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LUNAR EFFECT AND OTHER CALENDAR EFFECTS: EVIDENCE FROM VIETNAMESE STOCK MARKET

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ABSTRACT

There are beliefs that the Moon affects human behaviors and behavioral biases impact investors' decisions. Although these topics have been well studied in developed stock markets for years, it is still subjected to shortage of academic attentions in Vietnamese market. As a result, this deficiency motivated the author to perform a systematic test in this stock market. The thesis investigates the associations of lunar cycle and other Calendar effects with stock market returns in Vietnam. The sample includes returns of seven major indexes as well as twenty industry indexes over the period of 2009 to 2014. The relationships are tested by econometric analyses with selected indexes as dependent variables and dummy variables of respective anomalies as interested objects.

The empirical findings suggest that there is little evidence supporting the existence of anomalies in Vietnamese stock market. Regarding lunar effect, although the daily returns during full moon periods are consistently lower than that of the new moon period, the results are not statistically significant. Moreover, we only acquire the appearance of January effect in Vietnamese stock market for the chosen five-year period and the coefficients are statistically significant at least at 5% level. However, similar to lunar effect, the presences of Weekend effect, Intra-month effect and Turn-of-the-month effect are not confirmed.

KEYWORDS: Lunar effect, Calendar effect, Vietnamese stock market, market efficiency

1. INTRODUCTION

For thousands of years, the Moon/Luna has been presented in humans' lives in countless aspects. The worship of the Moon has been known since the earliest records of ancient Egyptian, Babylonian, Indian or Chinese. They deified the existence of the Moon in the names of gods and goddesses who were the incarnations of prosperity, fertility, birth, hunt, nature and even death. Luna used to shed lights to humans' paths in starless and somber nights. Besides, prior to the invention of calendars, ancient people accustomed to keep track with the time based on lunar phases.

In a few recent centuries, especially from 19th Century, human race has made great strides in industrial revolution and technologies. As a result, people are not as dependent on the Moon as previously. However, one is still convinced that the Moon has significant effects on humans' bodies, behaviors and minds. Thus, a great number of researches have been conducted to study the accuracy of those beliefs though the results are still controversial and unsettled.

In theory, investors are expected to act strictly rational to achieve wealth maximization purposes. However, recent investigations have found evidence of behavioral biased impacts on investors' decisions, such as: framing, mental accounting, regret avoidance and prospect theory etc. (Bodie, Kane & Marcus 2011: 381-400) For example, Edman, Garcia and Norli (2007) detect the relationship between sport sentiment and stock price or Hirshleifer and Shumway (2001) conclude that sunshine is significantly correlated with stock returns.

As a consequence, if the Moon genuinely affects humans' activities and behavioral biases influence investor's rationality, it will be reasonable to state that the Moon has impacts on investing decisions and stock prices.

1.1.Purpose of the study

This master thesis will firstly examines whether there is an existence of lunar effect on Vietnamese stock market, i.e. Does the Moon really affect investors' decisions and drive stock return out of its rational track?

In addition, we also experiment the existences of other Calendar effect on this stock market, namely January effect, Weekend effect, Monthly effect and Turn-of-the-month effect (TOM).

Both Lunar effect and other Calendar effects are well studied among financial researchers all around the world; however, this topic is subjected to much less academic attentions in Vietnam. Consequently, this is the main motivation and contribution of this thesis to academic financial literature.

1.2. Research hypotheses

We start the thesis by hypothesizing that there is an occurrence of Lunar effect in Vietnamese stock market. In other word, hypothesis 1 can be stated as follows:

Hypothesis 1: There is an association between Lunar effect and returns of Vietnamese stock market.

Additionally, to further recognize the existences of other Calendar anomalies in this stock market, we place the second hypothesis, which is:

Hypothesis 2: There are associations between the Calendar effects and returns of Vietnamese stock market.

1.3. Previous studies

Reviewing previous researches regarding this issue, we find various conclusions among investigators. Some of researchers declare that the cycle of the Moon does not have any impacts on stock market returns, for example: Rotton & Kelly (1985), Chandy, Haensly & Shetfy (2007), Herbst (2007) and Sivakumar & Sathyyanarayanan (2009) etc. On the other hand, other experiments conveyed by others affirm the opposite conclusion: the Moon undoubtedly has influences on investors' decisions as well as stock returns. A number of typical studies can be listed as follows: Crack (1999), Yuan, Zheng and Zhu (2001) and Dichev and Janes (2001) etc.

Because of controversial conclusions of previous main studies and little of academic research in this field in Vietnamese stock market, we are motivated to perform the analysis to check appearance of lunar cycle effect on this market.

1.4. Structure of the study

The remainder of the thesis is arranged as follows. Chapter 2 presents the literature review of previous main studies on the effects of the Moon and human behaviors as well as stock markets. Chapter 3 reviews the theory of market efficiency, market anomalies, equity valuation models, behavioral finance and scientific evidence of effects of the Moon on humans' behaviors. Chapter 4 provides the data used to analyze in the research and method utilized. Chapter 5 launches descriptive statistics in accordance with econometric analysis results. And finally Chapter 6 concludes and suggests some possible limitations of the study.

2. LITERATURE REVIEW

2.1. The Moon and human behaviors

In 1978, David E. Campbell and John L. Beets write an article named “Lunacy and the moon” concerning the relationship between the phases of the Moon and human behaviors. It studies the relationship of lunar cycles to psychiatric hospital admissions, suicides and homicides and finds no associations between lunar phases and mentioned behaviors. In fact, a few positive findings are examples of Type I error (reject null hypothesis although it is true, also referred to as a “false positive”)

Similar to Campell and Beets, Kelly, Rotton and Culver (1986) examine over 100 studies relating to lunar impacts and conclude that these studies have failed to demonstrate a reliable and statistically significant correlation between Full Moon or any other phases of the Moon and crime rates, suicides, mental illnesses, disasters, birthrates, fertility or werewolves.

However, as an old saying: ”There is no smoke without fire”, the issue remains controversial and is under investigation of many other scientists and specialists. 1 year before reaching to the conclusion of no relationship between the moon and human abnormal behaviors, Rotton and Kelly (1985) themselves find that 49.5% of the respondents to their survey accept the idea of lunar phenomena and the percentages of the believer are even higher among psychiatric nurses, nurses and physicians in emergency department, with 74%, 80% and 64% respectively. (Agus 1973, Danzl 1987).

Other researchers scrutinize the problem in more details by studying the connection between the Moon and specific human practices. Law S.P (1986) analyses the link between women menstrual cycles and lunar rhythm, in which the relationship is confirmed. Among 826 female volunteers with normal period cycle, aged from 16 to 25, 28.3% observe menstruations occur around New Moon; the result is significant at 1% level.

Another research of De Castro J.M and Pearcey S.M (1995) studies the lunar rhythms of people's meal and alcohol intake also discovers a small but significant effect of the moon on human with 8% increase in meal size and 26% decrease in alcohol consumption at the time of Full Moon compare to New Moon. This impact is present for all meals regardless of daytime or evening, suggesting that nocturnal illumination level is not a critical variable and there is a true internal lunar effect influencing nutrient intakes of normal human free-living in their natural environments.

Furthermore, Neal & Colledge (2000) confirms an increase in general practice consultants during Full Moon periods. The result indicates that there is 190 more consultants on days at the peak of the cycle compared with those at the bottom, i.e. about 3 consultations per practice. Besides, Lieber (1978) and Tasso & Miller (1976) also declare a disproportionately higher number of criminal offences when the Moon is full.

Contrary to other researches, which are criticized for utilizing inappropriate statistical controls to produce weak and inconsistent outcomes, Sands & Miller (1991) investigate the effects of Full Moon on daily absenteeism rates in a large sample while correcting for autocorrelation and controlling for weekly, monthly and holiday effects. They conclude that Full Moon is associated with a statistically significant but slight decline in absenteeism.

In addition to stated studies, Michal Zinmecki (2006) surveys how lunar cycle affects human and animal behaviors and physiology. He finds associations between the Moon and human reproduction (fertility, menstruation and birth rate), hospital admission rates, traffic accidents, crimes and suicides. Moreover, the author also detects the similar link with animal behaviors and physiology (hormonal changes, breeding, immune responses etc.). Although the precise mechanism of the connections awaits further exploration, the results of this paper have meaningful implications on police surveillance, medical practice and investigations involving laboratory animals.

2.2.Behavioral biases affect investor decisions

In theory, any decision made by investors should be rational and uncorrelated with any kind of behavioral biases. However, in practice, "The investor's chief problem – even his worst enemy – is likely to be himself"_ Benjamin Graham. As a result, a number of researches examining the influence of behavioral biases on investors' decisions have been conducted.

Edman, Garcia and Norli (2007) inspect the relationship between sport sentiments and stock returns. Using international soccer results as primary mood variable, they find a statistically significant market decreases after soccer losses, for example, a loss in the World Cup elimination stage results in a next-day abnormal stock return of -49 basis points.

Alongside with sentiments, weather is another behavioral-bias-relating topic that draws much of attentions from researchers. Studying daily market index returns across 26 countries from 1982 to 1997, Hirshleifer and Shumway (2001) conclude that sunshine is significantly correlated with stock returns. Similarly, Sauders (1993) also agrees that security markets are systematically affected by the weather in New York. On top of that, Seasonal Affective Disorder (SAD) seems to be an intriguing mood proxy that has notable impacts on stock market returns (Kamstra, Kramer & Levi, 2001 and Dowling & Lucey, 2005)

Additionally, behavioral biasness leads to stock price clustering as well. Brown & Mitchell (2004) and Brown, Chua & Mitchell (2002) documents the tendency of prices to be observed more frequent at number "8" than number "4" because the earlier is considered lucky while the later is regarded as bad luck due to similar pronunciation with "death" in Chinese. The evidence is found statistically significant in Chinese and Hong Kong stock market, especially during some selected lunar festivals.

Furthermore, a stimulating subject that raises the awareness of a vast number of scientists is calendar effect, which comprises various sub-topics, such as: Intraday effect,

Weekend/Monday effect, January effect, Holiday effect and Halloween effect etc. Regarding Holiday effect, Riel (1990) and Kim & Park (1994) both come to an agreement of abnormal stock return before holidays. The evidence is obtained from different stock markets (USA, UK and Japanese) even though each country has distinct holidays and institutional arrangements. In addition, the famous January effect is explored by Keim (1983) in an article named "Size-related anomalies and stock return seasonality: Further empirical evidence". Confirmation is provided that abnormal return distributions in January have larger means relative to the remaining eleven months and that the relation between abnormal return and size is always negative. Moreover, using 90 years of daily data on the Dow Jones Industrial Average to test for the existence of persistent seasonal patterns in the stock returns, Lakonishok & Smidt (1988) discover proof of continuous anomalous returns around the return of the week, around the return of the month, around the return of the year and around holidays.

2.3. The Moon and stock market

Similar to the question whether the moon affects human behaviors, the issue of whether the lunar cycle actually has impacts on stock markets is also under discussion.

Many researchers have reached an agreement on the disassociation between lunar phases and stock market performance. Rotton & Kelly (1985) conducts a meta-analysis of 37 published and unpublished studies and concludes that phases of the moon only account for less than 1% of the variance in activities often termed lunacy (mental hospital admissions, psychiatric disturbances, crisis calls, homicides and other offences). Likewise, Chandy, Haensly & Shetfy (2007) acquire no evidence of connection between market indices and Full/New moon effect. Another report supporting the Efficient Markets Hypothesis is "Lunacy in the stock market – What is the evidence?" by Herbst (2007). This work sees no consistent and predicable lunar influence on either daily return or daily price volatility in the Dow Jones Industrial Average for either Full moon or New moon periods. Comparable conclusion is also drawn from Sivakumar & Sathyyanarayanan (2009) when studying data on Bombay Stock Exchange.

In contrast to conclusions of disconnection between moon phases and stock market, a great number of papers have provided supportive evidences of the relationship. In " A classic case of "Data Snooping" for classroom discussion", Crack (1999) shows that close to both New moon and Full moon times, stock market volatility is higher and stock market returns are lower than away from these periods.

One of the most important and inspiring papers about this topic is " Are investors moonstruck? Lunar phases and stock returns" written by Yuan, Zheng and Zhu (2001). This article investigates the stated relationship in 48 countries and finds that stock returns are lower on the days around a full moon than on the days around a new moon. The difference is economically and statistically significant with 3-5% per annum. This variance cannot be explained by changes in market volatility, trading volumes, macroeconomic indicators, financial crises or calendar-related anomalies. Correspondingly, Dichev and Janes (2001) also notice the double in returns in the period of 15 days around New Moon compared to 15 days around Full Moon while analyzing US major stock indices and 24 other countries. Rather than only testing the average daily returns like above 2 papers, Liu (2009) utilizes a two-regime autoregressive model with a GARCH (1,1) innovation to investigate the association between lunar phases and stock returns. Although different patterns are shown in different geographical regions, the evidence is consistent and supports the belief that the Moon phases do affect human financial behaviors. Interestingly, even though acquiring the proof of correspondence between the moon and stock market, Gao (2009) comes up with a converse result with Yuan, Zheng and Zhu (2001) and Dichev and Janes (2001) while studying Chinese stock indexes over the last 16 years. The findings indicate that stock returns are lower on the days around New Moon than on the days around Full Moon.

3. THEORY

3.1. Market efficiency

Examining a proposition, Kendall & Hill (1953) find to their immense amazement that there is no predictable path in stock price, i.e. stock prices follow a random walk, which is a natural result of prices that reflect all current information. In fact, if the pattern of stock price change is foreseeable, the market is proved to behave inefficiently. As a result, the concept of stock price disclosing all available knowledge is referred to as the Efficient Market Hypothesis (EMH). (Bodie et al. 2011: 343-373)

There are commonly three versions of EMH, which differentiate each other in terms of "all available information" definition. (Fama, 1970)

Table 1. Efficient Market Hypothesis.

Forms of market efficiency	Stock price reflects		
	Past information	Public information	Private information
Weak form	✓		
Semi-strong form	✓	✓	
Strong form	✓	✓	✓

(i) Weak form

The weak form hypothesis declares that market prices already demonstrate all information that can be derived from the past data such as: past prices, trading volumes, dividend payout ratio etc. According to this version of hypothesis, studying past knowledge brings no abnormal returns to investors since all information are costless to obtain and any signal to exploit the market should be absorbed immediately by the

change in stock price. For instance, a buy signal will instantly lose its value because of instantaneous increase in price due to large number of bid orders. (Bodie et al. 2011: 347)

One way to test this version of EMH is calculating serial correlation of stock market returns over different horizons, which refers to the trend of stock market price to follow its past movements. Empirical researches reveal a slight positive correlation over short periods of time, yet suggesting evidence against existence of exploitable trading opportunities. (Conrad & Kaul 1988, Lo & Mackinlay 1988). On the other hand, studying stock returns over longer horizons, researchers have found reversal effect in which best-performing stock in the previous period tend to perform poorly in the following period. (Debondt & Thaler, 1985). Furthermore, the negative correlation seems to be large enough for profitable exploitation. Another way to test the weak-form market efficiency is through predictors of broad market returns, which are dividend/price ratio, dividend yield, earning yield or high-low bond yield spread (Fama & French 1988, Campbell & Shiller 1988, Keim & Stambaugh 1986). However, the results of these studies are mixed and difficult to interpret in terms of violation of the efficient market hypothesis.

(ii) Semi-strong form

In addition to past knowledge, the semi-strong version of EMH also confirms that all publicly available knowledge should be reflected in current stock price. Such kinds of data comprise historical prices, fundamental information regarding firms' product line, management quality, financial statements, patents, prospective earnings and accounting customs etc. Similar to past data, these statistics are not exploitative for investors for arbitrage purposes. (Bodie et al. 2011: 348)

Market anomalies are utilized to examine semi-strong form of EMH. These anomalies include the Small-firm-in-January effect, the Neglected-firm effect, Liquidity effect, book-to-market ratios and post-earning-announcement price drift. If one can earn abnormal returns based on the fundamental analysis results of mentioned anomalies, the semi-strong version of market efficiency will be proved to be violated. (Bodie et al. 2011: 360-364)

(iii) Strong form

The last and strongest form of EMH claims that stock prices should embrace all information pertinent to firms including one only available to insiders. This extreme version of hypothesis is quite controversial since one would argue that investors are able to make profitable trading as long as they have access to relevant information long enough in advance. In fact, Securities and Exchange Commission has enacted a number of rules to prevent corporate officers, directors, substantial owners, their relatives and associates from exploiting their privilege positions to earn profit. For instance, rule 10b-5 of the Security Exchange Act of 1934 put a ceiling on trading by insiders and require them to report trades to the SEC. However, determining insider trading is sometimes complicated because the difference between private and insider information is occasionally vague. (Bodie et al. 2011: 348)

It is predictable that insiders can trade profitably based on their privileged information of the firms' stock, i.e. market is not expected to be strong-form efficient. Indeed, the potentiality of insiders to trade beneficially on their own stocks is documented by Jaffe (1974), Seyhun (1986) and Givoly & Palmon (1985)

3.2. Market anomalies

According to EMH, markets are rational and stock prices completely reflect all available information. As a result, no investors can beat the market and generate abnormal returns. Nevertheless, there are evidences in global stock exchanges that challenge the existence of the market efficiency hypothesis. This deviation from the EMH is called anomalies. (Kuhn, 1970). For the purpose of interpretation, anomalies can be categorized into three basic types: Calendar or seasonal anomalies, Technical anomalies and Fundamental anomalies. (Latif, Arshad, Fatima & Farooq, 2011)

3.2.1. Calendar anomalies

Calendar or seasonal anomalies refer to patterns in stock prices in daily, monthly and yearly basis.

One of the most famous and well-studied calendar anomalies is *January effect*, in which small-company stocks have a tendency to produce higher returns than other asset classes in the first two to three week of January. Examining stock returns on NYSE and AMEX stock exchanges, Keim (1983) finds that abnormal return distributions in January possess larger mean than the rest eleven months and the correlation between size and return is negative, especially during the first month of the year.

Another calendar anomaly is called *Weekend effect*, which indicates that stock prices on Monday are likely to be lower than closing prices of the last Friday. This is considerably puzzled anomaly as Monday returns span three days, which should be expected to be higher due to greater risks. In an empirical research in 1980, French discovers that although the average returns of the other four days of the week are positive, the average for Monday is remarkably negative during each of the five-year sub-periods.

Other seasonal anomalies are *Turn-of-the-month effect* and *Turn-of-the year effect*. The former one implies that stock prices are possibly to rise during the last trading day of the month and the first three trading days of next month. The later refer to stock price and trading volume increases from the last week of December to the first two weeks of January. Scrutinizing five seasonal patterns in stock markets of eighteen countries, Agrawal & Tandon (1994) notice that returns on the last trading day of the month are significantly higher while variances are lower than other days. Besides, they also note large December pre-holiday and inter-holiday as well as excessive January returns in many countries.

Last but not least, an anomaly called *Intra-month effect* or *Monthly effect* describes the phenomenon when stock return of the first half of the month is significant higher than the

second half of the month. This anomaly is independent from other known anomalies such as the January effect. (Ariel, 1987)

3.2.2. Technical anomalies

Technical analysis is the technique of using historical prices and relevant information to predict the future stock returns. According to Bodie et al. (2011: 347), if the market is efficient even in weak form, practices of using past data is useless concerning attempts to earn abnormal returns. Yet there are a few anomalies that deviate the confirmation of this hypothesis.

The first anomaly is *Moving Average* that includes buying and selling orders based on long and short period averages. Investors are supposed to place a bid order when short period average is higher than long period average and sell the stocks vice versa.

The second anomaly is *Trading Range Break* that is based upon resistance and support level. This strategy recommends investors to buy when stock prices increase above last peak and to sell when prices drop below last trough. However, this technique is difficult to execute.

Investigating these two simplest and most popular trading rules, Brock, Lakonishok and LeBaron (1991) confirm strong support for stock price exploitable possibilities of these strategies.

3.2.3. Fundamental anomalies

Last but not least, fundamental anomalies comprise value anomaly, low price to book ratio, high dividend yield, low price to earnings ratio (P/E) and neglected stocks.

Analyzing value anomaly, Graham & Dodd (1934) state that this deviation occur due to false prediction of investors, in which future earnings and returns of growth companies are overestimated while value firms' are underestimated. Besides, Fama (1991) and Fama

& French (1988) explore other two anomalies. The first one is low price to book ratio which states that stocks with lower price to book ratio generate more return. The second anomaly is high dividend yield in which stocks with high dividend yield outperform the market and produce higher returns. In addition, Goodman & Peavy (1983) explore low price to earning strategy and confirm that stock with lower P/E ratio tend to create more returns and beat the market. Finally, De Bondt & Thaler (1985) are amazed while studying performances of previous "winner portfolios" and "loser portfolios". The result reveals that prior neglected stocks incline to generate higher return in subsequent period than previous cherished stocks.

3.3. Equity valuation models

Equity valuation models are utilized to evaluate the intrinsic value (fundamental value) of a security. If the market is efficient, current stock prices will reflect all available information and display the intrinsic value of the asset. However, if investors are convinced that the market is not efficient, they will endeavor to measure the fundamental values of securities with different types of models. Based on the estimated results, investors will decide to sell if current stock price is overvalued and buy if the price is undervalued. Basically intrinsic value of an asset is the present value of all future cash flows discounted at an appropriate rate. Nevertheless, the practice is not easy in reality since the determination of timing and riskiness of cash flows is quite complicated. As a result, investors often use several models to increase the accuracy of the estimation. (Bodie et al. 2011: 583-615)

3.3.1. Capital Asset Pricing Model (CAPM)

According to Bodie et al. (2011: 280), CAPM is the one of the core fundaments of modern financial economics. It provides the accurate estimation of the relationship between risk and return of an asset. First laid down in 1952 by Markowitz, this model was built up 12 years later in articles by Sharpe (1964), Lintner (1965) and Mossin (1966). Fundamentally the risk premium on a specific asset is proportional to the risk

premium of the market portfolio, M, and the beta coefficient of the concerning security, in which beta is the correlation of the asset and the market.

(1) $$E(r_i) - r_f = Cov(r_i, r_M)/\sigma^2_M * [E(r_M) - r_f] = \beta_i * [E(r_M) - r_f]$$

Or

(2) $$E(r_i) = r_f + \beta_i * [E(r_M) - r_f]$$

with $E(r_i)$ is expected return

r_f is risk free rate

$Cov(r_i, r_M)$ is covariance between stock and market

σ^2_M is variance of market

β_i is beta coefficient of stock with market

Expected return, $E(r_i)$, calculated in CAPM is also considered as the required rate of return that investors demand in order to compensate for the risk associated by investing in the asset. Thus, using this rate, investors are able to measure the present value of the certain asset through various types of valuation models. (Bodie et al. 2011: 280-288)

3.3.2. Dividend discount models

Suppose an investor buy a share and intend to hold it for 1 year period, thus, the intrinsic value of the stock is the present value of the dividend to be paid at the end of the first year, D_1, plus the expected price of the share, P_1.

(3) $$V_0 = \frac{D_1 + P_1}{1 + k}$$

with V_0 is current stock price

D_1 is dividend at the end of year 1

P_1 is expected price at the end of year 1

k is required rate of return

Thus, in general, if the investor holds the share for n period, the formula above can be written as:

(4) $$V_0 = \frac{D_1}{1+k} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_n + P_n}{(1+k)^n}$$

Assume that the investor will hold the share indefinitely, then the stock price should equal present value of all future dividends into perpetuity. This formula is called the dividend discount model (DDM) of stock price.

(5) $$V_0 = \frac{D_1}{1+k} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_n}{(1+k)^n}$$

However, it is not practical to forecast dividend for every year into indefinite future. To simplify and generalize equation (5), we assume that dividend grows at a stable rate, g, indefinitely. Thus, equation (5) can be rewritten as follow:

(6) $$V_0 = \frac{D_0(1+g)}{1+k} + \frac{D_0(1+g)^2}{(1+k)^2} + \ldots + \frac{D_0(1+g)^n}{(1+k)^n}$$

or simplified into:

(7) $$V_0 = \frac{D_0(1+g)}{k-g} = \frac{D_1}{k-g}$$

Equation (7) is called the constant-growth DDM or the Gordon model, named after the first researcher to popularize it, Myron J. Gordon. (Bodie et al. 2011: 587-600)

3.3.3. Price-earnings ratio

When a firm earns profit, they can choose either to pay out all of the profit in dividend or reduce the pay out ratio to maintain a plow-back ratio or earnings retention ratio (the fraction of earnings reinvested in the firm). Usually, when firms are able to engage in projects generating returns higher than the required rate of return, they will choose not to pay 100% earnings as dividend, thus the value of the firm will be split into two parts: the value of assets that already in place (no-growth value) and the net present value of growth opportunities (PVGO)

Price = No-growth value per share + PVGO

(8) $$P_0 = \frac{E_1}{k} + PVGO$$

with E_1 represents earning at the end of year 1.

Rearrange equation (8), we will have:

(9) $$\frac{P_0}{E_1} = \frac{1}{k}(1 + \frac{PVGO}{E/k})$$

In reality, a large number of stock market valuations focus on this price-earning multiple, the ratio of price per share to earnings per share, or P/E ratio.

The price-earnings ratio is one of the comparative valuation ratios that investors can use to evaluate one firm against another and identify the "more aggressively" one. Other ratios that are commonly used among financial specialists are: price-to-book ratio, price-to-cash-flow ratio and price-to-sale ratio. (Bodie et al. 2011: 601-609)

3.3.4. Free cash flow valuation approaches

In the real world, not every firm pays dividend, which makes it difficult to value its stock based on DDM. An alternative approach is using free cash flow for the firm (FCFF), which is total available cash flow minus total expenditure.

(10) $FCFF = EBIT\ (1-t_c) + Depreciation - Capital\ Expenditures - Increase\ in\ NWC$

Where

EBIT: earnings before interest and taxes

t_c= the corporate tax rate

NWC= net working capital

Since FCFF is total cash flows available to both debt and equity holders, we can extract the amount that is accessible to equity holders (FCFE) by:

(11) $FCFE = FCFF - Interest\ expense\ (1-tc) + Increase\ in\ net\ debt$

Beside FCFE, market value of equity also includes some estimated terminal value V_T, which is calculated by constant-growth model

(12) $$V_T = \frac{FCFE_{T+1}}{k-g}$$

Therefore, total market value of equity is:

(13) $$\sum_{t=1}^{T} \frac{FCFE_t}{(1+k)^t} + \frac{V_T}{(1+k)^t}$$

Dividing total market value of equity by the number of share outstanding, investors can obtain the stock price for further investing decisions. (Bodie et al. 2011: 609-613)

3.4. Behavioral finance

The foundation of behavioral finance is that conventional financial theories disregard the fact that investing decisions are made by real humans who do not always act rationally. The irrationalities can be divided into two main categories: incorrect information processing leading to inaccurate probability distribution and inconsistent or systematically suboptimal decisions given correct distribution of returns. Nonetheless, irrationalities alone do not make market become inefficient because sharp-eyed arbitrageurs will exploit the opportunities and push the price back to its intrinsic value. Hence, another important leg of behavioral critique is that in reality arbitrages are limited and therefore inadequate to drive stock price back to its proper position. (Bodie et al. 2011: 381-400)

3.4.1. Incorrect information processing

(i) Forecasting errors

Through a series of experiments, Kahneman & Tversky (1973) indicate that people pay too much attention to recent experience compared to previous opinions when making predictions and incline to forecast too extreme given the variability innate in their information.

(ii) Overconfidence

People tend to overestimate their abilities, thus overestimate the accuracy of their beliefs and predictions. Studying the trading behaviors of two group of broker: male and female, Barber and Odean (2001) find an interesting result that men, particularly single men, trade more actively than women, which is consistent with the greater overconfidence among male comparing to female well recorded in psychology literature.

(iii) Conservatism

This behavioral bias means that investors can be too slow to react with news about a firm, which leads to reluctance in updating their investing decisions. Such bias will create an increase to momentum in stock market returns.

(iv) Sample size neglect and representativeness

On contrary to conservatism, representativeness states that people often neglect the size of sample act as if a small sample is just a representative of a population. Therefore, they tend to overreact with new information and extend the trend too far into the future. (Bodie et al. 2011: 382-384)

3.4.2. Behavioral biases

Even when the information is processed perfectly, investors are still able to make irrational decisions because of various biases. (Bodie et al. 2011: 384-386)

(i) Framing

People can decide differently due to different expression of choices. They can be risk averse in terms of gains but risk seeking regarding losses. In other word, how risky venture are framed directly affects how people react.

(ii) Mental accounting

Mental accounting is a form of framing in which investors make separate decisions due to different perception. For instance, an investor can act risk-seeking concerning one investment account while is quite conservative regarding account dedicated to his/her child's education.

(iii) Regret avoidance

Researchers discover that individual tend to blame themselves more on losses of unconventional decisions rather than traditional ones. For example, a loss of a blue-chip stock investment is less painful than the equal loss of a start-up-company investment. This regret avoidance is consistent with both the size and book-to-market effect (De Bondt & Thaler, 1987)

(iv) Prospect theory

This theory declares that the wealthier the investors, the more satisfactory (utility) and more risk averse they are. Furthermore, investors are more risk seeking than risk averse

when it comes to losses. In accordance with loss aversion, traders are observed to accept greater risk in an afternoon session following a lost morning session.

3.4.3. Limits to arbitrage

(i) Fundamental risk

Assume stock A is underpriced, thus, buying it offer a potential profit possibility. Even so, the investor who may be a mutual fund manager can lose his clients (not to mention his job) if the presumed market underpricing get worse and price does not converge back to its fundamental value before the end of the investing horizon. As a result, this kind of risk restricts the activity of the traders even with the existence of profit exploitation opportunities.

(ii) Implementation costs

Taking advantage of overpricing is complicated because short selling requires costs and short-sellers may have to return the borrowed asset within little notice. Consequently, arbitrage activities are limited resulting in prevention of forcing price to fair value.

(iii) Model risk

Last but not least, there is possibility that investors are using wrong model to value stock prices and the market prices are actually correct. Mispricing can be a great opportunity to earn profit but can turn into a tragedy if the initial evaluation is incorrect. (Bodie et al. 2011: 386-388)

3.5. Effects of the Moon

3.5.1. General information

The Moon (or Luna) is the only natural satellite of the Earth, which was formed 4.6 billion years ago, around 30-50 million after the formation of the solar system. Its circumference at the equator is 10,917 km with the diameter of 3.475 km. Comparing to the size of other satellites, the Moon is considered quite enormous. Luna is in synchronous rotation with the Earth, i.e. it rotates around itself in exactly the same time it takes to orbit the Earth, 29.5 days. As a result, there is only one face of the moon ever seen from Earth although both sides of it receive the same amount of sunlight. (http://solarsystem.nasa.gov/planets/profile.)

Acting like a mirror, the Moon shines because its surface reflects light from the Sun. The perceived brightness of the Moon, i.e. phase, is dependent on the location of its orbit around the Earth in 29.5 days.

Imagine a graphical demonstration of the moon's phases. Sunlight is assumed to come from the right hand side. The Earth is at the center of the image. New Moon occurs when the Moon lies in the center of the straight line between the Earth and the Sun. On the other hand, Full Moon happens when our planet is situated in the middle of the straight line. As a result, during New Moon period, the "dark-side" of the moon faces the Earth while in Full Moon the "bright-side" looks out on us and the shadowed portion is entirely hidden from view. Moreover, First Quarter and Third Quarter occur when the Moon is perpendicular (90 degree angle) to the Earth and the Sun. Therefore, we see exactly half of the illuminated side and half of the shadow side. Beside 4 "major" phases explained, there are 4 more "minor" phases in between: Waxing Crescent, Waxing Gibbous, Waning Gibbous and Waning Crescent. The word "crescent" means less than half while "gibbous" is more than half; and "waxing" means growing while "waning" is shrinking. In sum, the Moon phases can be described as follows. Starting with New Moon, the sunlit section increases but less than half, so it is Waxing Crescent, then it comes the First Quarter. Following that, the sunlight continues to rise to more than half to reach Waxing Gibbous which will lead to Full Moon. Afterwards, the sunlit portion began to decrease to Waning Gibbous, Third Quarter, Waning Crescent and back to New Moon to start a new cycle. (http://www.moonconnection.com/moon_phases.phtml)

3.5.2. Effects on the Earth - Tides

The most significant impact that the Moon has on the Earth is causing tides. As the Earth rotates around its axis, ocean water is retained at the same level all over the globe by the Earth's gravity pulling inward and the centrifugal force pushing outward. However, because of the existence of our natural satellite – the Moon, this balance is disrupted. There are 2 types of tide: one is on the side of the Earth that facing the moon and another is on the opposite side that faces away from it. The first type of tide is generated by the gravitational force of the Moon that accelerates the ocean water towards it, i.e. causes the seawater to "bulge". As the Earth spins and the Moon revolves around our planet, the bulge also moves creating high tide where the bulging occurs and low tide in other areas. The second type of tide is rooted from a different and interesting reason. Imagine yourself swinging a heavy object tied up to a rope around your body as you revolve. In order to keep balance, you have to lean back to put a center of mass between you and the object. The mechanism works the same for the Earth and the Moon with gravity acting like a rope that pulls and keeps two bodies together and centrifugal force is what holds them apart, i.e. the Earth "leans" backward. Since the centrifugal force is greater than the Moon's gravity, the ocean water in facing away side of the Earth rises.

Furthermore, alongside with the phases of the Moon, the tides on Earth are not the same during 29.5 days cycle, or in a month. When the Sun, the Moon and the Earth line up in Full Moon and New Moon, gravitational forces are larger creating Spring tides, 140% higher than usual. On the other hand, during First Quarter and Third Quarter when the planets are at right angle, there are Neap tides, 60% as strong as standard tides. (http://www.moonconnection.com/tides.phtml)

3.5.3. Effects on human

As explained above, the gravitational force of the Moon is strong enough to distort the balance of the ocean water on the Earth, an object weighing 5.9736×10^{24} kg (NASA). As a result, it is obvious to realize the influence of the Moon on a human body that generally only weighs 50-150kg in which 60% is water. (USGS)

3.5.3.1. Menstruation, fertility and births

Cutler (1980) investigates how the Moon affects menstrual cycle in 312 university students; of which 68 have experience of lunar-period cycles (29.5 days). 15% women in the tested group menstruate in the light half of the month, meaning that ovulation tends to occur during the dark phase (from the Third Quarter to the New Moon). Even women with irregular period cycles incline to ovulate during this phase. As a result, the researcher theorizes that the lunar cycle is in association with natural rhythm of electromagnetic radiation, which has impacts on human menstrual period. In another study, Law (1986) tests menstruations of 826 female volunteers, of which 28.3% menstruate around New Moon while only 8.8-12.6% encounter their periods in other times of the lunar cycle; the results are statistically significant at 1% level. In addition, 2/3 volunteers admit to have their zeniths during the New Moon and nadirs 3-4 days before the Full Moon.

Lunar impacts seem to occur on fertility and births as well. Of 140,000 live births in New York City in 1968, there is a small but systematic deviation in childbirth over a period of 29.53 days (the Moon's cycle) with peak fertility in the Third Quarter. (Criss & Marcum, 1981). Additionally, Guillion et al. (1986) researches 5,927,978 French nativities from 1968 to 1974 and reports two types of rhythm: weekly rhythm characterized by the lowest number of births on Sunday and annual rhythm with maximum deliveries in May and minimum figure in September and October.

3.5.3.2. Hospitality admissions

A number of reports examine the effects of lunar periodicity on the rate of hospital admittance due to various causes. Sitar (1989) analyses mortality percentage of 1437 cardiovascular emergency cases and recognizes the influence of the Moon on this figure. The maximum and minimum death rate curve shifts alongside with lunar phases and solar activity, in which during the time of high solar activity, minimum mortality is closer to the New Moon and the Full Moon while maximum death proportion converges on the

First and the Last Quarters. On the other hand, during lower period of solar activities, mortality curve conveys counter-directionally to the Moon's orbit around the Earth.

Another experiment is conducted by Roman et.al. (2004) on 447 patients with gastrointestinal hemorrhage over a 2-year period. The result suggests an increase in admissions during the Full Moon periods, especially among men and patients with variceal hemorrhage.

Moreover, lunar phases seem to influence the number of requests for appointment of patients at a thyroid outpatient clinic. The follow-up reservations climax during 3 days after the Full Moon while new appointments increase in 5 days afterwards. (Zettinig et.al. 2003)

3.5.3.3. Accidents, crimes and suicides

The cycle of the Moon also affect other human activities including traffic accidents, crimes suicides and other related behaviors. Alonso (1993) investigates the daily data on traffic crashes in comparison with daily records of barometric pressure and synodic lunar cycle over a period of 4 years. He finds significant variations in the number of accidents in relation with lunar phases; in particular, the quantity of accident is lowest during Full Moon day and highest 2 days before this period.

The crime rates reported to three police stations in various cities between 1978 and 1982 are also researched by Thakur & Sharma (1984). They realize considerably higher number of offences committed on full-moon days than on other days. The writers come to the conclusion that this phenomenon is found due to "human tidal waves" caused by gravitational pull of the Moon.

Self-destruction rate is also under investigation regarding the effects of the Moon on human behaviors. Jones & Jones (1977) study the relationship between suicide rates and time (year, month, day, lunar phases and holidays) in Ohio 1972-1975. The outcomes

indicate a statistically significant correlation ($p<0.01$) between the Moon's cycle and suicide rates, i.e. an escalation is witnessed with respect to the New Moon periods.

3.5.3.4. Sleeping patterns

In 2000, a group of researchers from University of Basel, the Swiss Federal Institute of Technology and the Switzerland Centre for Sleep Medicine gather 33 volunteers to study their sleep patterns in a lab over 3 year period. The data measured by electroencephalograms (EEG) include brain wave activity during sleep, melatonin level (a sleep related hormone), the amount of time it takes the subjects to fall asleep, the amount of time spent in deep sleep and participants' conditions in the next day.

More than a decade later, Cajochen et al. (2013) re-crunch the data to study the effect of the Moon on human sleep behaviors. The results suggest that on average, it takes the volunteers 5 minutes longer to fall asleep in 7-days window around the Full Moon while their time of sleeping is 20 minutes less. In addition, during the Full Moon period, EEG reports that deep sleeps fall 30%, melatonin levels are lower and subjects feel less refreshed in the next day. The outcomes are completely objective because the moon is not an initial variable and both subjects and investigators are not distorted by prejudiced cognition.

3.5.3.5. Surgery outcomes

In 2013, a paper assessing the impacts of natural time variations of both seasons and lunar periodicity on hospital survival and inpatient length is carried out. (Shuhaiber et al. 2013). The research reveals that aortic dissections performed during the Full Moon phases have remarkably shorter length of stay than during other phases, i.e. 10 days for the Full Moon cycle compared to 14 days for other cycles.

4. DATA AND METHODOLOGY

4.1. Data

A calendar reporting phases of the Moon was retrieved from United States Naval Oservatory (USNO) website. This site provides the date and time (Greenwich Mean Time) of 4 lunar phases (New Moon, First Quarter, Full Moon, Last Quarter) from 1700 to 2015. To give assistance to the purpose of this report, data from January 2009 to October 2014 were downloaded.

Additionally, data of daily closing price and volume of 7 market indexes and 20 industry indexes in Vietnamese stock market were obtained from January 2009 to October 2014 to form a sample of 78,462 daily observations. (http://www.cophieu68.vn)

4.2. Methodology

Based on the daily closing price, indexes' daily returns are calculated for day t as:

(14) $$LN(\frac{\Pr ice_t}{\Pr ice_{t-1}})$$

Therefore, the returns reflect only capital appreciation and omit the dividends. This omission is not critical since dividends are considered relatively fixed amount of payment and there is no reason to state that they should vary by phases of the moon.

From preliminary tests, we discovered that our data has serious problem of heteroskedasticity and autocorrelation. As a result, we decided to run our regression following GARCH (1,1) model as follows:

(15) $$r_{it} = \alpha_i + \beta * LunarDummy + \varepsilon_{it}$$

in which:

r_{it} = returns of the selected index i in lunar month t

LunarDummy = dummy variable equals to 1 if it is full moon period and 0 otherwise

β is the coefficient of dummy variable, β <0 indicates that returns during full moon period is lower than new moon period and vice versa.

Regression (15) is run on two different windows. The first window (15 days) analogizes daily returns occurring 2 calendar weeks centered on new/full moon date, i.e. new/full date +/- 7 days. The second window (7days) compares daily returns happening 1 calendar week centered on new/full moon date, i.e. new/full date +/- 3 days. Consequently, since the lunar cycle has a length of 29.5 days, the first specification uses all of available daily returns while the second window only utilizes half of the data.

In addition to econometric regressions, we also calculate the t-test for means of new moon and full moon periods. Based on mean results, we then compute the effect size index d introduced by Cohen (1977). The reason of utilizing index d is because this statistic is free of original unit, in other words, its power is unaffected by sample size. Thus, we are able to verify whether the results of econometric analyses are influenced by small sample size problem. Cohen's d index is calculated as follows:

(16) $$d = \frac{\mu_{new} - \mu_{full}}{\sigma}$$

where

d = effect size index for t test of means

μ_{new}, μ_{full}= means of New Moon and Full Moon periods respectively

σ= common standard deviation of both periods.

Although the cut-off values and interpretations are quite relative, Cohen hesitantly indicates the setting rules for d-index as follows:

Table 2. Cohen's d effect size – cutoff rule.

d - value	Effect size	Interpretation
0.2	Small	58% of the new moon returns will be above the mean of full moon
0.5	Medium	69% of the new moon returns will be above the mean of full moon
0.8	Large	79% of the new moon returns will be above the full moon

5. EMPIRICAL RESULTS

5.1. Vietnamese macro economy

Table 3 represents major indicators of Vietnamese macro economy from 2000 to 2013.

Current account balance is the sum of net exports of goods and services, net primary income and net secondary income. A current account surplus indicates that the nation is a net lender while a deficit balance shows that the country is a net borrower to the rest of the world. As can be seen from Table 3, Vietnamese current account balance was negative with the amount increased 8 times from more than -$560 million to -$4,276 million in the period of 2005-2010. However, from 2011, the balance started to be positive and it is witnessed a tremendous multiplication in only 1 year 2011- 2012, from $236 million to $9,062 million. As a result, the percentage of current account balance to GDP also enlarged from -0.97% to 5.82% in 2005 and 2012 respectively. The reason for this significant magnification is evidently explainable when looking at the amount of goods and services exported in this interval. While in 2005 Vietnam only exported more than $36 billion, this figure reached to more than $ 124 billion in 2012.

In addition, inflation was observed to have a remarkable fluctuation with a gradual increase from 2000 to 2007 followed by a peak of 23.12% in 2008. The rate backed to around 7-8% before rocketed up again in 2011 and then slowed down to nearly 7% in 2013. Although the nominal inflation rate decreased considerably in 2013, the real purchasing power reflected in consumer price index still indicated a weaker power over the period of 2000-2013.

Concerning the interest rate, it was noticeable that in spite of constant growth over time, Vietnam encountered problematic figures in 2008 and 2011. Notwithstanding the fact that nominal deposit interest rate reached the highest points in those years (12.73% and 13.99%); the real interest rate was both negative in 2011 (-3.55%) and 2008 (-5.62%).

The phenomenon was fully explainable given the global financial crash started with the subprime crisis in USA in 2007-2008.

Nevertheless, Vietnam still witnessed a steady augmentation in terms of GDP and GDP per capital. In 2013, Vietnamese GDP was more than $155 billion that was nearly 5 times larger than the amount in 2003. Besides, GDP per capital also soared more than 27 times from over $1000 in 2000 to $28,354 in 2013.

It is concluded that although Vietnam, similar to other countries in the world, faced a difficult financial situation from 2008, it still remains one of the fastest developing markets in the world and a promising land for foreign investors.

Table 3. Vietnamese macroeconomic indicators 2000-2013.

INDICATOR	2000	2001	2002	2003	2004	2005	2006
Current account balance (% of GDP)	n/a	n/a	n/a	n/a	n/a	-0.97	-0.25
Current account balance (BoP, current US$ million)	n/a	n/a	n/a	n/a	n/a	-560.189	-163.742
Exports of goods and services (BoP, current US$ million)	n/a	n/a	n/a	n/a	n/a	36 623	44 926
Inflation, consumer prices (annual %)	-1.71	-0.43	3.83	3.22	7.76	8.28	7.39
Consumer price index (2010 = 100)	48.13	47.92	49.76	51.36	55.34	59.93	64.35
Official exchange rate (VND per US$, period average)	14 167	14 725	15 279	15 509	15 746	15 858	15 994
Deposit interest rate (%)	3.65	5.30	6.45	6.62	6.17	7.15	7.63
Interest rate spread (lending rate minus deposit rate, %)	6.90	4.12	2.61	2.86	3.55	3.88	3.55
Lending interest rate (%)	10.55	9.42	9.06	9.48	9.72	11.03	11.18
Real interest rate (%)	-0.94	6.57	3.93	2.42	0.45	1.67	2.40
Risk premium on lending (lending rate minus treasury bill rate, %)	5.13	3.93	3.14	3.65	4.03	4.90	6.45

Unemployment, total (% of total labor force) (national estimate)	2.30	2.80	2.10	2.30	2.10	n/a	n/a
GDP (US$ billion)	n/a	n/a	n/a	37.94	42.71	49.42	57.63
GDP per capita (US$)	1 035	1 044	1 057	1 101	1 152	1 216	1 275

INDICATOR	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Current account balance (% of GDP)	-8.98	-10.92	-6.23	-3.69	0.17	5.82	n/a
Current account balance (BoP, current US$ million)	-6 953.1	-10 823	-6 608	-4 276	236	9 062	n/a
Exports of goods and services (BoP, current US$ million)	54 591	69 691	62 862	79 697	105 785	124 173	n/a
Inflation, consumer prices (annual %)	8.30	23.12	7.05	8.86	18.68	9.09	6.59
Consumer price index (2010 = 100)	69.70	85.81	91.86	100.00	118.68	129.47	138.01
Official exchange rate (VND per US$, period average)	16 105	16 302	17 065	18 612	20 509	20 828	20 933
Deposit interest rate (%)	7.49	12.73	7.91	11.19	13.99	10.50	n/a
Interest rate spread (lending rate minus deposit rate, %)	3.69	3.05	2.16	1.94	2.96	2.97	n/a
Lending interest rate (%)	11.18	15.78	10.07	13.14	16.95	13.47	10.37
Real interest rate (%)	1.41	-5.62	3.63	0.95	-3.55	2.29	5.36
Risk premium on lending (lending rate minus treasury bill rate, %)	7.03	3.65	2.03	1.99	4.60	4.66	3.73
Unemployment, total (% of total labor force) (national estimate)	n/a	2.40	n/a	n/a	2.00	1.80	n/a
GDP (US$ billion)	66.37	77.41	99.13	106.01	115.93	135.53	155.82
GDP per capita (US$)	21 618	22 600	23 570	24 822	26 098	27 179	28 354

Source: World development indicators http://data.worldbank.org/indicator/

http://tradingeconomics.com

5.2. Vietnamese stock market

5.2.1. Establishment

In order to industrialize and modernize the country, maintain constant economic development and restructure the economy, Vietnam needed an immense amount of investment. As a result, it was vital to set up securities market in Vietnam to mobilize mid-term and long-term capital requirements. In November 1996, The State Securities Commission of Vietnam (SSC) was officially founded to supervise and broaden the country's security market, which comprises of two stock trading centers: Ho Chi Minh City Stock Exchange (HOSE/HSX) founded in July 2000 and Hanoi Stock Exchange (HASTC/HNX) founded in March 2005. HOSE is the market for large capitalization stocks with the capital greater than VND 120 billion (USD 5.7 million) while HASTC is, on the other hand, a place for small capitalization stocks with capital only from VND 30 billion (USD 1.44 million) (58/2012/ND-CP)

5.2.2. Organization and operation

As discussed above, Vietnam has 2 main stock exchanges, one in the Capital – Ha Noi and another in the largest city of the country – Ho Chi Minh City. See table 4 for the main features of these exchanges.

Table 4. Overview of Vietnamese stock exchanges.

Full name	Ho Chi Minh Stock Exchange	Hanoi Stock Exchange
Abbreviation	HSX/HOSE	HNX/HASTC
Index	VN-INDEX Reuters: VNI Bloomberg: VNINDEX	HNX-INDEX Reuters: HNXI Bloomberg: VHINDEX
Official website	http://www.hsx.vn	http://hnx.vn
Currency of trade	Vietnam Dong (VND)	

<table>
<tr><td>Trading days</td><td colspan="4">Monday - Friday (GMT + 07:00)</td></tr>
<tr><td>Trading hours</td><td colspan="2">Equities (no bond traded)
Session 1: 08:30 - 08:45 (P.OM & PT)
Session 2: 08:45 - 10:30 (C.OM & PT)
Session 3: 10:30 - 10:45 (P.OM & PT)
Session 4: 10:45 - 11:00 (PT only)

P.OM: Periodic order matching
C.OM: Continuous through out the session
PT: Put through</td><td colspan="2">HNX: Equities and bonds
Session 1: 08:30 - 11:00 (Continous OM and PT)

UpCom: Equities and bonds
Session 1: 08:30 - 11:30
Session 2: 13:30 - 15:00 (Continous OM and PT)</td></tr>
<tr><td>Boards</td><td colspan="2">Main board: HSX</td><td colspan="2">Main board: HNX
"Nasdaq type" board: UpCom</td></tr>
<tr><td>Order type and validity</td><td colspan="4">LO: Limit order, valid the entire day
ATO: Market order valid in 1st session only,
matching priority over LO
ATC: Market order valid in 3rd session only,
matching priority over LO
MP: Market order (approved but not yet executed)</td></tr>
<tr><td rowspan="4">Price Units/Ticks/ aka Quote unit</td><td rowspan="2">Price Unit (vnd)</td><td colspan="3">Equities</td><td>Bonds</td></tr>
<tr><td>HSX</td><td>HNX</td><td>UpCom</td><td>All exchange</td></tr>
<tr><td>≤ 49,900</td><td>100</td><td>100</td><td>100</td><td>None</td></tr>
<tr><td>50,000 -100,000</td><td>500</td><td>100</td><td>100</td><td>None</td></tr>
<tr><td>≥ 100,000</td><td>1000</td><td>100</td><td>100</td><td>None</td></tr>
<tr><td>Board lot (smallest number of share one can transact)</td><td colspan="2">Equities: 10</td><td colspan="2">HNX: 100 shares/ bonds
UpCom: no board lot, minimum 10 shares</td></tr>
</table>

Amending and cancelling orders	**Session 1:** Cannot cancel any order. Unmatched portion of ATO orders are cancelled at the end of the session. **Session 2**: Unmatched portion of any order can be cancelled at any time. **Session 3:** Can only cancel limit orders that were placed in previous sessions. New orders cannot be cancelled. **Session 4**: N/A *It's impossible to change the price or quantity of an order; you must cancel the order and then enter a new one.*	**Session 1:** Unmatched portion of any order can be cancelled at any time *It is possible to change the price of any order at any time, but to change the quantity you must first cancel your current order and enter a new one.*
Matching priority	#1 – Price priority: priority to the highest price bid or the lowest ask #2 – Time priority: for orders at same price, priority to orders that came in first #3 – Quantity priority: for orders at same price and time, priority is given to orders with the highest quantity of shares	
Matching principle	Buy orders at higher or equal price than sell orders are matched against each other following the PTQ principle. Partial fills are possible.	Buy orders at higher or equal price to sell orders are matched against each other following the PTQ principle. Partial fills are possible
Settlement *(cash/stocks received on settlement day can only be used the day after)*	Equities: T+3 days; T+1 if transacting over 100,000 shares by put-through	**HNX** Equities: T+3 days; T+1 if transacting over 100,000 shares by put-through Bonds: T+3; choice of T+1,2 or 3 if transacting over 100,000 bonds **UpCom** Equities & Bonds: T+3
Face value	Equities: 10,000vnd Bonds: 100,000vnd	

Sources: Guide to Vietnamese securities 2011 – Viet Capital Securities

Foreign investors (institution and individual) are allowed to trade in both HSX and HNX. However, their ownership limits are 49% of outstanding shares of listed companies and

30% of for listed banks. Besides, Vietnamese stock market has not accept margin trading and short selling yet, i.e. investors must have sufficient funds in their local currency (VND) bank account if buying and sufficient securities if selling.

In addition, Table 5 presents Vietnamese major stock market indexes and industry indexes with their capitalization, as of 07 November 2014. Among them, VNINDEX is a capitalization-weighted index of all corporations listed on the Ho Chi Minh Stock Exchange while HNXINDEX is the index of companies listed on the Hanoi Stock Exchange. On the other hand, VN30 and vn50 are the indexes representing 30 and 50 top stocks that have highest capitalization and liquidity on HOSE. Additionally, indexes are also calculated for stocks categorized by market capitalization with SMALLCAP (100 < MKC<= 1,000), MIDCAP (1,000<MKC<= 10,000) and LARGECAP (MKC> 10,000) (MKC – Market capitalization, data in billion VND). The rest of the table displays the indexes of various industries in the economy.

Table 5. Vietnamese major indexes. – as of 7 November 2014

Indexes	**Number of company**	**Market Capitalization (billion VND)**	**Market Capitalization (USD)**
VNINDEX		2 090 501	98 007 548 054
HNXINDEX		190 584	8 935 021 097
VN50		986 560	46 252 226 910
VN30		629 120	29 494 608 533
SMALLCAP		34 857	1 634 177 215
MIDCAP		170 299	7 984 013 127
LARGECAP		772 811	36 231 176 746
CONSTRUCTION	76	45 560	2 135 958 744
CONSTRUCTION MATERIAL	46	20 388	955 836 850
TRANSPORTATION	45	37 177	1 742 944 210
SEAFOOD	19	25 497	1 195 358 650

TRADE	21	11 514	539 803 094
FOOD	28	223 684	10 486 826 067
STEEL	14	11 603	543 975 621
MANUFACTURING	38	27 408	1 284 950 774
PLASTIC	20	10 342	484 857 009
BANK	16	227 881	10 683 591 186
ENERGY	19	124 932	5 857 102 672
MINERAL	28	16 217	760 290 670
EDUCATION	23	1 330	62 353 493
PHARMACEUTICAL	21	19 125	896 624 473
SERVICE	14	15 799	740 693 858
OIL	31	118 030	5 533 520 863
TELECOMMUNICATION	24	15 640	733 239 569
SECURITIES	20	38 642	1 811 626 817
RUBBER	9	15 418	722 831 692

Source: http://www.cophieu68.vn

Figure 1a and 1b shows the graphical demonstrations of Vietnamese stock market classified by sector based on number of company and market capitalization.

Figure 1a. Vietnamese stock market categorized by sector – number of company.

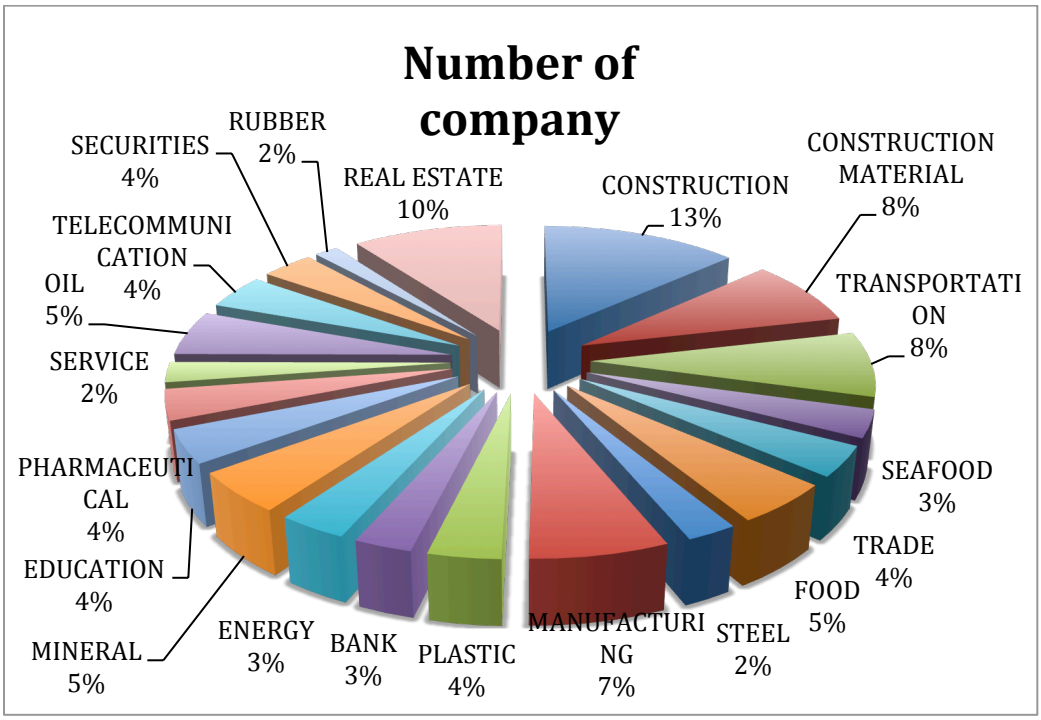
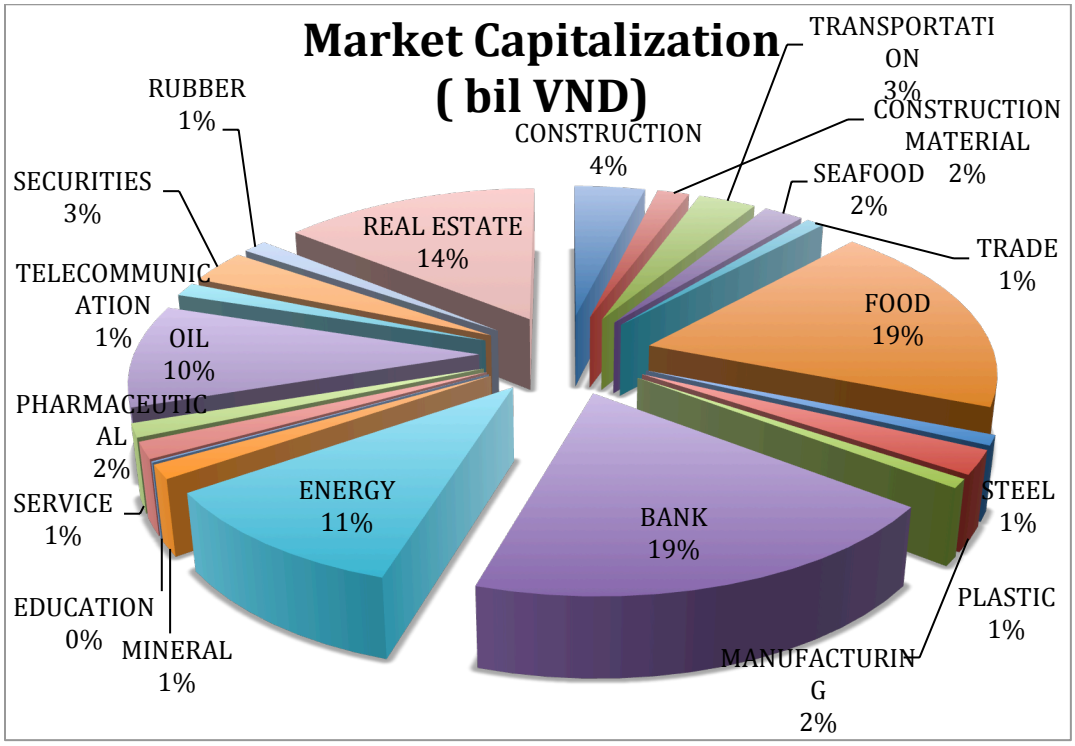


Figure 1b. Vietnamese stock market categorized by sector - market capitalization.



Source: http://www.cophieu68.vn

5.2.3. Performance

Table 6 presents some of Vietnamese stock market key performance indicators from 2003 to 2012 (data before this period were subjected to limited availability). While in 2003 there were only 22 listed companies, this figure multiplied 14 times and reached to 311 firms in 2012. In accordance with remarkable magnification of the total number of listed companies, market capitalization of these firms also amplified from more than $154 million to over $ 32 billion in a 10-year period. Yet similar to other markets in the world, this country stock market also witnessed significant downturn in 2008 and 2011 with market capitalization as percentage of GDP dropped to 9.67% and 13.51% respectively. Regarding country indexes, VN-INDEX noticed an outstanding surge from 506.03 basis points to 1,007.32 points over 1 year period 2006 - 2007. Nonetheless, this index halved in the next year and continued to decrease to 412.83 points in 2012. Corresponding to VN-INDEX, HNX-INDEX also observed a peak in 2007 with a quote of 329.17 basis points and then considerable reduction to 64.27 points in 2012. See figure 2 for graphical illustrations.

Table 6. Performance indicators of Vietnamese stock market over period of 2003-2012.

INDICATOR	2003	2004	2005	2006	2007
Listed domestic companies, total	22	26	33	102	121
Market capitalization of listed companies (% of GDP)	0.36	0.50	0.80	13.70	25.24
Market capitalization of listed companies (current US$ million)	154	248	461	9 093	19 542
Stocks traded, total value (% of GDP)	0.04	0.13	0.15	1.61	16.25
Stocks traded, total value (current US$ million)	16	63	88	1 070	12 583
Stocks traded, turnover ratio (%)	n/a	31.18	24.77	22.40	87.89

VN-INDEX	152.88	238.44	262.31	506.03	1007.32
Change in VN-INDEX (%)	n/a	55.96	10.01	92.91	99.06
HNX-INDEX	n/a	n/a	n/a	192.82	329.17
Change in HNX-INDEX (%)	n/a	n/a	n/a	n/a	70.72

INDICATOR	**2008**	**2009**	**2010**	**2011**	**2012**
Listed domestic companies, total	171	196	275	301	311
Market capitalization of listed companies (% of GDP)	9.67	20.00	17.58	13.51	21.14
Market capitalization of listed companies (current US$ million)	9 589	21 199	20 385	18 316	32 933
Stocks traded, total value (% of GDP)	6.58	20.47	14.83	4.22	2.17
Stocks traded, total value (current US$ million)	6 520	21 705	17 192	5 718	3 378
Stocks traded, turnover ratio (%)	44.76	141.00	82.69	29.55	13.18
VN-INDEX	494.66	431.29	486.05	434.59	412.83
Change in VN-INDEX (%)	-50.89	-12.81	12.70	-10.59	-5.01
HNX-INDEX	156.42	142.50	144.44	78.15	64.27
Change in HNX-INDEX (%)	-52.48	-8.90	1.36	-45.90	-17.76

Source: World development indicators http://data.worldbank.org/indicator/

Figure 2a. VN-INDEX performance 2003-2012.

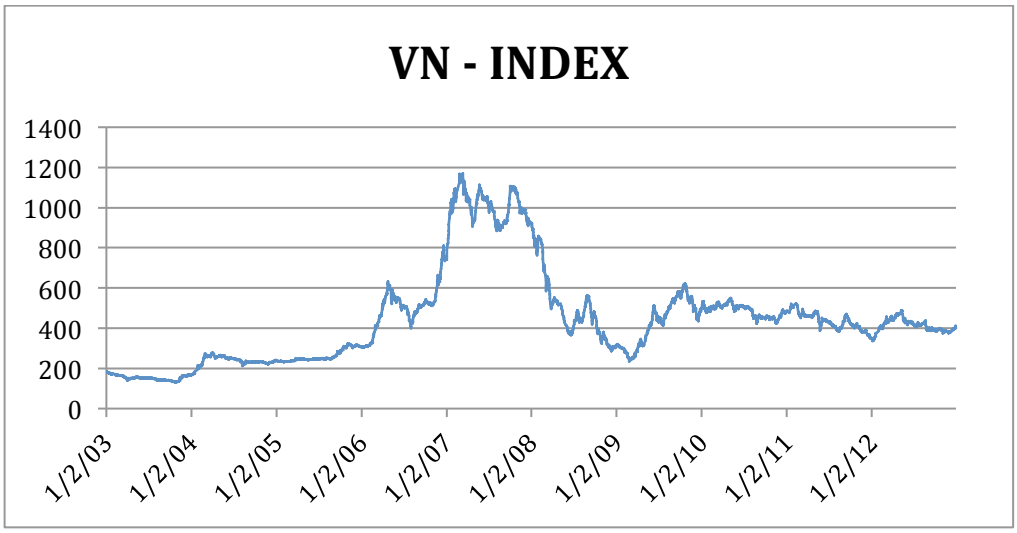


Figure 2b. HNX-INDEX performance 2003-2012.

Source: http://www.itrade.vn

5.2.4. Taxes and transaction costs

Table 7 summarizes the applicable taxes for individual and institutional investors regarding investments in equities, bonds and money market.

Vietnam has double taxation agreements (DTAs) with more than 60 countries in the world, which have adjustably applicable tax rates for organizations and individuals in some specific regions.

As can be seen from Table 7, for securities and bond trading, the tax on sales proceeds is 0.1% for both institutions and individuals. However, unlike foreign investors, Vietnam tax residents (Vietnamese and foreign individuals who live in Vietnam for 183 days or more in a fiscal year) can choose to pay a 20% capital gain tax per year instead of 0.1% tax on sale proceed. (58/2012/ND-CP) Nevertheless, considering the onerous amount of paperwork, the number of investors choosing this scheme is limited.

Concerning transaction costs, investors are required to pay 1-2 % per transaction. The brokerage fees calculated are based on guideline of each securities firms and specific type of transactions.

Table 7. Vietnamese applicable taxes for securities trading.

	Institutional investors	**Individual investors**
Equities	- Capital gains: 0% - Cash dividends: 0% - Cash dividends from listed fund certificates: Varies - Tax on sales proceeds: 0.1%	- Capital gains: 0% - Cash dividends: 5% - Cash dividends from listed fund certificates: Varies - Tax on sales proceeds: 0.1%
Bonds	- Interest (coupon): 10% - Tax on sales proceeds: 0.1%	- Interest (coupon): 5% - Tax on sales proceeds: 0.1%
Money Market	- Term deposit: N/A to non-residents - Certificate of deposit: 10% - Current account: 10%	- Term deposit: N/A to non-residents - Certificate of deposit: 0% - Current account: 0%

Sources: Guide to Vietnamese securities 2011 – Viet Capital Securities

5.3. Descriptive statistics

As can be seen from table 8, the mean values of all seven major indexes in Vietnam are quite small and some are even negative. MIDCAP's daily average daily return from 2009 to 2014 is -0.0151%, the lowest figure among all. Other indexes that also possess less than zero daily return are HNX-INDEX and SMALLCAP with -0.0118% and -0.0109% respectively. Conversely, the other four indexes performed better during the last five years and achieved positive daily stock return, though the figures are rather insignificant. VN30 owns the highest statistics with 0.0491% daily return, which is equivalent to about 12.4% annually. Moreover, VN-INDEX, the main index of Vietnamese stock market only generates 0.0448% daily or about 11.3% annual returns.

In contrast to minor returns producing daily, the standard deviations of all seven chosen indexes are considerably high. The highest standard deviation belongs to VN30 with 2.23% daily or about 562% annually. On the other hand, VN-INDEX has the lowest standard deviation with 1.44% daily or 363% annually, still notably large. Assuming there are 252 trading days per year and the annual risk free rate is the average of deposit interest rate, we calculate the Sharpe ratios for seven concerning indexes. As presented in table 8, the results are discouraging with five over seven indexes score negative Sharpe ratio. The best performance is held by VN30 with 1.53, followed by VN-INDEX with 0.83. In contrast, the worst performer is HNX-INDEX with the rate of -7.18.

In general, looking at descriptive statistics, we can state that Vietnamese stock market has had a gloomy period of performance from 2009 to 2014. The mean returns are trivial and even negative while the variances are enormous, which then create disappointing Sharpe ratios for all of the seven major indexes. This outcome can partially be explained by the global financial crisis in general and the Vietnamese stock market crisis in particular for the last 5 years.

Table 8. Descriptive statistics.

	Hnx-Index	Largecap	Midcap	Smallcap	VN30	VN50	VN-Index
Mean	-0.000118	0.000272	-0.000151	-0.000109	0.000491	0.000229	0.000448
Median	-	0.000665	-	0.000801	0.000708	0.000704	0.000772
Maximum	0.067	0.046	0.051	0.062	0.045	0.046	0.047
Minimum	-0.068	-0.066	-0.077	-0.070	-0.058	-0.065	-0.061
Std. Dev.	0.018	0.016	0.020	0.022	0.015	0.015	0.014
Skewness	-0.005	-0.239	-0.218	-0.212	-0.216	-0.258	-0.179
Kurtosis	4.569	3.989	3.502	2.917	4.127	4.055	4.210
Jarque-Bera	148.88	73.01	26.81	11.24	88.08	83.39	96.37
Probability	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum	-0.172	0.395	-0.219	-0.158	0.713	0.333	0.651
Sum Sq. Dev.	0.481	0.366	0.549	0.722	0.322	0.343	0.301
Sharpe ratio	-7.18	-2.04	-7.15	-5.76	1.53	-2.82	0.83
Observations	1 452	1 452	1 452	1 452	1 452	1 452	1 452

5.4. Econometric analyses

This section describes the empirical results of testing the hypotheses that stock returns are associated with lunar effect and other Calendar effects. We first test the impacts of lunar cycle on the stock market by regressing equation (15) on seven chosen major indexes and twenty industry indexes respectively. The outcomes are reported in table 9 and 10.

5.4.1. Lunar effect

According to table 9, the daily returns during full moon periods are considerably lower than that of the new moon. The results are consistent among all of the testes indexes within both windows. In 15-days windows, the daily difference of VN-INDEX returns between two periods is -0.0461% or about 11.6% assuming 252 trading days annually. The largest variance belongs to MIDCAP index with -0.0542% or about 13.7% daily and annually respectively. The smallest difference is found in SMALLCAP index with only -0.0098% daily, which is roughly 2.5% per annum. The gap between full moon and new

periods is remarkably wider concerning 7-day window, i.e. the lunar effect is stronger around full/new moon days. VN-INDEX's daily returns during full moon period is 0.1639% lower than during new moon period, or about 41% per annum. Again, the MIDCAP index has the widest difference with -0.2602% daily or approximately 65% annually. On contrary, VN50 index possess the smallest gap in this window with -0.1539% daily or 38.8% per annum.

In spite of the noteworthy difference in returns economically, none of the p-values is significant. Our results are much similar to a study conducted by Dichev & Janes (2001), in which they conclude that the insignificant t-statistics are the consequences of large standard deviations of daily returns, about 1%. As a result, the marginal difference in returns is swamped in magnitude.

Table 9. Lunar effect – Major market indexes

This table reports the estimates of the regression $r_{it} = \alpha_i + \beta * LunarDummy + \varepsilon_{it}$ *for 15-day and 7-day windows respectively, where* r_{it} *is the average daily logarithmic returns for index i in lunar month t for each full moon and new moon period. LunarDummy is a dummy variable equals to 1 if it is a full moon period and 0 if it is a new moon period. We define the full moon and new moon periods using the 15-day and the 7-day windows. In the 15-day window, the full moon period is 7 days before and after the full moon day plus the full moon day, the rest of the month is considered as the new moon period. In the 7-day window specification, the full (new) moon period is 3 days before and after the full moon (new moon) day plus the full moon (new moon) day. The GARCH (1,1) model is followed to adjust the heteroskedasticity and autocorrelation among the indexes. P-values are in parentheses. *, ** & *** denote significance level at 10%, 5% and 1% respectively.*

	Lunar Dummy (β)	
	15-day window	7-day window
VN-INDEX	-0.000461	-0.001639
	(0.446)	(0.326)

HNX-INDEX	-0.000267	-0.002208
	(0.704)	(0.215)
VN30	-0.000384	-0.001581
	(0.535)	(0.368)
VN50	-0.000528	-0.001539
	(0.425)	(0.416)
SMALLCAP	-0.0000983	-0.002512
	(0.924)	(0.445)
MIDCAP	-0.000542	-0.002602
	(0.545)	(0.303)
LARGECAP	-0.00054	-0.001771
	(0.421)	(0.376)

For further evidence, we compute the daily difference in returns of other twenty industry indexes. The results are displayed in table 10. The figures presented in table 10 are fairly similar to the statistics in table 9. 18 out of 20 industry indexes encounter lower returns during full moon period than new moon. Among that, the only index that has statistically significant result at 5% level is also the index possessing the highest daily difference in return, Seafood, with -0.1523% daily or about 38% annually.

Nonetheless, resemble to reported results in table 9, 19 out of 20 industry indexes experience statistically insignificant p-values. Therefore, the statistically significant result of Seafood industry index may be spurious (Crack, 1999).

Contrasting to Dichev & Janes (2001), in this paper, we decide to pursuit the conventional method of interpreting econometric analysis results and conclude that although there are appreciable difference in terms of returns between full moon and new moon period, the lunar effect is not proved to exist in Vietnamese stock market due to insignificant p-values.

Therefore, our results do not support the first hypothesis that there is an association between lunar effect and Vietnamese stock market.

Table 10. Lunar effect – Industry indexes

This table reports the estimates of the regression $r_{it} = \alpha_i + \beta * LunarDummy + \varepsilon_{it}$ *for 15-day window, where* r_{it} *is the average daily logarithmic returns for industry index i in lunar month t for each full moon and new moon period. LunarDummy is a dummy variable equals to 1 if it is a full moon period and 0 if it is a new moon period. We define the full moon and new moon periods using the 15-day window. In the 15-day window, the full moon period is 7 days before and after the full moon day plus the full moon day, the rest of the month is considered as the new moon period. The GARCH (1,1) model is followed to adjust the heteroskedasticity and autocorrelation among the indexes. P-values are in parentheses. *, ** & *** denote significance level at 10%, 5% and 1% respectively.*

	Lunar Dummy (β)
Bank	-0.0000325
	(0.964)
Construction	-0.000208
	(0.843)
Construction material	-0.000244
	(0.761)
Education	-0.00039
	(0.483)
Energy	-0.0000343
	(0.972)
Food	-0.0000963
	(0.878)
Manufacturing	-0.000565
	(0.395)

Mineral	-0.000155
	(0.666)
Oil	-0.000704
	(0.428)
Pharmaceuticals	-0.000381
	(0.448)
Plastic	0.000189
	(0.769)
Real estate	-0.001073
	(0.185)
Rubber	-0.000848
	(0.206)
Seafood	-0.001523**
	(0.041)
Securities	-0.001445
	(0.189)
Service	-0.000607
	(0.307)
Steel	-0.000424
	(0.626)
Telecommunication	-0.0000492
	(0.950)
Trade	0.000122
	(0.859)
Transportation	-0.000533
	(0.515)

To check whether the insignificant results of above regressions are influenced by small sample size issue, we perform the t-test for mean equality of New Moon and Full Moon periods. The outcomes are then used to calculate for the Cohen's d index and the results are presented in Table 11.

Table 11. Cohen's d effect size index.

	μ_{new}	μ_{full}	σ	d
VNINDEX	0.000536	0.000367	0.014409	0.012
HNXINDEX	-0.000415	0.000157	0.018214	-0.031
VN30	0.000624	0.000367	0.014889	0.017
VN50	0.000386	0.0000836	0.015379	0.020
SMALLCAP	-0.000732	0.00047	0.022305	-0.054
MICAP	-0.0000931	-0.000205	0.019452	0.006
LARGECAP	0.000446	0.00011	0.015877	0.021

As can be observed in table 11, the d indexes of all seven major indexes' absolute values are less than 0.2, which means that the effect size is small, or in other word, the insignificant results of econometric regressions reported in table 9 and 10 is not explained by the small sample size problem.

5.4.2. Other Calendar effect

As obtaining no statistical significant evidence proving the association between Vietnamese stock market and lunar effect, we decide to dig the issue further by examining other calendar anomalies, namely January effect, Intra-month effect, Turn-of-the-month (TOM) and Weekend effect.

5.4.2.1. January effect

Table 12 reveals the results for January effect tested in Vietnamese stock market for the period from 2009 to 2014 for seven major indexes. 5/7 indexes witness statistically significantly higher daily returns during January than the rest of the year. VN-INDEX daily return in the first month of the year is 0.334% higher the other eleven months, i.e. 7.4% higher monthly return assuming 22 trading days in a month. This result is

statistically significant at 1% level. Other indexes that also experience statistically significantly higher daily returns at 1% level during January are VN30, VN50 and LARGECAP with 0.3952%, 0.378% and 0.4314% respectively. Moreover, HNX-INDEX encounters 0.2339% larger daily return than the rest eleven month too, though the level of significance is marginally lower, 5%. On the other hand, although SMALLCAP and MIDCAP indexes do not confront higher daily return in January statistically, the figures are still considerable economically, 0.099% and 0.247% respectively.

As a consequence, we can conclude that there is an existence of January effect in Vietnamese stock market during the last five tested years.

Table 12. January effect.

This table reports the estimates of the regression $r_{it} = \alpha_i + \beta * JanDummy + \varepsilon_{it}$ *, where* r_{it} *is the average daily logarithmic returns for index i in month t. JanDummy is a dummy variable equals to 1 if it is January and 0 otherwise. The GARCH (1,1) model is followed to adjust the heteroskedasticity and autocorrelation among the indexes. P-values are in parentheses. *, ** & *** denote significance level at 10%, 5% and 1% respectively.*

	JanDummy
VN-INDEX	0.00334***
	(0.002)
HNX-INDEX	0.002339*
	(0.059)
VN30	0.003952***
	(0.001)
VN50	0.00378***
	(0.002)
SMALLCAP	0.00099

	(0.596)
MIDCAP	0.00247
	(0.162)
LARGECAP	0.004314***
	(0.001)

5.4.2.2. Intra-month effect

The data of Vietnamese seven major indexes returns are then utilized to study for the existence of Intra-month or Monthly effect. Table 13 presents the outcomes of the regression. The daily returns of all seven selected indexes during the first half of the month are considerably higher than the second half of the month. VN-INDEX's daily return in the first 15 days is 0.0953% higher than the rest of the month. Furthermore, the most substantial difference is found in SMALLCAP index with 0.1632%. The smallest deviation is detected in VN30 index with only 0.0676%.

Nevertheless, comparable to the results reported in lunar effect testing, none of the p-values is significant at any conventional level, except one case of HNXINDEX that is significant at 10% level. Hence, in spite of notably economical difference in terms of daily returns, we find no statistically significantly supporting evidence for the association between Monthly effect anomaly and Vietnamese stock market.

Table 13. Intra-month effect.

This table reports the estimates of the regression $r_{it} = \alpha_i + \beta * IntraDummy + \varepsilon_{it}$ *, where* r_{it} *is the average daily logarithmic returns for index i in month t. IntraDummy is a dummy variable equals to 1 if it is the first half of the month and 0 otherwise. The GARCH (1,1) model is followed to adjust the heteroskedasticity and autocorrelation among the indexes. P-values are in parentheses. *, ** & *** denote significance level at 10%, 5% and 1% respectively.*

	IntraDummy
VN-INDEX	0.000953
	(0.113)
HNX-INDEX	0.001213*
	(0.082)
VN30	0.000676
	(0.277)
VN50	0.000871
	(0.188)
SMALLCAP	0.001632
	(0.107)
MIDCAP	0.001004
	(0.262)
LARGECAP	0.000904
	(0.181)

5.4.2.3. Turn-of-the-month effect

Another effect that we interest to test whether it occurs in Vietnamese stock market is turn-of-the-month effect. We find marginal significant occurrence of this anomaly in table 14. Among 7 selected indexes, 4 indexes witness higher daily returns in the last trading day and the first 3 trading days than the rest of the month, statistically significant at 10% level. They are HNX-INDEX, VN50, SMALLCAP AND LARGECAP with 0.1581%, 0.1471%, 0.2354% and 0.144% respectively.

Besides, in the chosen period, VN-INDEX daily returns are superior to the rest of the month, 0.0794%. However, the coefficient is not statistically significant at any conventional level.

Once again, in spite of consistent higher returns in four appointed days, we neither confirm nor accept the hypothesis that that there is a Turn-of-the-month effect in Vietnamese stock market because of insignificant p-values.

Table 14. Turn-of-the-month effect.

This table reports the estimates of the regression $r_{it} = \alpha_i + \beta * TurnDummy + \varepsilon_{it}$ *, where* r_{it} *is the average daily logarithmic returns for index i in month t. TurnDummy is a dummy variable equals to 1 if it is the last and the first 3 trading days of the month and 0 otherwise. The GARCH (1,1) model is followed to adjust the heteroskedasticity and autocorrelation among the indexes. P-values are in parentheses. *, ** & *** denote significance level at 10%, 5% and 1% respectively.*

	TurnDummy
VN-INDEX	0.001211
	(0.112)
HNX-INDEX	0.001581*
	(0.066)
VN30	0.000977
	(0.213)
VN50	0.001471*
	(0.079)
SMALLCAP	0.002354*
	(0.065)
MIDCAP	0.001594
	(0.156)
LARGECAP	0.00144*
	(0.095)

5.4.2.4. Weekend effect

Last, we consider the relationship between Weekend effect and Vietnamese stock market. The results are shown in table 15. The beta coefficients of seven picked indexes send mixed signals. If there is an existence of Weekend effect, the beta coefficients will be negative stating that returns on Monday is significantly lower than the rest of the week. However, as can be seen from table 15, the coefficients of the major indexes are only negative for 5 indexes and positive for the rest two. Additionally, none of the p-values is significant.

Consequently, our results do not support the hypothesis that there is Weekend effect in Vietnamese stock market.

In general, providing the results of regressions on January effect, Weekend effect, Intra-month effect and Turn-of-the-month effect, we neither accept nor reject the second hypothesis that there are associations between Calendar anomalies and Vietnamese stock market returns.

Table 15. Weekend effect.

This table reports the estimates of the regression $r_{it} = \alpha_i + \beta * MonDummy + \varepsilon_{it}$ *, where* r_{it} *is the average daily logarithmic returns for index i in month t. MonDummy is a dummy variable equals to 1 if it is Monday and 0 otherwise. The GARCH (1,1) model is followed to adjust the heteroskedasticity and autocorrelation among the indexes. P-values are in parentheses. *, ** & *** denote significance level at 10%, 5% and 1% respectively.*

	MonDummy
VN-INDEX	-0.000106
	(0.878)
HNX-INDEX	-0.000306
	(0.603)
VN30	0.0000695

	(0.921)
VN50	-0.000165
	(0.824)
SMALLCAP	-0.00108
	(0.319)
MIDCAP	-0.001218
	(0.199)
LARGECAP	0.0000256
	(0.973)

6. CONCLUSION AND LIMITATIONS

6.1.Conclusions

This thesis investigates the relationships between Lunar effect and other Calendar anomalies and Vietnamese stock market from January 2009 to October 2014. There are seven major indexes and twenty industries indexes, which comprises 78,462 daily observations.

Although the topic of Calendar anomalies in stock market has been well studied in academic literature by various researchers all over the globe, this issue is still under-examined within Vietnamese stock market. As a result, this constitutes the principal motivations as well as contributions of this paper.

To analyze the mentioned issues, regressions following GARCH (1,1) model are employed, in which returns of selected indexes are dependent variables and dummy variables are the interested objects. The coefficients of dummy variables will provide the information regarding the connections between concerned variables.

Regarding the first hypothesis of the existence of relationship between lunar cycle and stock market returns, our results do not provide the evidence of this proposition to be true. Although there are consistent evidences of lower stock market returns during Full Moon period comparing to New Moon period, none of the figures is statistically significant at any conventional level. Besides, concerning the second hypothesis of relations between Vietnamese stock market returns and other Calendar effects, the outcomes deliver heterogeneous signals. We conclude that there is January effect in this stock market, i.e. daily returns of January are statistically significantly higher than other months'. On the other hand, although we discover some existences of Weekend effect, Turn-of-the-month effect and Intra-month effect in Vietnamese stock market, the coefficients are not statistically significant.

In conclusion, it is reasonable to declare that Vietnamese stock market is fairly efficient; most of Calendar anomalies cannot be found within the operation of this market, except January effect.

6.2. Limitations

This paper conducts an investigation based on Vietnamese stock market data from 2009 to 2014. The reason for choosing this time frame is that most of the indexes were founded only from January 2009. The studied period may be too short to produce statistically significant results. Therefore, the conclusion of market efficiency in Vietnam in previous section may be spurious due to shortage of data.

REFERENCE

Agrawal, Anup & Tandon, Kishore (1994). Anomalies or illusions? Evidence from stock markets in eighteen countries. Journal of International Money and Finance. Volume 13, pp 83-106.

Andrew, W. Lo & MacKinlay, A. Craig (1988). Stock Market Prices Do Not Follow Random Walks: Evidence from a Simple Specification Test. Review of Financial Studies, Volume 1, pp. 41-66.

Angus, Monica Diane (1970). The rejection of two explanations of belief in a lunar influence on behavior. [Online]. [Cited 05.11.2014]. Available from internet: <file:///Users/thuytran/Downloads/b13960763%20(1).pdf>

Ariel, Robert A. (1987). A monthly effect in stock returns. Journal of Financial Economics, Volume 18, pp.161-174.

Barber, Brad & Odean, Terrance (2000). Trading Is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors. Journal of Finance, Volume 55, pp. 773-806.

Barber, Brad & Odean, Terrance (2001). Boys Will Be Boys: Gender, Overconfidence, and Common Stock Investment. Quarterly Journal of Economics, Volume 16, pp. 262-92.

Bodie, Zvi, Kane, Alex & Marcus, Alan J. (2011). Investments. 9ed. United States: McGraw-Hill/Irwin. 978. ISBN 0-07-353070-3

Brock, William, Lakonishok, Josef & Lebaron, Blake. (1992). Simple Technical Trading Rules and the Stochastic Properties of Stock Return. Journal of Finance, Volume 47.

Brown, Philip & Mitchell, Jason (2008). Culture and stock price clustering: Evidence from The Peoples' Republic of China. Pacific-Basin Finance Journal. Volume 16, pp.95-120.

Brown, Philip, Angeline, Chua & Mitchell, Jason (2002). The influence of cultural factors on price clustering: Evidence from Asia-Pacific stock markets. Pacific-Basin Finanance Journal. Volume 10(3), pp. 307-332.

Cajochen, Christian, Altanay-Ekici, SongŸl, MŸnch, Mirjam, Frey , Sylvia , Knoblauch, Vera & Wirz-Justice ,Anna (2000). Evidence that the Lunar Cycle Influences Human Sleep, Current Biology. Volume 23, pp. 1485-1488

Campbell, David E. & Beets, John L. (1978). Lunacy and the moon. Psychological Bulletin. Volume 85(5), pp. 1123-1129

Campbell, John Y. & Shiller, Robert (1988). Stock Prices, Earnings and Expected Dividends. Journal of Finance, Volume 43, pp. 661-76.

Chandy, P.R, Haensly, P. & Shetty, S. (2007). Does full or new moon influence stock markets? A methodological approach. Journal of Financial Management and Analysis, Volume 20(1).

Cohen, Jacob (1977). Statistical power analysis for the behavioral sciences. 2ed. United States: Lawrence Erlbaum Associates Plublishers. ISBN 0-8058-0283-5

Conrad, Jennifer & Kaul, Gautam (1988). Time-Variation in Expected Returns. Journal of Business. Volume 61, pp. 409-25.

Crack, Timothy Falcon (1999). A classic case of ÒData SnoopingÓ for classroom discussion. Journal of Financial Education. Volume 25, pp. 92-97.

Cutler, W.B. (1980). Lunar and menstrual phase locking. American Journal of Obstetrics and Gynecology. Volume 137, pp. 834-839.

Danzl, Daniel F. (1987). Lunacy. Journal of Emergency Medicine. Volume 5(2), pp.91-95

De Bondt, W.F.M. & Thaler, R.H. (1987). Further Evidence on Investor Overreaction and Stock Market Seasonality. Journal of Finance, Volume 42, pp. 557-81.

De Castro, J.M. & Pearcey, S.M. (1995). Lunar rhythms of the meal and alcohol intake

of humans. Physiology & Behavior. Volume 57(3), pp. 439-444

DeBondt, Werner F. M. & Thaler, Richard (1985). Does the Stock Market Overreact? Journal of Finance, Volume 40, pp. 793-805.

Decree 58/2012/ND-CP. Decree on Providing Detailed Regulations For Implementation Of A Number Of Articles Of The Law On Securities.

Dichev, Ilia D. & Janes, Troy D. (2003). Lunar cycle effects in stock returns. The Journal of Pricate Equity. Volume 6(4), pp. 8-29

Dowling, Michael & Lucey, Brian (2005). Are weather induced moods priced in global equity markets? Journal of Multinational Financial Management. Volume 18(2).

Earth: Facts & Figures. [Online]. [Cited 08.11.2014] Available from Internet: < http://solarsystem.nasa.gov/planets/profile.cfm?Object=Earth&Display=Facts>

Edmans, Alex, Garci, Diego A. & Norli, Oyvind (2007). Sports sentiment and stock returns. The Journal of Finance. Volume 62(4).

Fama, E. F. (1991). Efficient Capital Markets. The Journal of Finance, Volume 46, pp.1575-1617.

Fama, E. F. & French, K. R. (1988). Dividend Yields and Expected Stock Returns. Journal of Financial Economics, Volume 22, pp. 3-25.

Fama, Eugene F. (1970). Efficient Capital Markets: A Review of Theory and Empirical. The Journal of Finance, Volume 25, pp. 383-417

Fama, Eugene F. & French, Kenneth R. (1988) Dividend Yields and Expected Stock Returns. Journal of Financial Economics, Volume 22, pp. 3-25.

French, Kenneth R. (1980). Stock Returns and the Weekend Effect. Journal of Financial Economics, Volume 8, Issue 1, pp.55-69.

Gao, Quinghui (2009). Lunar phases effect in Chinese stock returns. Conference: Business Intelligence and Financial Engineering. DOI: 10.1109/BIFE.2009.159

Ghiandoni G., Secli R., Rocchi M.B., & Ugolini G. Incidence of lunar position in the distribution of deliveries. A statistical analysis. Minerva Ginecologica. Volume 49(3), pp. 91-94

Givoly, Dan & Palmon, Dan (1985). Insider Trading and Exploitation of Inside Information: Some Empirical Evidence. Journal of Business, Volume 58.

Goodman, D. A. & Peavy, J.W. (1983). Industry Relative Price-Earnings Ratios as Indicators of Investment Returns. Financial Analysts Journal, Volume 39, pp. 60-66.

Graham, Benjamin & Dodd, David (1934). Security Analysis. 6ed. McGraw-Hill ISBN 0-07-159253-9.

Guide to Vietnamese securities (2011). Viet Capital Securities. [Online]. [Cited 07.11.2014] Available from internet: < www.stoxplus.com/download.asp?id=2785>

Guillon P., Guillon D., Lansac J., Soutoul J.H., Bertrand P. & Hornecker J.P (1986). Births, fertility, rhythms and lunar cycle. A statistical study of 5,927,978 births. Journal Gynecol Obstet Biol Reprod (Paris). Volume 15(3), pp. 265-271.

Herbst, Anthony F. (2007). Lunacy in the stock market- What is the evidence? Journal of Bioeconomics. Volume 9(1), pp. 1-18.

Hirshleifer, David & Shumway, Tyler (2003). Good day sunshine: Stock returns and the weather. The Journal of Finance. Volume 58(3), pp. 1009-1032

Jaffe, Jeffrey F. (1974). Special Information and Insider Trading. Journal of Business, Volume 47.

Jones P.K. & Jones S.L. (1977). Lunar association with suicide. Suicide and Life-Threatening Behavior. Volume 7(1), pp. 31-39

Kahneman & Tversky (1972). Subjective Probability: A Judgment of Representativeness. Cognitive Psychology, Volume 3, pp. 430-54.

Kahneman & Tversky (1973). On the Psychology of Prediction. Psychology Review,

Volume 80 , pp. 237-51

Kamstra, M., Kramer, L.A. & Levi, M.D. (2003). Winter blues: Seasonal affective disorder (SAD) and stock market returns. American Economic Review. Volume 93(1), pp. 324-243

Keim, Donald B. (1983). Size-related anomalies and stock return seasonality: Further empirical evidence. Journal of Financial Economics, Volume 12, Issue 1, pp.13-32.

Keim, Donald B. (1983). Size-related anomalies and stock return seasonality: Further empirical evidence. Journal of Financial Economics. Volume 12(1), pp. 13-32.

Keim, Donald B. & Stambaugh, Robert F. (1986). Predicting Returns in the Stock and Bond Markets. Journal of Financial Economics, Volume 17, pp. 357-90.

Kelly, I.W. & Rotton, J. (1985). Much ado the full moon: A meta-analysis of lunar-lunacy research. Psychological Bulletin. Volume 97(2), pp. 286-306

Kelly, I.W., Rotton, J. & Culver, R. (1986). The moon was full and nothing happened. Skeptical Inquirer. Volume 10(2), pp. 129-143

Kendall, Maurice & Hill, Bradford (1953). The Analysis of Economic Time Series, Part I: Prices. Journal of the Royal Statistical Society 116 (1), pp. 11-34

Kim, Chan Wung & Park, Jinwoo (1994). Holiday effects and stock returns: Further evidence. The Journal of Financial and Quantitative Analysis. Volume 29(1), pp. 145-157.

Kuhn, T. (1970). The Stucture of Scientific Revolutions. Chicago: University of Chicago Press.

Lakonnishok, Josef & Smidt, Seymour (1988). Are seasonal anomalies real? A ninety-year perspective. The Review of Financial Studies. Volume 1(4), pp. 403-425.

Latif, Madiha, Arshad, Shanza, Fatima, Mariam & Farooq, Samia (2011). Market Efficiency, Market Anomalies, Causes, Evidences, and Some Behavioral Aspects of

Market Anomalies. Research Journal of Finance and Accounting. Volume 2, No. 9/10.

Law, S.P. (1986). The regulation of menstrual cycle and its relationship to the moon. Acta Obstetricia et Gynecologica Scandinavica. Volume 65(1), pp. 45-48

Lieber, A.L. (1978). The lunar effect: Biological tides and human emotions. United States of America: Doubleday

Lintner, John (1965). The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. Review of Economics and Statistics.

Liu, Shu Ing & Tseng Jauling (2009). A Bayesian analysis of lunar effects on stock returns. Journal of Behavioral Finance. Volume 6 (3/4), p. 67

Markowitz, Harry (1952). Portfolio Selection. The Journal of Finance, Volume 7, pp. 77-91.

Moon facts. [Online]. [Cited 07.11.2014] Available from Internet: <http://www.moonconnection.com/moon_phases.phtml>

Moon phases. [Online]. [Cited 09.11.2014] Available from Internet: <http://aa.usno.navy.mil/data/docs/RS_OneDay.php>

Mossin, Jan (1966). Equilibrium in a Capital Asset Market. Econometric.

Neal, Richard D. & Colledge, Malcolm (2000). The effect of the full moon on general practice consultation rates. Family Practice. Great Britain: Oxford University Press 2000, Volume 17(6).

Palermo, Elizabeth (2014). Why does the moon shine? [Online]. [Cited 07.11.2014] Available from Internet: < http://www.livescience.com/45979-why-does-the-moon-shine.html>

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

Roman E.M., Soriano G., Fuentes M., Galvez M.L. & Fernandez C. (2004). The influence of the full moon on the number of admissions related to gastrointestinal bleeding. International Journal of Nursing Practice. Volume 10(6), pp.292-296

Sands, Joanne M & Miller, Lunn E. (1991). Effects of moon phase and other temporal variables on absenteeism. Psychological Reports. Volume 69, pp. 959-962

Sathyanarayanan, S. & Sivakumar, N. (2009). Do Krishna Paksha (new moon phase) and Shukla Paksha (full moon phase) affect the Indian stock market? - A study of lunar cycles in the Bombay Stock Exchange. International Journal of Indian Culture and Business Management. Volume 2(3), pp. 281-294.

Sauders, Edward M. (1993). Stock prices and Wall Street weather. The American Economic Review. American Economic Association. Volume 83(5), pp. 1337-1345.

Seyhun, H. Nejat (1986). Insiders' Profits, Costs of Trading and Market Efficiency. Journal of Financial Economics, Volume 16.

Sharpe, William (1964). Capital Asset Prices: A Theory of Market Equilibrium. Journal of Finance.

Shuhaiber , Jeffrey H. , Fava , Joseph L. , Shin , Tai , Dobrilovic , Nikola , Ehsan , Afshin , Bert , Arthur & Sellke , Frank (2013). The influence of seasons and lunar cycle on hospital outcomes following ascending aortic dissection repair. Interactive CardioVascular and Thoracic Surgery. Volume 17, pp. 818-822

Siegel, Ethan (2013). The top 5 things we'd miss if we didn't have a moon. [Online]. [Cited 08.11.2014] Available from Internet: <http://scienceblogs.com/startswithabang/2013/08/08/the-top-5-things-wed-miss-if-we-didnt-have-a-moon/>

Sitar, J. (1989). The effect of solar activity on lunar changes in cardiovascular mortality. Cas Lek Cesk. Volume 128(14), pp. 425-428.

Tasso, Jodi & Miller, Elizabeth (1976). The effects of the full moon on human

behavior. The Journal of Psychology: Interdisciplinary and Applied. Volume 98 (1), pp. 81-83

Thakur C.P. & Sharma D. (1984). Full moon and crime. Br. Med. J. (Clin. Res. Ed.), Volume 289, pp. 1789-1791

The water in you. . [Online]. [Cited 08.11.2014] Available from Internet: <http://water.usgs.gov/edu/propertyyou.html>

Valandro L., Zordan M., Polanska M., Puricelli P. & Colombo L (2004). Relevance of lunar periodicity in human spontaneous abortions. Gynecologic and Obstetric Investigation. Volume 58, pp. 179-182.

Vercillo, Kathryn. 10 Interesting Myths and Legends About The Moon. [Online]. [Cited 08.11.2014] Available from Internet: < http://kathrynvercillo.hubpages.com/hub/10-Interesting-Myths-and-Legends-About-The-Moon>

Vietnamese stock data. [Cited 09.11.2014] Available from Internet: <http://vietstock.vn/2010/12/co-phieu-largecap-midcap-hay-smallcap-se-but-pha-115-174301.htm>

World Bank Indicators. [Online] [Cited 05.11.2014] Available from Internet: <http://data.worldbank.org/indicator/>

Yuan, Kathy, Zheng, Lu & Zhu, Qiaoqiao (2001). Are investors moonstruck? Lunar phases and stock returns. Journal of Empirical Finance. Volume 13(1), pp. 1-23.

Zettinig G., Crevenna R., Pirich C., Dudczak R. & Waldhoer T. (2003). Appointments at a thyroid outpatient clinic and the lunar cycle. Department of Nuclear Medicine, Ludwig Boltzmann Institute of Nuclear Medicine, University of Vienna, Vienna, Austria. Wiener klinische Wochenschrift. Volume 115(9), pp. 298-301.

Zimecki, Michal (2006). The lunar cycle: effects on human and animal behavior and physiology. Advances in Hygiene and Experimental Medicine. Volume 60, pp. 1-7