Semi-Monthly and Turn-of-the-Month Seasonality in Stock Returns : Evidence from Emerging Markets

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Abstract

Behaviour of stock prices has often challenged the established theories and models of financial literature. Monthly effect is also termed as semi-monthly effect and turn-of-the-month effect are among such anomalies which have been documented in stock markets across the world. It refers to the tendency of financial assets to exhibit abnormal returns during the first of the month and at the turn of the month. The objective of the present study was to explore the existence of semi-monthly effect and turn-of-the-year effect in the stock index returns of nine emerging stock markets namely, Argentina, Brazil, China, India, Indonesia, Malaysia, Mexico, Russia, and Taiwan over a time span of more than 17 years commencing from January 1997 through March 2014. The returns of the first half of the month and turn-of-the-month have been compared with the return of second half and rest of the trading month using independent sample *t* - test, Mann-Whitney U test, and dummy variable regression. The results indicated the presence of semi-monthly effect in four stock markets namely India, Indonesia, Russia, and Taiwan, which exhibited higher mean returns during the first half of the trading month, indicating the presence of semi-monthly effect. The turn-of-the-month represented by sequence of four trading days (-1 to +3) recorded statistically significant positive and higher mean returns than the remaining trading days of the month in the majority of the stock markets investigated.

Key words : **market efficiency, calendar anomaly, semi-monthly effect, turn-of-the-month effect, emerging markets**

JEL Classification : G11, G14, G15

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Stock markets are deeply woven into the dynamic maze of a financial system. They provide real time and reasonable valuation of financial assets. A great deal of research has been done to explain the underlying factors and phenomena that explain stock prices. Behaviour of stock prices has generated innumerable controversies among the financial experts and practitioners. Early empirical work explaining stock price behaviour is known as efficient market hypothesis. In an efficient market, stock prices are supposed to follow a random walk. The leading challenge to the efficient market hypothesis is 'anomaly,' which implies a regular pattern in an asset's returns which is reliable and not explained by the established financial models or theories. Numerous calendar anomalies in the stock returns and volatility, namely, day-of-the-week effect, week-of-the-month effect, month-of-the-year effect, semi-monthly effect, turn-of-the-month effect, and many more country culture specific seasonalities have been documented till date.

The day-of-the-week effect (Cross, 1973) refers to systematic returns disparities among weekdays ; the week-of-the-month effect (Aydogan & Booth, 2003) states that financial assets returns keep on changing and vary from week to week ; the January effect (Rozeff & Kinney, 1976) refers to relatively higher returns in the month of

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January ; the semi-monthly effect (Ariel, 1987 ; Lakonishok & Smidt, 1988 ; Mangala & Mittal, 2005) refers to seasonality in returns during the first half and second half of the calendar or trading month ; the turn-of-the-month effect (Ariel, 1987) documents abnormal returns during the first and last days of a calendar month. Countries' culture specific anomalies have also been discovered (Safitri & Asandimitra, 2016). The existence of the calendar anomalies is a denial of the weak form of market efficiency. These seasonal patterns in the stock returns imply that investors may earn abnormal returns by timing their investments strategically.

Monthly effect is one such anomaly, which postulates that stocks earn significantly positive and greater mean returns around the commencement and during the first half of the month and almost zero or negative mean returns during the second half of the month (Ariel, 1987). The monthly effect, also termed as the semi-month effect, implies that mean daily returns is positive and significantly higher during the first half of the month in comparison to the second half. Further, Ariel (1987) reported that the five days period commencing from the last trading days of the previous month to the fourth trading day of the next month is marked by abnormally high mean returns popularly known as turn-of-the-month effect. In a subsequent study, Lakonishok and Smidt (1988) revealed that average returns during the turn of the month trading days is approximately eight times higher than the average returns for any other day.

Review of Literature

Ariel (1987) first reported a semi-monthly seasonal pattern in the returns of the U.S. stock market. He found that the stock returns in the first half of the month are much higher than stock returns in the second half of the month. Boudreaux (1995) employed the global stock indices to investigate the monthly seasonality in seven international stock markets. The study found a positive semi-monthly calendar effect in the Denmark, Germany, and Norway stock markets. Semi-monthly effect has been reinvestigated and reconfirmed in the U.S. stock markets by Hensel and Ziemba (1996). The said seasonality in the Indian stock market has been examined and confirmed by Karmakar and Chakraborty (2000); Bodla and Jindal (2006) ; and Mangala and Sharma (2008). Zafar, Shah, and Urooj (2009) found anomalous behavior of KSE toward returns during the semi-monthly trading days and provided evidence for the presence of semi-monthly effect in the Pakistan stock market. Garg, Bodla, and Chhabra (2010) scrutinized the semi-monthly effect in developed and developing markets and reconfirmed the presence of semi-monthly effect in the Indian as well as U.S. stock markets.

Financial literature has simultaneously provided contrary findings depicting non-existence or erosion of semi-monthly effect as indicated in the Table 1. Using dummy variable regression, Balaban and Bulu (1996); Lin (2000); and Joshi and Bahadu (2005) documented the non-existence of semi-monthly effect in the Turkish, Taiwan, and Nepalese stock markets, respectively. Hansen and Lunde (2003) and Giovanis (2009) revealed that the semi-monthly calendar effect did not have any considerable impact on stock returns of a majority of the stock exchanges across the world.

After initial publication by Ariel (1987), the TOM seasonality has been documented in a number of developed and developing as well as less-developed stock markets. It is an interesting fact to note that most of the empirical work done on TOM effect has depicted the presence of positive and significant TOM effect in a majority of the stock markets investigated. The initial research on TOM commenced in the U.S. stock market where it has been extensively investigated, reinvestigated, and revalidated by Ariel (1987); Lakonishok and Smidt (1988); Ogden (1990); Hensel and Ziemba (1996); Redman, Manakyan, and Liano (1997); Kunkel and Compton (1998) ; and Compton (2002). Even after the commencement of the twenty first century, the TOM effect was again explored in the U.S. stock market by Marquering, Nisser, and Valla (2006); Garg et al. (2010) ; and Liu (2013), who found strong evidence for TOM anomaly in the U.S. markets.

Agrawal and Tandon (1994) conducted a study with an objective to examine the TOM effect in the stock markets of 18 countries. The empirical results provided a strong evidence of TOM effect in most of the countries. Compton

Table 1. Research on Semi-Monthly and Turn-of-the-Month Effects

Author(s)	Methodology	Results
Ariel (1987) (USA); Boudreaux (1995) (Denmark, France, Germany, Norway, Singapore/Malaysia, Spain, and Switzerland); Hensel & Ziemba (1996) (USA); Karmakar & Chakraborty (2000) (India); Bodla & Jindal (2006) (India); Mangala & Sharma (2008) (India); Zafar et al. (2009) (Pakistan) and Garg et al. (2010) (India & USA)	*t*-test, *F*-test, Dummy variable regression, Mann-Whitney U test	**Presence of Semi-monthly effect**
Balaban & Bulu (1996) (Turkey); Lin (2000) (Taiwan); Hansen & Lunde (2003) (Denmark, France, Germany, Hong Kong, Italy, Japan, Norway, Sweden, UK, and USA); Joshi & Bahadu (2005) (Nepal) ; and Giovanis (2009) (51 countries)	Dummy variable regression, χ^2-test, Bootstrapping simulated *t*-statistics,	**Absence of Semi-monthly effect**
Ariel (1987) ; Lakonishok & Smidt (1988) ; Ogden (1990) ; Hensel & Ziemba (1996) ; Redman et al. (1997) ; Kunkel & Compton (1998) ; Garg et al. (2010) ; and Liu (2013)	*t*-test, *F*-test, Dummy Variables Regression	**Presence of TOM effect in the U.S. Stock Market**
Agrawal & Tandon (1994) (18 countries) ; Compton (2002) (7 countries) and Giovanis (2009) (51 countries) ; Aydogan & Booth (2003) (Turkey) ; Peng (2004) (Austria) ; Oguzsoy & Guven (2006) (Turkey) ; Zafar et al. (2009) (Pakistan) ; Silva (2010) (Portuguese) ; Stefanescu & Dumitriu (2011) (Romania) ; Sanaullah et al. (2012) (Pakistan) ; and Evangelos (2014) (Greece)	*t*-test, *F*-test, Dummy variable regression, Mann-Whitney U test, Kruskall-Wallis test and GARCH(1, 1) model , ANOVA, Wilcoxon signed rank test and Bootstrapping simulated *t*-statistics	**Presence of TOM effect in Markets other than U.S. and India**
Karmakar & Chakraborty (2000) ; Bodla & Jindal (2006) ; Freund et al. (2007) ; Mangala & Sharma (2008) ; Chandra (2009) ; Garg et al. (2010) ; and Deepak & Viswanath (2012)	*t*-test, *F*-test, Dummy variable regression, Mann-Whitney U test, Kruskall-Wallis test and GARCH (1, 1) model	**Presence of TOM effect in India**
Sullivan et al. (1998) (USA) ; Hansen & Lunde (2003) (Denmark, France, Germany, Hong Kong, Italy, Japan, Norway, Sweden, UK, and USA) ; Joshi & Bahadu (2005) (Nepal) ; Wong et al. (2006) (Singapore) ; Blandon (2010) (Latibex) ; Al-Jarrah et al. (2011) (Jordan) ; Georgantopoulos & Tsamis (2011) (Developing markets) ; Khan et al. (2014) (Pakistan) ; and Safeer & Kevin (2014) (India)	*t*-test, χ^2-test, Dummy variable regression model and GARCH (1, 1) model	**Absence of TOM effect in respective stock market**

(2002) studied the TOM effect in the stock markets of four Pacific Rim countries, namely, Australia, Japan, Hong Kong, and Singapore and three developed countries, namely, USA, UK, and Canada. The study reported the higher and significant average returns at the TOM (-1 to +3) in all the countries investigated.

There are many more empirical evidences supporting TOM anomaly across the world as mentioned in the Table 1. The Indian stock market has also witnessed TOM anomaly as examined by Karmakar and Chakraborty (2000); Bodla and Jindal (2006); Freund, Jain, and Puri (2007); Mangala and Sharma (2008); Chandra (2009); Garg et al. (2010) ; and Deepak and Viswanath (2012). They confirmed the presence of the TOM calendar anomaly in the Indian stock market.

There is yet another section of financial literature, which defies the presence of TOM effect, thus documenting its absence. Using a hundred years of return data of the U.S. stock market, Sullivan, Timmermann, and White (1998) found that the TOM effect no longer remains significant. Hansen and Lunde (2003) reported that there is no conclusive evidence, which suggested that the underlying anomaly was present in the Denmark, France, Germany, Hong Kong, Italy, Japan, Norway, Sweden, UK, and U.S. stock markets. Joshi and Bahadu (2005) examined the TOM effect in the Nepal Stock Exchange (NEPSE) index and found non-existence of TOM anomaly. Wong, Agarwal, and Wong (2006) ; Zhang and Li (2006) ; Blandon (2010); Al-Jarrah, Khamees, and Qteishat (2011); Georgantopoulos and Tsamis (2011) ; Khan, Khan, and Khan (2014) ; and Archana, Safeer, and

Kevin (2014) scrutinized the TOM effect in the Singapore, Chinese, Latibex, Jordon, developing stock market by taking FYROM, Pakistani, and Indian stock markets, respectively. These studies did not find any evidence of presence of the TOM effect.

After reviewing the available literature on semi-monthly and TOM effects, it may be conclusively said that a large number of empirical research supports the existence of TOM anomaly the world over in developed, developing, as well as less-developed stock markets. A few research papers supported the presence of semi-monthly effect. It has been observed that the research results are sensitive to the market maturity and size. Every research paper represents a combination of unique dataset, time frame, and statistical methods. The present research tries to comprehensively investigate the semi-monthly and TOM anomalies in nine emerging stock markets (Argentina, Brazil, China, India, Indonesia, Malaysia, Mexico, Russia, and Taiwan) which have similar growth rate and fundamental characteristics.

Objectives of the Study and Hypotheses

The objective of the study is to explore the existence of semi-monthly effect and turn-of-the-year effect in the stock index returns of the selected emerging stock markets. The following research hypotheses have been formulated :

- **H_{01} :** The mean daily returns of the first half of the trading month is not statistically different from the mean daily returns of the second half of the trading month.

- **H_{02} :** The mean daily returns at the turn-of-the-month of the trading month is statistically equal to the mean daily returns of the rest of the trading month.

Methodology

The study has utilized the observations from data recorded in form of stock index prices to investigate the calendar seasonality in the selected nine emerging stock markets, namely, Argentina, Brazil, China, India, Indonesia, Malaysia, Mexico, Russia, and Taiwan. These emerging stock markets are represented by their most prominent stock indices over a time span of more than 17 years commencing from January 1997 through March 2014 as mentioned in the Table 2.

Table 2. Market Wise List of Index Used, Time Window, and Source

Emerging Stock Market	Underlying Index	Time Window	Source
Argentina	MERVAL (MERV)	January 1997 to March 2014	www.yahoofinance.com
Brazil	BVSP INDEX (BOVESPA SAO PAULO Stock Exchange)	January 1997 to March 2014	www.yahoofinance.com
China	SSE (Shanghai Stock Exchange)	January 1997 to March 2014	www.yahoofinance.com
India	BSE Sensex (BSESN)	July 1997 to March 2014	www.bseindia.com
Indonesia	Jakarta Stock Exchange Composite Index (JCI)	July 1997 to March 2014	www.yahoofinance.com
Malaysia	FBMKLCI (FTSE Malaysia Kuala Lumpur Composite Index)	January 1997 to March 2014	www.yahoofinance.com
Mexico	IPC (Mexico MXX)	January 1997 to March 2014	www.econstates.com
Russia	RTSI (RTS Exchange)	January 1997 to March 2014	www.rts.rucom
Taiwan	Taiwan Capitalization Weighted Stock index (TAIEX)	July 1997 to March 2014	www.yahoofinance.com

The study has measured index returns as the continuously compounded percentage change in the share price index on a daily basis. The daily stock returns for the selected stock indices are calculated as follows :

$$R_t = \ln (P_t / P_{t-1}) * 100$$

where, R_t is daily return on the share price index for day t, P_t is closing value of the index for the day t, and P_{t-1} is the closing value of the index for the preceding day t -1.

The present study uses trading day approach recommended by Ariel (1987) to investigate whether semi-monthly effect and TOM effect exist in stock returns of the selected emerging stock markets. The average daily returns of 16 trading days have been computed of which eight trading days (-8 to -1) before and eight trading days (1 to 8) after the beginning of each month have been taken. Day (-1) is the last trading day of the previous month, day (1) is the first trading day of the present month, day (2) is the second trading day of the present month, and so on. In case of the months that had more than 16 trading days, the days that did not fall in the intervals (-8 to -1) and (1 to 8) were ignored. The month which had less than 16 trading days were considered and the corresponding entries for which no data was available were kept blank.

A trading month has been defined as the period from the last day of the previous calendar month (inclusive) until the last day of the current calendar month (exclusive). The first half of the month is represented by the first eight trading days of the month (-1 to 7), and correspondingly, the last half would be the last eight trading days (8 to -2). Further, for the TOM effect, the last trading day of the previous month and the first three trading days of the upcoming month are considered as TOM (-1 to 3). The remaining days in the trading months are considered as rest of the month (4 to -2) as followed by Lakonishok and Smidt (1988).

In order to analyze the semi-monthly and turn-of-the-month effects, the return of the first half and turn-of-the-month are compared with the return of second half and rest of the trading month using independent sample *t*-test and Mann-Whitney U test.

To further test the semi-monthly effect, the regression equation (1) with a dummy variable has been formulated to compare the return during the first half of the trading months (-1,……., +7) and second half of the trading month (+8, -8,……..., -2) (Balaban & Bulu, 1996 ; Joshi & Bahadu, 2005).

$$R_t = \beta_0 + \beta_1 D_{2t} + \varepsilon_t \qquad \ldots\ldots\ldots\ldots (1)$$

where, the dependent variable R_t refers to the daily returns of the respective stock market index, D_{2t} is a dummy variable and takes a value of 1 if returns occur in the second half of the trading month and 0 if returns occur in the first half of the trading month. The intercept β_0 measures the mean returns of the first half of the trading month and the coefficient β_1 measures the difference between the mean returns of the second half and first half of the trading month. ε_t is the error term. The regression model is tested for the null hypothesis H_o: $\beta_1 = 0$, which means there is no difference in mean returns of the second half and the first half of the trading month. The significant negative coefficient β_1 confirms that there is an existence of the semi-monthly effect.

To examine the turn-of-the-month effect in the selected emerging stock markets, the regression equation (2) has been run in line with Lakonishok and Smidt (1988).

$$R_t = \beta_0 + \beta_1 D_{2t} + \varepsilon_t \qquad \ldots\ldots\ldots\ldots (2)$$

where, R_t refers to the daily index returns, only one independent dummy variable D_{2t} has been taken which is assigned a value of 1 if returns occur on the turn of the month trading days (-1 to +3) and 0 if returns occur on the rest of the month trading days (4 to 8 and -8 to -2). The intercept β_0 measures the average daily returns on rest of the month trading days and the coefficient β_1 measures the difference between the mean returns of turn of the month

trading days and rest of the month trading days. ε_t is the error term. The regression model is tested for the null hypothesis H_o: $\beta_1 = 0$ which implies that there is no significant difference between the mean returns at turn of the month and rest of the month. The significant positive coefficient would indicate that turn of the month returns are significantly higher than rest of the month returns, providing an evidence for turn-of-the-month calendar effect.

Results and Discussion

(1) Semi - Monthly Effect : Semi-monthly effect is absent in Argentina and Mexican stock markets as the mean returns of the first and the second halves of the trading months are not statistically different as mentioned in the Table 3. The mean returns of the first half of the trading month for Brazilian, Chinese, and Malaysian stock markets is 0.0680 %, 0.0918 %, and 0.0572%, respectively ; whereas, the second halves have recorded negative

Table 3. Descriptive Statistics of Semi-Monthly Stock Returns of Emerging Stock Markets Indices

Countries	Descriptive	Ist Half	2nd Half	*T*-test	Mann-Whitney U test
Argentina	Mean	0.0159	0.0359	-0.2417	-0.3425
	Std. Dev.	0.8602	0.8149	-0.809	-0.7319
	Observations	206	206		
Brazil	Mean	0.068	-0.0259	1.2286	-1.9718*
	Std. Dev.	0.7996	0.7511	-0.2199	-0.0482
	Observations	206	206		
China	Mean	0.0918	-0.0109	1.8579	-2.9523**
	Std. Dev.	0.5289	0.5921	-0.0638	-0.0031
	Observations	206	206		
India	Mean	0.1485	-0.016	2.8602**	-3.2158**
	Std. Dev.	0.6036	0.5457	-0.0044	-0.0013
	Observations	200	200		
Indonesia	Mean	0.133	-0.0018	2.1087*	-2.6026**
	Std. Dev.	0.6799	0.5927	-0.0355	-0.0092
	Observations	199	199		
Malaysia	Mean	0.0572	-0.0048	1.1885	-1.9528*
	Std. Dev.	0.6301	0.4062	-0.2353	-0.0501
	Observations	206	206		
Mexico	Mean	0.0623	0.0348	0.5082	-0.6528
	Std. Dev.	0.5625	0.535	-0.6115	-0.5138
	Observations	206	206		
Russia	Mean	0.1659	-0.09	2.8033**	-3.5638**
	Std. Dev.	1.0009	0.8462	-0.0053	-0.0003
	Observations	206	206		
Taiwan	Mean	0.0784	-0.031	1.9702*	-2.4642**
	Std. Dev.	0.5709	0.5405	-0.0495	-0.0097
	Observations	200	200		

Note: Figures in the parenthesis denote the respective *p* - values.*significant at the 5% level **significant at the 1% level

mean returns. The results depict that first half mean returns in all the three stock markets is positive and higher than second half trading days. The superior returns during the first half seems to be a reward for assuming higher risk. The difference in means is statistically insignificant as indicated by the *t* -test, but the non-parametric Mann-Whitney U test produces contrary evidence.

Further, the results suggest that in case of India, Indonesia, Russia, and Taiwan, the first half records positive mean returns of 0.1485%, 0.1330 %, 0.1659 %, and 0.0784%, respectively ; whereas, mean returns for the second half is negative amounting to - 0.0160%, - 0.0018 % , - 0.0900%, and -0.0310%, respectively. The *t* - statistics and *Z* values of Mann-Whitney U test reject the null hypothesis of equality of mean returns between the first half and second half of the trading month. In addition, these stock markets also experience high level of risk (standard deviation) during the first half of the trading month than the second half of the trading month.

Overall, the semi-monthly effect is evident only in case of four stock markets, namely, India, Indonesia, Russia,

Table 4. Regression Estimates for Semi-Monthly Effect of Selected Emerging Stock Market Indices

Countries		First half (β_0)	Second half-First half (β_1)	Adjusted R^2	*F*-statistics
Argentina	Coefficient	0.0159	0.0199	-0.20%	0.0584
	t-value	0.2734	0.2417		-0.8091
	p-value	-0.7846	-0.8091		
Brazil	Coefficient	0.068	-0.0939	0.10%	1.5101
	t-value	1.2584	-1.2286		-0.2199
	p-value	-0.2089	-0.2199		
China	Coefficient	0.0918	-0.1027	0.60%	3.4519
	t-value	2.3475*	-1.8579		-0.0638
	p-value	-0.0193	-0.0638		
India	Coefficient	0.1485	-0.1645	1.80%	8.1811**
	t-value	3.6505**	-2.8602**		-0.0044
	p-value	0	-0.0044		
Indonesia	Coefficient	0.133	-0.1348	0.90%	4.4468*
	t-value	2.9416**	-2.1087*		-0.0355
	p-value	-0.0034	-0.0355		
Malaysia	Coefficient	0.0572	-0.062	0.10%	1.4131
	t-value	1.5506	-1.1885		-0.2353
	p-value	-0.1217	-0.2353		
Mexico	Coefficient	0.0623	-0.0274	-0.20%	0.2581
	t-value	1.6312	-0.5082		-0.6122
	p-value	-0.1036	-0.6115		
Russia	Coefficient	0.1659	-0.256	1.60%	7.8588**
	t-value	2.5701**	-2.8034**		-0.0052
	p-value	-0.0095	-0.0052		
Taiwan	Coefficient	0.0784	-0.1095	0.70%	3.8818*
	t-value	1.9959*	-1.9702*		-0.0495
	p-value	-0.0466	-0.0495		

Note: Figures in the parenthesis denote the respective *p* - values.*significant at the 5% level **significant at the 1% level.

and Taiwan, average returns during the first half of the trading month is significantly higher than the second half of the trading month. The Brazilian, Chinese, and Malaysian stock markets give a mild signal of presence of semi-monthly calendar seasonal effect.

The Table 4 exhibits the regression results of daily stock returns of nine selected emerging stock markets. It can be discerned that in Argentina, Brazilian, Malaysian, and Mexican stock markets, the value of intercept β_0 representing the mean returns during the first half of the trading month is positive, but undistinguishable from zero. On the other hand, the value of coefficient β_1, which shows the difference between the mean returns of second half and first half of the trading month is negative (except in case of Argentina) and insignificant. The *f* - values also do not identify any significant difference between the mean returns of two subsets, providing a strong evidence of absence of semi-monthly effect. The value of intercept β_0 (0.0918) representing the mean daily returns during the first half of the trading month is statistically significant in case of the Chinese stock market. The mean difference across two halves of the month is also negative, but not statistically different.

The regression results provide strong evidence for the presence of semi-monthly effect in India, Indonesia, Russia, and Taiwan as the null hypothesis of equality of mean daily returns across the two halves of trading month, that is, H_{01} stands rejected as represented by the respective *f* - values. These findings are in contradiction to the results of the study by Nageswari, Selvam, and Gayathri (2011) and Lin (2000) who found absence of semi-monthly effect in the Indian and Taiwan stock markets.

It may be concluded that only four stock markets namely, India, Indonesia, Russia, and Taiwan show significantly higher mean returns during the first half of the trading month than the second half of the trading month, indicating the presence of semi-monthly effect during the sample period. The other five stock markets do not follow any semi-monthly pattern in their return series leading to acceptance of the H_{01} null hypothesis of equality of mean daily returns across the two halves of the trading month.

(2) Turn- of- the- Month (TOM) Effect : Comparison of the mean returns of TOM with rest of the month along with the standard deviation, *t* - statistics for the difference between the two sets, and the Mann-Whitney U test (*Z*-values) are presented in the Table 5. During the 17 years span of investigation in most of the stock markets, cumulative advances occurred around the TOM, while remaining days of the month contributed virtually nothing to the cumulative gain.

It is apparent that in case of Argentina, Brazil, China, India, Mexico, and Russia, the mean returns for TOM trading days are 0.2370 %, 0.2527 %, 0.1574 %, 0.2403 %, 0.2076 %, and 0.2425 %,respectively which are much larger than mean returns for ROM trading days in these markets. *T*-test and Mann-Whitney U test have also rejected the null hypothesis of equality of mean returns of TOM and ROM trading days. The findings are in confirmation to the results of Desai and Trivedi (2012) who found TOM effect in the Argentina and Brazilian stock market ; studies of Karmakar and Chakraborty (2000) ; Garg et al. (2010) ; and Deepak and Viswanath (2012), who documented the TOM effect in the Indian market ; results drawn by Werner and Teresita (2015) ; and Compton, Kunkel, and Kuhlemeyer (2013), who exhibited its presence in the Mexican and Russian stock markets, respectively.

On the other hand, the results are in contradiction with the results obtained by Zhang and Li (2006) and Agrawal and Tandon (1994), who documented disappearance of TOM effect in Chinese and Mexican stock markets, respectively. The higher value of mean returns for the turn of the month trading days is also associated with the higher level of risk in terms of standard deviation portraying a linear relationship between the returns and risk. The Indonesian and Taiwan stock markets produce a weak signal of TOM anomaly ; whereas, the Malaysian stock returns do not exhibit such a seasonality.

The results clearly indicate that traditional TOM represented by sequence of four trading days (-1 to +3) exhibits statistically significant positive and higher mean returns than the remaining trading days of the month in the majority of the stock markets. The findings support the pattern of the TOM effect earlier observed in the global

Table 5. Descriptive Statistics of Turn-of-the-Month Stock Returns of Emerging Stock Markets Indices

Countries	Descriptive	T-O-M	R-O-M	*t*-test	Mann-Whitney U test
Argentina	Mean	0.237	-0.0454	2.9406**	-3.0981**
	Std. Dev.	1.1349	0.7831	-0.0034	-0.0019
	Observations	206	206		
Brazil	Mean	0.2527	-0.0561	3.3571**	-3.2933**
	Std. Dev.	1.1202	0.6994	-0.0008	-0.0009
	Observations	206	206		
China	Mean	0.1574	0.0017	2.6249**	-3.7169**
	Std. Dev.	0.6947	0.4919	-0.0089	-0.0002
	Observations	206	206		
India	Mean	0.2403	0.0082	3.4125**	-3.7625**
	Std. Dev.	0.8316	0.4834	-0.0007	-0.0001
	Observations	200	200		
Indonesia	Mean	0.1462	0.0383	1.3697	-2.0205*
	Std. Dev.	1.0001	0.4833	-0.1715	-0.0433
	Observations	199	199		
Malaysia	Mean	0.0323	0.0241	0.1247	-0.4882
	Std. Dev.	0.8562	0.3892	-0.9007	-0.6254
	Observations	206	206		
Mexico	Mean	0.2076	-0.0043	3.3545**	-3.4082**
	Std. Dev.	0.7821	0.4594	-0.0008	-0.0006
	Observations	206	206		
Russia	Mean	0.2425	-0.0304	2.6461**	-2.8133**
	Std. Dev.	1.2298	0.8237	-0.0085	-0.0049
	Observations	206	206		
Taiwan	Mean	0.1009	0.0005	1.4556	-2.3872*
	Std. Dev.	0.8756	0.4313	-0.1462	-0.0169
	Observations	200	200		

Note: Figures in the parenthesis denote the respective *p* - values.*significant at 5% level **significant at 1% level.

stock markets which have witnessed the tendency to cumulate most of the advances during the TOM trading days. The results of the regression model to explore the TOM effect are presented in the Table 6. The results confirm the findings of descriptive statistics. The ROM mean returns in most of the markets are either negative or very low as indicated by the values of the intercept β_0 . The value of the coefficient β_1 representing the mean difference of TOM and ROM trading days is positive and significant for Argentina, Brazil, China, India, Mexico, and Russia. The corresponding *f* - values exhibit significant difference in mean returns between the two subsets, refuting the null hypothesis H_{02} of equality, a mean returns across TOM and ROM trading days for majority of emerging markets investigated. The regression analysis shows that there exists a strong TOM effect in the majority of markets studied akin to what has been observed in many previous studies.

The results are consistent with the studies of Freund et al. (2007) and Chandra (2009), who found significant TOM effect in the Indian stock market and are inconsistent with the results of Nageswari et al. (2011), who found no TOM effect in the Indian stock market.

Table 6. Regression Estimates for T-O-M Effect of Selected Emerging Stock Market Indices

Countries		R-O-M (β_0)	TOM-ROM (β_1)	Adjusted R^2	*F*-statistics
Argentina	Coefficient	-0.0454	0.2825	1.80%	8.6471**
	t - value	-0.6695	2.9406**		-0.0034
	p - value	-0.5035	-0.0034		
Brazil	Coefficient	-0.0561	0.3088	2.40%	11.2710**
	t - value	-0.8631	3.3571**		-0.0011
	p - value	-0.388	-0.0011		
China	Coefficient	0.0017	0.1557	1.40%	6.8903**
	t - value	0.0407	2.6249**		-0.0089
	p - value	-0.9675	-0.0089		
India	Coefficient	0.0082	0.2321	2.60%	11.6454**
	t - value	0.1711	3.4125**		0
	p - value	-0.8651	0		
Indonesia	Coefficient	0.0383	0.1078	0.20%	1.8762
	t - value	0.689	1.3697		-0.1715
	p - value	-0.4912	-0.1715		
Malaysia	Coefficient	0.0241	0.0081	-0.20%	0.0161
	t - value	0.5222	0.1247		-0.9011
	p - value	-0.6021	-0.9011		
Mexico	Coefficient	-0.0043	0.2119	2.40%	11.2531**
	t - value	-0.0967	3.3545**		-0.0004
	p - value	-0.9221	-0.0008		
Russia	Coefficient	-0.0304	0.2729	1.40%	7.0023**
	t - value	-0.4165	2.6461**		-0.0085
	p - value	-0.6772	-0.0085		
Taiwan	Coefficient	0.0005	0.1004	0.30%	2.1188
	t - value	0.0105	-1.4556		-0.1463
	p - value	-0.9915	-0.1463		

Note: Figures in the parenthesis denote the respective *p* - values.*significant at 5% level **significant at 1% level.

Conclusion and Research Implications

A popular category of anomalies in stock markets focuses on specific time periods or seasons when stock returns exhibit abnormal patterns. The present paper makes an attempt to examine the existence of semi-monthly and the TOM effects in stock index returns of the nine selected emerging stock markets, namely, Argentina, Brazil, China, India, Indonesia, Mexico, Malaysia, Russia, and Taiwan. The results provide evidence for semi-monthly seasonality in Indian, Indonesian, Russian, and Taiwan's stock markets, which are earmarked by significantly higher mean returns during the first half of the trading month. A trading strategy to buy stocks in the second half of the trading month and sell them in the first half of the trading month would help an investor earn superior profits. The other five stock markets do not follow any semi-monthly pattern in their return series. So, the first and the second half of the trading month offer equal investment opportunities to the investors in these markets.

There exists a strong TOM effect in the majority of the stock markets investigated akin to what has been observed in many previous studies. This suggests a trading strategy to buy stocks during the rest of the month trading days and sell them during the turn of the month trading days. Three stock markets, namely, Indonesia, Malaysia, and Taiwan do not provide any evidence for significantly higher mean returns during the turn of the month trading days than the remaining trading days of the month. Therefore, an investor need not differentiate between TOM and ROM trading days as this exercise is futile and will not offer any superior returns. The findings provide an in-depth insight into the nature of seasonality in stock returns in the emerging markets and assist the investors to take benefit of relatively expected shifts in the market returns over a month and strategize their investment decisions in view of that. The observed anomalous stock price behaviour also raises a question mark on the validity of various asset pricing models. Investor psychology simultaneously plays a vital role in influencing the stock price behaviour (Mangala & Sharma, 2014). Therefore, investment behaviour must also figure in the financial models to make them closer to reality.

Limitations of the Study and Scope for Further Research

Traversing through the literature on market efficiency, it is evident that persistent efforts of academia and researchers round the world have contributed to development of efficient market hypothesis and related anomalies. The present study has explored only the equity segment of underlying stock markets using stock indices as its proxy. Other important segments, such as debt and derivatives, may be considered for further studies. The results of the present study are based on a specific time period and a given sample. A choice of a different time period and a different data set may produce different results. Further, use of high frequency data could provide even more authentic results. A comparative study on TOM and ROM anomalies between the emerging markets and developed markets can be undertaken.

The continuous research on market efficiency in order to explain the stock price behaviour has given birth to new questions, rigorous methodologies, and wider dataset. The quest for a more realistic model explaining the behaviour of stock prices in a closely integrated and highly volatile market would always motivate the researchers to dive and come out with innovative solutions to the unanswered questions.

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