effect is pronounced on the JSE.

In light of the day of the week effect, the findings from the JSE stock market imply that investors can make abnormal returns on Monday when the stock market opens as compared to Friday when it closes. Therefore, both individual and institutional investors can earn higher returns from buying stock on Friday and sell on Monday when the returns are high. We turn our discussion to the turn of the month effect results.

Table 4. Turn of the Month Effect Pooled OLS Panel Model Estimation Results

Coefficients					
	Estimate	Std. Error	Test statistic	*p*-value	
Other days	0.00019996	0.00002906	6.87990000	6.05E-12	***
Turn of the month	0.00103820	0.00007771	13.36120000	< 2.2e-16	***
R^2=0.00073086 *F*= 42.7045***					
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Turn of the month effect findings presented in Table 4 are based on pooled OLS with Arellano's robust errors which incorporates cross section dependence, serial correlation and heteroscedasticity (Arellano, 2004). Firstly, it is noted that 0.073% of the variation in daily JSE returns are accounted for by turn of the month and rest of the days' returns. The *F*-test results show that the null hypothesis that the turn of the month coefficient is equal to zero is rejected providing evidence of model enhancement. Holding other things constant, investors on the JSE require a premium of about 0.0002 for non-turn of the month days. The results show a positive significant coefficient of 0.00103820 for turn of the month days (4 days made up of the last trading day of the preceding month and the first three trading days of the following month). The turn of the month coefficient highlights that investors obtain

an extra return of 0.00103820 for trading on turn of the month period. A breach of the EMH hypothesis is explained by our results (Fama, 1970).

Evidence of positive turn of the month effect on the JSE is enveloped by two schools of thoughts namely the pay day and window dressing hypotheses. Firstly, the demand for equities at the turn of the month days is attributed to increased liquidity from diverse income such as wages and salaries, and interest payments from fixed securities (Odgen, 1990). The liquidity effect is displayed in high returns around turn of the month days as compared to the rest of the days (Odgen, 1990). Secondly, the possible explanation of the positive turn of the month anomaly on the JSE is unearthed by the activities of portfolio managers who drives the prices of equities as they window dress the books of their respective clients which results in high returns on turn of the month days (Ma & Goebel, 1991; 27four, 2013; Moleko & Ikhide, 2016).

The findings authenticate classical and modern evidence on turn of the month effect. Lakonishok and Smidt (1988), Cadsby (1992) found a positive premium on turn of the month days in the US equity market. Kunkel *et al*. (2003) analysed equity market indexes for nineteen countries, 50% which were European, and 25% from the Far East, South Africa, Mexico, and the US. They found strong evidence in support of the turn of the month effect with Japan recording the highest turn of the month effect during the period. South African stock market exhibited a positive turn of the month anomaly using the OLS approach (Kunkel *et al*., 2003). Sar (2003) found evidence of turn of the month effect in an 8-day consecutive period for Netherland equity market. The JSE results show turn of the month in a 4-day consecutive period suggesting that the turn of the month effect is revealed in shorter periods as well. Oguzsoy and Guven (2006) showed that the turn of the month effect was less than the rest of the month in the Turkish stock market, their evidence is contrary to the JSE results and this discrepancy can be attributed to the fact that we used a 4-day period whereas Oguzvoy and Guven (2006) used 5-day period. A 4-day turn of the month period in Mangala and Sharma (2007) exhibited a significant positive turn of the month effect in the Indian stock market and this dovetail with the results on the JSE. The panel results on the JSE are supported by Silva (2010) who revealed a positive turn of the month effect in a 4- and 6-day windows in the Portuguese stock market. However, Khouri (2013) established no turn of the month effect on the JSE All Shares index which is inconsistent with the present findings, the differences can be explained by use of panel approach whereas Khouri (2013) used the *t*-test. In addition, our data is not limited to one index but extends to cover the entire sectors on the JSE and hence provide more insight into the turn of the month anomaly.

The JSE returns highlights that trading from the period starting from the last day of the previous month to the first 3 days of the following month will yield higher average returns to an investor as compared to the rest of the month days. The strong

evidence in support of the turn of the month effect from the current and previous studies imply investors can benefit from this anomaly and maximise their returns. The EMH is discredited due to existence of the turn of the month anomaly. However, care should be taken as the benefit of turn of the month anomaly can be affected or eroded by transaction costs. The turn of the month trading strategy would purely work when there are no costs associated with trading or the merits outweigh the costs. The holiday anomaly findings are discussed next.

Table 5. Holiday Effect Pooled OLS Panel Model Estimation Results

Coefficients					
	Estimate	Std. Error	Test statistic	*p*-value	
Non-holiday	0.00032212	0.00002715	11.8639	< 2.2e-16	***
Pre-holiday	-0.00012053	0.00016235	-0.7424	0.4578	
Post-holiday	0.00207170	0.00034133	6.0694	1.29E-09	*******
R^2=0.00071762 *F*=20.965***					
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Table 5 shows the pooled panel model with Arellano's robust errors estimation results for the holiday effect for the JSE. The pre-holiday and post-holiday returns explains about 0.072% of variation in daily returns as highlighted by the R^2 value. The significant *F*-test demonstrates that the regression coefficients that are associated with dummy variables representing the pre and post holidays are not equal to zero indicating that modelling of holiday anomaly is boosted. In an EMH scenario, it is expected that the regression coefficients are zero suggesting that the average returns for non-holiday, pre and post holidays are equal to each other and hence one cannot devise a strategy that will result in abnormal or excess profit (Fama, 1970; Coutts & Sheikh, 2002; Al-Loughani *et al*., 2005). A significant non-holiday coefficient suggest that investors would require to be compensated with a return of 0.00032212 in the absence of pre and post holidays. The pre-holiday was found to be insignificant since the p-value is greater than the 0.05 level of test and hence does not have an influence on the daily returns for JSE indices. The significant post-holiday coefficient indicates that all other things being equal, investors will require an extra average return of 0.00207170 to trade on a post-holiday trading day, which is one day after the public holiday in South Africa. The overall effect of the investing 1 unit on a post-holiday is increasing of the average daily returns of the JSE indices by 0.00207170 units.

Teng and Liu (2013) provide the closet explanation on the existence of post-holiday returns on the JSE. According to 27four (2013), and Moleko and Ikhide (2016), institutional investors are crucial players on the JSE and therefore due to access to expertise such as asset managers, they can safely be considered mature investors and enjoy information advantage which explains the positive post-holiday returns. The JSE post-holiday returns can be attributed to positive investors' mood after the

holiday which exert buying pressure on stock and drives their returns up (Teng & Liu, 2013).

On the international scene, Marrett and Worthington (2009) found no post-holiday in the Australian stock market which is inconsistent with JSE's results, this could be explained by the type of economy that is Australia is a developed country whereas South Africa is a developing economy. The present study on the JSE amplifies international insights that demonstrates existence of the post-holiday anomaly (Dodd & Gakhovich, 2011). In addition, the post-holiday effects are in tandem with Dumitriu *et al*. (2012) though the application was in the Romanian stock market. The post-holiday anomaly had a greater impact than the non-holiday days for the present findings, this concur with recent studies in Seif *et al.* (2017).

Past studies on holiday effect on the JSE show mixed results. In contrast with the current findings, Coutts and Sheikh (2002) found no holiday effects. Alagidede (2013) exhibited pre-holiday effects for period 1997-2006, unlike our current study show no evidence of pre-holiday anomaly, the difference arises because our data is extended to 2018 and the panel approach was employed.

The EMH is does not hold due to existence of the post-holiday effect on the JSE and hence the equity market is weak form inefficient. Inferring from the results, it is possible for investors to enjoy abnormally high returns post holidays than days leading to a holiday. Thus, investors, individual and institutional can make a profit by buying stock a few days leading to a holiday for selling days just after the holiday when returns will be abnormally higher. However, as more investors practice this strategy, the market demand for stock on days prior to a holiday increase leading to an increase in price and ultimately the returns on days after the holiday. Finally, we look at the January anomaly results.

Table 6. January Effect Pooled OLS Panel Model Estimation Results

Coefficients					
	Estimate	Std. Error	Test statistic	*p*-value	
Jan	0.0118516	0.0022575	5.2498	1.637E-07	***
Feb	-0.0098569	0.0038410	-2.5662	0.0103326	*
Mar	-0.0055726	0.0055364	-0.9984	0.3181602	
Apr	0.0112624	0.0027585	4.0827	4.58E-05	***
May	-0.0104212	0.0031567	-3.3013	0.0009746	***
Jun	-0.0163540	0.0035192	-4.6471	3.52E-06	***
Jul	0.0017369	0.0031172	0.5572	0.0774416	
Aug	-0.0128245	0.0035169	-3.6466	0.0002706	***
Sept	-0.0224156	0.0040343	-5.5562	3.02E-08	***

Oct	0.0140755	0.0041038	3.4298	0.0006127	***
Nov	-0.0021775	0.0032012	-0.6802	4.96E-01	
Dec	0.0108875	0.0047835	2.276	0.0229196	*
R^2=0.025693 F=6.68376***					
Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

In Table 6, we present the pooled OLS model results for the January effect with Arellano robust estimates. The significant *F*-value depicts that the average returns for months January to December are not equal to zero and hence there is an improvement in panel modelling of the January effect. Months of the year accounts for approximately 2.6% of the variation in monthly returns on the JSE as revealed by the R^2 value. Findings in Table 6 illustrated that 9 months out of 12 have significant impact on the monthly returns of JSE indices. The significant coefficient of 0.0118516 highlights the average monthly returns that investors on the JSE would earn assuming they only trade in January months. Investors returns is reduced when they trade in February, May, June, August and September as compared to January by 0.0098569, 0.0104212, 0.016354, 0.0128245, and 0.0224156 respectively. Precisely, investors' returns are negative when they trade in June, August and September. However, April, October and December provide extra returns to investors of 0.0112624, 0.0140755, and 0.0108875 respectively as compared to January returns. Of interest is October which have additional returns that exceeds that of January.

Podgorski (2018) showed positive returns in European Union stock markets for months January, April and October in agreement with JSE findings. December had negative returns for European Union in contrast with JSE (Podgorski, 2018). The months June, August, and September returns are consistent with Podgorski (2018). The findings provide support that January effect also exists in developing capital markets. The period October-April is associated with significant positive returns whilst May-September has significant negative extra returns which is inconsistent with Norvaisiene *et al*. (2015) who observed higher returns in November-April and lower returns in May-October period for Baltic equity markets. Investors on the JSE may invest in the period October-April and earn higher returns than the rest of the months. Despite French (2011) highlighting foreign equity flows on the JSE, the January effect is still an important anomaly for investors and this suggest that the foreign flows have not be greater enough to improve market efficiency as alluded in Shiu *et al*. (2014). September returns were the most negative sharing similarities with Compton *et al*. (2013). Mashruwala and Mashruwala (2011) on US equity market illustrated January effect. A negative significant return in June collaborates Floros (2008) findings in Greek equity market.

Local evidence that supports the January effect was revealed by Mahlophe (2015) who utilised the pooled regression model on the JSE sectorial indices for the period

2002 to 2014. However, a couple of studies on the JSE did not find evidence for the January effect. These studies include: Coutts and Sheikh (2002) who used the OLS model and found no presence of the Monday, January or holiday effects. Auret and Cline (2011) also studied the January effect employing an analysis of variance (ANOVA) approach to JSE All Share Index for years 1988 to 2006. They found no evidence of seasonality patterns in January. Khouri (2013) and Astin (2015) applied regression and the Markov models respectively to investigate the January effect on the JSE and both concluded that the January effect was not present.

Companies normally declare bonuses at the end of the year and this pushes demand for securities in December-January period on the JSE resulting in higher returns for the period as suggested in Beladi *et al*. (2016). Additionally, the significant January returns on the JSE may be explained by Ritter (1988) who alluded that investors are aware that management have privy to information that are not released to the public at the end of the year, and managers may use it to the disadvantage of investors hence a higher premium in January is demanded by investors.

The January effect in the JSE suggest that the EMH is invalid and hence if investors trade in January they would earn positive returns. Furthermore, investors should avoid trading in months June, August and September as these are associated with losses. However, months that include April, October and December are attractive as they provide abnormal returns to investors whose investments are timed in these respective months. The highest return is attained in October.

5. Conclusions and Recommendations

The objective of the study was to test whether day of the week, turn of the month, holiday and January anomalies existed on the South African equity market. The study estimated the pooled OLS panel model with Arellano robust errors for the day of the week, turn of the month, holiday and January seasonality. The pooled OLS panel model analysis of the day of the week using aggregate and sectorial indices demonstrate positive returns on Mondays suggesting that regardless of the sector chosen investors' best return are attained on a Monday as compared to other trading days of the week. Turn of the month days have returns higher than other days for JSEs' aggregate and sectorial indices in pooled OLS panel model. The pooled OLS panel model results exhibited that post holidays returns are significantly greater than pre holidays returns for JSEs' aggregate and sectorial indices. An analysis of the January anomaly reveals its little importance in investment decisions for aggregate and sectorial indices of the JSE under the pooled OLS panel model. In fact, though the January month is significant it is less pronounced than the October effect. The study recommends that investors trade on Monday to maximise returns when using the day of week strategy. For the turn of the month strategy, investors should trade

on turn of the month period as compared to the rest of the days so obtain abnormal returns. The post-holiday provides better returns for investors as compared to the pre-holiday periods. We recommend that investors avoid January and trade in October since returns are attractive in October. Further studies can include the use of dynamic panel models in calendar anomalies modelling.

References

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

Alagidede, P. (2013). Month of the year and pre-holiday effects in African stock markets. *South African Journal of Economics and Management Sciences*, 16(1), pp. 64-74.

Alagidede, P. & Panagiotidis, T. (2009). Calendar anomalies in the Ghana stock exchange. *Journal of Emerging Market Finance*, 8(1), pp. 1–23.

Alberg, D.; Shalit. H. & Yosef, R. (2008). Estimating stock market volatility using asymmetric GARCH models. *Applied Financial Economics*, 18(15), pp. 1201-1208.

Al-Ississ, M. (2015). The holy day effect. *Journal of Behavioral and Experimental Finance*, 5(2015), pp. 60–80.

Al-Khazali, O. (2014). Revisiting fast profit investor sentiment and stock returns during Ramadan. *International Review of Financial Analysis*, 33(C), pp. 158–170.

Al-Loughani, N. & Chappell. D. (2001). Modelling the day of the week effect in the Kuwait Stock Exchange: A nonlinear GARCH representation. *Applied Financial Economics*, 11(4), pp. 353-359.

Alrashidi, F.; Ahmed, M. & Beneid, F. (2014). The calendar impact and trading behavior: An empirical evidence from around the globe. *International Business & Economics Research Journal*, 13(5), pp. 1025-1032.

Arellano, M. (2004). *Panel data econometrics*. Oxford: Oxford University Press.

Ariss, T.; Rezvanian, R. & Mehdian (2011). Calendar anomalies in the Gulf Cooperation Council stock markets. *Emerging Markets Review*, 12(1), pp. 293–307.

Astin, A. J. L. (2015). Analysis of calendar effects and market anomalies on the Johannesburg stock exchange. *Masters Thesis*. Nelson Mandela Metropolitan University.

Auret, C. & Cline, R. 2011. Do the value, size and January effects exist on the JSE?*Investment Analysts Journal*, 40(74), pp. 29-37.

Beladi, H.; Chao, C. C. & Hu, M. (2016). The Christmas effect—Special dividend announcements. *International Review of Financial Analysis*, 43(C), pp. 15–30.

Bergsma, K. & Jiang, D. 2016. Cultural New Year holidays and stock returns around the world. *Financial Management*, 1(1), pp. 3-35.

Berument, H.; Coskun, M. N. & Sahin, A. (2007). Day of the week effect on foreign exchange market volatility: Evidence from Turkey. *Research in International Business and Finance*, 21(2007), pp. 87–97.

Bhana, N. (1985). The Monday effect on the Johannesburg Stock Exchange. *South African Journal of Business Management*, 16(1), pp. 7-11.

Bhattacharya, K.; Sarkar, N. & Mukhopadhyay, D. (2003). Stability of the day of the week effect in return and in volatility at the Indian capital market: A GARCH approach with proper mean specification. *Applied Financial Economics*, 13(8), pp. 553-563.

Birru, J. (2018). Day of the week and the cross-section of returns. *Journal of Financial Economics*, 130(1), pp. 182–214.

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

Cadsby, C. B. (1992). The CAPM and the calendar: Empirical anomalies and the risk-return relationship. Management Science, 38(11), pp. 1543-1561.

Chancharat, S.; Maporn, S.; Phuensane, P. & Chancharat, N. (2018). Volatility of holiday effects in Thai stock market. *Kasetsart Journal of Social Sciences*, xxx(2018), pp. 1-6.

Compton, W.; Kunkel, R. A. & Kuhlemeyer, G. 2013. Calendar anomalies in the Russian stocks and bonds. *Managerial Finance*, 39(2), pp. 1138-1154.

Coutts, J. A. & Sheikh, M. A. 2002. The anomalies that aren't there: the weekend, January and pre-holiday effects on the all gold index on the Johannesburg stock exchange 1987-1997. *Applied Financial Economics*, 12(12), pp. 863-871.

Demirer, R. & Karan, M. B. (2002). An investigation of the day of the week effect on stock returns in Turkey. *Emerging Markets Finance & Trade*, 38(6), pp. 47-77.

Derbali, A. & Hallara. (2016). Day of the week effect on the Tunisian stock market return and volatility. *Cogent Business & Management*, 3(2016), pp. 1-12.

Dodd, O. & Gakhovich, A. (2011). The holiday effect in Central and Eastern European financial markets. *Investment Management and Financial Innovations*, 8(4), pp. 29-35.

Dumitriu, R.; Stefanescu, R. & Nistor, C. (2012). *Holiday effects on the Romanian stock market*. https://www.researchgate.net/publication/228318451_Holiday_Effects_on_the_Romanian_Stock_Market.

Fama, E. (1965). Random walks in stock market prices. *Financial Analysts Journal*, 21(5), pp. 55-59.

Fama, E.; Fisher, L.; Jensen, M. C. & Roll, R. (1969). The adjustment of stock prices to new information. *International Economic Review*, 10(1), pp. 1-21.

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, 25(2), pp. 383-417.

Floros, C. (2008). The monthly and trading month effects in Greek stock market returns:1996-2002. *Managerial Finance*, 34(7), pp. 453-464.

French, J. J. (2011). The dynamic interaction between foreign equity flows and returns: evidence from the Johannesburg stock exchange. *The International Journal of Business and Finance Research*, 5(4), pp. 45-56.

Gavriilidis, K.; Kallinterakis, V. & Tsalavoutas, I. (2016). Investor mood, herding and the Ramadan effect. *Journal of Economic Behavior & Organization*, 132(S), pp. 23–38. Delhi: National Publishing House.

Halari, A.; Helliar, C.; Power, D. M. & Tantisantiwong, N. (2018). Taking advantage of Ramadan and January in Muslim countries. *The Quarterly Review of Economics and Finance* xxx(2018):xxx–xxx.

Jebran, K. & Chen, S. (2017). Examining anomalies in Islamic equity market of Pakistan. *Journal of Sustainable Finance & Investment*, 7(3), pp. 275-289.

Kahneman, D. (2011). *Thinking, fast and slow*. New York: Farrar, Straus and Giroux.

Kaplanski, G. & Levy, H. (2012). The holiday and Yom Kippur War sentiment effects: the Tel Aviv Stock Exchange (TASE). *Quantitative Finance*, 12(8), pp. 1283-1298.

Kato, K. (1990). Weekly patterns in Japanese stock returns. *Management Science*, 36(9), pp. 1031-1043.

Khouri, Y. (2013). An empirical analysis of the turn-of-the-month and January anomalies in five emerging stock markets. *Masters Thesis*. The British University in Dubai.

Kiymaz, H. & Berument, H. (2003). The day of the week effect on stock market volatility and volume: International evidence. *Review of Financial Economics*, 12(2003), pp. 363–380.

Kuhn, T. S. (1970). *The structure of scientific revolutions*. Chicago: The University of Chicago Press.

Kunkel, R. A.; Compton, W. S. & Beyer, S. (2003). The turn of the month effect still lives: The international evidence. *International Review of Financial Analysis*, 12(2003), pp. 207-221.

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

Lakonishok, J. & Smidt, S. (1988). Are seasonal anomalies real? A ninety year perspective. *Review of Financial Studies*, 1(4), pp. 403-425.

Liano, K. & Gup, B. E. (1989). The day of the week effect in stock returns over business cycles. *Financial Analysts Journal*, 45(4), pp. 74-77.

Loffe, S. (2008). The Day of the Week Effect on the JSE Securities Exchange since 1994. *Masters Thesis*. University of the Witwatersrand.

Ma, C. K. & Goebel, P. R. (1991). On the seasonality of mortgage-backed security prices. *The Journal of Real Estate Research*, 6(1), pp. 19-38.

Mahlophe, M. I. (2015). Effect of market anomalies on expected returns on the JSE: A cross-sector analysis. Vaal Triangle: North-West University. *Thesis-Masters*.

Mangala, D. & Sharma, S. K. (2007). Are there monthly and turn of the month effects in Indian stock marksets?: Evidence and implications. *Paradigm*, 11(2), pp. 16-22.

Marrett, G. J. & Worthington, A. C. (2009). An empirical note on the holiday effect in the Australian stock market, 1996–2006. *Applied Economics Letters*, 16(17), pp. 1769–1772.

Mashruwala, C. A. & Mashruwala, S. D. (2011). The pricing of accruals quality: January versus the rest of the year. *The Accounting Review*, 86(4), pp. 1349-1381.

Mehta, K. & Chander, R. (2009). Seasonality in Indian stock market: A re-examination of January effect. *Asia-Pacific Business Review*, 5(4), pp. 28-42.

Mishkin, F. S. & Eakins, S. G. (2018). *Financial markets and institutions*. 9th ed. Harlow: Pearson Education.

Moleko, N. & Ikhide, S. (2016). *Pension funds evolution, reforms and trends in South Africa*. Pension Institute. https://www.pensions-institute.org/workingpapers/wp1608.pdf.

Mbululu, D. & Chipeta, C. (2012). Day of the week effect: Evidence from the nine economic sectors of the JSE. *Investment Analysts Journal*, 41(75), pp. 55-65.

Nawaz, S. & Mirza, N. (2012). Calendar anomalies and stock returns: A literature survey. *Journal of Basic and Applied Scientific Research*, 2(12), pp. 12321-12329.

Norvaisiene, R.; Stankeviciene, J. & Lakstutiene, A. 2015. Seasonality in the Baltic stock markets. *Procedia-Social and Behavioural Sciences*, 213(2015), pp. 468-473.

Odgen, J. P. (1990). Turn of the month evaluations of liquid profits and stock returns: A common explanation for the monthly and January effects. *The Journal of Finance,* 45(4), pp. 1259-1272.

Oguzsoy, C. B. & Guven, S. (2003). Stock returns and the day of the week effect in Istanbul Stock Exchange. *Applied Economics*, 35(8), pp. 959-971.

Oguzsoy, C. B. & Guven, S. (2006). Turn of the month and turn of the month surrounding days effects in Istanbul stock exchange. *Journal of Emerging Market Finance,* 5(1), pp. 1-13.

Podgorski, B. (2018). Impact of the January effect on return rates in the markets of the 2004 EU enlargement. *Journal of Management and Business Administration: Central Europe*, 26(1), pp. 27-48.

Pompian, M. M. (2012). *Behavioral finance and investor types: managing behavior to make better investment decisions*. New Jersey: John Wiley & Sons.

Qadan, M. & Kliger, D. (2016). The short trading day anomaly. *Journal of Empirical Finance*, 38(PA), pp. 62–80.

Reinganum, M. (1984). What the Anomalies Mean. *The Journal of Finance*, 39(3), pp. 837-840.

Ritter, J. R. (1988). The buying and selling behavior of individual investors at the turn of the year. *Journal of Finance*, 43(3), pp. 28-30.

Sanaullah, A.; Shah, S. M. A.; Ather, M.; Ali, E. & Asla, M. R. (2012). How behavioral aspects affect market efficiency: Evidence from KSE 100 Index. *Global Journal of Management and Business Research*, 12(10).

Sar, V. D. (2003). Calendar effects on the Amsterdam stock exchange. *De Economist*, 151(3), pp. 271-292.

Seif, M.; Docherty, P. & Shamsuddin, A. (2017). Seasonal anomalies in advanced emerging stock markets. *The Quarterly Review of Economics and Finance*, 66(C), pp. 169–181.

Shiu, Y. W.; Lee, C. I. & Gleason, K. C. (2014). Institutional shareholdings and the January effects in Taiwan. *Journal of Multinational Financial Management*, 27(2014), pp. 49-66.

Silva, P. M. 2010. Calendar "anomalies" in the Portuguese stock market. *Investment Analysts Journal*, 71(2010), pp. 37-50.

Teng, C. & Liu, V. W. (2013). The pre-holiday effect and positive emotion in the Taiwan Stock Market, 1971-2011. *Investment Analysts Journal*, 42(77), pp. 35-43.

Tilica, E. V. & Oprea, D. (2014). Seasonality in the Romanian stock market: The day of the week effect. *Procedia Economics and Finance*, 15(2014), pp. 704-710.

Torres-Reyna, O. (2007). *Panel data analysis fixed and random effects using Stata*. http://dss.princeton.edu/training/Panel101.pdf.

Ülküa, N. & Rogers, M. (2018). Who drives the Monday effect? *Journal of Economic Behavior and Organization*, 148 (C), pp. 46–65.

Vasileiou, E. (2017). Calendar anomalies in stock markets during financial crisis: The S&P 500 case. In Haciog˘lu, U. & Dinc¸er, H., ed. *Global financial crisis and its ramifications on capital markets: Opportunities and threats in volatile economic conditions*. Cham: Springer, pp. 493-506.

Weigand, R. A. (2014). *Applied equity analysis and portfolio management*. New Jersey: John Wiley & Sons.

Winkelried, D. & Iberico, L.A. 2018. Calendar effects in Latin American stock markets. *Emprical Economics*,54(3), pp. 1215-1235.

Yan, Z.; Cheng, L.; Zhao, Y. & Haung, C. (2016). Daily short covering activity and the weekend effect: Evidence from Taiwan. *Pacific-Basin Finance Journal*, 36 (C), pp. 166–184.

Yang, A. S. (2016). Calendar trading of Taiwan stock market: A study of holidays on trading detachment and interruptions. *Emerging Markets Review*, 28(C), pp. 140–154.

Yuan, T.; Gupta, R. & Bianchi, R. J. (2015). The pre-holiday effect in China: Abnormal returns or compensation for risk? *Review of Pacific Basin Financial Markets and Policies*, 18(3), pp. 1-28.

Yuan, T. & Gupta, R. (2014). Chinese Lunar New Year effect in Asian stock markets, 1999–2012. *The Quarterly Review of Economics and Finance*, 54(4), pp. 529–537.

Zhang, J.; Lai, Y. & Lin, J. (2017). The day of the week effects of stock markets in different countries. *Finance Research Letters*, 20(2017), pp. 47–62.

Zhang, T.; Chueh, H. & Hsu, Y. H. (2015). Day of the week trading patterns of informed and uninformed traders in Taiwan's foreign exchange market. *Economic Modelling*, 47(2015), pp. 271–279.

*** (2013). *An insight into African pension funds and financial markets*. http://www.27four.com/wp-content/uploads/2013/12/An-Insight-into-African-Pension-Funds-and-Financial-Markets.pdf.