



Faculty of Economics and Business

Effectiveness of Candlestick Charting in Malaysian Stock Market

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Effectiveness of Candlestick Charting in Malaysian Stock Market

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DECLARATION

The work described in this Master Thesis, entitled **Effectiveness of Candlestick Charting in Malaysian Stock Market** is to the best of the author's knowledge that of the author except where due reference is made. The thesis has not been accepted for any degree and not concurrently submitted in candidature of any other degree.

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ABSTRACT

The issue revolving around efficient market hypothesis and technical analysis has yet to be resolved until now. Technical analysis believes that future market movement can be forecasted by employing past prices and trading volume data which contradicts specifically with the weak form market efficiency whereby securities prices have fully reflected all historical information. The Japanese candlestick charting is considered to be a better trading tool with its ability to show trading signals earlier than other technical indicators which thus form the motivation for the current study instead of other technical analysis technique. Therefore, the purpose of this study is to empirically examine the effectiveness of candlestick charting in Malaysian stock market by using daily data from 3 January 2000 to 31 December 2014 among all public listed companies on Bursa Malaysia. A three-step research design is conducted which includes categorizing pattern, identifying trend prior to occurrence of pattern, and calculating stock return from a buy and hold perspective. The statistical significance of respective candlestick in predicting future stock price movement is examined with skewness adjusted t-test both before and after prevailing trend and with out-of-sample test acting as robustness checking. After transaction cost, it is found that only certain bearish candle lines and bearish reversal patterns are found to be effective in predicting bearish movement of stocks, while some bullish reversal patterns are only capable of generating bullish signals particularly among stocks with attribute of high trading volume. However, none of the continuation pattern shows significant predictive power. The findings also reveal that the effective holding period for candlestick trading strategy in Malaysian stock market generally lies within the 10-day to 15-day holding period.

Keywords: Efficient market hypothesis, technical analysis, candlestick charting, Malaysia

Keberkesanan Carta Lilin dalam Pasaran Saham Malaysia

ABSTRAK

Kewujudan isu antara hipotesis pasaran cekap dengan analisis teknikal masih tidak dapat diselesaikan sehingga kini. Analisis teknikal percaya bahawa pergerakan pasaran pada masa depan dapat diramalkan dengan menggunakan data harga saham dan juga jumlah dagangan pasaran yang mencanggahkan dengan hipotesis pasaran cekap lemah di mana harga sekuriti telah mencerminkan segala maklumat lalu. Analisis teknikal carta lilin dari Jepun dianggap sebagai teknik yang lebih baik dengan keupayaannya menunjukkan isyarat perdagangan lebih cepat berbanding dengan penunjuk teknikal analisis lain. Dengan itu maka terbentuklah motivasi kajian ini dan bukan terhadap teknik teknikal analisis yang lain. Oleh itu, tujuan penyelidikan ini adalah untuk mengkaji secara empirik keberkesanan carta lilin dalam pasaran saham Malaysia dengan menggunakan data harian dari 3 Januari 2000 sehingga 31 Disember 2014 dalam kalangan semua syarikat awam yang disenaraikan di Bursa Malaysia. Kajian ini dikendalikan dengan tiga langkah yang termasuk mengkategorikan corak, mengenal pasti trend sebelum kewujudan corak, dan mengira pulangan saham dari perspektif pembelian dan pertahanan. Kuasa ramalan bagi pelbagai jenis lilin dalam meramalkan pergerakan harga saham masa depan dikaji sebelum dan selepas trend dengan menggunakan ujian t penyelarasan kepencongan dan ujian out-of-sampel sebagai pemeriksaan keteguhan keputusan. Selepas kos transaksi, hanya lilin sebaris beruang dan corak pembalikan beruang tertentu didapati berkesan dalam meramalkan trend menurun bagi saham, manakala beberapa corak pembalikan lembu hanya dibuktikan berkesan dalam menjanakan isyarat naik dalam kalangan saham yang mempunyai ciri-ciri jumlah dagangan yang tinggi. Bagaimanapun, tiada kuasa

ramalan yang dijumpai bagi semua corak kesinambungan. Penemuan kajian juga menunjukkan bahawa tempoh pegangan berkesan bagi carta lilin dalam pasaran saham Malaysia adalah dalam lingkungan dari sepuluh hingga lima belas hari.

Kata kunci: *Hipotesis pasaran cekap, analisis teknikal, carta lilin, Malaysia*

TABLE OF CONTENTS

	Page
DECLARATION	i
ACKNOWLEDGEMENTS	ii
ABSTRACT	iii
ABSTRAK	iv
TABLE OF CONTENTS	vi
LIST OF TABLES	x
LIST OF FIGURES	xiv
CHAPTER 1: INTRODUCTION	1
1.1 Introduction	1
1.2 Background of the study	2
1.3 Problem statement	6
1.4 Research questions	10
1.5 Research objectives	10
1.6 Significance of the study	12
1.7 Scope of the study	12
CHAPTER 2: LITERATURE REVIEW	13
2.1 Chapter overview	13
2.2 Efficient Market Hypothesis	13
2.3 Behavioral finance	16
2.4 Technical analysis	17

2.5	History of Japanese candlestick charting	23
2.6	Interpretation of candlestick charting	25
2.6.1	Candlestick lines	27
2.6.2	Reversal patterns	32
2.6.3	Continuation patterns	49
2.7	Positive evidence on candlestick charting	56
2.8	Negative evidence on candlestick charting	65
2.9	Chapter summary	71
 CHAPTER 3: METHODOLOGY		 74
3.1	Chapter overview	74
3.2	Data description	74
3.3	Research framework	75
3.4	Research design	78
3.4.1	Categorize patterns	78
3.4.2	Identify trends	78
3.4.3	Calculate profits	79
3.5	Transaction costs	80
3.6	Decision rules	81
3.7	Hypothesis setting	82
3.8	Methods used for testing effectiveness of candlestick	82
3.8.1	Descriptive statistics	83
3.8.1.1	Mean	83
3.8.1.2	Standard deviation	83

3.8.1.3	Skewness	84
3.8.1.4	Kurtosis	85
3.8.1.5	Maximum and minimum	85
3.8.2	Binomial test	86
3.8.3	Skewness adjusted t-test	87
3.8.4	Out-of-sample test	89
3.9	Chapter summary	89
 CHAPTER 4: RESULTS AND DISCUSSION		 91
4.1	Chapter overview	91
4.2	Statistical properties of candlestick charting	91
4.2.1	Descriptive statistics	92
4.2.2	True return rate of candlestick lines	93
4.2.3	True return rate of reversal patterns	96
4.2.4	True return rate of continuation patterns	103
4.3	Predictive power of candlestick lines	106
4.4	Predictive power of reversal patterns	109
4.4.1	Reversal patterns for in-sample test	109
4.4.2	Reversal patterns for out-of-sample test	111
4.5	Predictive power of continuation patterns	122
4.5.1	Continuation patterns for in-sample test	122
4.5.2	Continuation patterns for out-of-sample test	123
4.6	Trading volume effect	128
4.6.1	Average trading volume for in-sample test	128

4.6.2	Average trading volume for out-of-sample test	137
4.7	Comparing effectiveness of candlesticks	145
4.7.1	In-sample and out-of-sample test	145
4.7.1.1	Effective holding period of candlestick lines	145
4.7.1.2	Effective holding period of reversal patterns	145
4.7.1.3	Effective holding period of continuation patterns	147
4.7.2	Sub-sample test on trading volume	155
4.8	Chapter summary	162
 CHAPTER 5: CONCLUSIONS		165
5.1	Conclusions	165
5.2	Implications of the study	169
5.2.1	Theoretical implications	169
5.2.2	Practical implications	169
5.3	Limitations of the study	170
5.4	Recommendations for future research	171
 REFERENCES		172
 APPENDICES		180

LIST OF TABLES

		Page
Table 1.1	Top 15 largest stock brokers trading in Bursa Malaysia in 2014	5
Table 3.1	Decision rules for proving predictive power of candlesticks	82
Table 4.1	Summary statistics for stock returns	92
Table 4.2	Bearish rate of bearish candle lines from 1 to 15 holding days from 2000 to 2011	95
Table 4.3	Bullish rate of bullish candle lines from 1 to 15 holding days from 2000 to 2011	95
Table 4.4	Bearish rate of bearish reversal patterns before and after trend from 1 to 15 holding days from 2000 to 2011	99
Table 4.5	Bullish rate of bullish reversal patterns before and after trend from 1 to 15 holding days from 2000 to 2011	101
Table 4.6	Bearish rate of bearish continuation patterns before and after trend from 1 to 15 holding days from 2000 to 2011	104
Table 4.7	Bullish rate of bullish continuation patterns before and after trend from 1 to 15 holding days from 2000 to 2011	105
Table 4.8	Average returns of single line candlesticks from 1 to 15 holding days for in-sample from 2000 to 2011	107
Table 4.9	Average returns of single line candlesticks from 1 to 15 holding days for out-of-sample test from 2012 to 2014	108
Table 4.10	Average returns of bearish reversal patterns before and after trend from 1 to 15 holding days for in-sample from 2000 to 2011	114

Table 4.11	Average returns of bullish reversal patterns before and after trend from 1 to 15 holding days for in-sample from 2000 to 2011	116
Table 4.12	Average returns of bearish reversal patterns before and after trend from 1 to 15 holding days for out-of-sample test from 2012 to 2014	118
Table 4.13	Average returns of bullish reversal patterns before and after trend from 1 to 15 holding days for out-of-sample test from 2012 to 2014	120
Table 4.14	Average returns of bearish continuation patterns before and after trend from 1 to 15 holding days for in-sample from 2000 to 2011	124
Table 4.15	Average returns of bullish continuation patterns before and after trend from 1 to 15 holding days for in-sample from 2000 to 2011	125
Table 4.16	Average returns of bearish continuation patterns before and after trend from 1 to 15 holding days for out-of-sample test from 2012 to 2014	126
Table 4.17	Average returns of bullish continuation patterns before and after trend from 1 to 15 holding days for out-of-sample test from 2012 to 2014	127
Table 4.18	Average returns of bearish reversal patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares from 2000 to 2007	131
Table 4.19	Average returns of bullish reversal patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares from 2000 to 2007	133

Table 4.20	Average returns of bearish continuation patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares from 2000 to 2007	135
Table 4.21	Average returns of bullish continuation patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares from 2000 to 2007	136
Table 4.22	Average returns of bearish reversal patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares for out-of-sample from 2012 to 2014	139
Table 4.23	Average returns of bullish reversal patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares for out-of-sample from 2012 to 2014	141
Table 4.24	Average returns of bearish continuation patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares for out-of-sample from 2012-2014	143
Table 4.25	Average returns of bullish continuation patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares for out-of-sample from 2012-2014	144
Table 4.26	Effective holding period of candlestick lines between in-sample and out-of-sample	148
Table 4.27	Effective holding period of bearish reversal patterns between in-sample and out-of-sample	149
Table 4.28	Effective holding period of bullish reversal patterns between in-sample and out-of-sample	153

Table 4.29	Effective holding period of bearish continuation patterns between in-sample and out-of-sample	154
Table 4.30	Effective holding period of bullish continuation patterns between in-sample and out-of-sample	154
Table 4.31	Effective holding period of bearish reversal patterns between sub-samples	157
Table 4.32	Effective holding period of bullish reversal patterns between sub-samples	160
Table 4.33	Effective holding period of bearish continuation patterns between sub-samples	161
Table 4.34	Effective holding period of bullish continuation patterns between sub-samples	161
Table 4.35	Table of summary for candlesticks with significant predictive power	163

LIST OF FIGURES

		Page
Figure 2.1	Single line candlesticks	26
Figure 2.2	Black Candle	28
Figure 2.3	Short Black Candle	28
Figure 2.4	Long Black Candle	28
Figure 2.5	White Candle	28
Figure 2.6	Short White Candle	28
Figure 2.7	Long White Candle	28
Figure 2.8	Black Marubozu	29
Figure 2.9	Opening Black Marubozu	29
Figure 2.10	Closing Black Marubozu	29
Figure 2.11	White Marubozu	30
Figure 2.12	Opening White Marubozu	30
Figure 2.13	Closing White Marubozu	30
Figure 2.14	Doji	30
Figure 2.15	Long-Legged Doji	30
Figure 2.16	Gravestone Doji	31
Figure 2.17	Dragonfly Doji	31
Figure 2.18	Four-Price Doji	32
Figure 2.19	Spinning Tops	32
Figure 2.20	High Wave	32
Figure 2.21	Hammer	33
Figure 2.22	Hanging Man	33

Figure 2.23	Inverted Hammer	33
Figure 2.24	Shooting Star	33
Figure 2.25	Bullish Belt Hold	34
Figure 2.26	Bearish Belt Hold	34
Figure 2.27	Bullish Engulfing	35
Figure 2.28	Bearish Engulfing	35
Figure 2.29	Last Engulfing Bottom	35
Figure 2.30	Last Engulfing Top	35
Figure 2.31	Bullish Harami	36
Figure 2.32	Bearish Harami	36
Figure 2.33	Bullish Harami Cross	37
Figure 2.34	Bearish Harami Cross	37
Figure 2.35	Homing Pigeon	38
Figure 2.36	Descending Hawk	38
Figure 2.37	Piercing Line	39
Figure 2.38	Dark Cloud Cover	39
Figure 2.39	Bullish Meeting Lines	40
Figure 2.40	Bearish Meeting Lines	40
Figure 2.41	Bullish Kicking	41
Figure 2.42	Bearish Kicking	41
Figure 2.43	Bullish Doji Star	41
Figure 2.44	Bearish Doji Star	41
Figure 2.45	Tweezers Bottom	42
Figure 2.46	Tweezers Top	42

Figure 2.47	Morning Star	43
Figure 2.48	Evening Star	43
Figure 2.49	Morning Doji Star	43
Figure 2.50	Evening Doji Star	43
Figure 2.51	Bullish Abandoned Baby	44
Figure 2.52	Bearish Abandoned Baby	44
Figure 2.53	Bullish Tri-Star	44
Figure 2.54	Bearish Tri-Star	44
Figure 2.55	Three White Soldiers	45
Figure 2.56	Three Black Crows	45
Figure 2.57	Advance Block	46
Figure 2.58	Deliberation	46
Figure 2.59	Upside Gap Two Crows	47
Figure 2.60	Two Crows	47
Figure 2.61	Downside Gap Two Rabbits	48
Figure 2.62	Two Rabbits	48
Figure 2.63	Three Inside Up	48
Figure 2.64	Three Inside Down	48
Figure 2.65	Three Outside Up	49
Figure 2.66	Three Outside Down	49
Figure 2.67	Rising Window	50
Figure 2.68	Falling Window	50
Figure 2.69	Bullish Separating Lines	50
Figure 2.70	Bearish Separating Lines	50

Figure 2.71	On Neck Line	51
Figure 2.72	In Neck Line	51
Figure 2.73	Thrusting	52
Figure 2.74	Two Black Gapping Candles	52
Figure 2.75	Upside Tasuki Gap	53
Figure 2.76	Downside Tasuki Gap	53
Figure 2.77	Bullish Side-by-Side White Lines	53
Figure 2.78	Bearish Side-by-Side White Lines	53
Figure 2.79	Bullish Three-Line Strike	54
Figure 2.80	Bearish Three-Line Strike	54
Figure 2.81	Rising Three Methods	55
Figure 2.82	Falling Three Methods	55
Figure 2.83	Mat Hold	56
Figure 3.1	Research framework	77
Figure 3.2	Types of skewed distributions	84
Figure 3.3	Types of kurtosis distributions	85

CHAPTER 1

INTRODUCTION

1.1 Introduction

Efficient market hypothesis states that it is impossible to beat the market and obtain abnormal returns in all three forms of market efficiency namely the weak form, semi-strong form, and strong form efficient market as all available information have already been fully incorporated into the prices of financial assets (Fama, 1970). There are a number of studies which report Malaysian stock market to be in a weak form market efficiency as shown by Barnes (1986), Young (1994), Lim, Liew, and Wong (2005), Hoque, Kim, and Pyun (2007), and Kok and Munir (2015). Meanwhile, Lai, Balachandher, and Fauzias (2003), Kim and Shamsuddin (2008), and Cheong (2008) provide evidence indicating market inefficiency in Malaysia context.

Market inefficiency is believed to be intrigued by the occurrence of market anomalies through distortion of market events. The existence of market anomalies allow fundamental and technical analysis to be practicable. Both fundamental and technical analysts believe that the direction of future market movement can actually be forecasted by utilizing the correct tools and techniques. Fundamental analysis relies on financial statements to obtain the true value of the company and is appropriate for long run investment while technical analysis depends on signals from charts and calculation to forecast future market movement which is more suitable for short term trading (Kumar & Mohapatra, 2015; Lien, 2008).

Fundamental analyst predicts the intrinsic value of securities based on economic and accounting information which are retrieved from financial reports of the company. It is believed that the true value of the securities can be gained by analyzing balance sheet, income statement, and cash flow statement. Fundamental analysis serves to evaluate the growth of a company

based on its liquidity, profitability, and asset and debt management. Intrinsic value of a company can then be computed by discounted cash flow valuation, dividend discount model, relative valuation, or value-added methods. Typically, a strong business model is indicated by a high intrinsic value which concurrently suggesting a good prospect of investment. Thus, investment decision can be made easily based on fundamental analysis by taking advantage of the undervalued stocks to gain profits from trading (Bulkowski, 2012; Kumar & Mohapatra, 2015; Lien, 2008).

While the approach of fundamental analysis is deemed to be easy, technical analyst does not believe in the rational of such method as all fundamental information of the company has already been accounted for in the stock prices. Technical analyst on the other hand employs market statistics such as past prices and trading volume to forecast future market movement. This can be done by analyzing the signals from chart patterns and also numerical calculation. The indicators of Moving Average, Relative Strength Index, and Moving Average Convergence Divergence are derived through mathematical method. Meanwhile, visual patterns in charts form are usually used to project market trend besides reflecting changes in market psychology. Some of the charts which have been widely practiced by technical traders include the line charts, bar charts, point and figure charts, and also candlestick charting. Amongst that, the Japanese candlestick charting is a time-tested technique which has been practiced by Japanese traders for over 300 years ago (Kumar & Mohapatra, 2015; Lien, 2008; Murphy, 1999).

1.2 Background of the study

Based on the concept of weak form market efficiency, the use of past prices to predict future market movement is impractical as historical information has been embedded into the current prices based on the theory of efficient market hypothesis. However, growing evidence

from the studies of behavioral finance shows that investors do not always act rationally as it was assumed by the efficient market hypothesis. Thereby, academicians begin to perform serious studies regarding the theory and indicators of technical analysis. Positive evidence is even being accumulated for the studies that examine profitability of various technical analysis, which include Treynor and Ferguson (1985), Brock, Lakonishok, and LeBaron (1992), Lo, Mamaysky, and Wang (2000), Shen (2003), and Neely, Rapach, Tu, and Zhou (2011).

The oldest known form of technical analysis is believed to be the Dow Theory which can be traced back to 1884. In the field of finance, technical analysis has been ignored due to its controversy with the ground of weak form efficient market hypothesis. Despite that, the practice of technical analysis in the financial market is undeniable since centuries ago. In fact, the Japanese candlestick charting which is one of the most popular technical method owns the longest history of over 300 years ago and its usefulness is underscored with the inclusion of candlestick charting technique in every real time technical service providers (Lo & Hasanhodzic, 2011; Wagner & Matheny, 1994).

As both professional investors and amateur traders have relied heavily on technical analysis, nowadays technical analysis has become ubiquitous and is available in almost every stock trading software and online charting package. Candlestick charting is a popular technique under technical analysis which is based on visualization method and effective for capturing investor sentiment. The history of candlestick charting can be traced back to 1700s from the Japanese rice market with Munehisa Homma as the proponent who has said to win a hundred trades consecutively in the Japanese rice market by using such technique. However, candlestick charting is only confined to the Japanese market until it has been encountered by the Americans in the 1980s and officially exposed to the West in 1991 by Steve Nison who introduces his two

books entitled “Japanese Candlestick Charting Techniques” and “Beyond Candles” in the year 1991 and 1994 respectively (Morris, 1995; Nison, 1991; Nison, 2012).

Candlestick charting utilizes the relationship between the opening, high, low, and closing prices to form candlestick line and patterns. Candlestick lines and patterns will then portray specific market signals that shall guide traders in making investment decision to maximize their profit. With the knowledge of various types of reversal patterns and also continuation patterns, investors should know when to buy, hold, and sell their trades at the right time. Therefore, the technique of candlestick charting enables traders to gain short term profit by entering and exiting the market correctly at the right turning point through market timing (Bigalow, 2002; Northcott, 2009; Sadekar, 2015).

Stock price varies as a result of market forces between supply and demand. The existence of a stock market is to aid in regulating the exchange of shares between buyers and sellers. In the context of Malaysia, Bursa Malaysia or formerly known as Kuala Lumpur Stock Exchange (KLSE) acts as the platform to facilitate the securities transaction since its establishment in 1976. The products managed under Bursa Malaysia include equities, bonds, and derivatives with the FTSE Bursa Malaysia KLCI as the main composite index. In fact, Bursa Malaysia has been expanded from year to year with increasing number of stocks listed on the exchange and until now the total number of listed firms recorded on Bursa Malaysia is around 811 stocks under the Main market while only about 111 stocks listed under the Ace market. One of the fundamental criteria for company to list under the Main market is to own a total market capitalization of at least RM500 million upon listing, whereas no minimum operating track record or profit requirement is needed for listing under the Ace market. According to Bursa Malaysia, the purpose of Main market is to provide an ideal platform for established companies to raise funds, while Ace market is mainly designed for companies with

growth potential from all business sectors. Table 1.1 shows the top fifteen largest stock brokers recorded in 2014 by trading volume and trading value. In overall, the total trading volume which is at 1,061,310 million units corresponds to the total trading value of RM 1,063,584 million. Specifically, Affin Hwang Investment Bank has shown both largest trading volume and trading value at 178,605 million units and RM 128,731 million respectively.

Table 1.1: Top 15 largest stock brokers trading in Bursa Malaysia in 2014

No	Participating Organization	Trading Volume		Trading Value	
		Unit (million)	%	RM (million)	%
1	Affin Hwang Investment Bank	178,605	16.83	128,731	12.10
2	CIMB Investment Bank	95,202	8.97	116,768	10.98
3	RHB Investment Bank	145,011	13.66	101,258	9.52
4	Maybank Investment Bank	81,860	7.71	98,120	9.23
5	Kenanga Investment Bank	129,734	12.22	96,400	9.06
6	Credit Suisse Securities	13,361	1.26	64,588	6.07
7	AmInvestment Bank	42,973	4.05	57,267	5.38
8	Hong Leong Investment Bank	50,768	4.78	45,204	4.25
9	TA Securities	75,023	7.07	43,572	4.10
10	UBS Securities Malaysia	7,981	0.75	32,330	3.04
11	Public Investment Bank	28,116	2.65	28,163	2.65
12	Macquarie Capital Securities	7,296	0.69	25,639	2.41
13	CLSA Securities	4,787	0.45	23,772	2.24
14	J.P. Morgan Securities	4,699	0.44	21,814	2.05
15	Nomura Securities	5,267	0.50	20,511	1.93
16	Others	190,619	17.97	159,439	14.99
TOTAL		1,061,310	100	1,063,584	100

Source: Bursa Malaysia, 2015

Apart from prices, trading volume also plays an important role in the stock market. Trading volume represents the unit of transaction for securities in the market usually on a daily basis. As stressed by Dormeier (2011), volume analysis is important in technical analysis to help investors make smarter trades as trading volume denotes the liquidity of stock, validates stock price, and also substantiates information. High liquidity is implied from high trading volume that leads to rapid transaction of shares at good price. High volume of shares traded in the market also helps to confirm the price besides revealing the flow of new information through changes in trading volume (Leibovit, 2011; Mitchell, 2014).

Prior studies related to candlestick charting technique are rather limited even though this technique has existed for centuries. The study by Caginalp and Laurent (1998) is among the foremost research to show the three-day reversal patterns in possessing the ability to predict future market trend. Besides, positive evidence supporting the effectiveness of candlestick trading technique is mostly accumulated in the Taiwan stock market. For instance is by Shiu and Lu (2011), Lu and Shiu (2012), Lu, Chen, and Hsu (2014), and Lu (2014). Goo, Chen, and Chang (2007) discover that different candlestick requires different holding period for better performance while Lu, Chen, and Hsu (2014) realize the insignificance of trend definition in affecting the effectiveness of candlestick. Apart from that, negative evidence on candlestick charting have also been depicted by Marshall, Young, and Rose (2006) among DJIA component stocks while Marshall, Young, and Cahan (2008) for the Tokyo Stock Exchange.

1.3 Problem statement

The issue revolving around efficient market hypothesis and technical analysis has yet to be resolved until now. Efficient market hypothesis is deemed to be the pillar of modern finance theory which has been acknowledged by academicians in the finance world since centuries ago. Fama (1970) proposes that all readily available information including the public and private information have been fully incorporated into the prices of financial assets. Hence, all three forms of market efficiency signify the impossibility to achieve abnormal returns in an efficient market in spite of any source of information received. Technical analysis on the other hand believes that market psychology can be traced by analyzing market trend based on past prices and trading volume data with the assistance from charts and numerical calculation (Kumar & Mohapatra, 2015; Murphy, 1999). Thereafter, traders can make investment decision by utilizing the forecasted trading signals from technical analysis to obtain profits through market timing.

In particular, technical analysis is rejected by the weak form efficient market hypothesis which states that the use of historical information to forecast future market movement is useless following the definition from Fama (1970).

Notwithstanding the continuous criticisms from the proponents of efficient market hypothesis, technical analysis is still widely applied by traders in the real time securities market. Positive evidence which supports the application of technical analysis are accumulated from Treynor and Ferguson (1985), Brock et al. (1992), Lo et al. (2000), Shen (2003), and Neely et al. (2011). Recent findings from behavioral finance which show that investors do not always make decision rationally has added value to the practice of technical analysis methods (Marshall et al., 2006). Following that, emerging studies on behavioral finance have also discovered the incapability of fundamental analysis to capture irrational investor sentiment which thus lead to the proposition of the positive feedback rules (De Long, Shleifer, Summers, & Waldmann, 1990) and anchoring effects (Tversky & Kahneman, 1974) to explain such phenomenon from the perspective of technical analysis.

Technical analysis tools can be classified according to visual or calculation basis. Visual type technical indicators include bar chart, line chart, point and figure chart, Elliott Wave, and candlestick charting whereas numerical type technical indicators comprise of the Moving Average, Relative Strength Index (RSI), Moving Average Convergence Divergence (MACD), Stochastic, Momentum, Bollinger Bands, and Fibonacci Sequence (Low, 2014; Schwager, 2017; Tinghino, 2010). When comparing among other technical indicators, candlesticks serve as one of the most powerful technical analysis tools among traders as candlestick act as a leading indicator which is able to portray signals earlier than other technical trading strategy (Pasternak, 2006; Tam, 2015). It is true that Momentum and Stochastic indicators also able to reveal advanced signal since usually momentum precedes price. However, even rapidly moving

Momentum indicators such as Commodity Channel Index (CCI) usually lag the candle signal by a day or two. Not to mention too, the break of a trendline or a moving average crossover which is known as a confirming signal for trading activities typically occurs days later than the peak or bottom of price and much after the candlestick signal (Nison, 2012; Pasternak, 2006; Sadekar, 2015). As candlestick charting technique is based on the analysis of the price itself, which distincts it from other technical indicators, therefore candlestick charting is worth to study as nothing can beat the analysis of price itself with formation of signals earlier than other technical indicators like Momentum, Stochastic, and Moving Average technical tools (Nison, 2012; Tam, 2001; Tam, 2015).

Candlestick charting which is developed by Japanese rice traders in the 17th century is still one of the most popular technical analysis methods in today's equity markets. Candlestick analysis is unique as it is very short term and able to generate buy and sell signals based on the relationship between open, high, low, and close prices within a day and over successive days. The daily patterns are often used by investors to predict future turning points of stock price in order to make short term investment decision (Lu & Shiu, 2012; Wagner & Matheny, 1994). The flexibility and versatility of candlestick charting is underscored with its ability to function as a stand-alone technique or to combine with other Western technical indicators for more accurate prediction of future price movement (Morris, 1995; Nison, 1991). Candlestick charting has also been particularly influential in practice as up-to-date and detailed data are provided by most real time financial information services using the candlestick approach, such as Bloomberg, Share Investor, and Reuters while candlestick analysis is even being implemented in Microsoft Excel. With the increasing use of candlestick charting, it is thus necessary to find more effective ways to improve the reliability of candlestick charting trading strategy.

When the theory of efficient market hypothesis meets with the practice of candlestick charting trading strategy, a research issue arises due to different school of thought. Indeed, the application of candlestick charting technique is deemed to be very suitable in Malaysian stock market as it is observed to exhibit short term rallies follow by short term corrections with trading cycle ranges from three to fifteen days (Tam, 2001). However, such findings is not empirically tested in Malaysia. The practicability of candlestick trading strategy in Malaysia is mostly based on observations from traders which sometimes may be misleading. As the effectiveness of candlestick charting has been demonstrated empirically in the Taiwan stock market (Lu & Shiu, 2012; Lu, Shiu, & Liu, 2012; Lu, 2014) and also in the European stock market (Caginalp & Laurent, 1998; Lu & Chen, 2013) and even in China (Zhu, Atri & Yegen, 2016), there is no known research in the past that has empirically tested on the predictability of candlestick charting in the Malaysia context. As it has yet to be examined empirically, the reliability of candlestick trading strategy in Malaysian market is thus questionable. Therefore, this study intends to fill the research gap by investigating the application of candlestick trading strategy in Malaysian stock market to find out if its effectiveness is really shown and validated empirically when applying to out of sample through empirical testing. If candlestick technique is found to be effective, to some extent it may offer investors certain valuable information which is useful for securities trading especially in making short term investment decision. Accordingly, the predictability of all types of candlestick charting will be examined empirically in the present study including the continuation patterns which have been overlooked by past researchers apart from the reversal patterns and candlestick lines.

1.4 Research questions

The research questions for the present study examine the effectiveness of candlestick charting trading strategy in Malaysian stock market. The research questions are formed to answer the research objectives and are as follows:

- i. Are candlestick lines capable of predicting future price movement for Malaysian stock market?
- ii. Are candlestick reversal patterns capable of predicting future price movement for Malaysian stock market?
- iii. Are candlestick continuation patterns capable of predicting future price movement for Malaysian stock market?
- iv. How does trading volume affect the profitability of candlestick charting in Malaysian stock market?
- v. What is the effective holding period and/or maximum holding period for candlestick charting in Malaysian stock market?

1.5 Research objectives

➤ General objective

To test the effectiveness of candlestick charting technique in Malaysian stock market.

➤ Specific objectives

- i. To examine the statistical significance of candlestick lines in predicting future stock price movement for Malaysian market.
- ii. To investigate the statistical significance of reversal patterns in predicting future stock price movement for Malaysian market.

- iii. To test the statistical significance of continuation patterns in predicting future stock price movement for Malaysian market.
- iv. To study the effect of trading volume on statistical significance of candlesticks in predicting future stock price movement for Malaysian market.
- v. To determine the effective holding period and/or maximum holding period of candlestick charting in Malaysian stock market.

The objectives for this study are divided into general objective and specific objectives. The general objective of this study is to investigate the effectiveness of candlestick charting technique in Malaysian stock market. The effectiveness of candlestick charting is determined based on the predictability of candlestick charting in forecasting future market movement as measured from the statistical significance of average returns generated by respective candlestick from various holding periods besides taking into account the effective holding period.

Meanwhile, the specific objectives for this study focus on the investigation of capability of various types of candlesticks in predicting future stock price movement in the context of Malaysian stock market. The first specific objective is to examine the statistical significance of candlestick lines in portraying day trading signals to predict future stock price movement for Malaysian market. Secondly, this study also aims to investigate the statistical significance of reversal patterns in portraying trend reversal typically in the opposite direction for Malaysian market. At the same time, this study also intends to measure the statistical significance of continuation patterns in revealing persistence of prevailing trend for Malaysian market. Moreover, this study also takes into account the effect of trading volume towards the statistical significance of candlestick charting in predicting future stock price movement as trading volume is considered as one of the important components that control the movement of share

price in the stock market. Last but not least, this study also seeks to determine the effective holding period and/or maximum holding period of candlestick charting in the context of Malaysian stock market based on their statistical significance of average returns from different holding days.

1.6 Significance of the study

The main focus of this study is to examine the effectiveness of candlestick charting in predicting future price movement for Malaysian stock market. The predictive power of candlestick charting is measured based on the trading signals as revealed from the average returns of respective candlestick lines and patterns. The results for this study should enhance the understanding of investors towards the application of candlestick charting technique in Malaysian stock market and thus help to improve investors' skill on market timing. Therefore, the practical contribution of the present study is to provide further insight into the ability of investors to time the market over very short term time horizons.

1.7 Scope of the study

The scope of the present study focuses on the application of candlestick charting in Malaysian stock market among all public listed companies on Bursa Malaysia. Accordingly, the capability of various types of candlesticks in predicting future price movement are investigated including the continuation patterns which have been overlooked by past researchers apart from the common candlestick lines and reversal patterns. All listed firms from both Main market and Ace market which are still active during the retrieval date of 1 December 2015 are selected as sample data and daily stock prices are downloaded respectively within a total sample period of fifteen years from 2000 to 2014.

CHAPTER 2

LITERATURE REVIEW

2.1 Chapter overview

The emerging popularity of technical analysis is observed recently after the new field of behavioral finance has provided evidence that investors do not always make decision rationally. In the past, there is only limited research on technical analysis due to its confliction with the efficient market hypothesis which had stood strongly in the finance world for centuries. Therefore, the first section starts off with behavioral finance which then leads to technical analysis. Thereafter, the history and background of candlestick charting is discussed in the subsequent section and follow by definitions on various types of candlesticks. The penultimate section presents positive and negative evidence on efficacy of candlestick charting technique from review of prior studies. The last section concludes this chapter.

2.2 Efficient Market Hypothesis

Efficient market hypothesis is developed by Eugene Fama in the early 1960s which explains the impossibility to attain abnormal returns because all relevant information has been fully incorporated into the existing securities' prices. Basically, an efficient market can be divided into three categories, namely the weak form, semi-strong form, and strong form market efficiency. All three forms of market efficiency do not allow investors to take advantage of new information to earn abnormal profit for any types of assets such as stocks, bonds, futures or even currencies (Fama, 1970; Read, 2012).

Weak form efficient market hypothesis claims that all historical information including the historical prices, past rate of return, trading volume data, and other market-generated information such as odd-lot transactions and block trades have been fully incorporated into

current asset prices. Thus, the market should act independently and there is no relationship between any historical data with future returns (Fama, 1970; Read, 2012). In fact, technical analysis is rejected in a weak form efficient market as future prices could not be predicted based on past prices. Therefore, statistical tests for independence and trading tests are utilized to test for the weak form market efficiency. Examples of statistical tests for independence include the autocorrelation tests and runs tests while the filter rule is one of the trading tests which shows that abnormal return could not be achieved after transaction costs. Autocorrelation tests measure the significance of positive or negative correlation of returns over time while runs tests determine the correlation of returns by counting the actual number of runs for a series of price changes to compare it with the table for expected number of runs (Brealey, Myers, & Allen, 2008; Moles, Parrino, & Kidwell, 2011).

Semi-strong form efficient market hypothesis contends that all publicly available information which includes basic corporate information like dividend announcements, price-to-earnings ratio (P/E), dividend yield ratio, book-to-market value, stock splits, economy news and political news have been infused into current market prices (Fama, 1970; Read, 2012). It encompasses the weak-form efficient market hypothesis as all the market information from weak-form hypothesis is considered public too. The tests for the semi-strong form efficient market hypothesis include the event study and also time series regression analysis. Event study examines the reaction of stock prices to specific significant economic events by measuring returns from before and after the event. Meanwhile, time series tests intend to determine the public information that can best estimate the future rate of return from the long run historical rate of return (Brealey et al., 2008; Moles et al., 2011).

Strong form efficient market hypothesis on the other hand asserts that all public and private information including company insider information have been fully and relevantly

reflected in current prices. Insider information is non-public and hence only available to the company insiders like corporate executives and major shareholders (Fama, 1970; Read, 2012). As strong form market efficiency is reflective of both public and private information, thus the tests should evolve around groups of investors that possess excess information, which include the insiders such as senior managers, exchange specialists who own specific order information, and also professional money managers who is responsible for the management of securities' portfolio (Brealey et al., 2008; Moles et al., 2011).

Barnes (1986) who utilizes monthly data, Yong (1994) and Hoque et al. (2007) who use weekly data, Kok and Goh (1995) and Lim et al. (2005) who employ daily prices have provided evidence to show Malaysia to be in a weak form efficient market. Meanwhile, a recent study by Kok and Munir (2015) which include the daily prices of individual finance stocks in Malaysia have also discovered that the finance sector is in weak form efficiency after applying panel nonlinear unit root test that accounts for heterogeneity and panel stationarity test that allows for the presence of structural breaks and cross-sectional dependence. However, Malaysian market is also found to be inefficient as shown by Lai et al. (2003), Kim and Shamsuddin (2008), while Cheong (2008) shows evidence of sectoral inefficiency in Malaysia.

Market anomalies is defined as the exploitation of any event to generate abnormal returns which causes market inefficiency. Efficient market hypothesis can be violated by firm, seasonal, event, and accounting anomalies. Firm anomalies are related to specific firm characteristics like the small firm effect which proves that smaller size companies tend to outperform larger size companies even on a risk adjusted basis. Seasonal anomalies rely on certain time effect like the January anomaly and time of the day effect. January anomaly believes that stock price tends to rise at the first few days of January and also during the last few days in December while time of the day effect asserts that securities' prices tend to be

higher in the first forty five minutes and also the last fifteen minutes of the day. Event anomalies will cause changes in price after the occurrence of certain event like listing announcement which tends to increase the share price. P/E ratio acts as one of the accounting anomalies in the market whereby stocks with lower P/E ratio tend to produce higher returns (Brealey et al., 2008; Moles et al., 2011).

2.3 Behavioral finance

Behavioral finance provides explanation to the phenomenon of market anomalies and inefficiencies from the perspective of investor psychology. This theory asserts that investors are not always rational in decision making which thus leads to the probability of occurrence for incorrect investment decision due to emotional feelings when trading or from erroneous analysis of prices. Therefore, behavioral finance believes that such market anomalies can be identified from certain historical price patterns and allow for exploitation to attain excess returns. Market participants tend to overestimate their own ability when comes to prediction of future price movement which thus leads to over or under reaction towards the availability of new unanticipated information. The fact that humans are short term oriented and emotional is deemed to correspond with the price movements in the securities market. Besides, investors are likely to be dominated by herd behavior which is the tendency to mimic the actions of a larger group. As a result, mispricing of the stock market often occurs as investors prone to follow any decisions made by the herd even of a bad and irrational decision. In short, the theory of behavioral finance interprets on market inefficiency which believes that excess returns can be obtained by exploiting market anomalies caused by behavioral biases (Baker & Nofsinger, 2010; Montier, 2009; Pompian, 2012).

2.4 Technical analysis

The emergence of behavioral finance which shows the irrational component of investors in decision making validates the theory of technical analysis despite its controversy with the efficient market hypothesis. Technical analysis is typically a graphical method of security evaluation based on market statistics such as past prices and volume. Unlike fundamental analysis which aims to discover the true intrinsic value of a security, technical analysis is very much depends on charts and visual diagrams to identify price movement from patterns. Technical analysis takes into account the psychological factor by measuring the irrational component or investor sentiment in the market. Thus, technical analysis indicates any shift in market psychology through changes of market trend. Apart from that, technical analysis helps investors to be objective by diminishing their emotion in market trading through a view on the market from different perspective (Edwards, Magee, & Bassetti, 2013; Koonitz, 2014; Lim, 2015).

The oldest form of technical analysis in United States is believed to be the Dow Theory which can be traced back to 1884. In fact, Dow Theory is deemed to be the fundamental for today's technical analysis and was inevitably originated from Charles Dow. Charles Dow originally worked as a reporter and then as a writer and also editor. After the establishment of Dow Jones and Company, he officially published his articles in the Wall Street Journal in the late 19th century. Until around 1900, he started to observe the movement of prices in financial instruments based on Dow Jones Industrial Average and the Dow Jones Transportation Index which results in a series of papers that focus on market trends and stock price movement from him before he died in 1902. Accordingly, a set of beliefs on the behavior of financial market has been proposed by Charles Dow. Such development was then refined by S.A. Nelson and William Hamilton into today's Dow Theory which consist of six principles and assumptions.

Dow Theory concentrates on the overall movement of the stock market which is also a reflection of the business condition in the market. This is a bit dissimilar if compared to technical analysis which focuses more on the movement of specific securities. Nevertheless, the six basic principles from Dow Theory has remained to act relevantly on current market indexes even though Dow Theory had been created for over 100 years ago (Edwards et al., 2013; Lim, 2015; Schannep, 2008; Sheimo, 1998)

The first principle of Dow Theory explains the formation of market by three trends which are the primary trend, secondary trend, and the minor trend. Primary trend is a major trend in the market with long term basis which usually lasts for more than a year. The primary trend is considered as rising or bullish when prices move upward in the market, whereas it is considered as falling or bearish when price indexes decrease in the market. The overall direction of the market is determined by using trend analysis. Basically, an uptrend occurs when successive rallies have higher highs and higher lows than previous one. On the other hand, downtrend takes place when successive lower lows and lower highs appear compared to the previous sell-off. Subsequently, secondary trend arises in an intermediate term from three weeks to several months. Secondary trend acts as corrections to the primary trend, whereby it moves in a reverse direction to the primary trend. The third one is a short run trend which takes about one day to three weeks and is known as a minor trend. Minor trend is related to the secondary trend by moving against the direction of the secondary trend and as well acts as a corrective move to secondary trend. It is important to notice that all these three trends can happen together in any market movement (Edwards et al., 2013; Lim, 2015; Murphy, 1999; Schannep, 2008; Sheimo, 1998).

The second principle claims that the market trend is categorized into three phases, namely the accumulation phase, public participation phase, and the distribution or excess phase.

The first stage is the accumulation phase whereby informed investors begin to enter the market by trading actively with the assumption that a potential recovery or turning point is ahead right after the end of the worst condition. Such trading action usually occurs at the end of a downtrend and is beyond the interest of most of the investors. Thus, there is not much change to the price of securities at this stage as the informed investors only act as a minor group that are not persuasive enough to affect the price. When this good news permeate to the market, the public starts to trade in the same direction as the informed investors, hence causing prices to rise rapidly at this public participation phase. Follow by the widespread of the news on improved business condition, the market will then move into an excess phase in which more and more investors trade on the same side. At the same time, smart traders also begin to exit their positions at this excess phase (Edwards et al., 2013; Lim, 2015; Murphy, 1999; Schannep, 2008; Sheimo, 1998).

The third principle of Dow Theory states that market discounts everything in the sense that all relevant information which arises in the market has been fully reflected in the stock price and indexes. This include the news which are capable to affect the supply and demand in the market, including the past, public, and also private information. At this point, it resembles with the beliefs of the efficient market hypothesis (Edwards et al., 2013; Lim, 2015; Murphy, 1999; Schannep, 2008; Sheimo, 1998).

The fourth principle of Dow Theory lies on the concept that the averages must confirm each other. This tenet simply means that any reversal in the market entails confirmation from both the Dow Jones Industrial Average and the Dow Jones Transportation Index as created by Charles Dow. The rationale behind such tenet is that both the Industrial Average and Rail Average are correlated in the sense that the shipping of manufacturing goods from the industrial requires the transportation from the rail sector. Thus, any increase in the profits of industrial

sector will also cause a rise in the profits of the transportation sector (Edwards et al., 2013; Lim, 2015; Murphy, 1999; Schannep, 2008; Sheimo, 1998).

The fifth principle claims that volume is essential for determining the market trends. Price movement is the main factor in conveying signals from the market according to Dow Theory, whereas volume has been recognized as the second indicator for price signals. Based on this principle, volume will be affected by the direction of the trend. For instance, during an uptrend, an increase in volume should be observed when the price rises and a decrease in volume should be observed when the price falls. The reason behind this is that an increase participation of traders in certain stock has moved the price up, and such condition is a significant indicator of a trend development and hence the market should be moving in the direction of the trend (Edwards et al., 2013; Lim, 2015; Murphy, 1999; Schannep, 2008; Sheimo, 1998).

The last principle as suggested by Dow Theory mentions that a trend remains in the market until a clear reversal is detected. A definitive reversal signal need to be seen before the traders are confident enough to switch their trading direction, otherwise most of the traders trade by following the direction of the trend (Edwards et al., 2013; Lim, 2015; Murphy, 1999; Schannep, 2008; Sheimo, 1998).

Some of the common technical indicators employed in real time trading system include Moving Average, Moving Average Convergence Divergence (MACD), Momentum, Stochastic, Bollinger Bands, Elliott Waves and Fibonacci sequence. Moving Average is a simple technical tool which reduces the noise on price chart and creates a constantly updated average price over a specific period of time to predict the direction of price movement. Meanwhile, MACD is based on the difference between a fast moving average with shorter time length and a slow moving average with longer time length (Koonitz, 2014; Larson, 2012; Lim, 2015; Low, 2014).

The Momentum indicator compares current price with previous price from a selected number of periods ago while the Stochastic oscillator normalizes price as a percentage between 0 and 100 which signals overbought conditions above 80 and oversold conditions below 20. On the other hand, Bollinger Bands are volatility bands measured as standard deviation plotted above and below a moving average (Koonitz, 2014; Low, 2014; Tinghino, 2010). Alternatively, Elliott Wave theory refers to the formation of wave patterns with Fibonacci based ratios to predict price movement (Brown, 2012; Gorman & Kennedy, 2013; Lim, 2015).

Thirteen technical analysis methods are compared by Tham, Azizan, and Lau (2012) in the context of Malaysian stock market to find out that twelve out of thirteen technical indicators reveal significantly positive gross returns without transaction costs which thus refute the assertion that Malaysian market to be in weak form efficiency. The thirteen technical trading systems include in the study are 1-30 dual simple moving average crossover, 5-20 dual simple moving average crossover, 3-7 exponential moving average crossover, Relative Strength Index (RSI), momentum, stochastic, Moving Average Convergence Divergence (MACD), five Channel Breakout Systems (CBO 20-20, CBO 20-10, CBO 20-5, CBO 10-5 and CBO 15-5) and the Directional Movement Index (DMI). Moving Average as a simple technical trading tool commonly used among traders has drawn much attention from practitioners and also researchers. Technical trading rules based on crossover of two moving averages is found to be profitable in Czech stock market after deduction of transaction cost by Kresta and Franek (2015). It is also observed that moving average rules have predictive power for changes in various Asian, Latin American, and European emerging stock markets. (Ahmed, Beck, & Goldreyer, 2000; Fifield, Power, & Knipe, 2008). Hung, Yang, and Thang (2014) provide evidence to show that technical trading rule of moving average is effective in generating excess returns for investors of Vietnamese market even after taking into account the transaction costs besides showing that

variable moving average performs better in a trending market than they do in a non-trending one. For Indian stock market, variable moving average trading rules are found to possess predictive ability prior to transaction costs (Achuthan & Anubhai, 2005) while Lai and Lau (2006) found strong evidence supporting the applicability of variable moving averages in particular, and also fixed moving averages in the China, Thailand, Taiwan, Malaysian, Singaporean, Hong Kong, Korean, and Indonesian stock markets with the length of 20 days and 60 days respectively.

Volume or trading volume represents the total number of shares exchanged between buyers and sellers during a given period of time for a certain period, typically for one day. Many investors have ignored the point of volume and focus solely on stock's price. However, volume actually plays an important role in the stock market which functions as a basic fuel to drive shares' price up and down throughout daily transaction. In fact, Blume, Easley, and O'hara (1994) have discovered that trading volume contains information about the financial market that cannot be retrieved solely from stock prices. Basically, volume portrays the liquidity of a stock. Higher volume indicates that there are more buyers and sellers in the market. Apart from that, volume helps to validate price movement based on the number of participants at a given price point and hence confirms the share price in the market (Dormeier, 2011; Koonitz, 2014; Leibovit, 2011).

In the context of technical analysis, volume is important as it helps to predict trends besides confirming chart patterns as mentioned under the fifth principle of Dow Theory. Any movement with relatively high volume is deemed as a stronger signal than a similar move with weak volume. Moreover, technical analysts also use volume as a barometer of market sentiment. It is believed that high trading volume implies a consensus between many buyers and sellers who trade a large number of shares on a specific stock. Combining trading volume and stock

price together could thus help technical analysts to detect the true commitment of a price movement easily (Dormeier, 2011; Koonitz, 2014; Leibovit, 2011). It is found that lower expected returns tend to be generated by stocks with more volatile liquidity (Chordia, Subrahmanyam, & Anshuman, 2001). Meanwhile, Gervais, Kaniel, and Mingelgrin (2001) discover that trading volume tends to affect the movement of stock price over the subsequent holding period of twenty days, whereby an unusual weekly or daily high (low) trading volume tends to lead to an increase (decrease) of stock price.

2.5 History of Japanese candlestick charting

The history of candlestick charting can be traced back to the Japanese rice market in the 1700s. The candlestick charting technique was originally employed by Munehisa Homma, who was among the first who introduced the prediction of future price movements by using past prices in Japan. As a result, a huge amount of fortune had been amassed by him with the help of such technique on analyzing the prices for rice futures contract. He was even known to win over 100 consecutive trades in the rice market which had thus made him popular for the successful of candlestick charting technique. After that, it was only until 1991 that the Western country was exposed with the knowledge of Japanese candlestick which was brought by Nison through publication of his books on candlesticks (Nison, 1991; Pring, 2002; Quseynov, 2013).

Sakata's Rules or Sakata's Methods are often referring to Homma too as he began the trade of local rice exchange in the port city of Sakata. Sakata's Method is actually referring to technique of chart analysis which deals with the basic yin and yang candle lines along with two additional lines at different points and times in the market. So centering around the number 3, Sakata's Five Methods are composed of San-zan (three mountains), San-sen (three rivers), San-ku (three gaps), San-pei (three soldiers), and San-poh (three methods). San-zan (three

mountains) makes major top in the market while the opposite San-sen (three rivers) is often used like traditional triple bottom. San-ku (three gaps) consist of three individual gaps in price that occur during a definite trend with the saying to sell on the third gap after a market bottom. San-pei (three soldiers) is formed by three parallel lines moving in the same direction and is viewed as a continuation of the current market trend. San-poh (three methods) imply a rest in market action with a popular Japanese saying is to buy, sell, and rest (Morris, 1995).

Candlestick charting is a technical approach used to depict the price movement of securities by utilizing the open, high, low, and close prices from a single day, or from weekly or even monthly stock price data. Candlestick charting is only effective in capturing short term price movement and thus appropriate for short term investment only and the maximum holding period for candlestick charting has been identified to be ten days by Nison (1991) and Morris (1995). The presentation of daily four price levels on candlestick charting provides useful signal to investors to help them be familiar to the new market environment and hence altering their trading style for better market timing.

Candlestick charts are usually accounted for analyzing the market alone. But at the same time candlestick charts can also be used in combination with other technical analysis tools. Thus, the attributes of candlestick charting to be used as a supplement to other technical analysis techniques is an added value to the investors in terms of supplying an extra dimension of analysis. From the perspective of limitation, candlestick chart patterns are subject to the interpretation of the user. Different users probably have dissimilar interpretation from candlestick charting depending on the familiarity and experience in trading with their own market. Besides, candlestick charts only serve to provide several useful trading signals to investors but are not able to identify accurate price targets. Therefore, most practitioners of candlestick will take investment decision based on candlestick signal and stay tune with the

same decision until the occurrence of the next candlestick pattern which signals investor on the next step of trading. Another limitation is it requires the close price of the stock to form a candlestick line but the close price can only be gained when the market closes on that day, which thus forces investors to wait for confirmation of prices before trading (Nison, 1991; Quseynov, 2013).

Nevertheless, the popularity of candlestick charting trading strategy is still undeniable for several reasons. Firstly, candlestick charting acts as a leading indicator which allows earlier identification of potential market signals earlier than other Western technical indicators. The presentation of candlestick charting in graphical form is easier to remember and identify too. Moreover, the element of versatility which allows for the standalone application or in adaption with other technical tools, plus the flexibility to be in use for various market like stock, future, currency, and even commodity have an added value to such graphical technique of candlestick charting. In fact, candlestick charting can function independently in tracking market turning points without any need to cooperate with other technical tools. However, the application of pure candlestick chart analysis alone can produce high number of false signals. Hence, candlestick charting technique is preferably to be adapted with other technical indicators and in conjunction with trend analysis in order to improve the gain from winning trades and reducing the percentage of occurrence for wrong signals (Morris, 1995; Nison, 1991; Pring, 2002; Quseynov, 2013).

2.6 Interpretation of candlestick charting

A candlestick line is formed by four price levels, which consist of the opening, high, low, and closing price. As shown in Figure 2.1, the rectangular space between the opening and closing price is known as the real body. If the closing price is higher than the opening price,

then the real body will present a white or hollow body. Alternatively, if the opening price is greater than the closing price, then the real body will present in black or a filled body. A white candlestick represents a bullish signal, whereas a black candlestick indicates a bearish signal. The vertical lines drawn above and below the real body is the upper and lower shadows respectively (Lambert, 2009; Nison, 1991; Northcott, 2009).

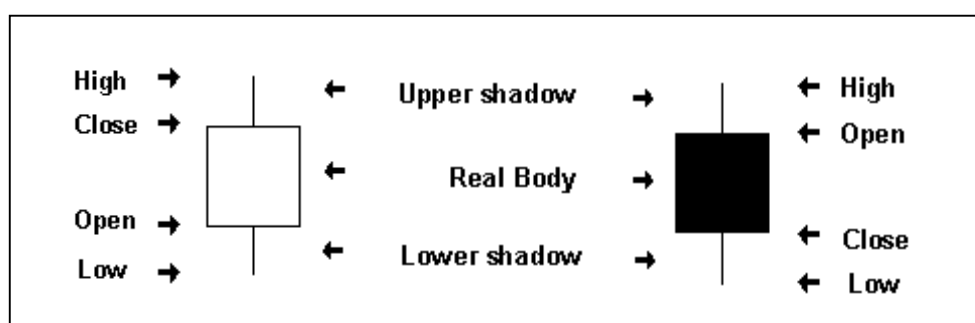


Figure 2.1: Single line candlesticks

The combination of two or more candlestick lines will form a sequence of candlestick patterns. Basically, there are two types of candlestick patterns which are the reversal patterns and continuation patterns. Reversal patterns indicate a high probability of a change in trend, usually in the reverse direction, whereas continuation patterns suggest that the prevailing trend shall persist. In this case, reversal patterns can be a powerful tool for investors by providing accurate trading signals to buy low and sell high. Thus, reversal patterns are more popular than continuation patterns as they can help traders to maximize profit in securities trading. Candlestick patterns require a definite trend prior to the pattern to enable future market direction to be forecasted more accurately (Morris, 1995; Nison, 1991). With the existence of prior trend, some single line candlesticks can function as reversal pattern too. Hence, candlestick patterns can actually be made up of one-line, two-line and three-line candlesticks or even more. All possible candlestick lines and patterns which are commonly seen are identified from practitioner books with main reference from Nison (1991) and Morris (1995) and documented accordingly in the following section.

2.6.1 Candlestick lines

Basic candlestick lines generally refer to individual single line candlesticks which depict one day trading signal. Typically, a white real body with closing price above the opening price indicates a bullish signal or a strengthening in buying pressure whereas a black real body with closing price below the opening price denotes a bearish signal or a reinforcing in the selling force. The size of the real body acts as an important indication for the strength of the signals. The larger or longer a real body, the stronger the implied signals. For instance, a long white candlestick is more bullish than a small white candlestick, and a long black candlestick is more bearish than a small black candlestick. The upper and lower shadows do convey certain implication too whereby longer upper shadow of a candlestick indicates that bull period is gradually declining and the bears have increased in power at that time. On the other hand, longer lower shadow denotes a declining in bears' period and gradual gaining of bull power at that time. Basic candlestick line acts independently as it does not require the existence of prior trend or combination with other candlesticks (Morris, 1995; Nison, 1991).

A black body candlestick is formed when the opening price is higher than the closing price. A Black Candle has a normal size black body with both upper and lower shadows. The lengths of the shadows is not important for a black candle, but normally it should not be longer than the real body size. Typically, the occurrence of a Black Candle implies a bearish signal. A Black Candle can be divided into Short Black Candle and Long Black Candle. A Short Black Candle owns a smaller black body than the normal Black Candle whereas a Long Black Candle has a long black body. Both Short Black Candle and Long Black Candle imply bearishness. However, a Small Black Candle signifies a relatively weak selling pressure while a relatively strong selling pressure is depicted from a Long Black Candle. Typically, the black candlestick alone is not reliable enough to decide about bearishness as only one day's trading that was under

sellers' control is reflected. Other neighboring candlesticks shall be considered for a better decision regarding the market direction (Logan, 2011; Morris, 1995; Northcott, 2009; Wagner & Matheny, 1994).

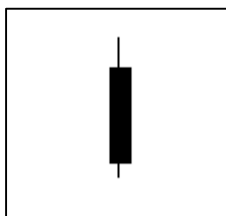


Figure 2.2: Black Candle

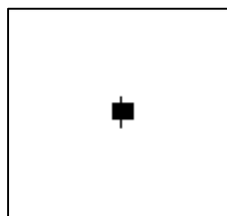


Figure 2.3: Short Black Candle

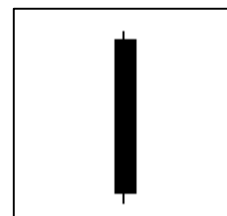


Figure 2.4: Long Black Candle

A white body candlestick is constructed when the closing price is higher than the opening price. A normal White Candle possess both upper and lower shadows with a normal size white real body. Same as Black Candle, the lengths of the shadows is not important as long as it does not exceed the real body size. The appearance of a White Candle typically depicts a bullish signal. White Candle can also be divided into Short White Candle and Long White Candle. A Short White Candle as its name implies possess a small white body whereas a Long White Candle is obviously having a longer white body. As both the Short White Candle and Long White Candle indicate bullishness, a Long White Candle actually implies a relatively strong buying pressure while a Short White Candle signifies a relatively weak buying pressure. Generally, the white candlestick alone is not reliable enough to decide about bullishness since only one day's trading under buyers' control is reflected. For precision, other neighboring candlesticks shall be considered to decide the real direction of the market (Logan, 2011; Morris, 1995; Northcott, 2009; Wagner & Matheny, 1994).

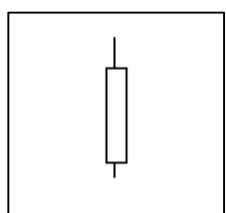


Figure 2.5: White Candle

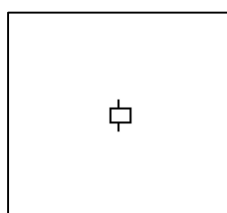


Figure 2.6: Short White Candle

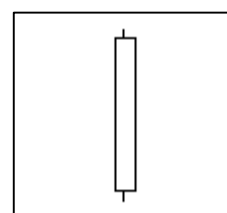


Figure 2.7: Long White Candle

Marubozu candlestick is described as shadowless as it does not have any upper or lower shadows. Black Marubozu is a black body candlestick without shadows and with the opening price equals to the high of the day and the closing price equals to the low of the day, showing that the sellers are actually in control of the price action from the first trade to the last trade. Typically, a Black Marubozu indicates extreme bearishness. Opening Black Marubozu occurs when the opening price of the black real body is equal to the high of the day and there is no upper shadow. Closing Black Marubozu on the other hand appears as a black real body with no lower shadow and with the closing price equals to the low of the day. Both Opening Black Marubozu and Closing Black Marubozu indicate weak bearish sign in comparison to the black Marubozu. Still, the candlestick alone is not reliable enough in portraying future market direction as it only reflects one day's trading signal (Logan, 2011; Morris, 1995; Northcott, 2009; Wagner & Matheny, 1994).



Figure 2.8:
Black Marubozu



Figure 2.9:
Opening Black Marubozu

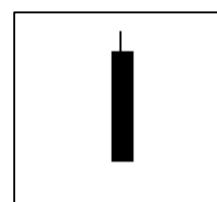


Figure 2.10:
Closing Black Marubozu

Meanwhile, White Marubozu has a white real body with no shadows and with the closing price equals to the high of the day and the opening price equals to the low of the day thus showing that the price action is controlled by the buyers from the first trade to the last trade. A White Marubozu usually depicts extreme bullishness. Opening White Marubozu appears as a white real body without any lower shadows and the opening price equals to the low of the day. Closing White Marubozu occurs when the closing price of a white real body is equal to the high of the day and without any upper shadow. Both Opening White Marubozu and Closing White Marubozu depict weaker bullish signals as compared to the White Marubozu. Yet, the

candlestick alone is not reliable enough to decide the direction of the markets as only one day's trading signal is reflected (Logan, 2011; Morris, 1995; Northcott, 2009; Wagner & Matheny, 1994).

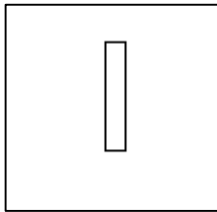


Figure 2.11:
White Marubozu

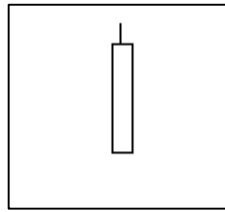


Figure 2.12:
Opening White Marubozu

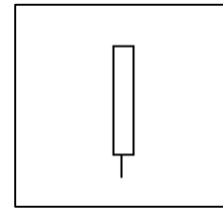


Figure 2.13:
Closing White Marubozu

Nison (1991) views Doji as a significant warning to trend reversal. However, Doji is only meaningful in the market where only a few Doji appears. A perfect Doji has the opening and closing price meets at the same level with no real body. The length of the upper and lower shadows can be long or short. A Doji is always neutral until it appears at a high or low price area. A volatile day is reflected through a Doji with longer shadows, whereas a dull and quiet day is revealed from a Doji with lower shadows. The Doji candlestick line represents indecision in the market or an equilibrium between supply and demand. Thus, it only shows trend reversal signal when spotted during uptrend or downtrend (Morris, 1995; Nison, 1991; Sadekar, 2015).

A Long-Legged Doji has equal opening and closing price as the Doji but with longer upper and lower shadows. It typically indicates indecision between the buyers and the sellers. The Long-Legged Doji typically depicts a bearish signal if it is found in an uptrend market, while a bullish signal is implied if it is found in a downtrend market (Morris, 1995; Nison, 1991; Sadekar, 2015).

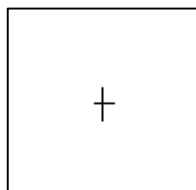


Figure 2.14: Doji

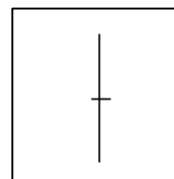


Figure 2.15: Long-Legged Doji

The Gravestone Doji is developed when the opening price is equal to the closing price and is at or very near to the low of the day with only upper shadow and no lower shadow. The Gravestone Doji is relatively bearish when spotted at the top of an uptrend and it is considered to be much more bearish with longer upper shadow. The Dragonfly Doji on the other hand is formed when the opening price is the same as the closing price and is at or very near to the high of the day with only lower shadow but without upper shadow. It is relatively bullish when appearing at the end of a downtrend (Lambert, 2009; Morris, 1995; Nison, 1991; Sadekar, 2015).

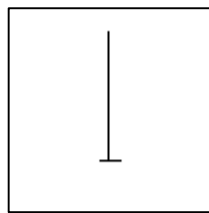


Figure 2.16: Gravestone Doji

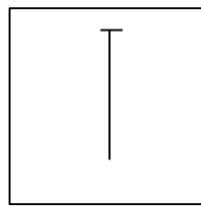


Figure 2.17: Dragonfly Doji

The Four-Price Doji is a very rare candlestick with four components of price at the same level. This means that it has equal opening, high, low, and closing price. This line will only occur when the stock is very illiquid or there is an error with the data source. However, it is undeniable that the occurrence of a Four-Price Doji may represent total uncertainty of traders in market direction (Morris, 1995; Nison, 1991; Sadekar, 2015).

Spinning Tops are made up of candlestick lines that have small real bodies with upper and lower shadows that are longer than the real body size. The color of the real body and the shadows length for spinning tops are not important. It is the small body relative to the shadows that form the spinning tops. Spinning Tops represent indecision between the bulls and the bears. The significance of Spinning Tops increase when they appear at an obvious uptrend or downtrend, which is an important signal for potential trend reversal (Morris, 1995; Northcott, 2009; Sadekar, 2015).

A High Wave has a small real body with a very long upper and or lower shadows. The color of the real body is not important and it can be a black or white body. Appearing as a long line, a group of High Wave can foretell a market turn (Morris, 1995; Northcott, 2009; Nison, 1991).



Figure 2.18: Four-Price Doji

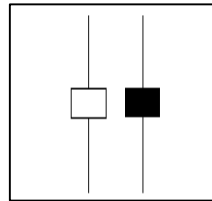


Figure 2.19: Spinning Tops

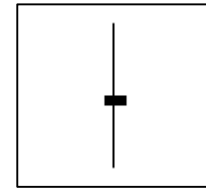


Figure 2.20: High Wave

2.6.2 Reversal patterns

Candlestick reversal patterns act as useful technical indicators for traders by alerting them on the shift in market psychology from changes in market trend. Trend reversals usually occur by stage and in a slow pace. Most of the reversal patterns are inversely related, whereby there is a pair of bearish and bullish signal for each types of candlestick pattern. A bullish reversal pattern or also known as a top reversal signal suggest a change to bullish trend in the near future. In contrary, a bearish reversal pattern or a bottom reversal signal indicates a shift to bearish trend in the near future (Morris, 1995; Nison, 1991).

Hammer and Hanging Man both belong to single line reversal patterns. They have small real bodies with long lower shadows which is at least twice the length of the real body size. It is said that the longer the lower shadows length, the more significant is the pattern. The Hammer appears in a downtrend whereas the Hanging Man happens during an uptrend. The color of the real bodies is not important but they usually occur at the top of the daily trading range. It should have no or a very short upper shadow only. The Hammer pattern portrays a bullish signal, while the Hanging Man pattern depicts a bearish signal (Lambert, 2009; Logan, 2011; Northcott, 2009; Sadekar, 2015).

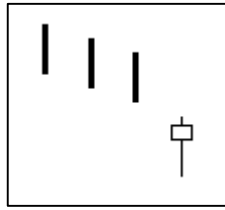


Figure 2.21: Hammer

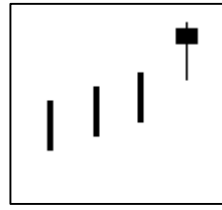


Figure 2.22: Hanging Man

The Inverted Hammer occurs in a downtrend and acts as a single line bullish reversal pattern. The sharper the prior decline, the more significant is the subsequent rebound. Meanwhile, the Shooting Star appears in an uptrend and functions as a single line bearish reversal pattern. So, the sharper the previous rally, the higher the probability for a market top to occur. Both the Inverted Hammer and Shooting Star patterns possess small real bodies with long upper shadows which are twice the length of the real body. The color of the real bodies is unimportant and it should have no or a very short lower shadow. Although both inverted hammer and shooting star belong to single line patterns group, but they should be viewed as consisting of two lines and the previous candle should be taken into account too while searching for them (Lambert, 2009; Logan, 2011; Northcott, 2009; Sadekar, 2015).

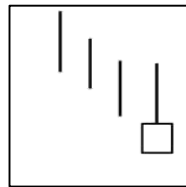


Figure 2.23: Inverted Hammer

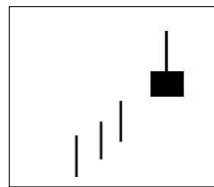


Figure 2.24: Shooting Star

The Belt Hold lines forecast a reversal signal and are composed of Opening Marubozu lines. The Bullish Belt Hold consists of an Opening White Marubozu after a downtrend. It opens on a daily low but then rallies significantly to close near its high. At a low price area, the Bullish Belt Hold depicts a bullish signal. The Bearish Belt Hold is made up of Opening Black Marubozu after an uptrend. It opens on the daily high and then declines all the way down to close near its low. At a high price area, the Bearish Belt Hold shows a bearish signal (Morris, 1995; Nison, 1991).

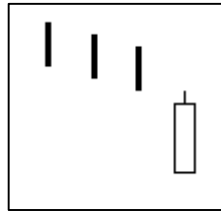


Figure 2.25: Bullish Belt Hold

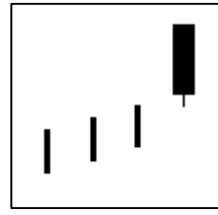


Figure 2.26: Bearish Belt Hold

The Engulfing pattern is comprised of two opposite colored real bodies with the second day's body completely embraces the previous day's body. The first day of the Engulfing pattern usually has a small real body and the second day has a long real body. A Bullish Engulfing is a two-day bullish reversal pattern. Following a prevailing downtrend, the first day must be a black candle and the second day's white candle must completely engulfs the first day's black real body. The shadows is not important for a Bullish Engulfing but the color of the second day's real body must be white. The Bullish Engulfing is considered as the most bullish among all bullish reversal patterns as the downtrend pressure at the beginning has been completely void by the counterattack from the bulls on the second day. The appearance of a short black candle on the first day implies lower volume of selling while the market opens at new lows on the next day which seems to signal more occurrence of bearish trading. However, the momentum for downtrend has lose causing the bulls to lead the day with overcoming buying pressure. Eventually, the downtrend is damaged when the market closes above the open of the previous day (Lambert, 2009; Logan, 2011; Sadekar, 2015; Tam, 2001).

Bearish Engulfing on the other hand is a two-day bearish reversal pattern with a prevailing uptrend. The first day must be a white candle, follow by a black candle on the second day that completely engulfs the first day's white real body. The shadows are unimportant provided that the second day's real body must be black color. Bearish Engulfing is also deemed as the most bearish of all bearish reversal patterns as the second day's bears has completely nullified the bulls' control on the first day. After a prevailing uptrend, the occurrence of a short white candle on the first day implies lower volume of buying while the market opens at new

high on the next day seems to signal more bullish trading but end up the uptrend has loses momentum and the lead is taken by the bears with overcoming selling pressure. The uptrend is finally ruined when the market closes below the open of the previous day (Lambert, 2009; Logan, 2011; Sadekar, 2015; Tam, 2001).

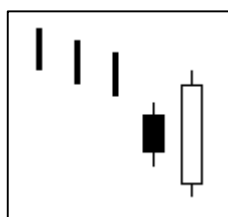


Figure 2.27: Bullish Engulfing

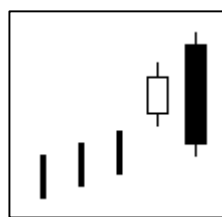


Figure 2.28: Bearish Engulfing

Last Engulfing Bottom is a two-line bullish reversal pattern consisting of a small white candle being engulfed by a long black candle. The formation of candlestick is the same as bearish Engulfing except that a downtrend precedes the Last Engulfing Bottom pattern. For Last Engulfing Bottom to act as a positive market force, it must be confirmed by a close above the black candle's close on the next day after the pattern. Meanwhile, the formation of candlestick for Last Engulfing Top is the same as bullish Engulfing which consists of a small black day being engulfed by a long white candle but with uptrend appears prior to the pattern. In order for Last Engulfing Top to emit bearish signals, confirmation in the form of a close below the previous session's white candle close is required (Morris, 1995; Northcott, 2009; Pring, 2002; Tam, 2001).

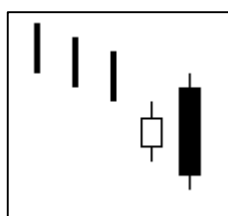


Figure 2.29: Last Engulfing Bottom

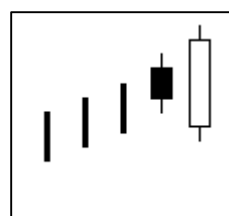


Figure 2.30: Last Engulfing Top

Also like the Engulfing pattern, the Harami pattern is comprised of two real bodies of opposite color too. In Japanese word, Harami means pregnant. Thus, the Harami pattern is made

up of a long candle on the first day which represents the mother follow by a small candle on the second day which depicts the fetus. An initial downtrend is in place for a bullish Harami. The first day is a long black candle follow by a small white candle on the second day which is totally embraced by the prior day's real body. After a prevailing downtrend which reflects bearish mood, the bearishness is further supported by heavy selling from a long black candle on the first day. The prices then open higher on the next day which has alarmed the short traders and causes the covering of many short positions that lead to further rise in price and the formation of a small white candle. Diminishing bearish power is shown from the second day's small white body thus implying a bullish signal from a bullish Harami pattern (Lambert, 2009; Pring, 2002; Sadekar, 2015; Tam, 2001).

For the bearish Harami pattern to occur, an uptrend is first in progress follow by a long white candle on the first day. The second day's small black candle is completely engulfed by the previous day's white body. The bullishness from an initial uptrend is further supported by a long white body on the first day which indicates heavy buying. The prices on the second day then open lower and closes even lower within a small range forming a small black candle. A sudden deteriorating trend on the second day suggesting a bearish signal from a bearish Harami pattern (Lambert, 2009; Pring, 2002; Sadekar, 2015; Tam, 2001).

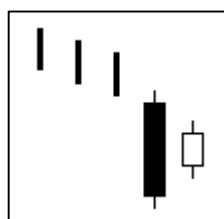


Figure 2.31: Bullish Harami

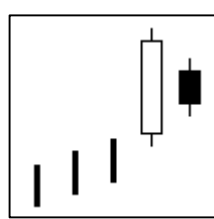


Figure 2.32: Bearish Harami

The Harami Cross pattern possess stronger signal than the Harami pattern. The Harami Cross pattern consists of a Doji after a long candle on the first day. As Doji represents indecision, thus the likelihood for a trend change increases with the existence of greater uncertainty. A

bullish Harami Cross is a bullish reversal pattern with the occurrence of a long black candle after a prevailing downtrend and a Doji on the second day which is completely engulfed by the real body of previous black candle. The black candle on the first day supports the prevailing bearish mood but the prices open higher than the close of the preceding day which causes many short positions to be covered by short traders and lead to a rise in price. However, a lack of decision is shown when the prices on the next day open and close at the same level, thus amplifying the likelihood for a trend reversal (Morris, 1995; Nison, 1991; Pring, 2002; Tam, 2001).

A bearish Harami Cross is a bearish reversal pattern with a long white candle after a prevailing uptrend follow by a Doji which lies within the real body of the first white candle on the second day. The bullishness from the prevailing uptrend is supported by a white body on the first day. However, on the next day the price opens below the previous day's close. Indecision is then revealed when the market closes at the same level as it opens and thus implying an imminent reversal in the current uptrend (Morris, 1995; Nison, 1991; Pring, 2002; Tam, 2001).

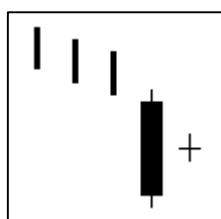


Figure 2.33: Bullish Harami Cross

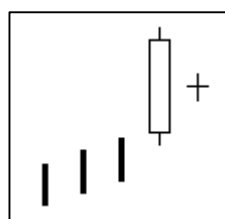


Figure 2.34: Bearish Harami Cross

Homing Pigeon is a two-line bullish reversal pattern that resembles a Harami pattern, except that both bodies are black. With a prevailing uptrend, Homing Pigeon is formed by a long black body on the first day follow by a small black body on the second day which is completely engulfed by the first day's black body. The first day's long black body which appears after a prevailing downtrend reflects heavy selling. However, the second day's smaller

black body portrays the diminished power and enthusiasm of the sellers thus suggesting a trend reversal for the current downtrend (Morris, 1995; Tam, 2001; Pring, 2002).

On the other hand, Descending Hawk is a two-line bearish reversal pattern that resembles a Harami pattern too but comprised of two white bodies. The formation of a Descending Hawk pattern is characterized by a prevailing uptrend followed by a long white body on the first day and a small white body on the second day which is completely engulfed by the first day's body. Initially, heavy buying is indicated from the long white body on the first day but a diminished power and enthusiasm is shown by the buyers from the second day's smaller white body thus suggesting a trend reversal in the current uptrend (Morris, 1995; Tam, 2001; Pring, 2002).

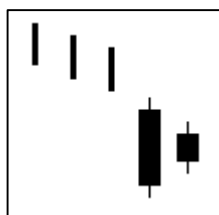


Figure 2.35: Homing Pigeon

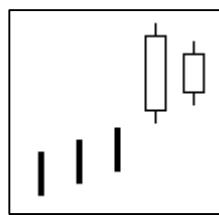


Figure 2.36: Descending Hawk

The Piercing Line is a two-line bullish reversal pattern. This pattern happens in a downtrend market, with a long black candle representing the bearish trend on the first day. The second day is a long white candle which opens at a new low and then piercing back into the previous body with a closing price above the midpoint of the first day's black real body. The Piercing Line is more likely to be a bottom reversal pattern when the degree of penetration into the first day's black body increases. The first day's black body supports the bearishness in the prevailing downtrend. On the next day, the market opens lower with a gap showing that the bearishness still persists but then the bulls decide to take the lead thus the market surges toward the close and a rise in price results in a close above the previous day's close. In this case, the bears are losing their confidence and are reevaluating their short positions while the potential

buyers start to take long positions as they think new lows may not hold (Lambert, 2009; Logan, 2011; Pring, 2002; Sadekar, 2015).

The Dark Cloud Cover pattern only occurs in an uptrend and the first day is a long white candle which supports the trend. The second day is a long black candle with the opening price above the previous day's high and then penetrates into the body of first day's white candle with the closing price below the midpoint of previous white real body. The probability to be a top reversal increases for the Dark Cloud Cover when the degree of penetration of the second day's black candle into the previous white real body is greater. The first white body reinforces the bullishness in the prevailing uptrend. The market opens higher via a gap on the next day, showing that the bullishness still persists. After this, the bears decide to take control, thus the market plunges toward the close and a decrease in price resulted in a close below the previous day's close. Now, the bulls are losing their confidence and are reevaluating their long positions while potential short sellers begin to take short positions as they think that the new highs may not hold (Lambert, 2009; Logan, 2011; Pring, 2002; Sadekar, 2015).

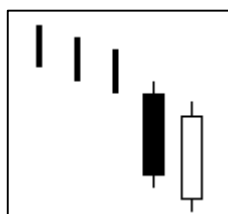


Figure 2.37: Piercing Line

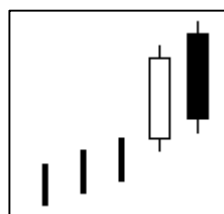


Figure 2.38: Dark Cloud Cover

Meeting Lines is a two-line reversal pattern with two opposite color candles having the same closing price and are also referred to as the Counterattack Lines. The current trend for a Bullish Meeting Lines is a downtrend with a long black candle on the first day to reflect bearishness. The second day is a long white candle that closes at the same level with previous black candle's closing price. The Bullish Meeting Lines pattern forecasts a bullish signal. The appearance of a black candle on the first day supports the bearishness from prevailing

downtrend. The bears feel more confident when the candle opens sharply on the next day. However, the bulls start a counterattack to push price up and eventually leading to a close equal to the previous close and thus the downtrend is breached (Morris, 1995; Pring, 2002; Tam, 2001).

Meanwhile, a Bearish Meeting Lines have an ongoing uptrend and is accompanied with a long white candle on the first day. Then, a long black candle appears on the second day with closing price equals to prior day's white candle close. A Bearish Meeting Lines predicts bearish signal. The bullish mood of the prevailing uptrend is further supported with a strong white candle formed on the first day. The bulls feel more confident when the next day opens sharply higher. Later, the bears start a counterattack pushing prices down and leads to a close equal to the previous close. The uptrend is now breached (Morris, 1995; Pring, 2002; Tam, 2001).

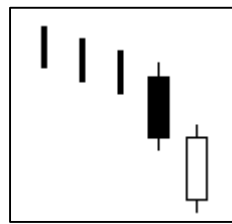


Figure 2.39: Bullish Meeting Lines

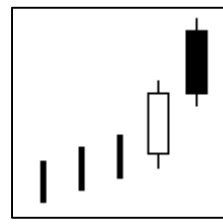


Figure 2.40: Bearish Meeting Lines

As mentioned by Morris (1995), the Kicking pattern is a two-line reversal pattern which is similar to the Separating Lines pattern. Instead of having the same opening price, a gap occurs in between two candles. The occurrence of a huge gap urges the bulls and bears to take action. Thus, Bullish Kicking implies a bullish signal, whilst the Bearish Kicking indicates a bearish signal. The Bullish Kicking usually occurs after a prevailing downtrend with a Black Marubozu appears on the first day that confirms the bearishness. The second day is a White Marubozu which gaps up above the previous candle with a higher opening price. After a prevailing uptrend, a White Marubozu appears on the first day for a Bearish Kicking pattern which confirms the

bullishness, follow by a Black Marubozu which gaps down below the previous candle with a lower opening price.

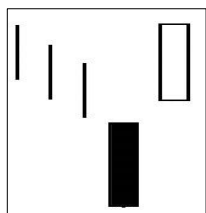


Figure 2.41: Bullish Kicking

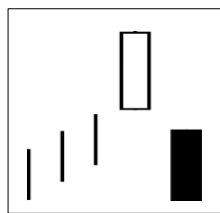


Figure 2.42: Bearish Kicking

A Doji Star pattern normally functions as a warning to a trend change. A bullish Doji Star is a bullish reversal pattern while a bearish Doji Star is a bearish reversal pattern. With a prevailing downtrend, a bullish Doji Star has a long black candle on the first day. Then, a Doji candle gaps down on the second day. For a bearish Doji Star, a prevailing uptrend occurs forming a long white candle on the first day, follow by a Doji candle which gaps higher on the second day. The action of a Doji candle which gaps higher in a bearish Doji Star has eroded almost all confidence from the previous rally, thus causes a reversal from uptrend to downtrend (Morris, 1995; Nison, 1991; Tam, 2001).

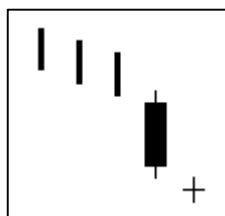


Figure 2.43: Bullish Doji Star

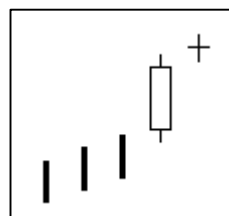


Figure 2.44: Bearish Doji Star

In the identification for a Tweezers pattern, the highs and lows are more crucial compare to the real bodies while the shape of the candles are unimportant. The Tweezers Bottom is a bullish reversal pattern with matching lows. With a downtrend in position, the first day is a black candle reflecting the bearish mood. The second day's candle then matches the low of the first candle forming a double bottom. The second candle can be a Doji, white or black candle with or without lower shadows as long as its lowest price is at the same level as the first candle's

low. Market support is indicated through the matching lows of the Tweezers Bottom. The Tweezers Top have equal highs and acts as a bearish reversal pattern. After a prevailing uptrend, a white candle appears on the first day indicating the bullish mood. The second day's candle then matches the high of the first candle forming a double top. The second candle can be a Doji, white or black candle with or without upper shadows as long as the highest price is the same with previous high. The matching highs of the Tweezers Top reflects market resistance that shows the inability of market bulls to drive the price higher than the previous price (Morris, 1995; Nison, 1991; Pring, 2002; Tam, 2001).

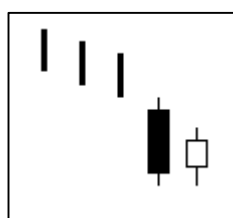


Figure 2.45: Tweezers Bottom

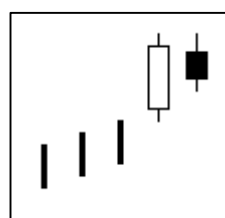


Figure 2.46: Tweezers Top

An ideal Morning Star and Evening Star should have a gap before and after the middle candle. The first sign of indecision is shown by the middle candle. A significant trend reversal is then identified from the third candle which gaps higher in a Morning Star and gaps lower in an Evening Star. The Morning Star is a three-line bullish reversal pattern and usually occurs after a prevailing downtrend. Thus, the first line consists of a long black candle followed by a star on the second day with a small body that gaps lower. The color for the second day's candle is not important. The third day is a white candle that gaps higher and closes within the first day's black body. The black candle on the first day confirms the bearishness from the prevailing downtrend. The occurrence of a short candle that gaps down on the next day indicates that the bears are still pushing down the price. However, the tight price action on the second day between the open and the close shows indecision. The third day is a white body that moves into the first day's black body and thus drives the price up. The Evening Star which acts as a bearish

reversal pattern is the opposite for Morning Star. After an uptrend, a long white candle appears on the first day. Then the second day is a small size candle known as a star which gaps higher. The third day's black candle gaps lower and closes within the first day's white body (Lambert, 2009; Morris, 1995; Nison, 1991; Sadekar, 2015).

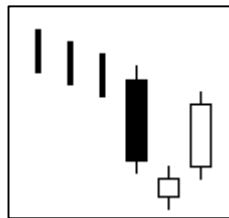


Figure 2.47: Morning Star

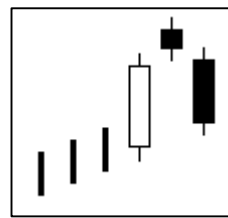


Figure 2.48: Evening Star

The Morning Doji Star is formed by a bullish Doji Star pattern in a downtrend market and follow by a white candle which gaps higher and closes within the first day's black candle. The second line's Doji must have a high price above the previous candle's low price. A Morning Doji Star is considered to be more significant and bullish than a Morning Star. In an uptrend market, the Evening Star is composed of a bearish Doji Star follow by a black candle which gaps lower and closes within the first day's white candle. The second day's Doji candle must have a low price below the previous candle's high price. An Evening Doji Star is deemed to be more significant and bearish than an Evening Star (Morris, 1995; Nison, 1991; Pring, 2002).

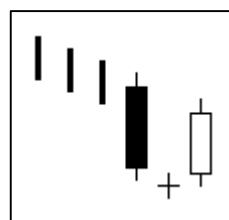


Figure 2.49: Morning Doji Star

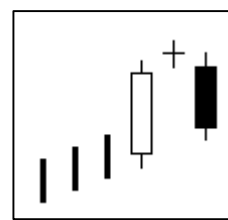


Figure 2.50: Evening Doji Star

The Abandoned Baby pattern is similar to the Morning Star and Evening Star family patterns except that the shadows for the second line's Doji must gaps below or above the previous day's candle. A bullish Abandoned Baby is a bullish reversal pattern that happens in a downtrend. The first line is a long black candle follow by a Doji that gaps below the lower

shadow of the previous black candle. The third line is a white candle which closes within the first line's black body. Meanwhile, a bearish Abandoned Baby occurs in an uptrend market with a long white candle on the first day indicating the bullish mood. Next, the second line consists of a Doji which gaps higher from the first candle's upper shadow and the third line is a black candle that closes within the first line's white body. The occurrence of Abandoned Baby pattern is quite rare in the market (Morris, 1995; Nison, 1991; Tam, 2001; Thomsett, 2012).

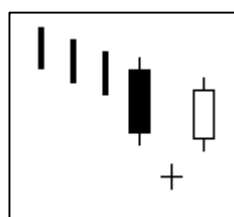


Figure 2.51: Bullish Abandoned Baby

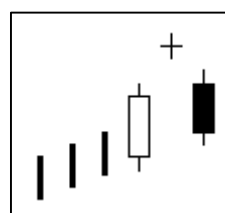


Figure 2.52: Bearish Abandoned Baby

The appearance of Tri Star pattern is extremely rare but possess a significant reversal signal. The Tri Star pattern is formed of three Doji lines whereby the second Doji clearly indicates that the market is losing its direction. This pattern indicates too much indecision leading to the reversal of positions. A bullish Tri Star or also known as a Tri Star bottom is a significant reversal pattern which indicates future bullish direction. For a bullish Tri Star, a downtrend is in position follow by three Doji lines with the second line's Doji gaps below the first and the third line. The third Doji warns that the downtrend is over. Meanwhile, a bearish Tri Star or also known as a Tri Star Top is a significant reversal pattern which implies a future bearish direction. For a bearish Tri Star, an uptrend is in movement follow by three Doji lines with the Doji on second day gaps above the first and the third line. The third Doji warns that the uptrend is over (Nison, 1991; Pring, 2002; Tam, 2001).

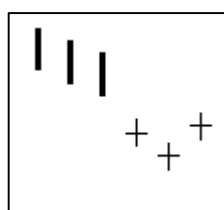


Figure 2.53: Bullish Tri-Star



Figure 2.54: Bearish Tri-Star

Three White Soldiers consist of a series of white candles which close progressively at higher price. Each candle should open within the previous body and then gaps up progressively at new closing price. The Three White Soldiers pattern reflects a bullish market ahead especially when spotted at a low price area. Initially, the market is in a downtrend. Then a decisive attempt upward is viewed from the first white candle. Rally continues in the next two days and resulted in higher closes. Thus, bears are forced to cover short positions (Morris, 1995; Nison, 1991; Tam, 2001).

Meanwhile, Three Black Crows is made up of three black candles which closes consecutively at lower price. Every candle should open within previous body and then gaps down consecutively at new closing price. The Three Black Crows pattern implies strong selling pressure by the bears. The market is initially in an uptrend but then a decisive downtrend attempt is shown from the first black candle. In the next two days, erosion of prices persist which resulted in lower closes. In this case, bulls are now forced to take profits (Morris, 1995; Nison, 1991; Tam, 2001).

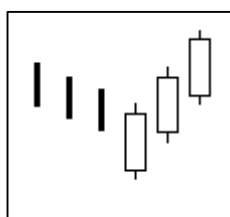


Figure 2.55: Three White Soldiers



Figure 2.56: Three Black Crows

The Advance Block is a bearish reversal pattern formed by three white candles with consecutively higher closes and with each day opens within the previous day's body after a prevailing uptrend. It may be seem that the market is ruled by the bulls from the three white candlesticks. However, signs of weaknesses can be viewed when the size of the real bodies is getting shorter. The long upper shadows also show the inability to sustain price extremes and reveal that the rise is losing its power especially of the longer upper shadows on the second and

third day that imply a definite deterioration in the upward strength (Morris, 1995; Nison, 1991; Tam, 2001).

The Deliberation pattern consists of two long white candle with consecutive higher closing prices on the first two days which resemble with the Three White Soldiers pattern. However, the third day is a small white candle or a star which gaps upward forming a Spinning Top. Sometimes, the Deliberation pattern is also referred to as a Stalled pattern. The Deliberation pattern occurs after a prevailing uptrend and exhibits bearish signal same as the Advance Block. Signs of weaknesses is revealed when the range of each real body is getting smaller with the third day gaps up forming a star which implies indecision (Morris, 1995; Nison, 1991; Tam, 2001).

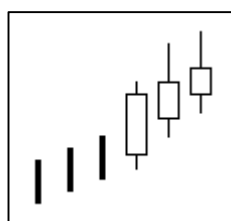


Figure 2.57: Advance Block

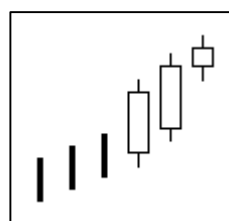


Figure 2.58: Deliberation

The Upside Gap Two Crows is a bearish reversal pattern that only happens in an uptrend. It begins with a white candle follow by a gap between the first and the second candle and also a gap between the first and the third candle. The second line appears to be an upward gapping small black candle. The third candle then gaps up higher to form a black candle with opening price above prior candle and closing price below previous candle. To simplify, the third black candle is engulfing the second day's black body. The two consecutive black bodies show that the strength of the uptrend is eroded (Morris, 1995; Nison, 1991; Tam, 2001).

The formation of Two Crows pattern is similar to the Upside Gap Two Crows except that the third day black candle for Two Crows closes into the first day's white real body. The Two Crows is also a bearish reversal pattern which forecasts bearishness. Also appearing during

an uptrend, a white candle happens on the first day. The second day gaps up and forms a black candle. The third day is another black candle with the opening price within the previous black candle and the closing price falls within the first day's white candle. The third day's action thus fills up the gap of the second day and shows that the bullishness is losing power (Morris, 1995; Pring, 2002).

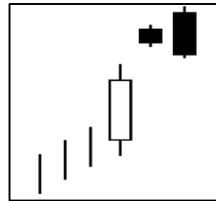


Figure 2.59: Upside Gap Two Crows



Figure 2.60: Two Crows

The Downside Gap Two Rabbits is a three-line bullish reversal pattern that usually occurs after a prevailing downtrend. It begins with a normal or long black candle on the first day. The second day is a short white candle that gaps down. The third day consists of another white candle that opens at or below the previous opening price and then closes above the close of the previous candle, but still below the close of the first black candle. The two consecutive white bodies show that the strength of the downtrend is weakening (Pring, 2002).

When the third day white candle gets to close into the first day's black body, a Two Rabbits pattern which forecasts bullish signal will be formed. In Two Rabbits pattern, the appearance of a strong black candle on the first day adds to the bearishness that is already present from the prevailing downtrend. The following day opens lower with a downside gap and then prices rise a little bit forming a short white candle. The bears are not alarmed by this day as the prices fail to close above the close of the previous day even a white body appears. The third day's price action which closes well within the first day's body shows that bearishness is eroding and thus suggesting a bullish trend in the near future (Pring, 2002).

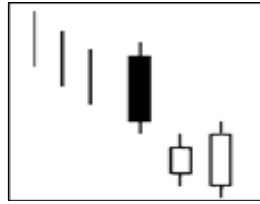


Figure 2.61: Downside Gap Two Rabbits

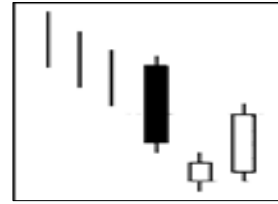


Figure 2.62: Two Rabbits

The Three Inside Up pattern which signals bullishness comprises of a bullish Harami pattern after a prevailing downtrend and the third day is a white candle with a higher close. The second day's white candle of the Three Inside Up pattern already signals that the bearish power is diminishing with confirmation from the third day's white candle (Caginalp & Laurent, 1998; Morris, 1995).

The Three Inside Down which implies a bearish signal consists of a bearish Harami pattern after a prevailing uptrend follow by a black candle with lower close on the third day. A trend reversal is already implied from the second day's small black body which reflects deteriorating bullishness while confirmation is gained from the third day's black candle (Caginalp & Laurent, 1998; Morris, 1995).



Figure 2.63: Three Inside Up

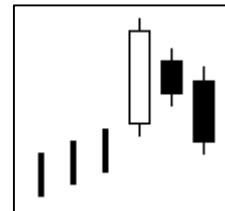


Figure 2.64: Three Inside Down

The Three Outside Up is a bullish reversal pattern occurring after a prevailing downtrend. It is made up of a bullish Engulfing pattern follow by a white candle which closes at a higher price on the third day. The third day's white candle thus suggests that the downtrend is damaged (Caginalp & Laurent, 1998; Morris, 1995).

The Three Outside Down on the other hand is a bearish reversal pattern that occurs after a prevailing uptrend. It consists of a bearish Engulfing pattern and follow by a black candle on

the third day which closes at a lower price. Thus, the third day's black candle confirm that the current uptrend is damaged (Caginalp & Laurent, 1998; Morris, 1995).

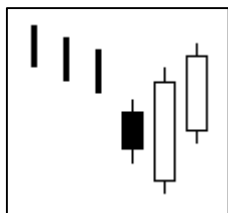


Figure 2.65: Three Outside Up

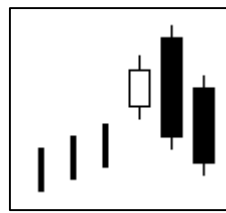


Figure 2.66: Three Outside Down

2.6.3 Continuation patterns

According to the Sakata's Method which is developed by Homma, continuation patterns represent a time of rest in the market (Morris, 1995). The presence of reversal patterns always implies a trend reversal. As for the continuation patterns, prices are expected to resume the prevailing trend following the completion of the pattern.

Windows are known as gaps in western technical analysis (Nison, 1991). Window is formed when a gap exists between the prior and the current session's price extremes. Rising Window is a bullish continuation pattern that normally happens after a prevailing uptrend. The first and second candle can be any basic candles of either a long or short line except the Four-Price Doji. Rising Window appears when a gap is formed between the first candle's high and the second candle's low.

In contrary, Falling Window acts as a bearish continuation pattern which usually occurs after a prevailing downtrend. Any basic candles of long or short line can appear on the first and second day, except for the Four-Price Doji. In Falling Window, a gap appears between the first candle's low and the second candle's high. Japanese are very particular about windows claiming that the trend will only end when the gap is filled, otherwise the current trend shall proceed (Nison, 1991).

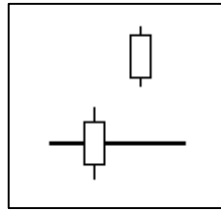


Figure 2.67: Rising Window

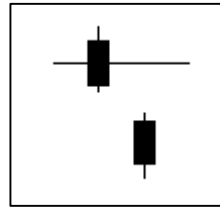


Figure 2.68: Falling Window

A Separating Lines occurs when the opening price for different colors of candlesticks meet at the same level. The bullish Separating Lines appear in an uptrend with a long black candle occurs on the first day. The next day is a long white candle or a bullish Belt Hold which opens at the same price as the previous day's open and then closes higher. In this case, the prevailing uptrend shall continue for a bullish separating line despite the appearance of the first black candle (Bigalow, 2002; Morris, 1995; Nison, 1991; Tam, 2001).

As for the Bearish Separating Lines, a long white candle occurs on the first day after a prevailing downtrend, follow by a long black candle or a bearish Belt Hold which opens at the same opening price of the first candle and then closes lower. Hence, the prevailing downtrend shall resume for a bearish Separating Lines despite the occurrence of the first white candle (Bigalow, 2002; Morris, 1995; Nison, 1991; Tam, 2001).

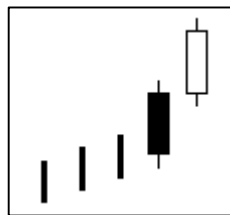


Figure 2.69: Bullish Separating Lines

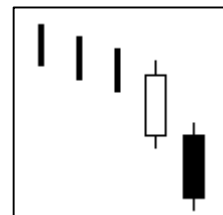


Figure 2.70: Bearish Separating Lines

For an On Neck Line pattern to appear, a downtrend must first be in progress. The first day is a long black candle, follow by a small white candle which closes at or near to the low of the first black candle. The On Neck Line is viewed as a bearish continuation pattern as the second day's small white candle only manages to close at the low of first day's black candle,

denoting that the bears are still controlling the market (Bigalow, 2002; Morris, 1995; Tam, 2001).

An In Neck Line pattern usually occurs after a prevailing downtrend. It is comprised of a long black candle on the first day. The second day comprises a small Closing White Marubozu that opens below the first day's low but closes into and above the low of the first day, and they may even close into the real body of the first day's black candle. The markets are still in control by the bears as the second day's white candle only manages to close at the close of first day's black candle, thus indicating a bearish continuation signal (Bigalow, 2002; Morris, 1995; Tam, 2001).

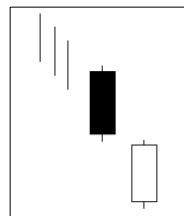


Figure 2.71: On Neck Line

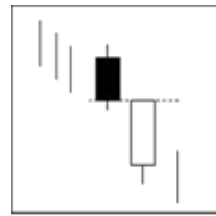


Figure 2.72: In Neck Line

The Thrusting Line is comprised of a long black candle after a prevailing downtrend, followed by a white candle on the second day that opens below the first day's low and closes within but not above the midpoint of the previous day's black body. A failure to rally in a down market is represented by a Thrusting Line, thus discouraging the bulls and a lack of buying will cause the downtrend to continue (Bigalow, 2002; Morris, 1995; Tam, 2001).

The Two Black Gapping Candles pattern appears in a downtrend and predicts a bearish continuation trend. The first day is a black candle with the opening price gaps lower from the previous candle. The second day is also a black candle with the opening price below the prior candle's opening but higher than its low and the closing price below the prior candle's closing. The first and second line of the pattern can be of any candle with a black body except Doji (Pring, 2002).

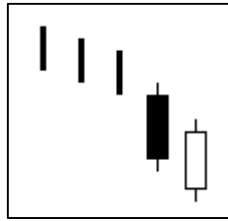


Figure 2.73: Thrusting

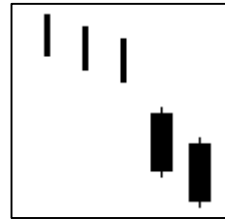


Figure 2.74: Two Black Gapping Candles

An Upside Tasuki Gap is a three-line bullish continuation pattern which resumes the prevailing uptrend after confirmation of the pattern. The first line representing the prevailing uptrend appears as a long white candle, followed by a white candle in the second line which gaps up higher from the first candle forming a price gap. The third line is a black candle which opens within the previous white body and closes below the prior opening price (Bigalow, 2002; Nison, 1991; Morris, 1995; Tam, 2001).

A Downside Tasuki Gap on the other hand is a three-line bearish continuation pattern which resumes the prevailing downtrend after confirmation of the pattern. The first line is a black candle representing the prevailing downtrend. A price gap occurs when the second day black candle gaps down lower from the first day black candle. The third line is a white candle which opens within the prior black body and closes above the previous closing price (Bigalow, 2002; Nison, 1991; Morris, 1995; Tam, 2001).

Morris (1995) mentions about the psychology behind a Tasuki Gap is to move along with the trend of the gap. Hence, when the gap is not filled or closed by the third candle, it means the previous trend should continue. Thus, after completion of the pattern, an Upside Tasuki Gap signifies that a bullish trend should resume, whereas a Downside Tasuki Gap indicates that a bearish trend should continue.

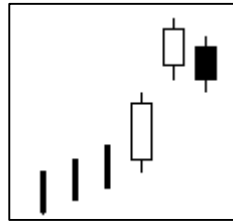


Figure 2.75: Upside Tasuki Gap

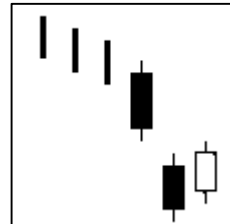


Figure 2.76: Downside Tasuki Gap

The gap shall not be filled for Side-by-Side White Lines pattern. The second and third line may appear as a long or short white candle as long as they do not exceed the first day's real body. Also referring to as an Upside Gap Side-by-Side White Lines, a bullish Side-by-Side White Lines appear when two similar size white candles are side-by-side after gapping above the first day's white candle. A bullish Side-by-Side White Lines usually happen after a prevailing uptrend and signifies an uptrend continuation. Some profit taking exists when two white candles lie side-by-side with one another in the bullish Side-by-Side White Lines pattern and inability of the bears to close the gap implies a bullish support (Bigalow, 2002; Nison, 1991; Morris, 1995; Tam, 2001).

A bearish Side-by-Side White Lines, also named Downside Gap Side-by-Side White Lines occur when two consecutive small white candles of similar size gap below the first day's long black candle. A bearish Side-by-Side White Lines normally occur after a prevailing downtrend and forecasts a downtrend continuation. Short covering or bargain hunting is said to take place when two white candles lie side-by-side with one another in bearish Side-by-Side White Lines pattern, and the bearish trend proceeds when the bargain is over (Bigalow, 2002; Nison, 1991; Morris, 1995; Tam, 2001).

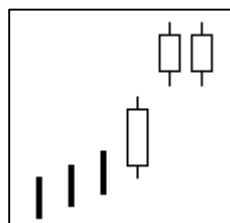


Figure 2.77:
Bullish Side-by-Side White Lines

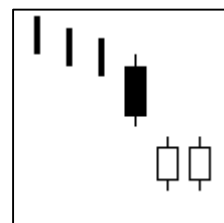


Figure 2.78:
Bearish Side-by-Side White Lines

Three-Line Strike is a four-line pattern that appears after a definite trend. A bullish Three-Line Strike occurs after a prevailing uptrend with three consecutive white candles of higher highs and end with a long black candle that plunges to a lower low than the first white candle. On the other hand, a bearish Three-Line Strike usually appears after a prevailing downtrend with the first three days comprised of black candles with consecutively lower lows and then end with a long white candle which rallies above the high of the first black candle. The action of creating greater highs or lows on the last day can completely wipe off the effect from the previous three days, thus erasing the sentiment of short term reversal and the trend shall resume its previous direction. A bullish Three-Line Strike shall maintain its uptrend position whereas a bearish Three-Line Strike shall resume to downtrend (Bigalow, 2002; Morris, 1995).

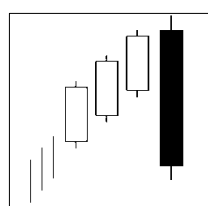


Figure 2.79: Bullish Three-Line Strike

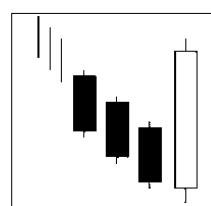


Figure 2.80: Bearish Three-Line Strike

Rising Three Methods is a bullish continuation pattern which consists of a long white candle on the first day after a prevailing uptrend. Subsequently follow by the appearance of a group of small black candles which fall within the range of the first day's real body. The final candle usually happens on the fifth day is a strong white candle which opens and closes above the opening and closing price of the first white candle. Meanwhile, Falling Three Methods is a bearish continuation pattern comprises of a long black candle at the starting point after a prevailing downtrend. Next, a group of small white candles which fall within the first day's black body occur. The final candle which normally happens on the fifth day is a strong black candle that opens and closes below the opening and closing price of the first black candle (Bigalow, 2002; Nison, 1991; Morris, 1995; Tam, 2001).

The Three Methods is considered a rest from trading or a rest from battle as in the Sakata Method. The psychology behind such pattern occur when some doubt about the ability of the trend to continue arises, and such doubt is enhanced with the occurrence of small-range reaction days. But once a new low cannot be identified by the bulls, the bullishness shall resume with the formation of new highs as in the rising three methods. The opposite happen to the Falling Three Methods. When a new high cannot be made by the bears, the bearishness shall continue with the formation of new lows (Bigalow, 2002; Nison, 1991; Morris, 1995; Tam, 2001).

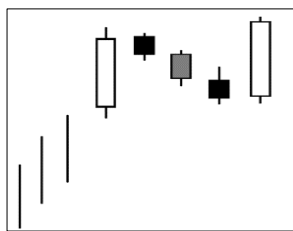


Figure 2.81: Rising Three Methods

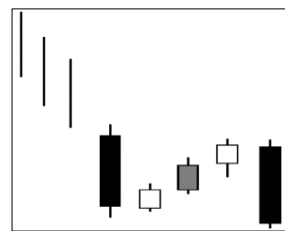


Figure 2.82: Falling Three Methods

Mat Hold is a bullish continuation pattern that usually occurs after a prevailing uptrend and look similar to Rising Three Methods. The difference in Mat Hold is that the second candle gaps above the first white candle. Beginning with a white candle on the first day, a Mat Hold pattern is follow by a black candle which gaps higher but with a lower close, leaving the gap unfilled on the second day. On the third day, the black candle comes down to fill the gap and closes into the first white candle. The fourth black candle closes even lower but stay above the midpoint of the first white candle. The fifth day consists of a long white candle with a new closing price. Mat Hold is deemed to be a modified version of the Rising Three Methods and thus indicating greater strength as a bullish continuation signal. This is because the correction days are less severe and the small black candles do not fall below the midpoint of the first white candle in a Mat Hold (Bigalow, 2002; Morris, 1995; Tam, 2001). Correction is generally refers to temporary price declines which interrupt an uptrend in the market.

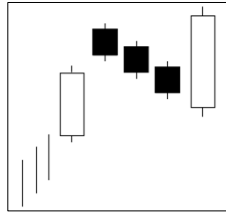


Figure 2.83: Mat Hold

2.7 Positive evidence on candlestick charting

One of the earliest research on candlestick charting has been carried out by Caginalp and Laurent (1998). At that time, it was the first study to provide strong evidence on the predictive power of candlestick patterns with scientific tests. They analyze the daily prices for all S&P 500 stocks which consist of the open, high, low, and close prices between 1992 and 1996. The trend definition of a three-day moving average over six days (MA_3) is used to define uptrend and downtrend properly. Eight three-day reversal patterns are selected for testing, namely the Three White Soldiers, Three Black Crows, Three Inside Up, Three Inside Down, Three Outside Up, Three Outside Down, Morning Star, and Evening Star. The amount of profit per trade is calculated on the basis of a two day holding period. After taking into account the transaction costs which include the commissions and the bid-ask spread, large profit is observed to be generated significantly by most of the candlestick patterns, with a compounding rate of over 200% yearly. Z-test is utilized to examine the predictive ability of the candlestick patterns and the findings reveal that all the three day candlestick reversal patterns that have been investigated are found to possess value for investors with their predictive capability been verified scientifically and statistically with non-parametric tests.

Goo, Chen, and Chang (2007) study the application of Japanese candlestick charting in Taiwan stock market by focusing on two important components which are candlesticks and holding period. They employ the daily data of 25 component stocks which are included in the

Taiwan Top 50 Tracker Fund and Taiwan Mid-Cap 100 Tracker Fund from 1997 to 2006 with the intention to discover the types of candlesticks and also the length of holding period which are profitable to investors. The types of candlesticks included in the study comprise of six bullish single lines, six bearish single lines, seven bullish reversal patterns, and seven bearish reversal patterns. Goo et al. (2007) utilize five-day moving average to identify trends prior to the candlestick patterns, and then using t-test to analyze the profitability of the candlesticks through computation of the mean rate of return. They then follow the maximum holding period of ten days as identified by Morris (1995) and calculate the rate of return from day to day through one to ten days to identify the length of holding period which is profitable for the candlesticks. They assume that the trades are entered at the opening price on the day following a signal and the rate of return are calculated daily after the trades ended at the closing price on each selected holding day. A General Linear Model (GLM) is formed to examine the relationship between rate of return with types of candlesticks and the length of holding period. After that, ANOVA and Duncan's multiple range tests are applied for comparison of profitability between the candlesticks and holding days. At the same time, a stop loss strategy is employed at a -5% stop loss point to manage the loss from failed trades. As a result, Goo et al. (2007) have discovered that the trading strategy of Japanese candlestick is found to be profitable for the 25 component stocks in Taiwan. In overall, bullish candlesticks have performed better than bearish candlesticks. As an example, bullish Dragonfly Doji has higher mean rate of return than bearish Gravestone Doji throughout the ten days holding period, with one of the mean rate of return recorded at 3.06% for Dragonfly Doji but only 1.12% for Gravestone Doji on tenth day holding period. Reversal patterns are also found to attain higher profit than single line candlesticks and a logical explanation behind such scene is that single line candlesticks usually act as a confirmation component to further confirm the effect of

candlestick reversal patterns. The most profitable candlesticks fall to the bullish reversal patterns which have gained the highest mean rate of return recorded at 6.53% on sixth day holding period for Three Inside Up pattern. Based on the findings of Goo et al. (2007), different candlesticks also require different holding days in order to attain the best performance. A long holding period is more appropriate for bullish single line candlesticks and bullish reversal patterns due to the increasing trend of the mean rate of return. On the other hand, bearish single line candlesticks and bearish reversal patterns fit more with short holding period as shown from a decreasing trend of the mean rate of return. The mean rate of return for most of the candlesticks are also improved, with as high as 10.91% recorded for Piercing Line pattern on ninth day holding period after applying a stop loss strategy.

The study by Shiu and Lu (2011) was the first to use Quantile Regression Model to test the predictive power of candlestick trading strategy. Three confirmation factors are utilized to improve the performance of candlesticks, which comprise of the opening price on the day after a reversal pattern, the gap between two real bodies in two days, and the changes in trading volume. As compared to Goo et al. (2007) who have implemented a stop-loss strategy to improve the returns of candlesticks, Shiu and Lu (2011) instead take into account two of the factors which have yet been investigated in prior research which are trading volume and positions. Their study focus on the Taiwan stock market for a period of ten years from 1998 to 2007 based on the daily prices and trading volumes for 69 electronic securities. Three bullish reversal patterns and three bearish reversal patterns are examined in this study, namely the Piercing pattern, Bullish Engulfing, Bullish Harami, Dark Cloud Cover, Bearish Engulfing, and Bearish Harami respectively. Daily opening, high, low, and closing prices are used to form candlestick patterns and the trend prior to the candlesticks are identified with five-day moving average. After that, Quantile Regression Model is used to test the predictive power of each

reversal pattern according to each confirmation factors stated previously. The returns of the reversal patterns are measured on the basis of a five day holding period. As a result, Harami patterns have shown highly positive and significant returns among the six candlestick patterns tested. Bullish Harami has recorded with significant returns at 5.78% on Day 5, whereas bearish Harami has shown significant returns of 0.70% on Day 3 and 4 respectively. On the other hand, other reversal patterns have also been found to be related with the confirmative elements, and thus further confirm the investigation that the three confirmation factors, which involve trading volumes, positions, and open price on the day following a reversal patterns have modification power against the results for the candlestick patterns. These improvement aspects have thus considered to be an influential contribution to the Taiwan stock trading (Shiu & Lu, 2011).

Prior research by Lu and Shiu (2012) on candlestick charting has also gained positive evidence. They examine all possible two day candlestick patterns for fifty stocks from Taiwan 50 Index component stocks within the period of 2 January 2002 to 31 December 2009. The intention is to examine the predictive power of all possible two day candlestick patterns which are not limited to the one mentioned in Nison (1991) only. Hence, a four digit number approach similar to the one used by Lu and Chen (2013) is used to categorize all the two day candlestick patterns based on the sequence of prices, which is the opening and closing price for the first day, denoted as 1 and 2, while 3 and 4 referring to the opening and closing price for the second day. Lu and Shiu (2012) utilize a five day moving average to identify the trend prior to the two day candlestick patterns and then measure the returns based on three rules. The opening price on the day following a two day pattern is set as the beginning measurement, whereas the end measurement is set to be the closing price on the first, fifth, and tenth holding day, with raw returns taken into account. Besides, transaction cost is randomly set at 1% for a round-trip trade. According to a buy-and-hold basis, bullish signals are assembled with positive rate of return,

while bearish signals are assembled with negative return rate for confirmation of correct predicted price movements. The profitability of returns are examined with both the skewness adjusted t-test and binomial test to test for their predictive power. For robustness checking, sub sample tests based on prior trends have led to significant results from two new patterns. The robustness of the results from these two new patterns are further examined with three different trend definitions, which include a five-day moving average over ten days, a ten-day moving average over ten and twenty days. Following that, nonparametric tests which are the Kolmogorov-Smirnov test and the Birnbaum-Hall test have identified that the samples based on that two profitable candlestick patterns are drawn from different population distribution. In conclusion, pattern 1234 and 1324 out of the twenty four candlestick patterns been examined are found to have value for investors, with pattern 1234 been classified as a reversal pattern which match with the contrarian strategy, and pattern 1324 been categorized as a continuation pattern which complement with the momentum strategy.

Instead of the Taiwan stock market, Lu and Chen (2013) investigate the predictive power of candlestick charting in the European stock market based on the component stocks in the FTSE 100, DAX 30, and CAC 40 from the period of 2 January 2003 to 31 October 2012. Since the sample period of the study encompasses the chapter of global financial crisis, thus a cut-off point is set at 14 September 2008 for comparison of the pre and post-financial crisis data for the purpose of viewing the effects of financial crisis on the efficacy of candlestick. Lu and Chen (2013) follow three main steps in executing their study. Firstly they categorize the patterns systematically and scientifically through a coding of all possible two-day patterns using a 1×4 vector, $|k_1 k_2 k_3 k_4|$ and the ranking of the four prices are used to form 24 possible candlesticks, whereby k_1 and k_2 refer to the opening and closing prices of the first day, whereas k_3 and k_4 indicate the opening and closing prices of the second day. The importance of a trend in

confirming the profitability of a candlestick pattern is emphasized in this study as noted from Nison (1991). Hence, a five-day moving average is used to identify uptrends and downtrends. After that, the third step is to compute the profits. To calculate raw returns, a trade is simulated at the opening price on the day after a two-day pattern, and the returns is computed based on a ten day holding period. In order to test the significance of the results, Lu and Chen (2013) employ the skewness-adjusted t-test and also the binomial-test for testing the null hypothesis for the winning rates, and the Bonferroni-adjusted significance level (adjusted for the number of different patterns) tests. For further checking on the robustness of the results, bootstrapping methodology is applied to deal with the problem of data snooping. In conclusion, it is found that two continuation patterns namely pattern 1324 in the DAX 30 and pattern 2314 in the CAC 40 during uptrends are profitable. Besides, one reversal pattern namely pattern 2134 in the FTSE 100 during downtrends are profitable too. As for the effects of financial crisis, it is found that the candlestick patterns are performing better before the occurrence of the global financial crisis than after the crisis. The findings from Lu and Chen (2013) also reveal that different candlestick patterns are profitable in different markets and such situation may due to the variance in the characteristics of investors and also varied institutional contexts from different markets. In conclusion, the research by Lu and Chen (2013) provides evidence that candlestick charting do possess values for the investors in the three main European stock markets.

In the study by Lu, Chen, and Hsu (2014) based on DJIA component stocks, they investigate the factors that affect the profits of candlestick trading strategy. Hence, the determinants of trend definition and holding strategy are examined. Following Caginalp and Laurent (1998), eight three-line reversal patterns are tested, which include the Three White Soldiers, Three Black Crows, Three Inside Up, Three Inside Down, Three Outside Up, Three Outside Down, Morning Star, and Evening Star. By using the daily sample data from 26

component stocks of DJIA Index within the sample period of 2 January 1992 to 31 December 2012, it is found that the Caginalp-Laurent exit strategy does affect the effectiveness of candlestick charting. The Caginalp-Laurent exit strategy which exits based on an average price for the holding period seems to be more profitable than the Marshall-Young-Rose exit strategy that exits the market based on the condition set on a specific day. With respect to the effectiveness of holding strategies, it is also found that a three-day holding period is better than a ten-day holding period. Nevertheless, no value has been found regarding the effect of trend definitions, regardless of the three trend definitions that have been examined in this study, which are the three-day moving average (MA_3), a ten-day exponential moving average of closing prices (EMA_{10}), and a Levy trend. The results for this study are gained by using the Stepwise SPA Test and at the same time taking into account the issue of transaction cost and data snooping bias. Sub sample tests are also applied for robustness checks. In short, Lu, Chen, and Hsu (2014) have discovered the value of candlestick charting with the application of Caginalp-Laurent exit strategy despite the studies from Marshall et al. (2006) and Marshall et al. (2008) which assert a negative evidence for the effectiveness of candlestick charting based on the same DJIA stock Index.

With respect to the Taiwan Stock Market, Lu, Huang, and Hsu (2014) have conducted a study that examines the predictive power of three day candlestick patterns in adaption of two trend definitions and different holding period. At the same time, they also intend to identify the behavioral factors which can influence the profitability of candlestick charting in conjunction with the claim that the technical trading strategy of candlestick patterns are useful for reflection of the investors' psychological factors. Thus, a total of 154 stocks from Taiwan Stock Exchange are examined within the period of 4 January 1992 to 31 December 2012. Systematically, the first stage in conducting this study is to categorize the candlestick patterns. Eight three-line

reversal patterns are defined properly and can be divided into bullish and bearish patterns. Next, the profitability of candlestick patterns are compared between two trend definitions for the first time among prior research. From previous studies, Caginalp and Laurent (1998), Goo et al. (2007), and Lu et al. (2012) have gained positive support for the profitability of candlestick trading strategy by utilizing the three-day moving average over six days (MA_3), whereas negative result have been resulted from the studies by Marshall et al. (2006) and Marshall et al. (2008) who use the ten-day exponential moving average of closing prices (EMA_{10}). Subsequently, when calculating profits for candlestick trading strategy, a fixed and variable holding period approach are practiced. As a result, positive returns are shown significantly from the Morning Star in downtrends and the Evening Star in uptrends after consideration of transaction costs. When comparing between the two trend definitions, MA_3 is obviously performing better than EMA_{10} . Besides, variable holding period is found to have the ability to improve the profitability of candlestick charting and the two behavioral factors identified appear to be the trading volume per trade and turnover rates.

Lu (2014) examines the effectiveness of candlestick charting in generating profits for the Taiwan Stock Market. The sample data comprises of 151 daily stock prices from Taiwan Capitalization Weighted Stock Index with sample period from 4 January 1992 until 31 December 2009. The period of 1992 is chosen as candlestick charting techniques has only been exposed to the West in 1991. All possible single line candlesticks are examined in the study unlike a number of the prior studies like Caginalp and Laurent (1998) and Goo et al. (2007) who have ignored some of the candlesticks. Apart from that, the reliability of the result for this study is further supported with bootstrap analysis for mitigating data snooping problem along with out-of-sample test and sub sample tests for enhancing the robustness of the results. The research design for this study basically consists of three important steps, namely classifying

patterns, identifying market trends, and calculating profits. First, the candlesticks are identified based on the computation of four price levels for each stock, which are the daily opening, high, low, and closing price. As a result, twelve candlestick patterns are tabulated for analysis. The second step involves the determination of market trends prior to the candlestick pattern. This is done by using the three-day moving average over six inequalities, denoted as $MA_3(t)$. Thus, an uptrend is identified when $MA_3(t - 6) < MA_3(t - 5) < \dots < MA_3(t - 1) < MA_3(t)$. Whilst, a downtrend is identified if $MA_3(t - 6) > MA_3(t - 5) > \dots > MA_3(t - 1) > MA_3(t)$. The final step is to compute the profits based on the first and tenth holding days by taking the stock prices as the natural logarithm of the closing price on day $t+n$ (C_{t+n}) divided by the opening price on the next day after a one-day pattern (O_{t+1}). The rules of decision claim that a bullish signal is denoted by a positive return rate whereas a bearish signal is represented by a negative return rate. Thereafter, positive returns during uptrend indicate a continuation pattern while negative returns during uptrend signify a reversal pattern, and vice versa. Apart from this, bootstrap analysis, sensitivity analysis, and several sub sample tests and out-of-sample tests have been conducted to enhance the robustness of the results. As a result, a total of twelve single line candlesticks from Taiwan Stock Market have been examined in this study. Lu (2014) has noticed that four of these patterns are profitable, which consist of one bullish reversal pattern (Four Price Doji), one bearish continuation pattern (Dragonfly Doji in downtrends), and two bearish reversal patterns (Four Price Doji and Hammer in uptrends) respectively. Meanwhile, the findings have also suggested that candlestick charting technique is more effective towards smaller firms and lower priced stocks.

Zhu et al. (2016) examine the effectiveness of five different candlestick reversal patterns by using daily trade data of Chinese stock markets between 1999 and 2008. The reversal patterns investigated include Bearish Engulfing, Harami, Kicking, Cross, Piercing and also

Bullish Engulfing, Harami, Kicking, Cross, Piercing. They distinguish their research from previous studies as the purpose for their study is to determine the existence of certain types of stocks in a specific market which would be more effective than others when applying with candlestick technique. Therefore, they divide the sample data into subgroups based on the size, liquidity, and PE ratio of stocks. The profitability of ten reversal candlestick patterns are then computed from 1-day, 5-day, and 10-day holding periods to predict short term stock movements. They employ a bootstrapped skewness adjusted t-test along with robustness test like out-of-sample test in their study. As a result, their statistical analysis suggest that Bearish Harami and Cross patterns are effective in predicting the turning points of uptrends while Bullish Piercing, Engulfing, and Harami reveal profitable prediction for the turning points of downtrends. Besides, high liquidity and small companies' stocks are more reliable in portraying bullish signals whereas bearish signals perform better for stocks with low liquidity and small size.

2.8 Negative evidence on candlestick charting

The performance of candlestick analysis on German intraday futures data over the period of 2002 to 2003 has been studied by Fock, Klein, and Zwergel (2005). The predictive ability of candlestick patterns is measured from two major futures, namely the DAX stock index contract and the Bond interest rate future by employing five-minute German stock indexes. Randomized buy signals in the underlying futures have formed a benchmark which is used to test against the predictive ability of candlesticks with t-test. Apart from that, a few technical indicators are added with the purpose to improve the performance of candlestick analysis results such as the Moving Average, the Relative Strength Index, and the Moving Average Convergence and Divergence indicators. However, no obvious improvement on the forecasting ability of candlesticks are observed when adapting with other technical indicators, which thus

further conclude that candlestick technique is not able to generate abnormal returns based on the German futures market.

Marshall et al. (2006) conduct a robust study on the profitability of candlestick charting based on DJIA component stocks by implementing bootstrap methodology to generate random open, high, low, and close prices. Their study which is less susceptible to data snooping bias covers the sample period from 1 January 1992 to 31 December 2002. In order to determine the forecasting power of every candlestick pattern, Marshall et al. (2006) use the rule of combining two or three individual single lines that make up the pattern to form an overall single line and end up with the selection of a total of 14 single line candlesticks and 14 reversal patterns which are believed to have strong explanatory power and most likely to be used by exponents of candlestick technical analysis for examination in the study. The single line candlesticks tested include the Long White Candle, White Marubozu, Closing White Marubozu, Opening White Marubozu, Dragonfly Doji, White and Black Umbrella, Long Black Candle, Black Marubozu, Closing Black Marubozu, Opening Black Marubozu, Gravestone Doji, White and Black Shooting Star. Whereas the reversal patterns tested include Hammer, Bullish Engulfing, Piercing Line, Bullish Harami, Three Inside Up, Three Outside Up, Tweezers Bottom, Hanging Man, Bearish Engulfing, Dark Cloud Cover, Bearish Harami, Three Inside Down, Three Outside Down, and Tweezers Top. Other than that, other candlestick patterns are deemed to have no explanatory power after forming an overall single line pattern as documented by Morris (1995).

Basically, Marshall et al. (2006) apply three key assumptions throughout the study, which involve entering trade at the open price on the day following a signal, a ten-day exponential moving average and a ten-day holding period. Bootstrap methodology is recommended to be more suitable than traditional t-test subject to its ability to accommodate to

the characteristics of skewness, kurtosis, and autocorrelation of stock prices. The first step in applying bootstrap methodology is to fit a null model to the data. Marshall et al. (2006) focus on the result from the GARCH in-Mean (GARCH-M) model following most literature even though other three widely used processes for stock prices which include random walk, autoregressive process of order one (AR(1)), and Exponential GARCH model have been adopted simultaneously as the results are very similar between the four models. The next step is to resample the residuals and using these to form random series that own the same properties as the original. The profits accruing to candlestick technical trading strategies on the random series are then compared to the profits earned on the actual DJIA component stock series to determine the statistical or economically significance of candlestick charting strategy. As a result, all the single line candlesticks and patterns do not depict statistically significance explanatory power in the US stock market even with the implementation of bootstrap methodology.

As a robustness checking to such result, Marshall et al. (2006) design nine different scenarios to conduct sensitivity analysis on the bootstrap p -values. Scenarios A and B enter trades at the close price on the day of a signal and the day after a signal, a ten-day exponential moving average, and a ten-day holding period. Scenario C enters trade at the open price on the day after a signal, a ten-day exponential moving average, and a ten-day holding period. Scenarios D and E are the same as Scenario C except that the holding period is changed to five and two days respectively. Scenarios F and G resemble Scenario C except that the candlestick parameters specifications are altered by +20% and -20% respectively. Scenarios H and I are also identical to Scenario C except the exponential moving average are changed to five and fifteen days respectively. The result from sensitivity analysis further confirm the earlier result

and hence Marshall et al. (2006) conclude that candlestick trading rules is not profitable on DJIA stocks from 1992 to 2002.

Following that, Marshall et al. (2008) conduct a similar study as Marshall et al. (2006), with a shift from the US stock market to the Japanese equity market which is popular with candlestick strategy. They examine the profitability of candlestick trading strategy on the Japanese equity market within 30 years sample period which is from 1 January 1975 until 31 December 2004. The sample data is comprised of the largest 100 stocks from the Tokyo Stock Exchange based on the market capitalization and the daily data for open, high, low, and adjusted close prices which are adjusted for capital structure changes and dividends for each of the sample stocks are collected to form candlestick lines and patterns. Following Marshall et al. (2006), only 14 single line candlesticks and 14 reversal patterns are included in the analysis without taking into account the continuation patterns as Morris (1995) does not show any strong forecasting power for continuation patterns. The core analysis is based on a ten-day exponential moving average to identify prior trend and the profits is measured on a basis of ten-day holding period with trades entering at the open price on the day following a signal. Bootstrap methodology is adapted to determine the statistical significance of the original result by comparing the mean profit between the original series and the 500 set bootstrapped series, whereby the number of stocks for which the mean profit is statistically significant on the original series must be greater than on the 500 set bootstrapped series. Later, they set up nine different scenarios which is the same as Marshall et al. (2006) to run sensitivity analysis. Moreover, the sample is divided into three ten-year sub-periods and between bull and bear period for further investigation. However, none of the tests prove the validity of the candlestick trading strategies in the Japanese equity market. Such findings are in contrarian with the popularity of candlestick charting in Japan since decades ago. Hence, Marshall et al. (2008)

suggest that Japanese culture is a reasonable explanation for the famous trend of candlestick charting in Japan instead of the profits generated.

Lieksnis (2008) has seek the opportunity to study the predictive power of candlestick charting techniques on Baltic Stock Market as it has not yet been conducted on the mentioned stock market. Hence, a total of 69 stocks are included in the study from 1 January 2005 until 1 May 2007. Following Caginalp and Laurent (1998), eight three-line reversal patterns are investigated by non-parametric means to test for their predictive power. The number of occurrence for the three day reversal patterns show that only Three Inside Down and Morning Star patterns are sufficient to be testable. So, the hypothesis tested states that the existence of Morning Star or Three Inside Down will increase the probability of reversal in stock price trends. The results from the study conclude that candlestick charting patterns do not provide any value for investors as the three day reversal patterns tested do not show any increment in the probability for trend reversal to happen.

Horton (2009) investigates on the use of Japanese candlestick method for the 349 stocks from Commodity Systems Inc (CSI). Following the study of Caginalp and Laurent (1998), three bull signals and three bear signals candlesticks are evaluated in the study, which encompasses of the Three White Soldiers, Three Inside Up, Three Outside Up, Morning Star, Three Black Crows, Three Inside Down, Three Outside Down, and Evening Star respectively, and adding also a Doji. The main track of this study is to investigate whether an appropriate signal will lead to the right market direction. There are three categories of signals, namely the good signal, bad signal, and sideways signal. Good signals are defined as when an upturn (downturn) occur within three days after a bull (bear) signal. Bad signals occur in the opposite way, whereby an upturn (downturn) occur within three days after a bear (bull) signal. Sideways signal is when no movement are shown in the market right after the signals. As such, uptrends and downtrends

are identified by using a three-day moving average. Apart from the statistics of the successes and failures for the correct market direction after an appropriate signal, three nonparametric tests are utilized to examine if the samples are all drawn from the same population distribution, which are the Kolmogorov-Smirnov test, the Cramer-von Mises test, and the Birnbaum-Hall test. As a result, all the indicators appear to be drawn from the same statistical distribution, which at the same time implies that choosing a correct result by candlestick is equal to the selection of an accurate result randomly. Subsequently, a comparison between the returns from S&P 500 and with the sample results are carried out for the aim of direct comparison. In the end, the findings by Horton (2009) provide an evidence towards the weak form of efficient market hypothesis, whereas the candlestick patterns of stars, crows, and doji are found to have no trading value for investors for the CSI stock market.

Prado, Ferneda, Morais, Luiz, and Matsura (2013) investigate the effectiveness of candlestick charting on Brazilian stock market with a different approach. Sixteen candlestick patterns are studied from a group of ten representative stocks from Sao Paulo Stock Exchange (Bovespa) for the sample period of 2005 to 2009. The criteria for stock selection are based on the amount of daily negotiation, participation, and representativeness. The predictive ability of candlesticks for the Brazilian stock market is analyzed statistically by frequential analysis, which is then compared with the results from Morris (2006) on U.S. stock market by comparative analysis approach. Candlestick patterns that appear with a frequency of higher than 1% are considered to have the most frequent patterns as identified from nine out of the sixteen candlestick patterns studied. When comparing the frequential analysis result with Morris (2006), it is found to have great contrarian as the sample market in these two studies are different. Bullish Harami is found to have the greatest predictive ability for the first, second, and fifth day, while Hanging Man has shown zero predictive capability even though it occurs most often in

the sample studies. In short, the main result from the research by Prado et al. (2013) have shown negative evidence regarding the predictive power of candlestick charts on Brazilian stock market.

2.9 Chapter summary

To summarize, the emergence of technical analysis is very much attributable to the irrationality of investors as mentioned by behavioral finance. Despite the efficient market hypothesis which had been the pillar of finance theory for centuries, technical analysis is still widely applied among traders. Some of the commonly used technical tools include Moving Average, momentum, stochastic, and candlestick charting.

Moving Average is considered as the most commonly applied technical trading rule for its simplicity. Evidence accumulated from prior studies has ascertained the predictive ability of Moving Average rule in the Malaysian stock market (Tham et al., 2012), Czech stock market (Kresta & Franek, 2015), Vietnamese market (Hung et al., 2014), Indian stock market (Achuthan & Anubhai, 2005) and among emerging stock markets (Ahmed et al., 2000; Fifield et al., 2008). Nevertheless, moving average which is based on the concept of trend analysis is not able to portray signals as early as candlestick charting since moving average is based on the average stock price for specific period rather than candlestick charting which is based on the analysis of price itself (Nison, 2012; Tam, 2015). Meanwhile, Pasternak (2006) mentioned that other technical indicator like momentum and stochastic indicator also fail to reveal trading signals as soon as candlestick charting. Therefore, candlestick charting technique serves better in this context as a leading indicator when comparing with other technical indicators which thus form the motivation for the current study.

The Japanese candlestick charting owns the longest history of over 300 years ago and utilizes the relationship between four price levels which consist of the opening, high, low, and closing prices to form candlestick charts (Nison, 2012; Tam, 2015). The combination of two or more single line candlesticks will then form a series of candlestick patterns which can be categorized into reversal patterns and continuation patterns. Reversal patterns often indicate a shift in trend usually in the opposite direction while continuation patterns represent a time of rest in the market which signifies persistence of prevailing trend after occurrence of patterns.

Mixed results have been yielded from prior studies regarding the efficacy of candlestick charting in various stock markets from different countries and time frame. Most of the positive evidence seem to derive from Taiwan stock market as shown by Goo et al. (2007), Shiu and Lu (2011), Lu and Shiu (2012), Lu, Huang, and Hsu (2014), and Lu (2014) with recent study by Zhu et al. (2016) showing predictive ability of candlestick charting in the China stock market. Alternatively, negative evidence which does not show any predictive power of candlestick charting is also gathered by Fock et al. (2005) in the German stock market, Marshall et al. (2006) for DJIA component stocks, Marshall et al. (2008) for Tokyo Stock Exchange, and Prado et al. (2013) in the Brazilian stock market.

Most of the researchers employed a three-step research design to conduct their study on effectiveness of candlestick charting (Lu, 2014; Lu et al., 2012; Lu & Chen, 2013; Lu, Huang, & Hsu, 2014; Marshall et al., 2006; Marshall et al., 2008). The first step is to categorize patterns by identifying all possible candlesticks appearing within the sample period including candlestick lines, reversal and continuation patterns. The second step is to identify prior trend by using moving average rule. Various trend definitions have been employed to identify uptrends and downtrends prior to the occurrence of candlestick patterns. For instance, a three-day simple moving average (SMA₃) has been employed by Caginalp and Laurent (1998),

Horton (2009), and Lu (2014) whereas a five-day moving average has been practiced by Goo et al. (2007), Shiu and Lu (2011), and Lu and Chen (2013). On the other hand, a ten-day exponential moving average (EMA_{10}) which allocates more weight to the most recent observations has been utilized by Marshall et al. (2006) and Marshall et al. (2008). Meanwhile, the third step is to calculate profit by measuring the stock return derived through the candlestick trading rule. It is observed that most of the prior studies have measured the profitability of candlestick trading rule based on a ten-day holding period as candlestick charting has been identified by Nison (1991) and Morris (1995) to be most useful for a short term period of approximately ten days.

Subsequently, in order to determine the statistical significance of stock returns, a bootstrapped skewness adjusted t-test or normally known as skewness adjusted t-test only is utilized (Lu, 2014; Lu & Chen, 2013; Zhu et al., 2016). The skewness adjusted t-test which is initially developed by Johnson (1978) is a non-parametric statistical test used to handle biased distributions of return rates. As for robustness checking to enhance the result of the study, sub-sample and out-of-sample test is commonly employed as shown from the studies by Lu et al. (2012), Lu, Chen, and Hsu (2014), Lu (2014) and Zhu et al. (2016).

CHAPTER 3

METHODOLOGY

3.1 Chapter overview

The first section of this chapter describes the sample data and sample period for the study, follow by the formation of research framework and steps-by-steps research design in the subsequent section. The last section then focuses on the methodology used to test the effectiveness of candlestick charting in Malaysian stock market which includes statistical analysis and also robustness tests.

3.2 Data description

The sample data for the present study comprises of daily share price which consist of the opening, high, low, and closing prices from public listed companies which are still active in Bursa Malaysia as retrieved on 1 December 2015. Thus, available company from both the Main market and Ace market are selected from Bursa Malaysia while historical share prices are downloaded through Yahoo Finance. The four price levels of opening, high, low, and closing price are used to form candlestick chart while the opening and closing price are particularly utilized to calculate end of day stock returns from a buy and hold perspective. The overall sample period for the present study covers a period of fifteen years from the year 2000 until 2014 but with the last three years reserved as out-of-sample data.

The main sample encompasses a period of twelve years which is from 3 January 2000 to 30 December 2011 for in-sample analysis. As a result, a total of 420 firms which are active throughout the sample period are included in the main sample (Refer to Appendix B).

The out-of-sample test utilizes a different set of data which are not reused in the in-sample data from 3 January 2012 to 31 December 2014 for enhancement of the robustness of

the results. Eventually, a total of 422 companies which are active throughout the three years sample period are identified as out-of-sample data (Refer to Appendix C).

Meanwhile, trading volume is recognized as an important component in the stock market due to its liquidity issue apart from the stock price itself. Investors often consider the factor of trading volume for stock screening. As trading volume indicates the level of interest in a stock, high volume security is usually more attractive to active traders typically day traders or short term investors as they need to be able to get in and out of a stock easily. Average trading volume represents the typical amount of transaction observed daily over a period of time and a high volume stock is usually denoted by one million shares at absolute minimum (Mitchell, 2014). Therefore, taking into account the attributes of high volume, this study only considers sample stocks which exceed average trading volume of one million unit shares as sub-sample to test the influence of trading volume on predictability of candlestick charting.

After withdrawing the crisis and post-crisis period, the first sub-sample extracts sample stocks with average trading volume that exceeds one million unit shares as consideration for trading volume effect from the main sample within the period from 2000 to 2007 and resulted in a total of 59 sample stocks with attributes of high trading volume (Refer to Appendix D). The second sub-sample only includes sample stocks with average trading volume that exceeds one million unit shares from the out-of-sample within the period of 2012 to 2014 and as a result a total of 131 firms are identified (Refer to Appendix E).

3.3 Research framework

Behavioral finance provides explanation for the occurrence of market anomalies and inefficiencies in the securities market. Market anomalies which can be identified from historical price patterns allow exploitation in the securities market to achieve excess returns (Montier,

2009; Pompian, 2012). Historical price patterns are usually detected through technical analysis with the aids of various technical indicators. However, technical analysis contradicts specifically with the theory of weak form efficient market hypothesis which is proposed by Fama (1970). In fact, the Japanese candlestick charting trading rule which is one of the most popular techniques for technical analysis methods owns the longest history of over 300 years ago and is widely employed among practitioners despite the criticisms received from academicians.

The studies by Caginalp and Laurent (1998) have investigated candlestick analysis in the European market while Lu (2014) and Zhu et al. (2016) have examined on the Taiwan and China market respectively. All of them have concentrated more on the reversal patterns while leaving the continuation patterns behind. Goo et al. (2007) have also conducted a study to compare the profitability of candlesticks with holding days which have shown that bullish reversal patterns tend to perform better during long holding period while bearish patterns are more suitable for short holding period. Meanwhile, Shiu and Lu (2011) have discovered that candlestick trading strategy is improved with changes of trading volume in the market. Although several studies on candlestick charting have been conducted by previous researchers, none of the known research in the past has focused specifically on the application of all types of candlestick charting including the continuation patterns.

The research framework for the present study thus focuses on the application of Japanese candlestick charting technique in Malaysia. As outlined in Figure 3.1, the main purpose of this study is to investigate the effectiveness of candlestick charting in the context of Malaysian stock market. The effectiveness of candlestick charting is determined based on the predictive power and effective holding period of candlesticks. The effective holding period

and/or maximum holding period is derived from the profitability of candlesticks in various holding periods.

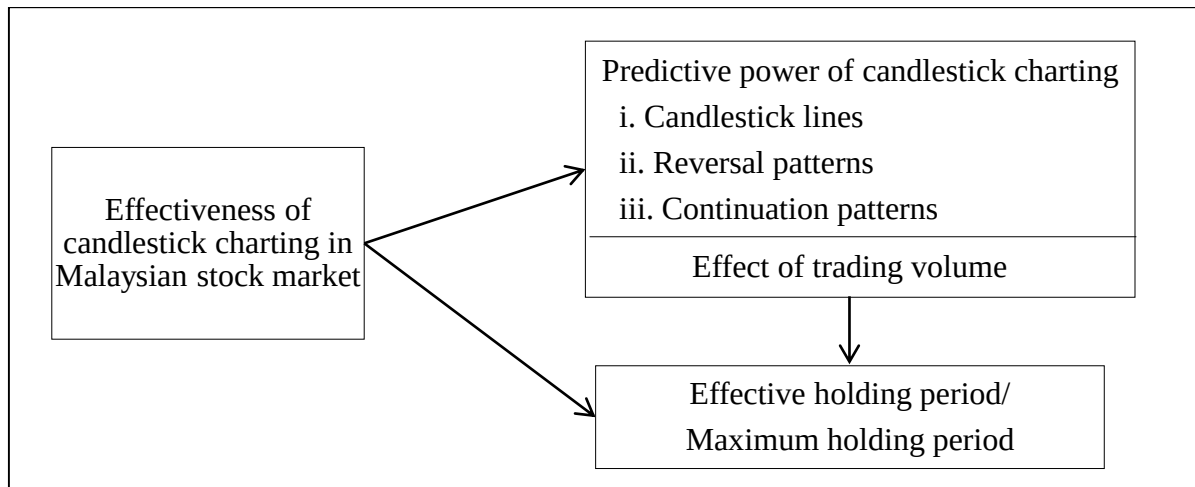


Figure 3.1: Research framework

The predictive power of candlestick charting is determined from the accuracy of candlesticks in predicting direction of future price movement based on the average returns obtained. The average returns is calculated based on a buy-and-hold perspective for short term trading. Basically, Nison (1991) and Morris (1995) have identified the maximum holding period for candlestick charting to be ten days. However, apart from a ten-day holding period, the profitability of candlestick patterns is also computed for various holding periods from one day until fifteen days holding period as Malaysian stock market is observed to display trading cycle ranges from three to fifteen days (Tam, 2001). A one day holding period is also included as we would like to investigate if candlesticks possess day-trading profitability for extremely short-term investors. The intention of measuring the average returns of candlestick patterns from various holding periods is to determine the effective holding period and/or maximum holding period of candlestick patterns in revealing accurate predictive power for future price movement. Besides, trading volume is also taken into account in the present study to view the effect of trading volume on predictability of different candlesticks.

3.4 Research design

Basically, the whole study is conducted according to the flow of three main phases. The first step is to identify and categorize candlestick patterns. The second step is to identify market trend prior to the patterns. The third step is to calculate stock returns based on candlestick charting trading rule.

3.4.1 Categorize patterns

Firstly, all possible candlestick patterns that occur within the sample period is scanned and identified with the help of Candle Scanner software. Candle Scanner helps to save time in this study as it is able to identify all possible candlestick patterns automatically instead of working on it manually which is time consuming. By inserting the four price levels, which consists of the daily opening, high, low, and closing prices for respective stocks within a specific sample period, Candle Scanner can easily recognize all possible candlestick patterns with reference mostly from Nison (1991) and Morris (1995). The output from Candle Scanner consists of all the possible candlestick patterns detected and are exported to Excel file for extraction and analysis (Refer to Appendix G).

3.4.2 Identify trends

Secondly, we employ three-day simple moving average (SMA_3) to identify trends prior to the occurrence of candlestick patterns as previous studies by Caginalp and Laurent (1998) and Lu (2014) show that the use of SMA_3 is most successful at providing proof for candlestick patterns profitability. The importance of trend is even being highlighted by Nison (1991) and Morris (1995). It is expected that candlestick patterns will only be valid when prices are in the appropriate trend, especially in the case for reversal patterns. In order to identify trend prior to the appearance of candlestick patterns, a three-day moving average on day t is computed as:

$$MA_3(t) = \frac{P(t-2)+P(t-1)+P(t)}{3} \quad (3.1)$$

, where $P(t)$ denotes the closing price on day t .

A set of inequalities is defined to help identifying market trend with at most one violation of the inequalities. A downtrend is detected on day t when:

$$MA_3(t-6) > MA_3(t-5) > \dots > MA_3(t-1) > MA_3(t) \quad (3.2)$$

Whereas an uptrend on day t is defined as:

$$MA_3(t-6) < MA_3(t-5) < \dots < MA_3(t-1) < MA_3(t) \quad (3.3)$$

3.4.3 Calculate profits

Thirdly, we measure the stock returns as the natural logarithm of the closing price on day $t + n$ divided by the opening price on the day following a candlestick line or pattern computed as follow:

$$Returns = \ln \frac{C_{t+n}}{O_{t+1}} \quad (3.4)$$

,where n refers to the number of holding period

Following Brock et al. (1992), the present study examines the profits based on the raw returns rather than abnormal ones as this approach is identified to be more appropriate for short-term trading strategies with the stock returns computed based on a buy-and-hold investment strategy (Sweeney, 1986; Lu, 2014; Zhu et al., 2016). The profitability of candlesticks is measured from various holding periods from 1-day until 15-day holding period to observe the variability of average returns rate so as to determine the effective holding period of candlestick charting in the context of Malaysian stock market. It is assumed that a trade is simulated at the opening price on the day following a candlestick line or pattern and then sold at the end of the closing price after holding for a specific holding period, n which ranges from 1 to 15 in the context of present study.

3.5 Transaction costs

As stated under Bursa Malaysia, the client is liable to pay transaction costs apart from the initial cost of the shares bought or sold in the securities market. Transaction costs are expenses which include brokers' commission, stamp duty, and clearing fees. Transaction costs are taken into account in the present study when considering the profitability of candlestick charting measured in terms of average returns rate.

Brokerage fees act as a compensation to brokers for executing a transaction and costs a percentage of charge on the transaction value. The commission rates for brokers are subject to Schedule 6 Rule 11.02 & 11.03 of Bursa Malaysia. It depends on the type of trade executed and can reach to a maximum of 0.70% commission rate.

Stamp duty are taxes paid on the transaction of shares. The stamp duty is RM1.00 for every RM1000.00 of the transaction value of securities as mentioned by Bursa Malaysia, which is approximately at 0.10%. Both buyer and seller are liable to pay for the stamp duty and it shall be remitted to the maximum of RM200. Stamp duty is not subjected to GST.

Clearing fees are costs charged by a clearing house for its services in handling unsettled transactions. Clearing fees are payable by both buyer and seller at 0.03% as stated by Bursa Malaysia. A 0.03% clearing fee is charged on transaction value with a maximum of RM 1000.00 per novated contract on market transaction with no minimum fee imposed. For direct business contract, a 0.03% of transaction value is charged as clearing fee with a maximum of RM 1000.00 per contract and a minimum of RM 10.00.

By adding the cost of brokers' commission, stamp duty, and clearing fees together, the total transaction cost incurred is equal to 0.83%. Therefore, an approximate transaction cost of 1% is assumed in this study when examining the effectiveness of candlestick analysis.

3.6 Decision rules

In order to confirm the existence of predictive power for candlestick charting, each type of candlestick should correctly predict the direction of future price movement based on the average returns attained from a buy-and-hold perspective. The signals reflected from the return rate shall be in coherent with the definition for respective candlesticks (Refer to Appendix A). Generally, bearish candlestick lines and patterns will emit bearish signals while bullish candlestick lines and patterns shall imply bullish signals. Thus, investment made from a bullish signal is expected to generate positive return rate. In contrary, bearish signals shall lead to negative return rate. Table 3.1 shows the decision rules for determining predictive power of respective candlestick and only return rate which is more than 1% transaction cost is considered significant in the case for the present study.

For candlestick lines and patterns without trend, no prevailing trend is required. Thus, a significant positive return rate for bullish candlestick line or pattern directly proves its bullish signal, while a significant negative return rate on bearish candlestick line or pattern prove its bearish signal instantly.

A prevailing uptrend is required to confirm the predictive power of bearish reversal patterns and also bullish continuation patterns. The bearish reversal patterns shall reveal negative return rate that imply bearish signals while bullish continuation patterns shall obtain positive return rate that represent bullish signals.

Meanwhile, a prevailing downtrend is needed to prove the predictive power of bullish reversal patterns and bearish continuation patterns. The bullish reversal patterns shall portray positive return rate to indicate bullish signals whereas bearish continuation patterns shall attain negative return rate which indicate bearish signals.

Table 3.1: Decision rules for proving predictive power of candlesticks

Types of candlestick	Average Returns (%)	Trend prior to pattern
Before trend:		
Bearish Line/Pattern	Negative *	No
Bullish Line/Pattern	Positive *	No
After trend:		
Bearish Reversal Pattern	Negative *	Uptrend
Bullish Reversal Pattern	Positive *	Downtrend
Bearish Continuation Pattern	Negative *	Downtrend
Bullish Continuation Pattern	Positive *	Uptrend

*significant at at least 10% significance level and over 1% average returns

3.7 Hypothesis setting

As the predictive power of candlestick is determined from the average returns, the hypothesis is set up on the basis of two-tailed tests to test the significance of returns rate. The statistical significance of average returns for each candlestick is tested with skewness adjusted t-test (Refer to 3.5.3) with the hypothesis stated below whereby the average returns rate for respective candlesticks is significantly different from zero in order to prove the gain of significant returns.

H_0 : The average returns for candlestick trading strategy is equal to zero.

H_1 : The average returns for candlestick trading strategy is significantly different from zero.

3.8 Methods used for testing effectiveness of candlestick

Basically, descriptive statistics are used to represent statistical properties of candlestick charting while Binomial test functions to test the significance of true returns rate for candlestick charting. Meanwhile, skewness adjusted t-test is employed to examine the significance of average returns of candlestick charting. Lastly, out-of-sample test acts as a robustness checking to enhance the accuracy of the research findings.

3.8.1 Descriptive statistics

Descriptive statistics summarize the data into simple and useful information to provide an overview on the statistical properties of the sample data. Basically, descriptive statistics constitute of the mean, standard deviation, skewness, kurtosis, and the minimum and maximum values. The summary statistics for the present study is measured based on the daily returns of 420 sample stocks from main sample. The daily returns are measured as a difference of natural logarithm between the daily prices as denoted below:

$$\text{Daily returns} = \ln(\text{Price in Day 2}) - \ln(\text{Price in Day 1}) \quad (3.5)$$

In fact, taking the log difference as a measure for daily returns is almost the same as the percentage change derived by subtracting the price on second day from the price on first day and then divided by the price on first day. However, taking natural logarithm of returns is more precise than percentage change as growth rate varies across time besides meeting the requirement for most of the statistical analysis pack (Lu, 2014; Marshall et al., 2006).

3.8.1.1 Mean

Mean represents the average for the data which sums up all the data values and then divided by the number of observations (Arulmozhi & Muthulakshmi, 2009; Holcomb, 2016). Mean is commonly used as a standard measure for the center distribution of the data and is computed as below:

$$\text{Mean}, \bar{x} = \frac{\sum x}{N} \quad (3.6)$$

3.8.1.2 Standard deviation

Standard deviation is a measure of dispersion of the data from its mean and is calculated as the square root of variance (Arulmozhi & Muthulakshmi, 2009; Holcomb, 2016). It is easier to interpret standard deviation than the variance as standard deviation is presented in the same

units as the data. In finance, standard deviation signifies an investment's volatility which is also a measurement for expected risk. So, a higher standard deviation signifies greater volatility or risk whereas a low standard deviation indicates lower risk or volatility. The formula used to calculate standard deviation is as shown below:

$$SD, \sigma = \sqrt{\frac{\sum_{i=1}^N (x_i - \bar{x})^2}{N-1}} \quad (3.7)$$

3.8.1.3 Skewness

Skewness is a measure of asymmetry of the data or in other words represents the extent to which the data are not symmetrical (Holcomb, 2016; Zikmund & Babin, 2012). Figure 3.2 shows three types of skewed data which includes the non-skewed, positive, and also negative distribution. For a normal distribution, the skewness is equal to zero. Positive or right-skewed distribution occurs when the skewness shows a value greater than zero and has a long tail to the right. Negative or left-skewed distribution appears when the value for skewness is less than zero and has a long tail to the left. Asymmetry indicates a lack of symmetry from the normal distribution and is a common phenomenon in the stock market as the stock price is randomly distributed and often unpredictable with either a sudden upsurge in price or a heavy plunge overnight. Skewness is computed using the formula below:

$$Skewness, S = \frac{1}{N} \sum_{i=1}^N \left(\frac{x_i - \bar{x}}{\sigma} \right)^3 \quad (3.8)$$

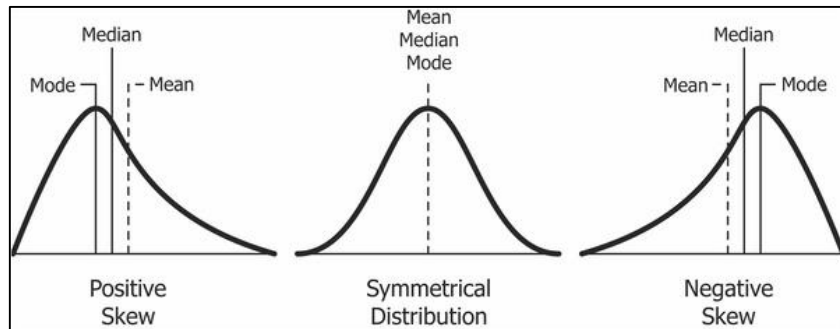


Figure 3.2: Types of skewed distributions

3.8.1.4 Kurtosis

Kurtosis is a measure for the sharpness of the peak and the farness from the tails for a distribution (Holcomb, 2016; Zikmund & Babin, 2012). The kurtosis for a normal distribution is 3 and is known as mesokurtic while some sources adjust this value to zero for a normally distributed data. So following the definition from Eviews 7, a kurtosis which exceeds 3 indicates a peaked distribution or also known as leptokurtic, whereas a kurtosis of less than 3 indicates a flat distribution or also known as platykurtic as shown from Figure 3.3. Typically, a mesokurtic distribution has moderately heavy tails whereas a leptokurtic consists of heavier tails which are farther above the horizontal axis while platykurtic has flatter peak than normal distributions and with lighter tails. Following the formula from Eviews 7, the kurtosis is calculated as below:

$$\text{Kurtosis}, K = \frac{1}{N} \sum_{i=1}^N \left(\frac{x_i - \bar{x}}{\sigma} \right)^4 \quad (3.9)$$

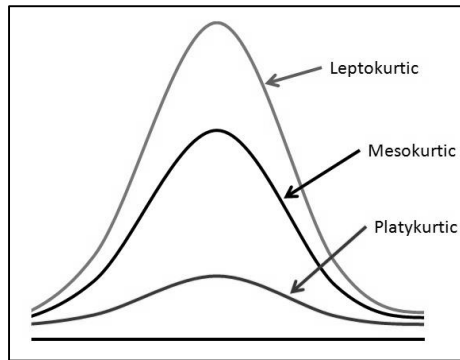


Figure 3.3: Types of kurtosis distributions

3.8.1.5 Maximum and minimum

Maximum refers to the largest data value whereas minimum indicates the smallest data value from the price series. The maximum and minimum can be used to identify possible outlier or error in data entry which can be observed from the extreme value. Extreme value exists when the maximum value is very high or when the minimum value is very low (Arulmozhi & Muthulakshmi, 2009; Holcomb, 2016).

3.8.2 Binomial test

Binomial test is a nonparametric test of difference that estimates the likelihood of equal representation between two categories in order to ascertain whether the sample data contains stochastic properties (Anderson, 2007; Kraska-Miller, 2013). Stochastic also referring to random determination is defined of having a random probability distribution or pattern that may be analyzed statistically but may not be predicted precisely.

In the context of present study, Binomial test is employed to test the statistical significance for true returns rate of candlesticks. True returns rate are computed to denote the statistical properties of correct predictions for different candlestick signals. The true returns rate of candlesticks are measured based on bearish and bullish rate. Bearish rate represents the proportion of positions with bearish signals and is measured as a percentage of negative returns obtained out of the total number of signals generated. Meanwhile, bullish rate signifies the proportion of positions with bullish signals which is derived as a percentage of positive returns attained out of the total number of signals produced.

Binomial test is applied to test whether the predictive correction is stochastic or not. Thus, the binomial test examines the hypothesis stated below, whereby the probability of correction is not equal to 0.5 at least if candlestick signals influence the returns of short term investments. When p-value for binomial test is less than or equal to either the 10%, 5%, or 1% significance level, then the null hypothesis can be rejected and resulted to significant bearish or bullish rate.

$$H_0: p = 0.5$$

$$H_a: p \neq 0.5$$

3.8.3 Skewness adjusted t-test

In order to test the predictive power of candlestick charting, the average returns for each candlestick pattern is computed from a buy-and-hold perspective and then tested with skewness adjusted t-test for its statistical significance. Skewness adjusted t-test is a non-parametric statistical test used to handle biased distributions of returns rate which is first developed by Johnson (1978). While the standard one-sample t-test is relatively robust, it can have problems if the data are sufficiently non-normal. The Wilcoxon test can be used if the problem is tails that are too heavy. However, if the data are skewed even as much as to a lognormal distribution, then both the t-test and the Wilcoxon sign-rank test can have problems. In this case, there is evidence that one-sided tests can be badly off while two-sided tests are not as badly off. Hence, Johnson's corrected t test which is sensitive to the degree of skewness and the sample size is developed for skewed data (Johnson, 1978). The formula for Johnson's corrected t-statistic is proposed as below:

$$t_1 = t + \frac{gt^2}{3\sqrt{n}} + \frac{g}{6\sqrt{n}} \quad (3.10)$$

where:

t = one-sample t-statistic

g = estimated skewness

n = total number of observations

Sutton (1993) shows that the Johnson's corrected t-test is slightly conservative when the degree of skewness is greater than 1.5 and noticeable conservative when the skewness is equal to or greater than 2.9. The test can be affected by sample sizes of less than 20 for skewness of about 1.5 or less than 80 for skewness of about 3 too. In this case, Sutton (1993) recommends a bootstrap correction to Johnson's t-test which appears to improve the results. Later, Chen (1995) has proposed a modified, upper-tailed, Johnson test that is better in terms of both the

power and accuracy of the p-value, than either Johnson's test or Sutton's bootstrap correction when the sample size is less than 20. The difference is not large unless the asymmetry is marked and/or the sample size is less than 10.

Barber and Lyon (1997) document that long-horizon buy-and-hold abnormal returns are positively skewed. They show that skewness has a greater impact on the distribution of the t-statistic than kurtosis does and that positive skewness of the sampling distribution leads to negatively biased t-statistics. This causes an inflated significance level for lower-tailed tests in which reported p-values will be smaller than they should be and also a loss of power for upper-tailed tests whereby the reported p-values will be too large.

Sutton (1993) addresses that a bootstrapped application of Johnson's t-statistics should be preferred when the parent distribution is asymmetrical as it can help to reduce the probability of type I error in cases where the test has an inflated type I error and it is also more powerful in other situations. Therefore, to eliminate the skewness bias for long-run abnormal returns which are calculated from a buy-and-hold perspective, a skewness adjusted t-test is employed in this study as stock returns are typically expected not to be normally distributed. Based on Lyon, Barber, and Tsai (1999), the skewness adjusted t-statistic is calculated as follow:

$$t_{sa} = \sqrt{n} \left(s + \frac{1}{3} \gamma s^2 + \frac{1}{6n} \gamma \right) \quad (3.11)$$

where:

n = total number of observations

s = standard mean of returns = $\frac{\overline{AR_t}}{\sigma(AR_t)}$

$\hat{\gamma}$ = estimated skewness of returns = $\frac{\sum_{i=1}^n (AR_{it} - \overline{AR_t})^3}{n\sigma(AR_t)^3}$

Therefore, Equation 3.11 of the skewness adjusted t-statistic is applied to test the statistical significance of average returns for candlestick trading strategy based on two tailed t-

tests with the hypothesis stated below. The rejection rule states that null hypothesis can be rejected when p-value is less than or equal to either the 10%, 5%, or 1% significance level.

$$H_0: \mu = 0$$

$$H_1: \mu \neq 0$$

3.8.4 Out-of-sample test

Neely et al. (2011) stress on the importance of out-of-sample tests to increase the robustness of results. The candlestick charting analysis is able to mitigate more of the data snooping problem as compared to tests of other technical trading rules since candlestick charting was originally applied to Japanese rice futures contracts in the 1700s (Marshall et al., 2006). Hence, the investigation of candlestick trading rules in the context of Malaysia stock market is actually deemed to be like conducting an out-of-sample test. Despite the results gained from the main sample or in-sample, the out-of-sample test is needed as an approach for further robustness checking through replication of all the initial analysis towards a new data set.

Thus, a different set of data which is not repeated in the in-sample stocks is employed in the out-of-sample test to examine the predictive power of candlestick charting. Hence, the out-of-sample test encompasses a period of three years from the most recent period of 2012 to 2014 and resulted to a total sample of 422 stocks which are active throughout the sample period.

3.9 Chapter summary

In short, this chapter has discussed the procedures and steps employed to conduct the present study in a systematic way. Besides, tests used to verify the hypothesis are highlighted which include the Binomial Test and skeweness adjusted t-test. After the process of data collection, stock prices are scanned with Candle Scanner software and each types of candlesticks including the single-line candlesticks, reversal patterns, and continuation patterns

are then organize into Microsoft Excel file to generate average returns, skewness adjusted t-statistics and also p-values for significance testing.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Chapter overview

This chapter presents all the empirical findings for analysis on the effectiveness of candlestick charting in Malaysian stock market. The first part shows the statistical properties of candlestick charting by presenting summary statistics and true return rate of candlesticks throughout the sample period. The next section presents the profitability of various types of candlesticks measured from the first day until fifteenth day holding period. The results for trading volume effect on effectiveness of candlestick trading strategy is presented in the subsequent section. The penultimate section then shows the results for effective holding period of candlestick lines and patterns after comparing the effectiveness of candlesticks follow by chapter summary in the last section.

4.2 Statistical properties of candlestick charting

Statistical properties included in this section encompass the descriptive statistics and also the true returns rate for candlesticks over the sample period. Descriptive statistics aim to summarize the sample by providing a quick and simple description of the data through the measures of mean, standard deviation, skewness, kurtosis, maximum and minimum values as shown in Table 4.1. Meanwhile, true return rate for candlestick charting denotes the accuracy of correct signals display by each candlesticks which are represented by the bearish and bullish rate as shown from Table 4.2 until Table 4.7. Bearish rate indicates the proportion of position with negative returns or bearish signals, whereas bullish rate reveals the proportion of position with positive returns or bullish signals.

4.2.1 Descriptive statistics

The summary statistics between four series which consist of the opening, high, low, and closing prices for 420 stocks from main sample within the period of 3 January 2000 to 30 December 2011 are shown in Table 4.1. The total number of daily stock returns within the twelve years sample period are measured as the natural logarithm difference. As a result, a total of 1,278,921 daily returns is obtained for each series within the twelve years sample period. Generally, the maximum and minimum values obtained between four series are similar. The maximum daily returns are obtained from the high series at 4.95 whereas the minimum daily returns are recorded at -3.64 from both the open and high series.

Table 4.1: Summary statistics for stock returns

Statistics	Open	High	Low	Close
Daily Return	1278921	1278921	1278921	1278921
Mean	0.000312	0.000322	0.000312	0.000323
Standard deviation	0.0732	0.0702	0.0527	0.0551
Skewness	0.0945***	0.5096***	-0.2407***	0.6533***
Kurtosis	171.1478***	191.1190***	440.8630***	324.2433***
Maximum	4.82	4.95	4.64	4.68
Minimum	-3.64	-3.64	-3.58	-3.30

*** Indicates statistical significance at 1% level.

The mean, standard deviation, skewness, and kurtosis are computed from the entire returns series for all stocks. The means of the daily returns for each of the four series are similar. The mean returns of the open series is the same with the low series at 0.000312, whereas the high series generate average returns which corresponds to the closing price at 0.000322 for the high series and 0.000323 for the close series. The standard deviation of the open and high series are recorded approximately at 0.07 while the low and close series is only about 0.05. It reflects that the open and high series are more volatile than the low and close series.

The skewness for all the four series is near zero with only the low series negatively skewed at -0.2407. The open series show a positive but weakly right-skewed distribution at 0.0945 while the high and close series produce similar positive skewness at 0.5096 and 0.6533

respectively. For the kurtosis, the low series' returns own the largest value at 440.86 while the open series have the lowest value at 171.15. This shows that all the four series are highly peaked and leptokurtic, with stronger characteristic displaying by the low and close series as compared to the open and high series. As statistically significant results are obtained for both skewness and kurtosis, thus it reveals that all the four series are distantly located from the normal distribution. In other words, stock returns is hardly to be normally distributed as shown from the result of summary statistics.

4.2.2 True return rate of candlestick lines

Generally, the bearish candlestick lines are more effective in reflecting bearish signals than bullish candlestick lines in portraying bullish signals as most of the bearish candle lines have shown significant bearish rate of over 50% while the bullish rate for all the bullish candle lines is significantly less than 50%.

As shown in Table 4.2, Opening Black Marubozu and Closing Black Marubozu are considered to be less effective in emitting bearish signals than other bearish lines as most of the bearish rate obtained is less than 50%. Meanwhile, Black Marubozu is most effective in revealing bearish signals compare to other bearish lines as higher bearish rate is obtained significantly throughout the fifteen days holding period and with the highest one recorded at 59% on the 14-day holding period. Long Black Candle only manages to produce accurate predictions for the first few holding days and thus is less effective than other bearish lines. Concurrently, Black Candle is more effective than Short Black Candle as higher bearish rate is identified consistently from the 3-day holding period until the 15-day holding period with average bearish rate recorded around 54%.

Table 4.3 shows that Long White Candle has obtained bullish rate of less than 40% throughout the fifteen days holding period, indicating that it is less effective in portraying

bullish signals as compared to other bullish candle lines. For 1-day holding period, all bullish lines except Closing White Marubozu are less effective in producing bullish signals as the bullish rate is only around 30%. The bullish rate for most of the bullish candle lines tend to increase as the holding period increases. Short White Candle is observed to be more effective in portraying bullish signals beginning from the 10-day holding period with bearish rate of around 47%. Typically, Opening White Marubozu is more effective than White Candle, White Marubozu and also Closing White Marubozu as higher bearish rate of about 44% is obtained throughout the fifteen days holding period.

Table 4.2: Bearish rate of bearish candle lines from 1 to 15 holding days from 2000 to 2011

Bearish Line	No.	Bearish Rate (%): Profit < 0 (bearish signals)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Black Candle	17331	46.70***	50.46	52.97***	54.14***	54.21***	54.04***	54.08***	54.33***	54.52***	54.77***	54.64***	54.79***	54.58***	54.44***	54.27***
Short Black Candle	3157	49.73	50.84	51.63*	52.36***	53.25***	52.68***	54.04***	53.12***	52.49***	53.12***	53.72***	52.80***	53.63***	53.60***	53.22***
Long Black Candle	1229	43.53***	46.38**	48.33	54.35***	54.52***	52.16	49.96	50.20	49.96	50.85	50.77	51.02	51.18	50.37	48.33
Black Marubozu	278069	46.08***	53.75***	55.67***	56.70***	57.30***	57.60***	57.92***	58.24***	58.40***	58.56***	58.73***	58.76***	58.88***	59.00***	58.99***
Opening Black Marubozu	51440	41.11***	46.03***	47.67***	48.57***	49.20***	49.38***	49.51**	49.81	49.81	50.25	50.22	50.56**	50.68***	50.60***	50.62***
Closing Black Marubozu	26509	39.61***	43.86***	45.97***	47.30***	47.54***	47.73***	48.20***	48.32***	48.62***	49.10***	49.28**	49.57	49.77	49.81	49.90

The bearish rate is obtained by dividing the number of bearish signals by the total observed signals (No.) and presented in percentage form. The number of correct signals and p-values for Binomial test can be referred from Appendix I. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.3: Bullish rate of bullish candle lines from 1 to 15 holding days from 2000 to 2011

Bullish Line	No.	Bullish Rate (%): Profit > 0 (bullish signals)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
White Candle	15642	38.53***	41.41***	41.41***	41.87***	42.22***	42.21***	42.01***	41.98***	42.11***	41.93***	42.24***	42.23***	41.84***	41.96***	42.05***
Short White Candle	2224	38.58***	43.48***	44.15***	44.92***	45.14***	45.41***	46.36***	45.86***	46.18***	46.85***	47.35**	47.66**	47.26**	47.12***	47.17***
Long White Candle	2705	35.49***	34.71***	35.05***	35.64***	35.75***	36.64***	36.56***	37.04***	38.08***	38.11***	37.45***	36.93***	36.97***	36.75***	36.19***
White Marubozu	165046	35.28***	39.07***	40.18***	40.67***	40.98***	41.37***	41.60***	41.77***	41.84***	41.97***	41.99***	41.92***	41.95***	42.01***	42.17***
Opening White Marubozu	49019	38.57***	42.15***	43.29***	43.70***	43.98***	43.96***	44.09***	44.29***	44.28***	44.52***	44.41***	44.22***	44.24***	44.18***	44.10***
Closing White Marubozu	44808	41.09***	42.29***	42.45***	42.53***	42.53***	42.73***	42.73***	43.11***	43.06***	43.18***	43.03***	43.09***	42.62***	42.64***	42.56***

The bullish rate is obtained by dividing the number of bullish signals by the total observed signals (No.) and presented in percentage form. The number of correct signals and p-values for Binomial test can be referred from Appendix I. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

4.2.3 True return rate of reversal patterns

Generally, bearish reversal patterns are more effective in revealing bearish signals than bullish reversal patterns in portraying bullish signals as most of the bearish rate for bearish reversal patterns are more than 50% while the bullish rate for bullish reversal patterns is less than 50%. The bearish rate and bullish rate typically rise as the number of holding day increases.

Prior to identification of trend, the Descending Hawk, Bearish Engulfing, Hanging Man, Three Black Crows, and Tweezers Top patterns tend to produce more accurate predictions on the 15-day holding period as highest bearish rate is obtained on that day for respective patterns. Table 4.4 shows that Bearish Harami Cross, Last Engulfing Top, Shooting Star, Three Inside Down, and Bearish Tri Star patterns are more effective on the 14-day holding period while Bearish Belt Hold and Three Outside Down are more effective on 13-day holding period whereas Dark Cloud Cover and Bearish Harami are more effective on the 12-day holding period. While most of the reversal patterns show significant and higher bearish rate during longer holding period from ten to fifteen days, Bearish Doji Star, Evening Star, Bearish Meeting Lines, and Two Crows patterns on the other hand are more effective in revealing bearish signals during short holding period of less than ten days.

After identification of prevailing uptrend, significant bearish rate of more than 50% is gained mostly from ten to fifteen days holding period as shown in Table 4.4. For the 10-day holding period, Evening Star pattern shows a bearish rate of 75% which is the highest among other patterns. On the 15-day holding period, Descending Hawk, Evening Star, and Shooting Star patterns have recorded higher bearish rate of more than 60% as compared to other patterns. Descending Hawk, Doji Star and Shooting Star patterns indicate higher probability of occurrence for bearish signals after uptrend. The reversal patterns tend to record higher bearish rate on specific days. Descending Hawk and Hanging Man patterns have shown highest bearish

rate on the 15-day holding period while Last Engulfing Top and Shooting Star show highest bearish rate on the 14-day holding period. Meanwhile, Bearish Doji Star is more effective on the 13-day holding period whereas Dark Cloud Cover, Bearish Engulfing, Bearish Harami, and Three Inside Down patterns are more effective during the 12-day holding period. On the other hand, Bearish Belt Hold, Evening Star, Bearish Harami Cross, Bearish Meeting Lines, Three Black Crows, Three Outside Down, Tweezers Top, and Two Crows tend to be more effective in forecasting bearish signals for holding period of less than ten days which is between three to nine holding days.

Table 4.5 shows an average bullish rate of approximately 40% among all the bullish reversal patterns. Before identifying any prior trend, Bullish Harami, Bullish Meeting Lines, and Tweezers Bottom tend to portray bullish signals more effective on the 15-day holding period with highest bullish rate obtained by respective patterns on that day. Homing Pigeon, Last Engulfing Bottom, and Three Inside Up are more effective on 14-day holding period while Bullish Tri Star and Bullish Belt Hold show highest bullish rate on the 13-day and 12-day holding period respectively. For the 11-day holding period, Bullish Doji Star and Bullish Engulfing have found to be more effective in predicting bullish signals whereas Piercing and Three Outside Up patterns are more effective during the 10-day holding period. Meanwhile, Hammer, Bullish Harami Cross, and Inverted Hammer patterns are more effective for shorter holding periods from five to nine holding days.

Overall, the probability for occurrence of bullish signal decreases after identification of a prevailing downtrend as shown in the case for Kicking Up, Bullish Meeting Lines, Morning Star, Morning Doji Star, Three Inside Up, and Bullish Tri Star patterns. The average bullish rate obtained after trend is only about 40%. Tweezers Bottom has shown more accurate predictions of bullish signals on the 15-day holding period, whereas Homing Pigeon and Last

Engulfing Bottom are more effective on the 14-day holding period. Meanwhile, Hammer and Bullish Harami patterns are more effective on the 13-day and 12-day holding period respectively. Bullish Belt Hold, Bullish Engulfing, and Piercing patterns have highest bullish rate during the 11-day holding period while Inverted Hammer and Three Outside Up are more effective on the 10-day holding period. Alternatively, Bullish Doji Star, Bullish Harami Cross, Three Inside Up, and Three White Soldiers patterns tend to be more effective for holding period of less than ten days which is between the 7-day to 9-day holding period.

Table 4.4: Bearish rate of bearish reversal patterns before and after trend from 1 to 15 holding days from 2000 to 2011

Bearish Reversal Patterns	No.	Bearish Rate (%): Profit < 0 (bearish signals)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Abandoned Baby-	7	42.86	71.43	57.14	28.57	42.86	14.29	42.86	28.57	14.29	42.86	57.14	57.14	42.86	42.86	57.14
Belt Hold-	1351	46.71**	51.67	53.44**	55.81***	55.44***	55.22***	55.37***	54.40***	56.62***	56.48***	57.44***	57.51***	57.96***	56.99***	56.11***
Dark Cloud Cover	541	38.26***	49.35	50.65	52.50	50.83	51.02	53.23	53.23	53.79*	53.97*	57.49***	59.15***	57.30***	56.93***	57.49***
Deliberation	36	36.11	44.44	38.89	47.22	55.56	58.33	50.00	50.00	50.00	50.00	58.33	52.78	52.78	50.00	50.00
Descending Hawk	675	34.67***	45.04**	43.85***	44.30***	47.56	46.81	49.33	50.22	51.26	50.96	52.15	51.41	51.41	53.04	54.37**
Doji Star-	419	36.99***	40.57***	45.35*	43.44***	46.54	47.02	47.02	46.78	45.58*	49.16	49.40	50.36	49.40	47.73	47.49
Engulfing-	6659	43.22***	49.17	52.20***	53.85***	53.51***	53.18***	53.30***	53.04***	53.97***	54.41***	54.45***	55.40***	55.26***	55.38***	55.41***
Evening Star	55	38.18	56.36	65.45**	61.82	70.91***	74.55***	69.09***	65.45**	65.45**	70.91***	69.09***	70.91***	67.27**	63.64*	65.45**
Evening Doji Star	32	43.75	50.00	53.13	46.88	50.00	46.88	43.75	50.00	43.75	53.13	46.88	53.13	50.00	53.13	53.13
Hanging Man	3857	38.94***	46.41***	48.02**	49.11	49.68	50.01	50.76	51.49*	51.72**	51.31	52.48***	52.94***	53.20***	52.92***	53.54***
Harami-	4464	40.12***	46.12***	48.72*	50.25	50.74	51.55**	51.59**	52.42***	52.17***	52.55***	53.20***	53.79***	53.16***	53.27***	53.07***
Harami Cross-	259	33.98***	42.08**	44.79	47.49	48.65	49.42	52.51	49.03	49.03	50.19	52.51	53.67	54.44	55.98*	55.21
Kicking Down	52	38.46	38.46	53.85	38.46	51.92	46.15	50.00	50.00	46.15	55.77	53.85	50.00	50.00	50.00	57.69
Last Engulfing Top	1442	39.74***	47.02*	47.30**	49.38	50.83	52.36*	53.40**	52.98**	53.40**	53.33**	54.85***	54.85***	56.38***	56.52***	56.45***
Meeting Lines-	300	37.67***	38.67***	40.33***	45.00*	46.33	44.33*	46.33	47.67	46.67	47.33	49.67	48.67	50.33	51.00	52.33
Shooting Star	922	49.89	51.19	54.34***	56.07***	55.21***	56.62***	58.13***	56.07***	57.48***	57.27***	57.81***	58.79***	58.35***	58.89***	57.48***
Three Black Crows	309	50.81	49.84	52.10	52.10	49.51	50.81	45.95	50.16	50.16	49.84	51.13	51.46	51.46	53.72	55.34*
Three Inside Down	1897	39.64***	46.71***	48.29	50.29	50.98	52.71**	52.56**	53.98***	53.87***	54.45***	54.98***	54.67***	54.82***	55.25***	54.82***
Three Outside Down	2482	44.12***	51.05	55.00***	54.51***	55.08***	55.04***	54.92***	55.28***	55.44***	55.20***	55.68***	56.45***	56.61***	55.84***	56.12***
Tri Star-	63	31.75***	25.40***	33.33**	34.92**	39.68	44.44	49.21	47.62	47.62	42.86	41.27	46.03	44.44	38.10*	44.44
Tweezers Top	24031	32.23***	39.30***	41.80***	43.67***	44.30***	45.04***	45.97***	46.27***	47.05***	47.31***	47.93***	48.08***	48.59***	48.62***	48.70***
Two Crows	26	42.31	73.08**	76.92**	69.23*	73.08**	61.54	65.38	61.54	65.38	61.54	65.38	65.38	65.38	61.54	57.69

Table 4.4 Continued

Bearish Reversal Patterns	No.	Bearish Rate (%): Profit < 0 (bearish signals)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After uptrend:																
Belt Hold-	691	47.61	53.11	54.27**	58.47***	56.15***	55.14***	55.86***	53.98**	56.58***	55.86***	57.02***	57.89***	57.45***	57.89***	56.30***
Dark Cloud Cover	244	41.39***	50.82	50.82	52.05	52.05	50.82	56.15*	54.10	55.74*	55.74*	56.97**	61.89***	59.84***	57.79**	58.20**
Deliberation	25	36.00	48.00	40.00	52.00	60.00	60.00	52.00	56.00	56.00	52.00	60.00	52.00	48.00	48.00	48.00
Descending Hawk	334	33.83***	42.81**	42.51***	42.81**	48.20	49.10	51.50	53.29	53.59	54.79*	56.29**	55.69**	55.39*	57.78***	60.18***
Doji Star-	191	34.55***	37.17***	47.64	46.60	50.26	51.31	55.50	56.54*	54.45	57.59**	58.64**	59.16**	59.69***	57.07*	58.12**
Engulfing-	3120	44.74***	51.54*	54.52***	56.03***	55.16***	53.56***	54.04***	54.17***	55.51***	56.25***	56.67***	57.34***	56.12***	56.19***	55.77***
Evening Star	36	44.44	58.33	63.89	69.44**	77.78***	77.78***	72.22**	69.44**	63.89	75.00***	72.22**	72.22**	63.89	61.11	69.44**
Evening Doji Star	13	53.85	61.54	53.85	61.54	53.85	61.54	46.15	46.15	53.85	61.54	53.85	46.15	53.85	53.85	46.15
Hanging Man	1725	40.99***	48.12	49.91	49.97	50.84	50.14	51.01	53.04**	52.93**	51.77	52.64**	53.68***	53.91***	54.49***	54.90***
Harami-	2084	41.84***	49.18	51.54	53.21***	52.83**	53.84***	53.55***	54.32***	53.50***	54.37***	55.33***	56.24***	55.33***	55.85***	55.42***
Harami Cross-	119	32.77***	38.66**	40.34**	42.02*	43.70	45.38	49.58	47.06	47.06	48.74	47.90	51.26	48.74	48.74	50.42
Last Engulfing Top	726	39.12***	47.25	48.21	49.45	49.04	51.65	51.52	51.10	52.34	52.48	53.31*	54.13**	54.68**	55.10***	53.86**
Meeting Lines-	133	40.60**	40.60**	41.35*	44.36	45.86	42.86	47.37	44.36	48.12	46.62	51.13	51.88	50.38	51.13	51.13
Shooting Star	470	57.02***	54.68**	56.38***	57.45***	57.87***	58.51***	60.00***	59.57***	59.57***	59.36***	59.79***	61.28***	61.28***	63.19***	60.00***
Three Black Crows	172	52.91	52.91	52.33	52.91	50.58	51.16	43.02*	47.67	47.67	44.77	48.26	50.58	51.74	52.91	56.40
Three Inside Down	940	42.02***	49.26	50.64	52.34	53.62**	55.00***	54.26***	55.00***	55.32***	55.32***	56.60***	57.98***	56.81***	56.70***	56.28***
Three Outside Down	1318	46.21***	53.41**	56.83***	56.90***	56.75***	56.90***	57.89***	58.65***	58.95***	58.42***	58.35***	58.50***	58.04***	56.60***	57.59***
Tri Star-	23	34.78	39.13	47.83	47.83	52.17	47.83	56.52	56.52	52.17	47.83	47.83	43.48	43.48	39.13	34.78
Tweezers Top	9372	35.22***	41.10***	43.85***	45.92***	46.71***	47.33***	48.22***	48.62***	48.61***	49.36	50.26	50.20	50.79	50.45	50.61
Two Crows	18	44.44	72.22*	72.22*	66.67	66.67	50.00	55.56	50.00	55.56	61.11	61.11	61.11	66.67	55.56	55.56

The bearish rate is obtained by dividing the number of bearish signals by the total observed signals (No.) and presented in percentage form. The number of correct signals and p-values for Binomial test can be referred from Appendix I. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.5: Bullish rate of bullish reversal patterns before and after trend from 1 to 15 holding days from 2000 to 2011

Bullish Reversal Patterns	No.	Bullish Rate (%): Profit > 0 (bullish signals)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Abandoned Baby+	23	26.09**	34.78	34.78	34.78	34.78	30.43*	39.13	34.78	34.78	26.09**	26.09**	30.43*	30.43*	21.74**	30.43*
Belt Hold+	1863	36.45***	42.24***	42.03***	42.94***	43.96***	42.62***	43.75***	44.50***	45.03***	45.79***	45.84***	46.75***	45.14***	45.41***	46.59***
Doji Star+	1296	32.02***	36.19***	37.50***	36.96***	38.27***	40.51***	41.05***	40.12***	40.51***	40.28***	41.74***	41.44***	41.44***	40.82***	41.05***
Engulfing+	8575	35.29***	37.94***	38.06***	38.59***	39.46***	39.44***	39.60***	40.22***	40.66***	41.78***	42.12***	41.43***	41.69***	41.45***	41.55***
Hammer	3377	37.84***	39.30***	39.21***	41.90***	42.49***	42.05***	42.11***	41.28***	41.22***	41.07***	41.19***	42.02***	42.32***	42.08***	42.11***
Harami+	5966	33.54***	37.73***	39.39***	40.41***	41.28***	41.92***	41.84***	42.81***	42.17***	43.70***	43.61***	45.07***	45.29***	45.54***	46.04***
Harami Cross+	573	32.11***	38.74***	39.62***	41.88***	43.11***	45.38***	44.85***	44.15***	42.76***	43.98***	43.80***	47.82	47.12	47.64	49.04
Homing Pigeon	1209	31.93***	32.84***	36.31***	36.48***	37.55***	40.12***	40.36***	40.69***	40.78***	40.78***	40.94***	44.25***	45.66***	46.24***	45.57***
Inverted Hammer	419	39.14***	43.68**	43.44***	42.96***	44.87**	45.82*	47.73	48.21	47.49	46.78	50.12	48.93	47.73	48.45	48.69
Kicking Up	93	36.56**	25.81***	35.48***	33.33***	37.63**	37.63**	40.86*	39.78*	40.86*	43.01	41.94	44.09	37.63**	35.48***	37.63**
Last Engulfing Bottom	1827	31.86***	37.88***	38.81***	39.46***	40.67***	41.76***	42.31***	42.58***	45.76***	45.10***	44.88***	45.48***	45.21***	45.92***	44.12***
Meeting Lines+	379	32.19***	39.05***	41.16***	43.80**	43.01***	42.22***	45.65	45.65	46.44	46.17	48.55	46.97	44.85*	43.54**	45.12*
Morning Star	48	29.17***	47.92	45.83	45.83	52.08	47.92	47.92	41.67	45.83	41.67	43.75	43.75	45.83	37.50	39.58
Morning Doji Star	43	27.91***	34.88*	39.53	34.88*	39.53	41.86	44.19	37.21	39.53	37.21	34.88*	34.88*	39.53	39.53	39.53
Piercing	826	31.84***	39.23***	38.74***	39.83***	40.44***	39.71***	40.07***	40.80***	41.89***	44.67***	44.43***	43.34***	42.86***	41.28***	42.86***
Three Inside Up	1564	34.85***	40.47***	40.22***	41.37***	43.16***	43.93***	44.05***	45.27***	45.72***	46.10***	48.40	49.17	48.15	47.51*	46.29***
Three Outside Up	1971	39.27***	44.24***	42.82***	41.40***	40.44***	42.21***	42.06***	43.78***	44.85***	45.21***	44.90***	44.95***	44.24***	44.29***	44.34***
Three White Soldiers	230	46.09	44.35*	39.57***	39.57***	43.04**	40.87***	41.74**	45.22	44.35*	42.61**	44.35*	43.48*	43.04**	43.04**	42.17**
Tri Star+	111	30.63***	27.93***	33.33***	36.04***	35.14***	32.43***	34.23***	31.53***	33.33***	34.23***	37.84**	37.84**	40.54*	36.94***	36.94***
Tweezers Bottom	30757	31.18***	35.95***	37.88***	38.64***	39.50***	40.03***	40.22***	40.36***	40.73***	41.28***	41.22***	41.50***	41.48***	41.64***	41.86***

Table 4.5 Continued

Bullish Reversal Patterns	No.	Bullish Rate (%): Profit > 0 (bullish signals)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After downtrend:																
Abandoned Baby+	11	27.27	27.27	45.45	36.36	27.27	9.09**	18.18*	27.27	18.18*	9.09**	9.09**	18.18*	18.18*	18.18*	18.18*
Belt Hold+	1177	36.02***	43.93***	41.63***	42.99***	44.18***	42.31***	44.69***	45.54***	45.45***	46.47**	47.15***	47.92	45.45***	45.88***	46.98**
Doji Star+	698	33.38***	37.82***	38.25***	38.97***	39.40***	39.83***	40.69***	38.40***	39.11***	39.26***	40.11***	39.97***	39.54***	39.26***	39.26***
Engulfing+	3875	36.70***	40.70***	40.23***	39.74***	40.10***	40.52***	40.75***	41.39***	42.27***	43.51***	44.23***	42.71***	42.94***	42.68***	42.86***
Hammer	1745	37.71***	38.45***	39.60***	42.87***	43.21***	43.15***	42.52***	41.83***	41.83***	41.26***	41.83***	42.92***	43.27***	43.15***	42.01***
Harami+	3079	34.23***	39.72***	41.05***	42.29***	41.96***	42.64***	42.97***	43.29***	42.74***	44.69***	45.11***	47.16***	46.64***	46.48***	46.83***
Harami Cross+	302	34.44***	39.74***	40.07***	43.05**	44.04**	45.70	44.70*	44.37*	42.38***	44.37*	43.71**	49.01	48.68	48.01	48.34
Homing Pigeon	639	33.80***	33.18***	35.84***	36.31***	37.25***	40.69***	41.00***	40.85***	41.00***	40.06***	40.85***	43.19***	45.23***	46.01**	45.85**
Inverted Hammer	267	39.70***	41.20***	39.70***	40.82***	43.45**	44.19*	44.94	46.44	45.32	44.57*	47.94	46.82	45.69	46.44	43.07**
Kicking Up	28	32.14*	17.86***	17.86***	21.43***	32.14*	39.29	35.71	39.29	39.29	50.00	50.00	50.00	46.43	42.86	46.43
Last Engulfing Bottom	920	31.52***	38.59***	39.78***	40.65***	41.20***	42.50***	42.50***	43.26***	46.74*	46.09**	46.20**	46.96*	46.09**	47.17*	45.11***
Meeting Lines+	180	30.56***	39.44***	43.33*	45.56	47.22	45.00	46.67	46.11	47.22	47.22	47.22	46.67	46.11	43.33*	46.11
Morning Star	24	29.17*	41.67	37.50	41.67	54.17	50.00	58.33	41.67	54.17	50.00	54.17	45.83	37.50	33.33	29.17*
Morning Doji Star	21	38.10	52.38	42.86	38.10	38.10	42.86	42.86	33.33	38.10	38.10	38.10	38.10	38.10	38.10	38.10
Piercing	439	33.49***	41.69***	39.18***	40.77***	39.64***	40.55***	41.23***	41.00***	42.14***	44.42**	45.56*	43.96**	43.51***	41.69***	42.14***
Three Inside Up	828	36.96***	42.15***	40.58***	42.63***	44.20***	44.81***	44.20***	46.98*	46.74*	47.10	49.40	49.52	48.91	47.71	47.10
Three Outside Up	971	41.92***	44.59***	42.43***	41.19***	40.06***	42.84***	42.84***	45.42***	45.93**	46.34**	45.73***	45.31***	45.31***	44.08***	43.87***
Three White Soldiers	132	46.21	43.94	40.15**	37.88***	41.67*	39.39**	40.15**	43.94	42.42*	39.39**	40.91**	38.64**	37.88***	38.64**	39.39**
Tri Star+	30	23.33***	16.67***	33.33	33.33	33.33	36.67	50.00	43.33	40.00	36.67	40.00	36.67	50.00	40.00	40.00
Tweezers Bottom	12234	33.50***	37.05***	39.06***	39.68***	40.58***	40.84***	40.82***	40.57***	40.89***	41.82***	42.10***	42.33***	42.05***	42.41***	42.48***

The bullish rate is obtained by dividing the number of bullish signals by the total observed signals (No.) and presented in percentage form. The number of correct signals and p-values for Binomial test can be referred from Appendix I. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

4.2.4 True return rate of continuation patterns

The results for the true return rate of continuation patterns are ambiguous but still the bearish continuation patterns are more effective than the bullish continuation patterns both before and after trend as bearish rate of over 50% is recorded for the bearish continuation patterns while only less than 50% bullish rate is identified from the bullish continuation patterns.

In the case of bearish continuation patterns, Table 4.6 shows that Falling Window and In Neck tend to be more effective in predicting bearish signals on the 10-day and 6-day holding period respectively both before and after prevailing downtrend with bearish rate of over 50%. Meanwhile, Bearish Separating Lines before trend is more effective on the 9-day holding period with bearish rate of around 40%. Moreover, Two Black Gapping Candles pattern is found to be more effective on 7-day holding period prior to trend at 52.62% bullish rate while only the first holding day shows significant bearish rate at about 40% after trend.

As for the bullish continuation patterns, less significant result has been obtained as compared to the bearish continuation patterns. Table 4.7 shows that Rising Window has shown bullish signals more effective on the five-day holding period both before and after trend with average bullish rate of 40% whereas Bullish Separating Lines prior to trend tend to be more effective on 3-day holding period with bullish rate recorded at 43.15%.

Table 4.6: Bearish rate of bearish continuation patterns before and after trend from 1 to 15 holding days from 2000 to 2011

Bearish Continuation Patterns	No.	Bearish Rate (%): Profit < 0 (bearish signals)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Downside Tasuki Gap	9	55.56	44.44	33.33	44.44	33.33	55.56	55.56	55.56	33.33	22.22	22.22	22.22	22.22	22.22	22.22
Falling Window	16803	39.43***	45.09***	48.02***	49.69	50.54	49.99	50.24	50.47	50.54	51.50***	51.20***	50.81**	50.92**	50.28	50.49
In Neck	22	45.45	40.91	50.00	54.55	59.09	72.73*	59.09	68.18	68.18	59.09	59.09	59.09	63.64	59.09	59.09
On Neck	276	36.96***	49.28	51.45	49.28	50.72	49.28	50.00	51.81	51.45	51.45	51.45	53.62	55.80*	50.72	52.90
Separating Lines-Side-by-Side White Lines-	279	30.11***	39.07***	39.78***	39.07***	41.94***	43.01**	40.86***	41.58***	44.80*	45.52	43.37**	43.73**	44.44*	46.95	48.03
Three-Line Strike-	7	28.57	71.43	71.43	57.14	57.14	57.14	57.14	85.71	71.43	71.43	57.14	57.14	71.43	57.14	57.14
Thrusting	9	66.67	44.44	44.44	44.44	55.56	55.56	33.33	44.44	44.44	33.33	33.33	66.67	55.56	66.67	44.44
Two Black Gapping Candles	340	39.12***	42.94**	45.00*	47.35	45.59	45.29*	45.29*	45.59	48.53	50.59	48.82	47.65	44.41	47.65	47.35
	1642	45.25***	48.96	51.04	52.31*	51.40	51.89	52.62**	51.22	51.64	51.46	51.58	52.07*	51.16	50.85	50.00
After downtrend:																
Falling Window	5088	41.39***	46.76***	49.53	50.98	51.73**	51.28*	51.36*	51.87***	51.57**	52.30***	51.81**	51.14	50.61	49.53	49.98
In Neck	16	50.00	43.75	50.00	56.25	62.50	75.00*	68.75	62.50	75.00*	62.50	56.25	62.50	62.50	62.50	62.50
On Neck	148	37.84***	49.32	47.30	40.54**	43.24	43.92	44.59	47.30	47.30	45.27	45.95	51.35	52.70	47.30	49.32
Separating Lines-	101	32.67***	44.55	38.61**	39.60**	44.55	40.59***	43.56	36.63***	41.58	41.58	38.61**	39.60**	39.60**	40.59*	40.59*
Thrusting	196	41.33**	40.82**	43.88	45.41	41.84**	43.88	43.88	43.37*	46.43	48.47	47.96	46.94	42.86*	46.94	45.92
Two Black Gapping Candles	846	43.85***	47.28	48.46	51.18	48.94	51.06	52.01	51.30	51.42	50.83	50.83	51.54	50.35	50.59	49.53

The bearish rate is obtained by dividing the number of bearish signals by the total observed signals (No.) and presented in percentage form. The number of correct signals and p-values for Binomial test can be referred from Appendix I. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.7: Bullish rate of bullish continuation patterns before and after trend from 1 to 15 holding days from 2000 to 2011

Bullish Continuation Patterns	No.	Bullish Rate (%): Profit > 0 (bullish signals)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Rising Window	13231	35.63***	41.08***	42.21***	41.89***	42.80***	42.72***	42.47***	42.69***	42.25***	41.93***	41.52***	41.58***	41.36***	40.94***	40.77***
Separating Lines+	197	37.06***	44.16	43.15***	44.67	51.78	47.21	50.25	47.21	48.73	45.18	44.67	45.18	47.21	42.64**	46.70
Side-by-Side White Lines+	16	62.50	50.00	50.00	50.00	62.50	50.00	50.00	50.00	62.50	68.75	75.00*	56.25	50.00	56.25	50.00
Three-Line Strike+	5	40.00	20.00	40.00	60.00	40.00	60.00	80.00	60.00	80.00	80.00	60.00	80.00	80.00	80.00	80.00
Upside Tasuki Gap	8	50.00	62.50	50.00	37.50	12.50*	12.50*	37.50	37.50	37.50	37.50	25.00	25.00	25.00	25.00	25.00
After uptrend:																
Rising Window	3123	37.24***	42.07***	43.52***	42.30***	43.42***	41.50***	40.57***	40.25***	40.06***	39.35***	39.13***	38.84***	39.13***	38.71***	39.58***
Separating Lines+	93	41.94	49.46	50.54	48.39	53.76	48.39	49.46	45.16	45.16	43.01	45.16	44.09	46.24	44.09	48.39

The bullish rate is obtained by dividing the number of bullish signals by the total observed signals (No.) and presented in percentage form. The number of correct signals and p-values for Binomial test can be referred from Appendix I. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

4.3 Predictive power of candlestick lines

Table 4.8 shows that only bearish candle lines reveal bearish signals for in-sample test. Black Marubozu tends to reveal stronger bearish signals as compared to other bearish lines as higher negative returns have been obtained by Black Marubozu throughout the fifteen days holding period at around -5.0%. Following that, Long Black Candle has revealed significant bearish signals from the three days to fifteen days holding period with the largest returns recorded at -2.46% for the 11-day holding period. Meanwhile, significant bearish signals are indicated by Black Candle from the 4-day until 15-day holding period with the highest returns rate recorded at -2.16% on the 12-day holding period. Short Black Candle only signifies bearish signals from the 8-day until 15-day holding period which records highest negative returns rate at -1.43% for the 14-day holding period.

Based on Table 4.9, the bearish candle lines from out-of-sample test possess better predictive signal than bullish candle lines as only White Marubozu shows bullish signals at return rate of 1.03% and 1.02% during the 11-day and 14-day holding period respectively. On the other hand, Black Candle, Short Black Candle, and Long Black Candle have revealed bearish signals significantly for the out-of-sample. Black Candle has achieved highest returns of -1.62% on the 15-day holding period, whereas Short Black Candle and Long Black Candle has shown largest negative returns during the 14-day holding period recorded at -2.45% and -2.22% respectively.

The results for in-sample test also indicate that Four-Price Doji and High Wave are effective in revealing bearish signals. However, Four-Price Doji seems to be more effective in portraying bullish signals for the out-of-sample test. Meanwhile, Dragonfly Doji and Gravestone Doji have signified bullish signals as shown in the out-of-sample test too.

Table 4.8: Average returns of candlestick lines from 1 to 15 holding days for in-sample from 2000 to 2011

Candlestick Line	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Black Candle	17331	-0.29***	-0.61***	-0.94***	-1.20***	-1.39***	-1.47***	-1.61***	-1.68***	-1.80***	-1.89***	-1.96***	-2.16***	-2.12***	-2.09***	-2.08***
Short Black Candle	3157	-0.34***	-0.48***	-0.48***	-0.68***	-0.72***	-0.88***	-0.94***	-1.08***	-1.09***	-1.26***	-1.37***	-1.24***	-1.38***	-1.43***	-1.31***
Long Black Candle	1229	-0.46***	-0.63***	-1.08***	-2.05***	-2.01***	-1.91***	-1.43***	-1.68***	-1.72***	-2.22***	-2.46***	-2.45***	-2.36***	-2.24***	-2.15***
Black Marubozu	278069	-5.19***	-5.05***	-5.05***	-5.05***	-5.05***	-5.05***	-5.07***	-5.09***	-5.11***	-5.10***	-5.12***	-5.14***	-5.16***	-5.20***	-5.21***
Opening Black Marubozu	51440	-0.12***	-0.28***	-0.35***	-0.44***	-0.55***	-0.58***	-0.62***	-0.67***	-0.69***	-0.81***	-0.84***	-0.89***	-0.90***	-0.92***	-0.97***
Closing Black Marubozu	26509	-0.09***	-0.07**	-0.14***	-0.24***	-0.28***	-0.31***	-0.31***	-0.40***	-0.39***	-0.45***	-0.51***	-0.58***	-0.61***	-0.64***	-0.62***
White Candle	15642	-0.02	-0.06	-0.26***	-0.42***	-0.55***	-0.70***	-0.83***	-0.97***	-1.12***	-1.12***	-1.19***	-1.21***	-1.36***	-1.48***	-1.52***
Short White Candle	2224	-0.08	0.02	-0.06	-0.29*	-0.37*	-0.63***	-0.46**	-0.47*	-0.55**	-0.45*	-0.36	-0.56*	-0.67**	-0.62*	-0.69**
Long White Candle	2705	-0.34***	-0.90***	-1.23***	-1.36***	-1.66***	-1.80***	-1.84***	-2.02***	-2.09***	-2.15***	-2.37***	-2.64***	-2.96***	-3.13***	-3.17***
White Marubozu	165046	-0.20***	-0.30***	-0.32***	-0.36***	-0.39***	-0.41***	-0.43***	-0.46***	-0.49***	-0.50***	-0.53***	-0.58***	-0.63***	-0.66***	-0.70***
Opening White Marubozu	49019	0.08***	0.05**	0.06*	0.01	-0.07*	-0.15***	-0.17***	-0.23***	-0.30***	-0.33***	-0.39***	-0.44***	-0.50***	-0.58***	-0.64***
Closing White Marubozu	44808	0.21***	0.02	-0.06**	-0.14***	-0.22***	-0.24***	-0.30***	-0.36***	-0.41***	-0.42***	-0.50***	-0.55***	-0.67***	-0.76***	-0.81***
Doji	104241	0.03***	0.04**	0.02	0.03*	-0.01	-0.03	-0.05**	-0.09***	-0.13***	-0.14***	-0.18***	-0.19***	-0.23***	-0.27***	-0.30***
Long-Legged Doji	11918	0.23***	0.25***	0.20***	0.15***	0.13**	0.05	0.07	0.04	0.12	0.05	-0.02	-0.08	-0.10	-0.19*	-0.18
Dragonfly Doji	19732	0.30***	0.17***	0.13***	0.06	0.03	-0.01	-0.09	-0.08	-0.11	-0.15**	-0.12	-0.12	-0.12	-0.18**	-0.20**
Gravestone Doji	14689	0.13***	0.20***	0.26***	0.22***	0.23***	0.24***	0.23***	0.30***	0.24***	0.16*	0.17**	0.23***	0.24***	0.18*	0.20**
Four-Price Doji	254948	-1.84***	-1.90***	-1.88***	-1.86***	-1.84***	-1.89***	-1.92***	-1.91***	-1.92***	-1.97***	-1.97***	-1.99***	-1.97***	-1.97***	-2.04***
Black Spinning Top	89657	-0.07***	-0.18***	-0.27***	-0.32***	-0.38***	-0.43***	-0.49***	-0.56***	-0.64***	-0.70***	-0.75***	-0.79***	-0.84***	-0.87***	-0.91***
White Spinning Top	91580	0.14***	0.07***	0.02	-0.03	-0.08***	-0.12***	-0.17***	-0.23***	-0.26***	-0.30***	-0.38***	-0.42***	-0.50***	-0.56***	-0.58***
High Wave	35389	-0.12***	-0.32***	-0.52***	-0.60***	-0.72***	-0.78***	-0.88***	-0.96***	-1.05***	-1.14***	-1.21***	-1.32***	-1.42***	-1.52***	-1.59***

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.9: Average returns of candlestick lines from 1 to 15 holding days for out-of-sample test from 2012 to 2014

Candlestick Line	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Black candle	2788	0.18	-0.47***	-0.51***	-0.27	-0.96***	-0.99***	-1.13***	-0.49	-0.68	-0.76	-0.96	-1.38***	-1.33***	-1.52***	-1.62***
Short Black Candle	492	-0.52***	-0.32	-0.52**	-0.72**	-1.01***	-1.11***	-1.33***	-1.51***	-1.65***	-1.78***	0.95	-2.10***	0.58	-2.45***	0.38
Long Black Candle	315	-0.49*	-0.59	-0.95**	-1.24***	-1.16**	-0.90*	-1.42***	2.53	-1.34**	2.56	-2.01***	-2.08***	-2.07***	-2.22***	-2.04***
Black Marubozu	35232	0.70***	0.70***	0.82***	0.76***	0.92***	0.83***	0.93***	0.96***	0.89***	1.17***	1.01***	0.98***	1.37***	1.00***	1.08***
Opening Black Marubozu	10056	0.12	0.23	-0.24***	0.20	-0.10	-0.09	-0.18	0.20	-0.08	-0.11	-0.10	-0.13	0.40	0.46*	-0.14
Closing Black Marubozu	5327	0.17	-0.08	-0.15*	0.63*	0.32	-0.35***	-0.42***	0.37	-0.04	-0.08	0.26	0.15	0.22	-0.16	-0.19
White Candle	2900	0.16***	0.10	0.03	-0.09	-0.06	-0.26*	0.05	-0.33*	-0.38**	-0.49**	-0.39	-0.55**	-0.56**	-0.52**	-0.48**
Short White Candle	392	0.03	0.04	0.09	0.10	0.08	0.02	-0.08	0.80	-0.15	0.18	0.00	-0.26	-0.41	-0.27	-0.40
Long White Candle	683	-0.17	-0.74***	-0.71***	-0.54*	-0.67*	-0.78**	-0.70*	-0.87**	-0.82*	-1.02**	-0.96**	-1.00**	-1.15**	-1.41***	-1.36**
White Marubozu	39132	0.83***	0.68***	0.70***	0.62***	0.83***	0.71***	0.82***	0.73***	0.80***	0.75***	1.03***	0.98***	0.79***	1.02***	0.97***
Opening White Marubozu	10843	0.26***	0.16*	0.19	0.16	0.27	0.20	0.27	-0.11	-0.04	-0.19*	-0.12	-0.25**	-0.06	-0.06	0.37
Closing White Marubozu	7359	0.61***	0.04	0.12	0.01	-0.11	0.29	-0.08	-0.11	-0.17*	-0.06	-0.07	-0.28**	-0.25**	0.15	-0.26**
Doji	24280	0.43***	0.60***	0.56***	0.43***	0.26***	0.23***	0.42***	0.27***	0.58***	0.42***	0.67***	0.67***	0.41***	0.46***	0.35***
Long-Legged Doji	4714	0.30**	0.20	0.89**	0.46	-0.19*	0.95**	0.01	-0.31**	0.45	0.48	0.06	0.19	-0.43	0.13	0.37
Dragonfly Doji	9039	0.57***	0.93***	0.66***	0.48***	0.34***	0.98***	1.12***	1.35***	0.95***	0.83***	1.00***	0.79***	1.25***	0.50***	0.68***
Gravestone Doji	8647	1.28***	1.48***	0.88***	1.65***	0.96***	1.12***	1.02***	1.09***	1.58***	1.46***	1.69***	1.41***	1.15***	1.80***	1.22***
Four-price Doji	118596	0.51***	0.58***	0.69***	0.75***	0.81***	0.88***	0.89***	0.95***	0.94***	1.04***	1.02***	1.14***	1.14***	1.19***	1.29***
Black Spinning Top	20717	0.01	0.28**	0.09	0.11	-0.05	0.11	-0.05	0.16	0.10	-0.14	-0.30*	-0.10	0.08	0.08	0.02
White Spinning Top	20893	0.29***	0.18***	0.37***	0.16*	0.54***	0.23**	0.35**	0.03	0.27*	0.15	-0.01	0.11	-0.15	-0.01	0.15
High Wave	5994	0.14	0.13	-0.16**	-0.05	0.02	-0.21**	-0.24**	-0.15	-0.43***	-0.41***	-0.17	-0.34**	-0.29*	-0.35**	-0.29**

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

4.4 Predictive power of reversal patterns

This section presents the results on average returns of reversal patterns measured from the first day until fifteen days holding period. The predictive power for reversal patterns is confirmed when the average returns obtained is more than 1% transaction cost alongside with a positive return rate for bullish patterns whereas a negative return rate for bearish patterns. The results for average returns of reversal patterns consist of two major division which include the main sample or in-sample and out-of-sample test. The term in-sample and main sample are used interchangeably in the following section. For easier identification, the average returns which prove the existence of predictive power for respective reversal patterns are highlighted.

4.4.1 Reversal patterns for in-sample test

Based on Table 4.10, bearish signals are shown from negative returns obtained by Bearish Belt Hold, Dark Cloud Cover, Descending Hawk, Bearish Engulfing, Evening Star, Evening Doji Star, Hanging Man, Bearish Harami, Last Engulfing Top, Shooting Star, Three Black Crows, Three Inside Down, Three Outside Down, and Two Crows patterns both before and after trend. However, the values of negative returns for bearish reversal patterns are significantly higher after trend which thus revealing a stronger magnitude of bearish signals after a prevailing uptrend. The reversal patterns of Bearish Harami Cross and Kicking Down only show bearish signals before trend while the bearishness of Bearish Doji Star and Bearish Meeting Lines patterns are only confirmed after an uptrend.

When comparing between the holding period, Kicking Down and Three Black Crows patterns before trend have shown largest negative returns on the 15-day holding period at -3.54% and -1.85% respectively. Following a prevailing uptrend, Dark Cloud Cover and Evening Star patterns have also recorded with highest negative returns rate for the 15-day holding period at -3.81% and -4.39% respectively. Meanwhile, Descending Hawk, Hanging Man, Bearish

Harami, and Last Engulfing Top patterns have revealed the largest negative return rate during the 15-day holding period both before and after trend as compared to other holding days. For instance, the average returns obtained by Descending Hawk pattern on the 15-day holding period is recorded significantly at -1.65% before trend and at -2.82% after trend, whereas for Bearish Harami is at -1.61% before trend and at -2.16% after an uptrend.

Larger negative return rate tends to imply greater strength of bearish signals. Hence, by focusing on the results for bearish reversal patterns after a prevailing uptrend, it is noted that Evening Star and Shooting Star patterns have managed to portray greater strength of bearishness than other bearish reversal patterns on the 15-day holding period with return rate of -4.39% and -4.56% respectively. For the 10-day holding period, Shooting Star and Dark Cloud Cover patterns are observed to depict greater strength of bearish signals as compared to other bearish reversal patterns at -3.02% and -2.84% respectively. When comparing between the tenth and fifteenth holding days, it is noted that greater magnitude of negative rate is obtained on the fifteen holding days for bearish reversal patterns after a prevailing uptrend.

Meanwhile, Bearish Belt Hold, Bearish Engulfing, Bearish Harami, Shooting Star, Three Inside Down, and Three Outside Down patterns tend to be more effective in portraying bearish signals when comparing to other bearish reversal patterns as these patterns have recorded significant negative returns consistently throughout the holding period from as early as two holding days until fifteen holding days. In fact, Three Outside Down pattern has revealed bearish signals throughout the two to fifteen days holding period both before and after trend. Besides, Bearish Belt Hold has also shown significant predictive power from the fourth until fifteenth holding period both prior to and after an uptrend.

The magnitude of negative returns for bearish reversal patterns typically s as the number of holding period increases as shown from Table 4.10. This reflects that greater bearish signals

tend to accumulate during longer holding period. It is also found that the effective holding period for bearish reversal patterns typically lies within the ten to fifteen days holding period as most of the bearish reversal patterns have shown correct predictive power within these holding days both prior to and after trend.

As seen from Table 4.11, most of the bullish reversal patterns before trend show negative returns rate significantly rather than a positive one. Even with a correct trend, none of them indicate bullish signals. Therefore, it shows that the predictive power for bullish reversal patterns does not exist for the in-sample.

4.4.2 Reversal patterns for out-of-sample test

For out-of-sample test, the bearish reversal patterns of Hanging Man, Last Engulfing Top, Bearish Meeting Lines, Shooting Star, and Three Black Crows have shown predictive power both before and after trend as shown in Table 4.12. The magnitude of bearish signals is generally greater after a prevailing uptrend. However, Bearish Engulfing, Evening Star, Evening Doji Star, Kicking Down, Three Inside Down, and Three Outside Down have only managed to generate bearish signals prior to trend identification whereas the predictive power of Dark Cloud Cover is only verified after a prevailing uptrend.

The patterns of Last Engulfing Top, Bearish Meeting Lines, and Three Black Crows have resulted in highest average returns on the 15-day holding period as compared to other holding days at -2.36%, -3.77%, and -4.05% respectively after a prevailing uptrend. Meanwhile, Hanging Man and Shooting Star patterns after trend indicate largest return rate on the 14-day holding period at -1.86% and -2.05% respectively. Prior to trend identification, Last Engulfing Top, Bearish Meeting Lines, Three Black Crows, and Three Inside Down patterns have noted with the highest return rate on the 15-day holding period at -1.94%, -2.50%, -5.02%, and -1.80% respectively. Greater strength of bearish signals tends to be implied from higher negative return

rate. Therefore, Three Black Crows pattern signifies stronger bearish signals than other bearish reversal patterns.

For the 10-day holding period, Evening Star, Evening Doji Star, and Three Black Crows patterns prior to trend tend to possess stronger bearish signals than other bearish reversal patterns with higher return rate obtained significantly at -5.51%, -4.32%, and -3.21% respectively. Whereas for the 15-day holding period, highest average returns has been revealed from Three Black Crows prior to trend at -5.02%. However, it is observed that after a prevailing uptrend, stronger magnitude of bearish signals is obtained on the 15-day holding period as compared to a 10-day holding period with Bearish Meeting Lines and Three Black Crows reflecting stronger bearish signals than other patterns.

Overall, Hanging Man and Bearish Meeting Lines tend to be more effective than other bearish reversal patterns as they have portrayed significant bearish signals consistently throughout the tenth to fifteenth holding day after a prevailing uptrend. The value of negative returns also increase as the holding period increases, denoting that higher magnitude of bearish signals tend to occur during longer holding days. Hence, it is noticed that the effective holding period for bearish reversal patterns from out-of-sample typically lies within the ten to fifteen days holding period as the existence of predictive power for bearish reversal patterns tend to gather around these days both before and after trend as shown from Table 4.12.

Based on Table 4.13, it is noted that the predictive power for some bullish reversal patterns do exist in the stock market. The predictive power for Bullish Doji Star, Bullish Harami, Bullish Meeting Lines, Morning Star, Piercing, and Three Outside Up are found to exist both before and after trend. Meanwhile, Bullish Engulfing and Inverted Hammer have shown predictive power only prior to trend identification while Bullish Belt Hold and Tweezers Bottom have revealed bullish signals only after a prevailing downtrend.

Generally, Bullish Meeting Lines before trend and Bullish Doji Star and Morning Star after trend are more effective than other bullish reversal patterns as significant bullish signals are shown continuously throughout the holding period from nine to fifteen holding days. It is also identified that Morning Star tends to reflect stronger bullish signals as higher return rate is observed as compared to other bullish reversal patterns both before and after trend. For instance, highest returns are revealed after a prevailing downtrend by Morning Star at 2.69% and 4.22% for the 10-day and 15-day holding period respectively. Besides, the effective holding period of bullish reversal patterns from out-of-sample is identified to lie within the ten to fifteen holding days as most of the predictive power of bullish reversal patterns are found to exist during these holding periods as shown in Table 4.13.

Table 4.10: Average returns of bearish reversal patterns before and after trend from 1 to 15 holding days for in-sample from 2000 to 2011

Bearish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Abandoned Baby-	7	0.42	0.28	0.45	2.97	2.26	2.59	1.55	4.49*	5.17*	4.26	2.54	1.34	1.93	2.23	0.31
Belt Hold-	1351	-0.40***	-0.67***	-0.94***	-1.25***	-1.25***	-1.35***	-1.73***	-1.66***	-1.80***	-2.01***	-2.11***	-2.31***	-2.40***	-2.44***	-2.30***
Dark Cloud Cover	541	0.23	-0.46	-0.87***	-1.35***	-0.98**	-0.86**	-1.07**	-1.38***	-2.17***	-2.23***	-2.59***	-3.17***	-2.99***	-3.01***	-2.84***
Deliberation	36	0.19	0.01	-0.01	-0.25	0.07	0.01	0.46	0.93	0.98	0.92	0.99	1.13	1.06	1.31	1.20
Descending Hawk	675	0.25	0.07	-0.09	-0.34	-0.54	-0.39	-0.48	-0.70*	-0.82*	-0.95**	-1.20***	-1.34***	-1.12**	-1.35***	-1.65***
Doji Star-	419	0.04	0.67***	0.23	0.18	0.10	0.16	0.11	0.11	-0.13	-0.27	-0.36	-0.34	-0.20	-0.15	-0.01
Engulfing-	6659	-0.77***	-0.89***	-1.18***	-1.59***	-1.47***	-1.46***	-1.61***	-1.63***	-1.76***	-1.83***	-1.92***	-2.17***	-2.20***	-2.23***	-2.19***
Evening Star	55	-0.03	-0.98	-1.17	-1.91*	-2.21**	-2.80**	-2.41*	-1.68	-1.64	-2.31	-2.93*	-2.76	-2.36	-2.35	-3.02
Evening Doji Star	32	-0.42	-1.72**	-1.73	-0.72	-1.45	-0.59	-0.81	-1.88	-0.56	-0.47	-1.64	-1.95	-1.96	-1.96	-2.54
Hanging Man	3857	0.14**	-0.13	-0.34***	-0.37***	-0.57***	-0.70***	-0.77***	-0.85***	-0.84***	-0.80***	-0.85***	-1.00***	-1.04***	-1.17***	-1.21***
Harami-	4464	-0.15***	-0.20**	-0.35***	-0.55***	-0.67***	-0.70***	-0.87***	-0.99***	-1.12***	-1.23***	-1.37***	-1.56***	-1.58***	-1.58***	-1.61***
Harami Cross-	259	0.18	0.07	-0.16	-0.26	-0.56	-0.58	-0.86*	-0.60	-0.77	-0.90	-1.05*	-1.18*	-1.42**	-1.71**	-1.54**
Kicking Down	52	-1.88	-1.30	-2.33**	-1.89*	-2.32*	-0.50	-0.99	-1.74	-0.55	-0.83	-1.22	-1.20	-1.15	-1.99*	-3.54***
Last Engulfing Top	1442	0.41***	0.26	0.32	-0.27	-0.41	-0.59**	-0.69**	-0.82**	-0.89**	-1.16***	-1.46***	-1.60***	-2.01***	-1.95***	-2.01***
Meeting Lines-	300	0.07	0.36	0.30	0.28	0.14	-0.23	-0.38	-0.37	-0.13	-0.44	-0.59	-0.59	-0.81	-0.94	-0.66
Shooting Star	922	-0.36**	-0.37*	-0.70**	-0.91***	-1.11***	-1.20***	-1.69***	-1.66***	-1.72***	-2.23***	-2.59***	-3.30***	-3.58***	-3.96***	-3.91***
Three Black Crows	309	-0.83**	-1.20**	-1.70***	-1.56***	-1.79***	-1.68***	-1.47**	-1.01	-1.17	-1.35*	-1.62*	-1.46*	-1.35	-1.54*	-1.85**
Three Inside Down	1897	-0.09	-0.34***	-0.61***	-0.88***	-0.80***	-1.22***	-1.28***	-1.32***	-1.61***	-1.72***	-1.97***	-2.09***	-2.26***	-2.42***	-2.23***
Three Outside Down	2482	-0.74***	-1.17***	-1.93***	-1.85***	-1.89***	-1.88***	-1.80***	-1.96***	-2.05***	-2.09***	-2.28***	-2.38***	-2.49***	-2.36***	-2.24***
Tri Star-	63	0.12	0.87**	1.12**	1.18*	0.90	0.67	-0.06	0.46	0.25	0.48	0.82	0.80	0.66	1.13	0.41
Tweezers Top	24031	-0.34***	-0.36***	-0.39***	-0.42***	-0.43***	-0.43***	-0.54***	-0.59***	-0.63***	-0.65***	-0.67***	-0.74***	-0.79***	-0.75***	-0.75***
Two Crows	26	-0.45	-1.63***	-2.25**	-2.32*	-3.72**	-4.69**	-3.79**	-2.42	-2.79	-2.66	-2.66	-2.41	-3.02	-3.21	-3.29

Table 4.10 Continued

Bearish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After uptrend:																
Belt Hold-	691	-0.36***	-0.58***	-0.97***	-1.34***	-1.14***	-1.09***	-1.32***	-1.27***	-1.48***	-1.66***	-1.79***	-2.01***	-2.14***	-2.28***	-2.22***
Dark Cloud Cover	244	0.29	-0.24	-0.89	-1.58**	-1.02	-0.62	-1.06	-1.20	-2.50***	-2.84***	-3.13***	-3.80***	-3.72***	-3.75***	-3.81***
Deliberation	25	0.28	-0.05	-0.07	-0.34	-0.19	-0.02	0.05	0.39	0.37	0.15	0.38	0.56	0.49	0.45	0.39
Descending Hawk	334	0.24	0.07	-0.32	-0.48	-0.93*	-1.02**	-0.98*	-1.52**	-1.65***	-1.98***	-2.35***	-2.48***	-2.32***	-2.46***	-2.82***
Doji Star-	191	0.30	0.59*	-0.11	-0.16	-0.51	-0.70	-0.86	-1.06	-1.59**	-1.77**	-2.07***	-2.36***	-2.40***	-2.43***	-2.01**
Engulfing-	3120	-0.41***	-0.75***	-1.15***	-1.81***	-1.64***	-1.50***	-1.76***	-1.90***	-2.09***	-2.19***	-2.35***	-2.56***	-2.44***	-2.49***	-2.54***
Evening Star	36	-0.62	-2.25***	-1.56*	-2.46**	-2.65**	-3.01**	-2.64**	-2.07	-2.42	-3.34	-3.75*	-3.83*	-3.45*	-3.87*	-4.39*
Evening Doji Star	13	-1.47*	-4.03**	-3.65**	-2.80**	-2.84**	-2.43	-2.61	-2.57	-1.13	-2.20	-3.25	-3.66	-3.49	-3.51	-3.89
Hanging Man	1725	0.05	-0.37***	-0.51***	-0.67***	-0.80***	-0.89***	-0.88***	-0.89***	-0.92***	-0.77***	-0.84***	-1.05***	-1.10***	-1.29***	-1.31***
Harami-	2084	-0.24***	-0.41***	-0.65***	-0.97***	-1.05***	-1.14***	-1.32***	-1.48***	-1.55***	-1.78***	-1.93***	-2.13***	-2.15***	-2.04***	-2.16***
Harami Cross-	119	0.20	0.54	0.21	0.00	-0.36	-0.10	-0.50	-0.54	-0.69	-1.00	-0.68	-1.20	-1.06	-0.59	-0.44
Last Engulfing Top	726	0.56***	0.46**	0.46	-0.19	-0.35	-0.41	-0.54	-0.49	-0.57	-0.93	-1.21**	-1.31**	-1.79***	-1.87***	-1.92***
Meeting Lines-	133	-0.04	0.06	0.24	0.29	-0.21	-0.41	-0.62	-0.60	-0.44	-0.68	-0.83	-1.22*	-1.14	-1.41*	-0.86
Shooting Star	470	-0.76***	-0.90***	-0.98**	-1.02**	-1.55***	-1.51***	-2.18***	-2.45***	-2.41***	-3.02***	-3.49***	-4.62***	-4.60***	-4.62***	-4.56***
Three Black Crows	172	-0.45	-1.76**	-1.36	-1.50*	-1.80**	-1.39	-0.63	-0.31	-0.45	-0.48	-1.11	-1.04	-1.16	-0.94	-1.56
Three Inside Down	940	-0.19	-0.52***	-0.77***	-1.06***	-1.02***	-1.59***	-1.74***	-1.83***	-2.17***	-2.27***	-2.55***	-2.86***	-2.61***	-2.91***	-2.69***
Three Outside Down	1318	-0.69***	-1.28***	-2.37***	-2.06***	-1.97***	-1.96***	-2.01***	-2.08***	-2.20***	-2.45***	-2.53***	-2.53***	-2.63***	-2.40***	-2.21***
Tri Star-	23	0.11	1.33	1.29	1.97	1.63	1.83	1.31	1.88	1.59	1.65	1.70	2.64	1.46	2.77	1.66
Tweezers Top	9372	-0.08	-0.07	-0.18**	-0.22***	-0.31***	-0.31***	-0.40***	-0.47***	-0.53***	-0.67***	-0.69***	-0.74***	-0.77***	-0.74***	-0.72***
Two Crows	18	-0.69	-1.78**	-1.66	-1.70	-3.83*	-5.21*	-4.37*	-2.52	-2.73	-3.53	-2.57	-2.02	-3.06	-2.77	-2.83

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.11: Average returns of bullish reversal patterns before and after trend from 1 to 15 holding days for in-sample from 2000 to 2011

Bullish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Abandoned Baby+	23	-0.94	-0.22	-0.92	-0.74	-1.49	-0.56	-0.52	-1.22	-1.18	-1.78	-1.84	-1.83	-1.63	-3.56**	-4.47**
Belt Hold+	1863	-0.14	-0.19	-0.13	-0.15	-0.34*	-0.68***	-0.74***	-0.66***	-0.70***	-0.58**	-0.46*	-0.47*	-0.64**	-0.59**	-0.71**
Doji Star+	1296	-0.18*	-0.46***	-0.79***	-0.94***	-1.24***	-1.08***	-1.20***	-1.27***	-1.28***	-1.27***	-1.65***	-1.58***	-1.56***	-1.60***	-1.46***
Engulfing+	8575	-0.04	-0.11**	-0.18***	-0.28***	-0.34***	-0.50***	-0.52***	-0.47***	-0.51***	-0.39***	-0.41***	-0.49***	-0.56***	-0.71***	-0.70***
Hammer	3377	0.02	-0.34***	-0.64***	-0.74***	-0.78***	-0.85***	-0.96***	-1.10***	-1.10***	-1.20***	-1.31***	-1.31***	-1.30***	-1.47***	-1.47***
Harami+	5966	-0.22***	-0.44***	-0.43***	-0.62***	-0.60***	-0.68***	-0.82***	-0.74***	-0.91***	-0.71***	-0.66***	-0.45***	-0.38***	-0.50***	-0.54***
Harami Cross+	573	-0.23	-0.36	-0.35	-0.38	-0.31	-0.14	-0.25	0.04	-0.35	-0.36	-0.31	-0.27	-0.15	-0.21	-0.40
Homing Pigeon	1209	-0.40***	-0.92***	-1.11***	-1.25***	-1.15***	-1.01***	-1.21***	-1.20***	-1.48***	-1.57***	-1.50***	-1.05***	-0.90***	-1.00***	-0.84***
Inverted Hammer	419	0.28	0.07	-0.03	-0.72**	-0.57	-0.51	-0.52	-0.59	-0.61	-0.81*	-0.62	-0.31	-0.12	-0.29	-0.54
Kicking Up	93	0.37	-0.68	-0.57	-0.46	-0.53	-0.04	-0.60	-0.48	-0.42	-1.40*	-2.31	-3.22**	-3.38***	-3.92***	-3.89***
Last Engulfing Bottom	1827	-1.38***	-1.32***	-1.21***	-1.17***	-1.38***	-1.39***	-1.52***	-1.45***	-1.06***	-1.11***	-1.08***	-1.15***	-1.16***	-1.15***	-1.49***
Meeting Lines+	379	0.07	-0.01	-0.06	-0.12	-0.27	-0.13	0.01	-0.31	-0.32	-0.21	-0.21	-0.17	-0.50	-0.88	-0.75
Morning Star	48	-0.98**	-0.06	-0.41	0.00	0.77	0.29	0.40	0.44	-0.37	-0.55	-0.53	0.17	0.31	0.21	0.33
Morning Doji Star	43	-1.29**	-1.32*	-1.25	-1.16	-0.50	-0.66	-0.69	-0.99	-1.14	-1.00	-0.97	-1.68	-1.57	-1.91	-2.81
Piercing	826	-0.24*	-0.12	-0.29	-0.39*	-0.38	-0.61**	-0.55**	-0.48	-0.73**	-0.63*	-0.51	-0.60	-0.67	-0.98**	-1.03**
Three Inside Up	1564	-0.12	0.00	-0.24	-0.22	-0.04	-0.16	-0.20	-0.11	-0.08	0.14	0.44	0.41	0.14	0.17	-0.01
Three Outside Up	1971	0.27***	0.39***	0.14	-0.03	-0.21	-0.19	-0.05	-0.10	0.12	0.29	0.24	0.09	-0.22	-0.27	-0.55**
Three White Soldiers	230	0.66***	0.45	-0.02	0.19	0.00	0.09	-0.01	0.08	0.28	0.02	0.01	-0.18	-0.19	-0.08	-0.09
Tri Star+	111	0.12	-0.44	-0.46	-0.73*	-0.57	-0.80	-0.53	-0.79	-1.28	-0.70	-0.81	-0.49	-0.26	0.52	0.28
Tweezers Bottom	30757	0.03	-0.05**	-0.14***	-0.22***	-0.26***	-0.29***	-0.35***	-0.42***	-0.44***	-0.43***	-0.44***	-0.47***	-0.52***	-0.60***	-0.61***

Table 4.11 Continued

Bullish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After downtrend:																
Abandoned Baby+	11	-0.91	-0.98	-0.40	-0.66	-2.12	-2.16**	-2.71**	-2.81*	-4.32**	-4.15***	-4.34	-4.07*	-3.98	-5.59**	-7.73***
Belt Hold+	1177	-0.12	0.05	0.09	-0.17	-0.36	-0.76***	-0.65**	-0.57**	-0.71**	-0.50*	-0.28	-0.30	-0.42	-0.46	-0.60*
Doji Star+	698	-0.20	-0.46**	-0.81***	-1.07***	-1.41***	-1.32***	-1.24***	-1.38***	-1.37***	-1.39***	-1.74***	-1.67***	-1.81***	-1.78***	-1.71***
Engulfing+	3875	-0.05	0.02	-0.11	-0.31***	-0.40***	-0.55***	-0.55***	-0.48***	-0.57***	-0.42***	-0.34**	-0.42**	-0.43**	-0.61***	-0.56***
Hammer	1745	-0.02	-0.41***	-0.68***	-0.70***	-0.79***	-0.79***	-0.95***	-1.06***	-1.05***	-1.17***	-1.29***	-1.20***	-1.26***	-1.47***	-1.44***
Harami+	3079	-0.24***	-0.36***	-0.36***	-0.62***	-0.69***	-0.74***	-0.83***	-0.70***	-0.83***	-0.58***	-0.43**	-0.25	-0.26	-0.45**	-0.51**
Harami Cross+	302	-0.44***	-0.65***	-0.68**	-0.71**	-0.76*	-0.52	-0.64	-0.18	-0.73	-0.71	-0.52	-0.42	-0.15	-0.04	-0.20
Homing Pigeon	639	-0.28	-0.99***	-1.37***	-1.47***	-1.31***	-1.18***	-1.28***	-1.14***	-1.31***	-1.46***	-1.31***	-1.03***	-0.82**	-0.93**	-0.89**
Inverted Hammer	267	0.33	-0.13	-0.27	-0.95*	-1.11**	-1.20**	-1.26**	-1.52**	-1.21*	-1.60**	-1.25*	-0.89	-0.75	-1.09	-1.50**
Kicking Up	28	0.03	-0.79	-1.86***	-0.92	-1.31	-0.73	-1.83	-1.85	-1.41	-1.74	-1.74	-3.01*	-3.38*	-3.61*	-4.18*
Last Engulfing Bottom	920	-1.26***	-1.10***	-1.05***	-1.06***	-1.08***	-1.17***	-1.43***	-1.32***	-0.85**	-0.98**	-1.00**	-0.85**	-1.03**	-0.97**	-1.49***
Meeting Lines+	180	-0.03	-0.23	-0.05	-0.03	-0.19	-0.51	-0.56	-0.90*	-1.03*	-0.82	-1.15*	-1.19*	-1.26*	-2.05**	-1.75**
Morning Star	24	-0.41	-0.24	-0.32	-0.30	0.41	0.71	1.33	1.42	0.60	0.59	1.29	0.92	0.72	0.52	0.28
Morning Doji Star	21	-0.67	-1.55	-2.46	-2.00	-1.35	-1.64	-1.90	-2.67	-2.89	-2.69	-2.66	-3.16	-3.24	-3.56	-4.92*
Piercing	439	-0.08	0.20	-0.03	-0.33	-0.50	-0.55	-0.55	-0.54	-0.83*	-0.89*	-0.66	-0.94*	-1.00*	-1.43**	-1.49**
Three Inside Up	828	-0.08	-0.03	-0.41**	-0.30	-0.05	-0.20	-0.21	-0.13	-0.02	0.24	0.56	0.46	0.12	0.09	-0.11
Three Outside Up	971	0.50***	0.49***	0.10	-0.14	-0.15	-0.05	0.05	-0.10	0.10	0.36	0.25	0.21	-0.11	-0.21	-0.36
Three White Soldiers	132	0.72**	0.35	-0.24	-0.30	-0.39	-0.32	-0.52	-0.21	-0.39	-0.62	-0.85	-1.17	-0.74	-0.86	-0.83
Tri Star+	30	-0.08	-1.31**	-0.76	-1.09	-0.30	-0.06	1.61	1.72	1.74	1.99	2.11	2.04	2.69	1.36	1.78
Tweezers Bottom	12234	0.02	-0.11***	-0.16***	-0.30***	-0.34***	-0.36***	-0.46***	-0.57***	-0.59***	-0.59***	-0.55***	-0.61***	-0.69***	-0.75***	-0.79***

The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.12: Average returns of bearish reversal patterns before and after trend from 1 to 15 holding days for out-of-sample from 2012 to 2014

Bearish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Belt Hold-	241	0.14	5.45	0.32	0.04	-0.16	-0.04	-0.61	-0.44	-0.24	-0.54	-0.48	-0.64	-0.35	5.18	-0.43
Dark Cloud Cover	86	-0.51**	-0.05	-0.15	0.28	0.90	0.42	0.50	0.66	0.25	0.89	0.71	0.70	0.37	-0.02	0.34
Deliberation	15	0.28	0.14	0.53	0.89	0.32	-0.01	0.11	0.18	1.01	1.23	0.68	0.72	0.68	1.22	0.63
Descending Hawk	123	0.14	0.25	0.28	0.02	0.15	-0.06	0.32	0.27	0.34	0.59	0.59	0.60	0.73	0.83	0.61
Doji Star-	118	-0.32	-0.49	-0.83*	-0.72	-0.47	-0.36	-0.17	0.00	0.07	-0.01	-0.35	-0.12	0.05	-0.40	-0.62
Engulfing-	1038	-0.11	-0.25	-0.27	1.06	-0.41*	-0.47*	-0.38	-0.89***	0.96	-1.04***	-1.08***	-1.13***	-1.02***	1.56	0.35
Evening Star	9	-0.34	-0.01	-0.29	-3.59	-0.54	-0.16	-1.36	-1.51	-1.88	-5.51*	-4.85	-4.50	-4.16	-4.44	-5.11
Evening Doji Star	12	0.33	-1.00**	0.80	1.02	0.44	-2.56	-3.70*	-3.74*	-4.72*	-4.32*	-4.17	-4.22*	-2.92	-4.03	-3.69
Hanging Man	644	-0.14	-0.33***	-0.48***	-0.31	-0.44*	-0.33	-0.52	-0.61*	-0.99***	-0.94***	-1.06***	-1.27***	-1.21***	-1.32***	-1.25***
Harami-	992	0.32***	0.34***	1.32	0.22	-0.19	-0.23	-0.38	-0.29	-0.33	-0.26	-0.29	-0.21	0.77	-0.33	0.80
Harami Cross-	60	-0.12	0.00	0.03	-0.30	0.00	0.64	-0.79	-0.27	-0.48	0.40	0.38	0.64	0.14	0.06	-0.01
Kicking Down	11	-0.13	0.02	-0.24	-1.85	-0.70	-1.52	-2.17*	-1.86	-2.21*	-2.33*	-2.29	-2.00	-2.11	-3.81	-3.43
Last Engulfing Top	235	0.36	0.11	-0.43	-0.52	-0.75	-0.37	-0.11	-0.10	-0.41	-1.01	-1.18*	-1.10	-1.30*	-1.57**	-1.94**
Meeting Lines-	61	-0.32	-0.76**	-1.21**	-1.06*	-1.05*	-0.67	-0.88	-0.71	-0.91	-1.46**	-2.48***	-2.00**	-2.02*	-2.19*	-2.50**
Shooting Star	1008	-0.13	-0.32	-0.49**	-0.65***	-0.65**	-0.79***	-0.95***	-1.18***	-1.08***	-0.10	-1.23***	-0.04	-1.34***	-1.41***	-0.89
Separating Lines-	96	0.17	0.11	-0.14	-0.12	14.99	14.96	-0.09	0.34	0.41	0.40	0.75	0.31	0.33	0.56	1.01
Three Black Crows	59	0.74	-0.36	0.27	0.54	0.36	-0.14	-0.51	-1.76	-2.77*	-3.21**	-2.59	-3.37*	18.79	-4.40**	-5.02***
Three Inside Down	369	-0.08	-0.42**	-0.36	-0.41	-0.62*	-0.79**	-0.88**	-0.76**	-0.74*	-1.05**	-1.17**	-1.42***	2.08	-1.63***	-1.80***
Three Outside Down	420	-0.06	-0.20	2.87	-0.77**	-0.79*	-0.52	-0.39	-0.31	-0.57	-0.67	-0.89	-0.78	5.48*	2.24	-1.18*
Tri Star-	13	0.84**	0.95**	1.32***	1.03	2.27	2.51	1.43	2.22	1.41	1.17	0.83	1.03	2.30	2.46	2.88
Tweezers Top	6314	0.72***	0.71***	0.49***	0.21**	0.55***	0.53**	0.06	0.98***	0.22	0.34	0.32	0.02	0.77**	0.87**	0.34

Table 4.12 Continued

Bearish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After uptrend:																
Belt Hold-	136	-0.21	9.20	0.54	-0.02	-0.66	-0.68	-0.86	-0.69	-0.70	-0.96	-0.64	-1.04	-0.72	9.40	-0.64
Dark Cloud Cover	29	-1.26***	-1.51***	-1.43*	-1.27	-0.78	-1.87	-2.12	-1.45	-1.04	-0.53	-0.07	-0.09	-0.49	-1.07	-0.83
Deliberation	10	0.12	0.65	0.78	1.46	1.30	1.09	1.61	2.15	2.43	2.55	1.94	2.20	2.73	3.18	2.43
Descending Hawk	59	-0.26	-0.60*	-0.19	-0.72	-0.51	-0.60	0.10	0.10	0.03	0.23	0.19	0.24	0.23	0.18	0.20
Doji Star-	50	-0.68	-1.08	-1.05	-0.51	-0.91	-1.07	-0.72	0.02	-0.41	-0.83	-0.58	-0.62	-0.10	-1.14	-1.36
Engulfing-	483	-0.08	-0.34	-0.28	2.72	-0.12	-0.34	-0.34	-0.51	1.64	-0.51	-0.38	-0.47	-0.23	2.58	-0.12
Evening Star	6	-0.66	-1.51	-2.23	-5.20	-2.45	-1.60	-2.79	-2.88	-3.20	-4.09	-3.72	-2.81	-2.50	-2.86	-3.31
Evening Doji Star	6	1.91	-0.45	2.16	1.85	-0.06	-5.44	-5.32	-5.65	-6.61	-5.88	-6.91	-6.20	-4.04	-5.52	-4.43
Hanging Man	321	-0.11	-0.29	-0.56**	-0.54*	-0.70*	-0.76*	-0.73	-0.90*	-1.32**	-1.32**	-1.42**	-1.74***	-1.76***	-1.86***	-1.70***
Harami-	476	0.25	0.37*	0.10	0.36	-0.41	-0.47	-0.52	-0.35	-0.13	-0.21	-0.29	-0.24	-0.39	-0.36	2.05
Harami Cross-	23	0.23	0.15	0.58	0.27	0.06	0.88	0.30	0.27	-0.32	0.13	0.06	0.56	0.13	-0.27	0.30
Last Engulfing Top	128	0.26	0.05	-0.32	-0.39	-0.51	-0.39	0.01	-0.12	-0.42	-1.16	-1.05	-1.21	-1.88*	-2.17**	-2.36**
Meeting Lines-	23	-0.52	-1.56**	-2.28***	-1.61	-1.54	-1.06	-1.71	-1.46	-1.73	-2.85**	-3.05**	-2.78**	-2.97**	-3.24**	-3.77**
Shooting Star	436	-0.17	-0.27	-0.44	-0.49	-0.29	-0.71*	-1.25***	-1.41***	-1.55***	0.86	-1.86***	-1.79***	-1.89***	-2.05***	-1.03
Three Black Crows	40	1.02	-0.44	0.51	0.99	0.82	0.23	-0.37	-2.18	-2.05	-2.76	-2.34	-2.67	-3.11	-3.56	-4.05*
Three Inside Down	203	0.01	-0.10	-0.15	-0.20	-0.35	-0.44	-0.33	-0.02	-0.06	-0.54	-0.54	-1.01	-1.11	-1.06	-1.18
Three Outside Down	199	-0.09	0.14	6.97	-0.28	-0.24	0.14	0.16	0.61	0.40	0.42	-0.02	0.28	7.36	0.30	-0.11
Tri Star-	6	1.57*	1.93**	1.76**	1.91	3.32	4.45	2.81	2.20	1.65	2.29	1.87	1.63	3.49	2.83	3.77
Tweezers Top	2272	0.90**	0.24**	0.14	-0.04	-0.07	0.20	-0.33	0.29	-0.34	0.20	-0.30	-0.33	0.17	0.34	0.04

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.13: Average returns of bullish reversal patterns before and after trend from 1 to 15 holding days for out-of-sample from 2012 to 2014

Bullish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Belt Hold+	336	0.39***	3.49	-0.17	-0.43	-0.35	-0.14	3.62	0.26	0.47	0.32	0.39	0.44	0.28	0.16	0.26
Doji Star+	228	0.48***	0.31	2.39*	0.42	-0.06	0.23	0.39	0.58	1.02**	0.87*	1.34**	1.09*	1.10**	1.12**	1.19**
Engulfing+	1517	0.72*	-0.12	0.59	0.14	-0.30*	1.61*	-0.24	-0.23	-0.17	-0.09	-0.09	0.38	-0.23	-0.22	-0.29
Hammer	546	0.14	-0.16	-0.18	-0.31	-0.19	-0.18	-0.11	0.02	-0.19	-0.07	0.04	0.09	0.11	0.13	0.18
Harami+	1141	-0.07	-0.15	0.72	1.00	0.53	-0.03	1.37	-0.01	2.19*	-0.01	0.11	0.65*	-0.01	0.08	-0.03
Harami Cross+	114	-0.10	-0.69**	-1.45***	-1.68***	-2.23***	-2.59***	-2.69***	-2.92***	-3.82***	-3.62***	-3.40***	-3.34***	-3.66***	-3.37***	-3.72***
Homing Pigeon	146	-0.41**	-0.67**	-0.72**	-0.43	-0.50	-0.19	-0.75	-0.72	-0.62	-0.03	-0.02	0.38	0.26	0.52	0.56
Inverted Hammer	86	0.05	-0.04	0.13	0.02	0.68	1.63*	14.33*	1.34	0.49	-0.03	0.17	0.50	0.43	0.17	-0.50
Kicking Up	33	-1.01	-1.62*	-0.90*	-1.05	-0.95	-0.89	0.14	-0.10	-0.51	-0.70	-0.28	0.31	1.08	1.05	1.37
Last Engulfing Bottom	177	-0.30*	-0.19	-0.36	-0.22	-0.31	-0.05	-0.42	-1.09	-1.12	-1.25*	-1.06	-1.33	-1.15	-1.32	-1.11
Meeting Lines+	95	0.75***	0.27	0.71	0.89*	0.78	0.86*	0.99**	0.79	1.00*	1.51**	1.77***	1.86***	2.05***	2.24***	2.31***
Morning Star	11	-1.33*	-0.89	-0.47	0.12	0.52	1.56	0.85	1.61	1.67	2.19*	3.08**	4.11***	3.61**	3.52**	3.54*
Morning Doji Star	9	1.59	0.11	0.20	1.58	0.60	0.34	1.36	-0.04	1.79	3.09	1.91	2.14	4.52	3.30	2.57
Piercing	120	0.00	-0.26	10.57	0.29	0.39	0.70	4.44**	1.04	1.49**	1.71**	1.91**	1.47*	1.28*	0.85	0.82
Three Inside Up	305	0.15	0.28	0.53**	0.47*	0.63**	0.22	0.39	0.56	0.51	0.52	0.25	0.03	0.15	0.11	0.29
Three Outside Up	335	-0.01	-0.21	-0.10	-0.39	8.05*	-0.63*	-0.29	0.07	0.08	0.18	1.23	-0.03	-0.11	-0.19	-0.30
Three White Soldiers	36	0.22	0.29	0.25	0.55	0.39	0.12	0.11	0.34	0.22	0.29	0.29	0.41	0.39	0.29	0.57
Tri Star+	44	-0.15	0.51*	-0.52	-0.84	-0.90	-1.23	-1.57	-0.63	-1.06	0.14	-0.44	-0.25	0.25	0.71	0.32
Tweezers Bottom	8657	0.15	0.44**	0.70***	0.66***	0.07	0.60**	0.10	0.58**	0.34	0.12	0.23	-0.01	-0.11	0.32	0.01

Table 4.13 Continued

Bullish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After downtrend:																
Belt Hold+	200	0.44**	5.91	-0.40	-0.12	-0.07	0.15	6.57	0.80	0.99	1.05	1.13	1.30*	1.13	1.00	1.15
Doji Star+	114	0.70**	0.35	4.60	0.42	0.79	0.49	0.85	1.18	1.66**	1.66**	2.24**	1.75**	1.79**	1.86**	1.85*
Engulfing+	715	1.29	-0.24	-0.31*	-0.20	-0.32	-0.22	-0.23	0.01	0.23	0.31	0.46	0.88*	0.30	0.31	0.23
Hammer	268	0.02	-0.22	-0.08	-0.13	0.09	0.05	0.20	0.22	0.02	0.11	0.23	0.37	0.35	0.18	0.37
Harami+	589	-0.07	-0.14	-0.16	0.02	-0.05	0.32	2.35	0.37	2.42*	0.34	0.45	0.61	0.34	0.49	0.24
Harami Cross+	66	0.29	-0.58*	-1.25**	-1.27**	-1.94***	-2.50***	-2.22*	-2.62**	-3.35***	-3.14***	-3.57***	-3.54***	-3.73***	-3.67***	-4.26***
Homing Pigeon	71	-0.59**	-0.77**	-1.04**	-0.98*	-1.15*	-0.85	-1.34**	-1.55**	-1.22**	-0.44	-0.64	-0.33	-0.42	-0.19	0.03
Inverted Hammer	56	-0.02	-0.19	0.00	-0.42	0.54	1.70	21.43	2.18	1.25	0.26	0.40	0.67	0.57	0.25	-0.05
Kicking Up	5	1.30	-0.42	0.07	0.07	0.50	0.27	-0.56	-0.65	-0.97	-0.67	-0.26	0.53	2.75	2.14	1.60
Last Engulfing Bottom	93	-0.26	0.04	-0.20	-0.02	-0.06	0.32	0.05	-0.44	-0.34	-0.67	-0.84	-0.95	-0.76	-1.25	-0.94
Meeting Lines+	41	0.56**	0.05	0.57	0.92	0.86	0.91	-0.05	0.05	0.66	1.52*	1.19	1.35	1.74*	1.60	1.55*
Morning Star	9	-1.84**	-0.54	0.01	0.89	1.05	2.46**	1.69*	2.69	2.37	2.69*	3.52**	4.71***	4.28**	4.24**	4.22*
Morning Doji Star	5	-1.81	-3.35	-3.63	-2.32	-4.67	-4.02	-0.83	-2.24	0.11	1.80	-0.60	-0.35	3.27	1.76	1.05
Piercing	63	0.14	-0.19	19.98	0.33	0.63	1.00	7.54*	1.29	1.89**	1.93**	2.00**	1.52*	1.30	0.95	0.85
Three Inside Up	160	0.14	0.18	0.61*	0.38	0.57	0.17	0.32	0.59	0.57	0.54	0.32	0.15	0.30	0.07	0.34
Three Outside Up	189	0.02	-0.08	0.42	0.14	0.18	-0.08	0.39	1.05**	1.10**	1.08**	1.13**	1.12*	0.92	0.90	0.77
Three White Soldiers	18	0.19	-1.32*	-2.51**	-1.38	-1.64	-2.14*	-1.58	-1.60	-1.80	-2.15	-1.91	-1.37	-0.91	-1.00	-0.84
Tri Star+	19	-0.04	0.25	-0.12	-0.26	-0.06	-0.82	-1.31	-0.40	0.16	0.72	0.89	0.14	0.56	0.39	0.46
Tweezers Bottom	3145	-0.12**	0.64	1.06*	0.52	-0.32***	0.10	-0.25**	0.27	0.32	0.17	0.05	0.10	0.03	0.50	-0.10

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

4.5 Predictive power of continuation patterns

This section presents the results on average returns of continuation patterns measured from the first day until fifteen days holding period. The predictive power for continuation patterns is confirmed when the average returns obtained is more than 1% transaction cost alongside with a positive return rate for bullish patterns whereas a negative return rate for bearish patterns. The results for average returns of continuation patterns consist of two major division which composed of the in-sample and out-of-sample test. For easier identification, the average returns which prove the existence of predictive power for respective continuation patterns are highlighted.

4.5.1 Continuation patterns for in-sample test

As for the bearish continuation patterns, both Falling Window and In Neck patterns have revealed predictive power of bearish signals both before and after trend as shown from Table 4.14. The In Neck pattern has noted to attain higher negative return rate after a prevailing downtrend, whereby the highest returns of -6.83% is recorded on the 9-day holding period while Falling Window has recorded average returns of -1.18% on the 5-day holding period after trend. Meanwhile, On Neck, Bearish Side-by-Side White Lines, and Two Black Gapping Candles patterns only show predictive power prior to trend identification. It is noted that bearish signals from bearish continuation patterns tend to appear more often during the 10-day holding period as compared to other holding period. During the 10-day holding period, In Neck pattern has indicated greater strength of bearishness as compared to other patterns with a -5.50% return rate before trend and a -6.15% return rate after a prevailing downtrend. It is also noticed that the bearish continuation patterns of In Neck, On Neck, and Two Black Gapping Candles prior to trend are more effective in signifying bearish signals as negative return rate which is over 1% has been recorded significantly throughout the holding period from as early as four holding

days until fifteen holding days. For instance, On Neck pattern has revealed significant bearish signals consistently from the ninth until the fifteenth holding day prior to trend identification.

The predictive power of bullish continuation patterns is found to exist only for Bullish Side-by-Side White Lines as shown in Table 4.15. Only a positive return rate of 1.51% and 2.07% are achieved on the two and six holding days respectively for Bullish Side-by-Side White Lines pattern prior to trend. After a prevailing uptrend, most of the bullish continuation patterns show negative returns significantly without any sign of bullish signal. Thus, it shows that bullish continuation pattern from in-sample is not really effective in revealing bullish signals.

4.5.2 Continuation patterns for out-of-sample test

The bearish continuation patterns in out-of-sample test has less predictive power when comparing with the in-sample data. Based on Table 4.16, most of the bearish continuation patterns have shown significant positive returns while only On Neck pattern indicates significant bearish signals on the 12-day and 13-day holding period with negative returns of -3.45% and -3.28% respectively after a prevailing downtrend.

As for the bullish continuation patterns, only Bullish Separating Lines pattern shows predictive power after a prevailing uptrend with significant return rate recorded at 1.29% on the first holding day as shown from Table 4.17. Therefore, the result shows that the continuation patterns from out-of-sample test are not as effective as the reversal patterns in revealing predictive power.

Table 4.14: Average returns of bearish continuation patterns before and after trend from 1 to 15 holding days for in-sample from 2000 to 2011

Bearish Continuation Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Downside Tasuki Gap	9	-1.93	0.10	-0.07	0.84	2.71	-0.47	-0.36	-0.29	4.53**	4.74*	2.94	4.01	3.73	3.23	0.60
Falling Window	16803	-0.33***	-0.26***	-0.50***	-0.73***	-0.94***	-0.80***	-0.89***	-0.95***	-1.00***	-1.04***	-1.04***	-0.95***	-0.93***	-0.78***	-0.86***
In Neck	22	-0.38	-1.42	-1.35	-3.16*	-3.34*	-4.05**	-4.92**	-4.29*	-5.48**	-5.50**	-4.54	-4.77	-4.81	-5.71	-5.36
On Neck	276	-0.37*	-0.80***	-0.96***	-1.25***	-1.24***	-1.46***	-0.98**	-0.92*	-1.20**	-1.33**	-1.38**	-1.17**	-1.20*	-1.16*	-1.30**
Separating Lines-	279	0.65***	0.42	0.55	0.74**	0.29	0.44	0.22	0.33	0.13	0.04	0.16	-0.03	0.53	0.59	-0.06
Side-by-Side White Lines-	7	-0.18	-2.58	-5.50*	-5.25	-6.94	-9.37	-10.08	-9.81	-9.60	-10.10	-9.89	-9.77	-10.90	-11.77	-12.54
Three-Line Strike-	9	1.51	1.01	-0.32	-0.41	-0.70	-0.14	0.93	1.30	1.00	0.53	0.11	-0.98	-0.68	-1.75	-0.81
Thrusting	340	0.21	0.50	0.40	0.09	-0.29	-0.18	-0.32	-0.06	-0.44	-0.43	-0.17	-0.08	0.61	0.71	0.30
Two Black Gapping Candles	1642	-0.51***	-0.64***	-0.80***	-1.05***	-1.20***	-0.99***	-1.18***	-1.24***	-1.32***	-1.40***	-1.28***	-1.15***	-0.96***	-1.00***	-1.00***
After downtrend:																
Falling Window	5088	-0.38***	-0.33***	-0.53***	-0.83***	-1.18***	-0.83***	-0.99***	-0.93***	-0.95***	-0.88***	-0.91***	-0.81***	-0.80***	-0.55***	-0.60***
In Neck	16	-0.34	-1.58	-0.96	-3.40	-4.10*	-4.17	-5.52*	-4.81	-6.83**	-6.15*	-4.57	-5.35	-5.31	-6.24	-5.93
On Neck	148	-0.48**	-0.55**	-0.52	-0.41	-0.42	-0.43	0.22	0.27	-0.10	-0.30	-0.20	-0.13	-0.05	0.17	0.05
Separating Lines-	101	0.18	0.51	0.25	0.52	-0.52	0.38	-0.03	0.41	0.07	0.31	0.28	0.31	1.33	1.63	0.80
Thrusting	196	0.39	1.15***	1.00**	0.78*	0.44	0.50	0.66	0.92	0.58	0.77	0.87	0.76	1.71**	1.80*	1.23
Two Black Gapping Candles	846	-0.23*	-0.37**	-0.50***	-0.78***	-0.84***	-0.72***	-0.94***	-0.97***	-0.88***	-0.90***	-0.77**	-0.75**	-0.58	-0.70*	-0.86**

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.15: Average returns of bullish continuation patterns before and after trend from 1 to 15 holding days for in-sample from 2000 to 2011

Bullish Continuation Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Rising Three Methods	5	-1.20	0.95	1.12	0.61	-1.83	-0.86	-1.63	-3.82	-4.60	-3.84	-2.20	-2.96	-2.72	-2.24	-2.47
Rising Window	13231	-0.31***	-0.25***	-0.33***	-0.43***	-0.47***	-0.60***	-0.74***	-0.87***	-1.05***	-1.32***	-1.51***	-1.72***	-1.95***	-2.02***	-2.15***
Separating Lines+	197	-0.22	0.22	0.37	0.32	0.41	0.51	0.39	-0.04	-0.25	-0.45	-0.49	-0.74	-0.33	-0.50	-0.16
Side-by-Side White Lines+	16	0.82**	1.51**	0.99	1.12	2.12	2.07*	1.43	1.44	1.87	2.38	1.25	1.01	0.76	1.27	0.16
Three-Line Strike+	5	-0.59	-0.16	0.57	1.31	1.70	2.62	2.72	2.93	3.74	3.58*	3.60	5.42	6.65	6.57	5.24
Upside Tasuki Gap	8	1.08	0.08	-0.77	-2.28*	-2.41*	-3.98*	-5.45*	-4.49	-4.87	-5.10	-5.66	-5.12	-4.42	-5.24	-5.03
After uptrend:																
Rising Window	3123	-0.23***	-0.22*	-0.35**	-0.38**	-0.80***	-1.05***	-1.40***	-1.76***	-2.03***	-2.52***	-2.58***	-2.89***	-3.08***	-3.02***	-3.00***
Separating Lines+	93	0.16	0.62	0.53	0.19	0.29	0.38	-0.06	-0.43	-1.01	-1.04	-1.01	-0.91	-0.19	0.09	0.39

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.16: Average returns of bearish continuation patterns before and after trend from 1 to 15 holding days for out-of-sample from 2012 to 2014

Bearish Continuation Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Falling Window	1913	0.21***	0.18*	0.03	0.78*	0.96**	0.94*	0.45**	0.49***	0.67***	0.65***	0.74***	0.83***	1.66***	1.10***	1.20***
On Neck	35	0.55	0.28	0.45	0.90	0.63	1.09	0.13	0.22	-0.62	-0.49	-0.61	-0.49	-0.68	-0.84	-1.39
Thrusting	44	0.22	0.21	0.14	1.05	1.85*	1.75	2.09*	2.63**	3.08**	2.42*	2.99**	2.83*	3.04**	3.26**	3.46**
Two Black Gapping Candles	208	-0.24	-0.06	-0.34	0.31	0.44	0.65	1.15**	1.28**	1.30**	1.48**	1.34*	1.37**	1.42**	1.51**	1.39**
After downtrend:																
Falling Window	604	0.64***	0.75***	0.80***	3.47***	1.56***	3.77***	1.95***	1.95***	2.40***	2.71***	3.05***	3.24***	3.29***	3.45***	3.65***
On Neck	17	0.07	0.24	1.27	1.31	0.86	0.89	-0.44	-0.78	-2.21	-2.06	-2.59	-3.45*	-3.28*	-2.72	-3.24
Separating Lines-	28	0.48	1.04	0.54	0.63	1.10	1.32	2.05*	2.01	1.96	1.49	2.53*	2.03	2.34	2.85*	3.38*
Thrusting	28	0.40	0.45	0.63	2.06	3.64**	3.57**	3.94**	4.54**	5.33**	4.50**	5.36***	5.30**	5.69***	5.28***	5.52***
Two Black Gapping Candles	102	-0.21	-0.24	-0.78	-0.19	-0.04	0.28	1.02	1.10	1.32	1.50*	1.89**	1.57	1.74*	2.07**	1.92**

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.17: Average returns of bullish continuation patterns before and after trend from 1 to 15 holding days for out-of-sample from 2012 to 2014

Bullish Continuation Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Rising Window	2275	0.25	-0.33***	0.10	-0.33**	0.30	-0.27	-0.36**	-0.53***	-0.08	-0.79***	0.27	-0.48	-0.98***	-1.16***	-0.62
Separating Lines+	80	0.10	-0.84	-1.16	-1.08	-1.77**	16.24	-1.95**	-1.91**	-1.61*	-0.76	-1.30	-2.05**	-1.81	-2.04*	-1.97*
After uptrend:																
Rising Window	523	-0.04	-0.14	-0.40	-0.19	-0.13	-0.23	-0.30	-0.64	-0.76*	-1.02**	1.17	-1.13**	-1.37**	-1.55**	-1.46**
Separating Lines+	24	1.29*	0.59	0.76	0.88	1.01	61.69	0.80	0.68	0.50	-0.04	-0.39	-0.13	-0.03	-0.44	-0.04

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

4.6 Trading volume effect

This section presents the results on average returns of candlestick patterns for sub-sample which only takes into account sample with high trading volume. The average returns for both reversal and continuation patterns are measured from various holding period ranges from one to fifteen holding days. The predictive power for candlestick patterns is confirmed when the average returns obtained is more than 1% transaction cost alongside with a positive return rate for bullish patterns whereas a negative return rate for bearish patterns. The results for average returns of candlestick patterns that consider the trading volume factor is divided into three division which consist of average trading volume for in-sample and out-of-sample test and also trading volume on next day for out-of-sample. For easier identification, the average returns which prove the existence of predictive power for respective candlestick patterns are highlighted.

4.6.1 Average trading volume for in-sample test

From Table 4.18, the bearish reversal patterns of Dark Cloud Cover, Bearish Engulfing, Bearish Harami, Bearish Harami Cross, Three Black Crows, Three Inside Down, and Three Outside Down have shown predictive power significantly both before and after trend. The negative return rate is obviously higher after a prevailing uptrend. Meanwhile, Evening Star and Last Engulfing Top patterns only show predictive power before trend whereas bearish signals have been reflected by Descending Hawk, Shooting Star, and Tweezers Top patterns only after a prevailing uptrend.

Prior to trend, Dark Cloud Cover and Bearish Harami Cross patterns have portrayed stronger bearish signals as compared to other bearish reversal patterns as higher negative return rate has been obtained both during the 10-day and 15-day holding period. The highest average returns of -11.72% has been shown by the Evening Star on the 11-day holding period among

all other patterns. Bearish Engulfing, Bearish Harami, and Bearish Harami Cross are deemed to be more effective than other bearish reversal patterns as significant results have been obtained throughout the holding period from as early as three holding days until fifteen holding days. For instance, Bearish Engulfing has signified bearish signals throughout the 4-day to 15-day holding period.

After a prevailing uptrend, Dark Cloud Cover and Shooting Star patterns have revealed stronger bearish signals than other bearish reversal patterns during the 15-day holding period at -8.97% and -7.12% respectively. Meanwhile, Bearish Engulfing and Bearish Harami Cross indicate stronger bearish signals than other bearish reversal patterns during the 10-day holding period at -3.57% and -4.75% respectively. Bearish Engulfing, Bearish Harami, and Three Outside Down patterns after a prevailing uptrend are deemed to be more effective in portraying bearish signals as significant negative returns are recorded consistently throughout the holding period from as early as three holding days until the fifteen holding days. For instance, Three Outside Down has indicated the existence of bearish signals significantly from three until fifteen days holding period.

The predictive power for bullish reversal patterns is obviously less effective than the bearish reversal patterns. As shown in Table 4.19, only Bullish Harami Cross, Homing Pigeon, and Three Inside Up patterns have correctly predicted the direction of future price movement with significant positive returns rate obtained both before and after trend. However, Bullish Meeting Lines pattern only shows predictive power prior to trend on the first holding day with return rate of 1.10% while Bullish Harami and Bullish Tri Star patterns have revealed bullish signals only after a prevailing downtrend.

After a prevailing downtrend, both Bullish Harami Cross and Homing Pigeon patterns have resulted with largest return rate on the 15-day holding period at 3.77% and 2.26%

respectively when compared to other holding days whereas Three Outside Up pattern shows highest returns on the 7-day holding period at 1.32%. Meanwhile, Bullish Tri Star pattern has recorded with the highest returns of 7.30% on the 9-day holding period. During the 10-day holding period, Bullish Tri Star shows stronger bullish signals at 5.88% average returns while Bullish Harami Cross portrays stronger bullish signals on the 15-day holding period at average return rate of 3.77%. In fact Bullish Harami Cross pattern is deemed to be more effective than other bullish reversal patterns as it has shown bullish signals consistently throughout the eleven to fifteen days holding period both before and after prevailing trend.

Based on Table 4.20, Thrusting pattern shows predictive power on the eleven, twelve, and fifteen holding days both before and after trend with the largest negative return rate recorded on the 15-day holding period at -3.14% prior to trend and at -3.58% after a prevailing downtrend. Meanwhile, Downside Tasuki Gap and Bearish Separating Lines patterns only display predictive power prior to trend while Falling Window pattern only shows predictive power after a prevailing downtrend with the largest negative return rate recorded at -1.78% on the 5-day holding period.

As shown from Table 4.21, none of the bullish continuation patterns have shown predictive power prior to trend. After a prevailing uptrend, only Bullish Separating Lines pattern reflects bullish signal with significant returns of 1.51% on the 2-day holding period.

Table 4.18: Average returns of bearish reversal patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares from 2000 to 2007

Bearish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Belt Hold-	174	-0.22	-0.42	0.22	0.14	0.45	0.66	0.38	0.50	0.30	0.02	-0.29	-0.58	-0.39	-0.76	-0.88
Dark Cloud Cover	76	-0.50	-2.23***	-1.88***	-2.34**	-2.00**	-1.99**	-1.60	-1.49	-4.28**	-5.21**	-5.53***	-5.94***	-4.89**	-4.80**	-5.14**
Descending Hawk	48	0.07	-0.50	-1.07	-1.28	-1.26	-0.40	-0.24	0.55	0.66	0.72	0.62	-0.65	-1.01	-1.48	-1.83
Doji Star-	31	-0.06	2.04	1.80	1.30	0.55	0.34	-0.25	-0.53	1.07	-0.65	0.33	2.01	1.83	1.94	0.85
Engulfing-	905	-0.08	-0.24	-0.59***	-1.33***	-1.36***	-1.21***	-1.47***	-1.45***	-1.42***	-1.73***	-1.81***	-2.20***	-2.18***	-2.33***	-2.08***
Evening Star	4	-1.62	-4.38*	-4.94	-6.83**	-4.69*	-7.04	-4.28	-5.26	-4.84	-7.85*	-11.72*	-11.82	-8.48	-8.20	-6.13
Evening Doji Star	4	-1.50	-2.15	0.18	1.24	0.80	1.05	1.29	2.04	3.62	3.35	3.80	4.29	6.27	6.97	8.84**
Hanging Man	512	0.13	-0.14	-0.37	-0.11	-0.39	-0.41	-0.44	-0.66	-0.82*	-0.90*	-0.65	-0.98*	-0.84	-0.93	-1.00
Harami-	597	-0.13	0.10	-0.17	-0.65**	-0.81**	-0.93**	-1.06**	-1.15**	-1.55***	-1.58***	-1.82***	-2.29***	-2.25***	-2.28***	-2.17***
Harami Cross-	46	-0.21	-0.75	-1.19*	-2.89**	-3.05**	-3.02**	-3.32**	-3.62***	-3.66***	-3.56***	-3.55**	-3.50**	-3.79**	-3.22**	-3.28**
Last Engulfing Top	165	0.60	0.39	0.40	-0.20	-0.56	-0.90	-1.15	-1.27	-0.92	-1.92*	-1.96*	-1.39	-1.21	-1.89	-2.05*
Meeting Lines-	15	0.82	2.16	2.15	2.30	4.90	5.54	4.00	4.65	4.87	3.89	3.61	3.79	3.93	2.93	2.75
Three Black Crows	61	-0.72	-0.41	-0.93	-1.33*	-1.46	-1.32	-0.49	0.28	0.28	0.36	0.19	0.17	-0.12	0.59	0.19
Three Inside Down	297	0.07	-0.15	-0.18	-0.34	-0.15	-0.85	-0.85	-0.92	-1.17	-1.57**	-1.93**	-1.80**	-1.38	-1.52*	-1.37
Three Outside Down	404	-0.24	-0.36	-1.31***	-1.14***	-1.11**	-0.78	-0.50	-0.50	-0.79	-0.97	-1.39**	-1.31**	-1.54**	-1.37**	-1.17
Tri Star-	5	-0.28	0.37	1.57	2.36	0.28	-0.01	-1.47	-1.50	-2.43	-0.28	0.72	0.20	-0.12	0.18	-0.22
Tweezers Top	3264	0.20***	0.28***	0.33***	0.20	0.28*	0.24	0.03	-0.05	-0.22	-0.40*	-0.41*	-0.46*	-0.45*	-0.50*	-0.50*

Table 4.18 Continued

Bearish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After uptrend:																
Belt Hold-	97	-0.41	-0.73	0.07	-0.43	0.01	0.56	0.24	0.49	0.36	-0.01	-0.26	-0.64	-0.85	-1.07	-1.19
Dark Cloud Cover	32	-1.32*	-2.69**	-2.50*	-2.60*	-1.97	-0.67	-0.34	-0.15	-7.51	-8.06	-8.46	-8.84	-7.62	-7.95	-8.97*
Descending Hawk	27	0.18	-1.15	-2.36	-2.46	-2.89**	-2.47*	-1.91	-1.68	-2.24	-2.26	-3.18	-4.35**	-4.96**	-5.00**	-5.39***
Doji Star-	13	-0.16	0.17	0.13	0.31	-1.45	-2.83	-1.82	-0.46	0.51	0.37	1.76	1.93	2.18	2.47	3.23
Engulfing-	455	-0.01	-0.46*	-0.92***	-2.20***	-2.49***	-2.22***	-3.03***	-2.94***	-2.94***	-3.57***	-3.76***	-3.95***	-3.69***	-3.83***	-3.59***
Hanging Man	248	0.10	-0.22	-0.52	-0.37	-0.66	-0.61	-0.51	-0.82	-0.99	-1.12	-0.73	-1.22	-1.09	-1.18	-1.28
Harami-	277	-0.36*	0.08	-0.22	-0.92*	-1.42**	-1.59**	-1.81**	-1.81**	-1.97**	-1.94**	-2.18***	-2.50***	-2.52***	-2.56***	-2.54***
Harami Cross-	24	-0.37	-0.12	-0.02	-3.60	-3.79	-4.10	-3.66	-4.30*	-4.44*	-4.75*	-4.75*	-5.00**	-4.48	-3.78	-3.40
Last Engulfing Top	93	0.38	0.24	0.27	-0.28	-0.07	0.34	-0.10	-0.06	0.42	-1.05	-0.64	-0.36	-0.05	-0.99	-1.14
Meeting Lines-	8	0.65	0.80	0.97	-0.03	-0.26	-0.53	-3.41	-2.71	-2.13	-3.23	-3.71	-3.63	-2.55	-4.71	-3.31
Shooting Star	63	-0.76	-0.74	-0.09	-0.48	-0.14	-0.20	-1.94	-1.50	-1.56	-2.96	-3.89**	-5.61**	-7.02***	-7.84***	-7.12***
Three Black Crows	33	-1.04	-1.34	-2.16**	-2.24**	-2.03	-1.36	-0.37	0.32	0.86	1.26	0.93	0.82	0.70	1.43	0.94
Three Inside Down	139	0.14	-0.33	-0.15	-1.14	-0.76	-2.38*	-2.20	-2.35*	-2.47**	-2.83**	-3.27**	-3.39**	-2.85**	-3.13**	-2.95*
Three Outside Down	218	-0.35	-0.85*	-2.42***	-2.28***	-1.99***	-1.97***	-1.51**	-1.61**	-2.37***	-2.68***	-3.10***	-2.67***	-2.69***	-2.53***	-2.24**
Tweezers Top	1312	0.04	0.18	0.25	0.08	0.06	-0.08	-0.42	-0.43	-0.60*	-0.91***	-0.98***	-1.02***	-1.07***	-1.18***	-1.14***

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.19: Average returns of bullish reversal patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares from 2000 to 2007

Bullish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Belt Hold+	276	-0.30	0.07	0.06	-0.38	-0.58	-0.96**	-1.49***	-0.86*	-0.84	-0.60	-0.47	-0.32	-0.19	-0.28	-0.70
Doji Star+	195	0.01	-0.21	-0.80**	-1.06**	-1.14*	-0.85	-0.81	-1.13*	-0.70	-0.73	-0.88	-0.59	-0.56	-0.56	-0.44
Engulfing+	1264	0.05	-0.05	0.22	-0.15	-0.01	-0.20	-0.21	-0.12	-0.15	0.04	0.10	-0.06	-0.14	-0.36	-0.20
Hammer	534	0.02	-0.29	-0.65***	-0.62**	-0.77**	-0.58*	-0.67*	-0.65*	-0.73*	-0.69*	-0.77*	-0.86**	-0.75	-1.11**	-0.98**
Harami+	1063	-0.30***	-0.42***	-0.21	-0.50**	-0.47**	-0.60**	-0.76***	-0.53*	-0.82***	-0.37	-0.14	0.06	0.25	0.19	0.04
Harami Cross+	142	-0.18	-0.24	0.57	0.93*	1.24**	1.42**	1.25	2.44***	1.69*	1.56	2.08**	1.88*	2.14**	2.31**	2.41**
Homing Pigeon	137	-0.12	-0.77	-0.81	-0.70	0.11	-0.10	-0.24	-0.39	-0.37	-0.46	-0.08	0.71	1.61*	1.76*	2.64***
Inverted Hammer	67	0.47	0.72	0.49	-0.37	-0.15	0.46	0.58	0.26	-0.71	-0.93	-0.56	-0.77	-0.63	-0.66	-0.97
Last Engulfing Bottom	252	-0.65**	-0.73**	-0.62	-0.04	-0.35	-0.25	-0.42	-0.27	0.74	0.68	0.41	0.65	0.66	1.07	1.15
Meeting Lines+	28	1.10**	0.47	0.88	0.59	0.59	0.50	0.79	0.56	0.82	1.21	2.39	1.94	1.37	1.58	1.20
Morning Star	5	-1.82	0.69	-0.08	0.87	0.84	-0.35	-2.69	-2.28	-2.45	-3.38	-2.39	-2.06	-1.52	-2.06	-0.85
Morning Doji Star	9	0.05	0.15	1.12	1.12	2.25	1.72	1.80	1.59	0.62	0.71	1.29	1.17	0.97	-0.44	-0.96
Piercing	111	-0.14	0.02	-0.03	-0.69	-0.17	0.09	-0.14	-0.29	-1.10	-0.52	-0.02	-0.75	-0.60	-0.96	-1.08
Three Inside Up	336	-0.20	-0.05	-0.26	-0.07	0.14	0.21	0.19	0.39	0.63	0.84	0.81	1.05	0.62	0.60	0.65
Three Outside Up	360	0.38*	1.03***	0.51*	0.73**	0.45	0.53	0.87**	0.70*	1.05**	1.26***	1.27***	1.14**	0.74	0.88	0.55
Three White Soldiers	48	0.19	0.00	-0.62	-0.20	-0.55	0.00	0.18	-0.72	-0.50	-0.39	-0.23	0.07	-0.22	-0.19	-0.05
Tri Star+	17	-0.03	-0.80	-0.48	-1.14	-0.35	0.48	-0.01	0.32	0.50	0.75	0.91	0.68	0.70	0.41	-0.67
Tweezers Bottom	4840	0.19***	0.07	0.12	0.06	0.09	0.04	-0.03	-0.08	0.00	0.02	0.12	-0.02	-0.03	-0.05	-0.05

Table 4.19 Continued

Bullish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After downtrend:																
Belt Hold+	192	-0.33	0.43	0.41	-0.22	-0.55	-0.98	-1.20*	-0.63	-0.54	-0.16	0.11	0.44	0.31	-0.04	-0.29
Doji Star+	107	0.07	0.22	-0.06	-0.65	-0.70	-0.11	-0.10	-0.46	0.00	-0.02	0.12	0.28	0.49	0.74	0.96
Engulfing+	630	-0.01	0.13	0.41*	-0.01	0.16	0.00	-0.06	0.12	0.10	0.43	0.49	0.36	0.38	-0.03	0.26
Hammer	302	0.15	-0.19	-0.65**	-0.45	-0.75*	-0.46	-0.63	-0.61	-0.68	-0.64	-0.39	-0.52	-0.38	-0.55	-0.48
Harami+	577	-0.16	-0.07	0.15	-0.24	-0.25	-0.29	-0.37	-0.06	-0.27	0.34	0.72	1.00**	1.14**	0.94*	0.74
Harami Cross+	69	-0.58**	-1.06**	-0.15	0.62	0.75	1.20	1.06	2.23*	1.51	1.39	2.40*	2.28*	3.00**	3.26**	3.77**
Homing Pigeon	70	-0.26	-1.33*	-1.78**	-2.18**	-0.40	-0.43	-0.31	-0.07	0.07	0.06	0.48	0.54	1.26	1.47	2.26*
Inverted Hammer	44	0.34	-0.08	0.16	-0.55	-0.64	-0.22	0.27	-0.42	-1.45	-1.91	-1.76	-2.29	-1.91	-2.09	-2.27
Last Engulfing Bottom	146	-0.56	-0.60	-0.72	-0.28	-0.74	-0.47	-0.66	-0.62	0.53	0.37	0.09	0.16	-0.15	0.59	0.50
Meeting Lines+	17	0.67	0.55	1.01	1.16	0.95	0.58	0.73	0.91	-0.33	0.12	-0.14	0.46	0.62	-0.14	0.02
Morning Doji Star	5	0.87	1.10	1.03	1.66	3.50	3.14	3.03	2.65	0.90	0.65	0.77	0.24	0.17	-1.34	-0.98
Piercing	67	0.08	0.72	0.56	-0.08	0.53	1.21	0.97	0.51	-0.33	-0.37	0.91	-0.15	0.44	0.09	-0.30
Three Inside Up	201	-0.09	-0.06	-0.27	-0.13	0.17	0.36	0.61	0.77	0.78	0.95	0.92	1.27	0.78	0.71	0.84
Three Outside Up	192	0.48*	1.17***	0.63*	0.82*	0.92*	0.84	1.32**	0.98*	1.24**	1.16**	1.07*	0.98	0.48	0.66	0.15
Three White Soldiers	30	0.45	0.04	-0.32	-0.20	-0.46	0.27	0.33	-0.83	-0.74	-0.79	-0.65	-0.08	-0.16	-0.74	-0.10
Tri Star+	5	-0.28	-1.55*	-0.99	-1.17*	0.60	3.72	5.16**	6.97*	7.30**	5.88*	3.62	3.30	4.13	2.19	2.19
Tweezers Bottom	2008	0.19***	0.10	0.18	0.15	0.17	0.19	0.10	0.10	0.15	0.21	0.32	0.20	0.24	0.11	0.13

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.20: Average returns of bearish continuation patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares from 2000 to 2007

Bearish Continuation Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Downside Tasuki Gap	4	-5.59**	1.74	0.44	3.26	2.11	-2.73	0.70	-0.16	3.20	6.75**	7.45	13.21	14.59*	12.09*	10.99
Falling Window	1268	0.07	0.18	-0.23	-0.45**	-0.78***	-0.40*	-0.60**	-0.60**	-0.58*	-0.69**	-0.57*	-0.11	-0.05	0.32	-0.03
On Neck	19	-0.28	-0.92	-0.11	-0.24	-1.14	-0.12	0.33	-0.29	0.09	0.36	0.06	1.53	2.56	2.55	2.98
Separating Lines-	16	0.32	-0.61	0.07	-0.58	-0.42	-1.16	-2.61*	-3.36*	-2.98	-3.10	-3.80	-3.75	-2.64	-0.73	-1.80
Thrusting	37	-0.50	-0.43	-0.06	-0.99	-0.88	-0.18	-0.49	-1.21	-1.24	-1.59	-2.33*	-2.52*	-1.70	-2.38	-3.14**
Two Black Gapping Candles	153	-0.48	-0.06	-0.07	0.00	-0.17	0.12	-0.06	-0.06	0.02	0.22	0.49	0.92	1.14	0.94	1.31
After downtrend:																
Falling Window	427	-0.25	-0.07	-0.56*	-1.09***	-1.78***	-0.88**	-1.12**	-0.65	-0.26	-0.09	-0.05	0.72	0.76	1.35**	1.26*
On Neck	10	-1.79	-1.80	-0.40	-0.89	-1.28	0.07	1.65	0.52	0.92	1.78	2.16	3.87	6.71	6.40*	7.35*
Separating Lines-	5	0.52	-2.52	-0.46	-1.53	-2.28	-3.55	-5.95	-5.52	-5.15	-6.73	-6.24	-6.50	-3.90	1.26	-1.88
Thrusting	23	-0.20	-0.37	-0.22	-1.53	-2.14	-1.33	-1.79	-2.25	-1.84	-2.17	-3.10*	-3.31*	-2.08	-3.27	-3.58*
Two Black Gapping Candles	84	0.55	0.59	0.05	0.15	-0.01	-0.07	-0.36	-0.51	0.10	0.63	0.79	0.85	1.09	0.65	0.67

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.21: Average returns of bullish continuation patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares from 2000 to 2007

Bullish Continuation Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Rising Window	904	-0.21	-0.44	-0.40	-0.58	-0.62	-0.79*	-1.20**	-1.83***	-2.76***	-3.57***	-3.65***	-4.10***	-4.67***	-5.02***	-5.42***
Separating Lines+	21	0.18	0.88	1.00	0.27	1.27	1.49	0.36	0.81	-0.12	-1.88	-2.65	-2.68	-1.26	-0.76	-0.56
After uptrend:																
Rising Window	214	-0.79**	-1.09*	-0.77	-1.36	-1.79*	-2.44***	-2.98***	-3.81***	-5.72***	-7.65***	-7.92***	-8.91***	-9.88***	-9.64***	-9.41***
Separating Lines+	14	0.75	1.51*	1.24	0.46	1.49	1.56	0.51	0.87	-0.10	-1.09	-1.07	-1.15	0.81	1.78	1.47

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

4.6.2 Average trading volume for out-of-sample test

Table 4.22 shows that prior to trend, bearish signal is shown by Three Inside Down and Three Outside Down patterns but not for after trend whereas Bearish Doji Star pattern only reveals predictive power for the first and second holding days after a prevailing uptrend. Meanwhile, Dark Cloud Cover, Hanging Man, Bearish Harami Cross, Last Engulfing Top, and Bearish Meeting Lines have shown predictive power before and after trend. The negative return rate is generally higher after a prevailing uptrend. When comparing between different holding periods, it is found that the largest negative returns for Hanging Man is recorded after trend on the 15-day holding period at -5.46% while Last Engulfing Top is on 14-day holding period at -5.64% after a prevailing uptrend while the return rate obtained for the 10-day holding period is comparatively lower.

Hanging Man and Last Engulfing Top are deemed to be more effective as compared to other bearish reversal patterns as significant returns are obtained consistently throughout the holding periods both before and after trend from as early as six holding days until fifteen holding days. For instance, Hanging Man has shown predictive power continuously from the seventh until fifteenth holding period after a prevailing uptrend while Last Engulfing Top has also portrayed bearish signals from six until fourteen holding days after a prevailing uptrend. It is also noted from Table 4.22 that the magnitude for bearish signals increases as the number of holding period increases which thus implies that effective holding period for bearish reversal patterns tend to accumulate around 10-day to 15-day holding period.

Based on Table 4.23, Homing Pigeon, Three Outside Up, and Tweezers Bottom only show predictive power prior to trend with highest average returns recorded at 1.85% on 15-day holding period, 22.03% on 5-day holding period and at 1.23% on 6-day holding period respectively. Meanwhile, Bullish Belt Hold, Inverted Hammer, Bullish Meeting Lines, and

Piercing patterns have revealed bullish signals both before and after trend. Bullish Belt Hold pattern is more effective comparing to other bullish reversal patterns as it shows significant positive returns consistently throughout the holding period from four until fifteen holding days after a prevailing downtrend. Prior to trend identification, Bullish Meeting Lines pattern is deemed to be more effective in reflecting bullish signals as compared to other bullish reversal patterns as significant positive returns are achieved throughout the first day until fifteenth day holding period with the highest returns recorded on the 13-day holding period at 4.88%. For Piercing pattern, the largest positive returns is gained during the 11-day holding period both before and after trend at 2.99% and 3.07% respectively.

As shown in Table 4.24, only positive returns is attained significantly by some of the bearish continuation patterns like Falling Window and Two Black Gapping Candles instead of a negative rate which reveal bearish signals.

On the other hand, Rising Window is the only bullish continuation pattern which shows predictive power from two to seven holding days after a prevailing uptrend with the highest returns recorded on 5-day holding period at 1.70% as shown from Table 4.25.

Table 4.22: Average returns of bearish reversal patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares for out-of-sample from 2012 to 2014

Bearish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Belt Hold-	78	0.34	0.65	0.46	-0.44	-0.93	-0.90	-1.76	-1.82	-1.77	-1.89	-1.52	-2.05	-1.44	16.03	-1.67
Dark Cloud Cover	28	-1.13**	-0.47	-0.60	-0.23	0.67	-0.77	-0.50	0.52	0.22	1.18	1.10	1.42	0.67	0.11	0.68
Descending Hawk	24	0.41	0.56	1.09**	0.92	0.63	0.95	2.11**	1.88	1.98*	1.93*	1.79	1.79	1.91	2.25	3.09**
Doji Star-	29	-1.45	-1.43	-1.12	-1.61	-0.61	-0.38	0.24	-0.03	0.43	-0.12	-0.12	-0.27	1.38	1.46	0.95
Engulfing-	390	-0.01	-0.12	-0.21	3.32	-0.36	-0.42	0.59	-0.67	-0.71	-0.67	-0.69	-0.72	-0.67	2.72	-0.65
Hanging Man	177	-0.33*	-0.29	-0.58	-0.63	-0.97*	-1.07*	-1.68**	-2.05***	-2.47***	-2.41***	-2.60***	-2.98***	-3.05***	-3.17***	-3.22***
Harami-	348	0.08	0.29	3.22	-0.12	-0.42	-0.36	-0.68	-0.44	-0.57	-0.41	-0.69	-0.73	-0.94	-0.85	2.56
Harami Cross-	22	-0.30	-0.24	-0.44	-1.42	-0.66	-0.32	-1.60	-1.24	-2.08	-1.55	-1.59	-2.49	-3.35*	-3.48*	-3.29
Last Engulfing Top	83	0.12	-0.25	-0.58	-0.10	-0.56	-0.49	-0.85	-1.02	-1.13	-1.87*	-2.01**	-2.04*	-2.54*	-2.74**	-3.36**
Meeting Lines-	15	-0.47	-1.60**	-2.99***	-3.15**	-1.79	-1.73	-1.48	-1.85	-1.99	-3.64*	-7.93**	-6.34*	-8.27**	-8.67**	-9.23**
Shooting Star	60	-0.23	-0.31	-0.40	-0.91	-1.26	-1.23	-1.68	-1.33	-0.30	0.20	0.80	1.02	1.72	1.49	1.57
Three Black Crows	24	1.23	-0.79	-0.24	0.59	0.87	1.00	1.17	1.59	-0.48	-1.62	-1.06	-2.66	-3.31	-3.82	-3.87
Three Inside Down	145	-0.15	-0.70**	-0.50	-0.78	-1.12**	-1.52***	-1.42**	-1.06	-1.17*	-1.55**	-1.41*	-1.42*	7.76	-1.86**	-2.29***
Three Outside Down	160	-0.10	-0.21	8.01	-1.32**	-1.74**	-1.22	-1.03	-0.63	-1.08	-1.25	-1.53	-1.46	6.78	-2.33*	-2.40*
Tweezers Top	2578	0.93**	1.38***	0.81**	0.31**	0.80**	0.80*	0.08	1.84**	0.48	0.35	-0.13	-0.07	1.40**	1.56**	0.40

Table 4.22 Continued

Bearish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After uptrend:																
Belt Hold-	44	-0.43	-0.15	0.15	-1.41	-2.38	-2.02	-2.18	-1.79	-1.68	-1.81	-0.84	-2.02	-1.27	30.11	-1.28
Dark Cloud Cover	13	-2.31***	-1.98*	-1.76	-1.51	-1.16	-2.65	-2.57	-0.34	0.63	1.27	2.37	2.28	1.63	0.56	1.11
Descending Hawk	12	0.59	0.55	1.55*	1.19	0.76	1.22*	2.26**	2.45*	2.57*	2.42	2.69	2.56	2.18	2.32	3.99**
Doji Star-	12	-3.30**	-3.33*	-2.28	-1.25	-0.68	-0.34	0.90	0.42	-1.85	-1.58	-0.82	-0.60	1.24	1.80	1.13
Engulfing-	173	0.44	0.17	-0.18	7.97	0.20	-0.02	0.06	-0.42	-0.28	-0.17	-0.08	-0.09	0.41	8.05	0.19
Hanging Man	87	-0.04	-0.02	-0.54	-0.92	-1.50	-1.65	-1.81*	-2.85*	-3.21***	-3.42***	-4.13***	-4.82***	-5.19***	-5.32***	-5.46***
Harami-	162	-0.09	0.45	0.20	0.66	0.36	0.38	0.03	0.32	0.73	0.78	0.14	0.14	-0.02	0.17	7.20
Harami Cross-	9	-0.07	0.21	0.36	-0.45	-0.61	-0.09	-0.15	-0.64	-2.75**	-0.97	-0.60	-0.35	-1.12	-1.68	-0.59
Last Engulfing Top	47	-0.17	-1.04	-1.01	-0.42	-1.17	-1.81*	-1.79*	-2.29*	-2.65*	-3.30**	-3.38**	-3.90**	-5.14***	-5.64***	-6.57
Meeting Lines-	6	-1.54*	-2.05	-3.46***	-5.20**	-3.80*	-2.75	-2.75	-3.26	-2.88	-4.74	-4.72	-3.04	-3.40	-2.80	-3.30
Shooting Star	32	0.33	-0.52	-0.88	-0.86	-1.28	-1.58	-1.90	-1.86	-0.30	-0.35	-0.07	0.25	0.96	1.55	1.23
Three Black Crows	16	2.18	-1.17	-0.63	0.70	1.16	1.16	1.36	1.69	2.45	1.19	1.53	0.15	-0.15	-0.70	-0.60
Three Inside Down	75	0.04	-0.10	-0.09	-0.21	-0.37	-0.81	-0.47	0.34	-0.10	-0.50	-0.29	-0.24	-0.22	-0.54	-0.94
Three Outside Down	67	-0.21	-0.21	20.16	-1.37	-1.31	-0.69	-0.78	0.28	0.04	-0.11	-0.94	-0.38	20.12	-1.51	-1.44
Tweezers Top	816	2.22*	0.34	0.04	-0.01	0.00	-0.29	-0.28	1.27	-0.34	-0.24	-0.27	-0.46	1.05	1.48	-0.46

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.23: Average returns of bullish reversal patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares for out-of-sample from 2012 to 2014

Bullish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Belt Hold+	129	0.41	0.25	0.23	0.64	0.45	0.74	0.85	1.23**	1.24**	1.24**	1.37**	1.41**	1.27*	1.15	1.32*
Doji Star+	77	-0.01	-0.32	5.56	-1.15*	-2.63**	-1.24	-0.62	-0.61	-0.06	-1.01	-0.82	-0.73	-0.50	-0.78	-0.67
Engulfing+	519	-0.06	-0.41*	1.73	-0.57*	-0.83***	4.78*	-0.76**	-0.77**	-0.63	-0.77*	-0.67	0.26	-0.45	-0.39	-0.53
Hammer	163	-0.13	-0.38	-0.31	-0.55	-0.58	-0.49	-0.94	-0.79	-1.29	-1.32*	-1.31	-1.39	-1.30	-1.39	-1.21
Harami+	464	-0.22*	-0.46*	-0.62**	-0.48*	-0.52*	-0.40	0.28	-0.65	4.96*	-0.56	-0.64	0.66	-0.71	-0.54	-0.62
Harami Cross+	65	0.00	-1.00**	-2.00***	-2.72***	-3.23***	-3.36***	-3.38**	-3.64***	-4.78***	-4.44***	-4.03***	-4.02***	-4.43***	-3.72***	-4.24***
Homing Pigeon	52	-0.34	-1.16**	-1.01	-0.60	-1.03	-0.30	-0.57	-0.67	0.00	0.80	0.85	1.18	0.94	1.25	1.85*
Inverted Hammer	36	0.34	0.10	0.52	0.07	1.72	4.50**	3.94**	3.10*	1.74	0.96	1.30	0.54	0.88	0.52	-0.89
Kicking Up	6	-6.73	-4.79	-1.93	-2.11	-2.00	-0.97	1.87	0.81	1.29	1.38	2.08	1.33	2.37	2.40	3.17
Last Engulfing Bottom	67	-0.59**	0.00	0.04	0.23	0.22	0.36	0.15	-1.01	-1.63	-2.11	-1.67	-1.58	-1.11	-1.48	-1.06
Meeting Lines+	22	1.38**	2.00**	2.23**	2.95**	2.57**	3.09***	2.73**	3.07**	3.89***	3.05**	4.31**	4.59**	4.88***	4.42**	4.79**
Piercing	42	-0.07	-0.18	30.39	0.23	0.72	1.13	11.27*	1.43	2.12**	2.24**	2.99***	2.17**	2.01	0.98	1.03
Three Inside Up	129	-0.16	-0.21	0.03	0.19	0.39	-0.43	-0.42	-0.31	-0.42	-0.45	-0.71	-0.94	-0.85	-0.79	-0.63
Three Outside Up	123	-0.52**	-0.93***	-0.69	-1.12**	22.03*	-1.33**	-0.82	-0.42	-0.57	-0.40	2.87	-0.32	-0.38	-0.68	-0.57
Three White Soldiers	15	-0.15	-0.75	0.38	1.13	0.52	0.61	0.96	1.45	0.64	0.40	0.49	0.02	-0.52	-0.60	-0.76
Tri Star+	24	-0.09	0.83*	-0.75	-0.64	-0.56	-1.18	-0.88	0.62	-0.53	1.65	0.37	1.11	2.02	2.75	2.38
Tweezers Bottom	3798	0.20	0.49	0.10	0.33	0.03	1.23**	0.11	0.39	0.35	0.21	0.41	-0.18	-0.40**	0.67	0.00

Table 4.23 Continued

Bullish Reversal Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After downtrend:																
Belt Hold+	77	0.87**	0.90	0.89	1.52**	1.13*	1.40*	1.66**	2.03**	1.82**	2.18**	2.44***	2.70***	2.82***	2.55***	2.78***
Doji Star+	39	0.11	0.04	11.93	-1.39	-0.84	-0.71	0.13	0.26	0.63	-0.21	0.43	-0.21	-0.14	-0.33	0.16
Engulfing+	260	-0.30	-0.44	-0.59*	-0.53	-0.76*	-0.67	-0.62	-0.22	0.15	-0.13	-0.01	-0.04	0.07	0.21	0.18
Hammer	88	-0.19	-0.19	0.13	-0.39	-0.27	-0.13	-0.19	-0.11	-0.89	-0.64	-0.69	-0.57	-0.62	-0.87	-0.42
Harami+	245	-0.17	-0.35	-0.65*	-0.36	-0.40	-0.15	-0.42	-0.37	4.77	-0.19	-0.52	-0.25	-0.44	-0.29	-0.40
Harami Cross+	37	0.31	-0.84	-1.48*	-1.68**	-2.27***	-2.46**	-1.70	-2.23	-3.33*	-2.90	-3.56**	-3.47*	-3.51*	-2.98*	-3.79*
Homing Pigeon	26	-0.38	-1.11*	-1.31	-1.08	-2.18**	-1.70*	-2.13**	-2.11**	-1.01	-0.22	-0.38	-0.20	-0.13	-0.09	0.36
Inverted Hammer	27	0.25	0.14	0.28	-0.89	1.12	3.74*	3.54*	3.43	2.11	0.68	0.93	-0.12	0.16	-0.29	-0.76
Last Engulfing Bottom	38	-0.45	0.16	0.43	0.64	0.43	0.25	0.60	-0.42	-0.75	-1.32	-1.42	-1.73	-1.13	-1.91	-1.42
Meeting Lines+	10	1.06*	1.57	2.40	3.62***	2.71***	2.93**	1.71	1.79	2.77	2.87	3.26	3.21	4.00	2.92	3.61
Piercing	21	-0.20	-0.21	60.28	0.10	0.65	1.75*	21.28	2.56**	3.03***	2.93***	3.07***	2.71**	2.98*	1.65	2.48
Three Inside Up	62	-0.17	-0.46	0.00	-0.11	0.19	-0.90	-0.95	-0.54	-0.67	-1.08	-1.19	-1.18	-1.10	-0.98	-1.00
Three Outside Up	65	-0.43	-0.64	0.05	-0.71	-0.56	-0.78	0.05	0.77	0.74	0.56	0.86	0.94	0.82	0.41	0.38
Three White Soldiers	8	-0.30	-2.07	-2.86**	-2.88**	-3.68**	-4.00**	-2.96**	-3.18**	-4.18**	-4.97***	-4.90**	-5.29**	-5.37**	-5.42***	-5.46***
Tri Star+	8	0.43	0.71	0.34	1.68	2.45	1.76	2.93	4.24	5.36	6.57	6.09	5.12	6.22	6.80	7.01
Tweezers Bottom	1272	-0.35***	0.52	-0.41	0.35	-0.78***	0.25	-0.65***	0.46	0.48	-0.07	-0.38	-0.42	-0.36	0.90	-0.21

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.24: Average returns of bearish continuation patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares for out-of-sample from 2012-2014

Bearish Continuation Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Falling Window	439	0.33*	0.06	-0.26	0.71	-0.03	3.08	0.44	0.37	0.66	0.37	0.51	0.50	3.82**	1.21*	1.37**
On Neck	7	0.21	2.25	0.60	-0.50	-1.52	-1.14	-1.21	-0.70	1.73	2.69	4.01	3.77	2.35	3.30	2.69
Separating Lines-	31	0.20	-0.26	-1.26	-0.63	45.95	45.69	-1.00	-0.56	-0.27	-0.32	-0.26	0.10	0.33	0.52	1.20
Thrusting	17	0.57	0.40	-0.14	-0.02	0.53	0.89	1.35	2.68	3.65	2.97	3.83	3.77	3.89	5.26*	5.06*
Two Black Gapping Candles	60	-0.79	-0.56	-0.98	0.22	0.63	0.55	1.56	2.24	2.19	2.84*	2.82	2.54	2.61	2.49	2.11
After downtrend:																
Falling Window	160	0.97***	1.41***	1.41**	4.47**	2.85***	11.57**	3.57***	3.72***	4.55***	5.04***	5.44***	5.43***	5.73***	6.37***	6.59***
Separating Lines-	9	0.09	0.45	-1.70	-2.02	-1.53	-0.96	-0.71	-1.86	-1.65	-1.20	0.34	0.02	1.81	2.29	2.46
Thrusting	10	0.55	-0.05	0.19	0.46	1.83	1.86	2.82	4.37	6.26	4.89	6.88	6.73	7.42	7.49	7.15
Two Black Gapping Candles	33	-0.35	-0.46	-1.58	-0.55	-0.14	0.23	1.45	1.80	2.25	3.23*	3.96**	3.29**	3.41*	3.66**	3.35**

The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.25: Average returns of bullish continuation patterns before and after trend from 1 to 15 holding days for average trading volume exceeds one million shares for out-of-sample from 2012-2014

Bullish Continuation Patterns	No.	Returns (%)														
		1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Rising Window	496	-0.24	-0.32	-0.40	-0.25	0.11	0.06	0.17	-0.09	-0.59	-0.84	1.88	-1.17*	-1.46**	-2.05***	0.36
Separating Lines+	28	-1.23*	-3.03**	-2.71	-2.46	-3.57*	49.21	-2.10	-1.85	-1.97	-2.36	-3.31**	-4.87**	-4.74**	-4.28**	-4.47**
After uptrend:																
Rising Window	112	0.25	1.08*	1.17*	1.47*	1.70**	1.57*	1.69*	1.47	0.63	0.06	0.05	0.06	-0.83	-1.61	-1.86
Separating Lines+	11	-0.42	-0.36	-0.26	-0.45	-0.22	132.69	0.05	-0.06	-0.24	-2.44	-2.46	-1.62	-1.27	-2.08	-1.63

The shading square represents significant predictive power of candlestick on specific holding day. The respective p-values for skewness adjusted t-test can be referred from Appendix J. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

4.7 Comparing effectiveness of candlesticks

Basically, the effectiveness of candlesticks in predicting the direction of future stock movement is justified based on the comparison between in-sample and out-of-sample test as shown from Table 4.30 to Table 4.34. The impact of trading volume on candlestick charting trading strategy is observed from Table 4.35 to Table 4.38.

4.7.1 In-sample and out-of-sample test

The out-of-sample test acts as a robustness checking for the effectiveness of candlestick charting. Therefore, the predictive power of candlesticks is confirmed explicitly when the results for out-of-sample test are consistent with the in-sample test. Effective holding period indicates the number of holding days for which significant bearish or bullish signals are portrayed by respective candlestick.

4.7.1.1 Effective holding period of candlestick lines

For candlestick lines, only bearish candle lines have shown consistent predictive power in revealing bearish signals which consist of the Black Candle, Short Black Candle, and Long Black Candle as shown from Table 4.26. Negative return rate has been depicted consistently during the 7-day and 12-day to 15-day effective holding period by Black Candle while Short Black Candle has revealed bearish signals effectively on the 8-day to 10-day, 12-day and 14-day holding period. Long Black Candle appears to be more effective in portraying bearish signals for effective holding period of 4-day, 5-day, 7-day, 9-day, and 11-day to 15-day.

4.7.1.2 Effective holding period of reversal patterns

After comparing the bearish reversal patterns between in-sample and out-of-sample test, it is found that only Hanging Man, Last Engulfing Top, Shooting Star, and Three Black Crows have revealed accurate predictive power of bearish signals both before and after a prevailing

uptrend as shown in Table 4.27. The effective holding period for Hanging Man lies between the 12-day to 15-day holding period whereas Last Engulfing Top shows an effective holding period from the 13-day until 15-day holding period. Shooting Star has revealed bearish signals effectively during the 8-day, 9-day, 11-day, 13-day, and 14-day holding period. However, Three Black Crows pattern is only observed to reveal bearishness mostly on the 15-day holding period.

Meanwhile, Bearish Engulfing, Evening Star, Evening Doji Star, Kicking Down, Three Inside Down, and Three Outside Down only show significant bearish signals prior to trend as shown from Table 4.27. Negative return rate is obtained by Evening Star and Kicking Down patterns from both in-sample and out-of-sample test prior to trend but without noticeable effective holding period been identified. Evening Doji Star has emitted bearish signals constantly on a 2-day effective holding period while the effective holding period for Bearish Engulfing appears to occur during the 10-day to 13-day holding period. Besides, Three Inside Down has also revealed significant bearish signals with effective holding period lies on the 10-day, 11-day, 12-day, 14-day, and 15-day holding period while Three Outside Down is recorded with an effective holding period of 13-day and 15-day.

On the other hand, the predictive power of Dark Cloud Cover and Bearish Meeting Lines as bearish reversal patterns are confirmed only after a prevailing uptrend based on Table 4.27. Dark Cloud Cover has effectively portrayed bearish signals follow by a prevailing uptrend but without any obvious pattern of effective holding period between in-sample and out-of-sample whereas the effective holding period for Bearish Meeting Lines appears to occur on the 12-day and 14-day holding period consistently.

As for bullish reversal patterns, none of them signify consistent predictive power between the in-sample and out-of-sample test. Instead, the bullish reversal patterns only reveal

bullish signals with significant positive return rate for the out-of-sample test as shown in Table 4.28.

4.7.1.3 Effective holding period of continuation patterns

The same result is obtained for bearish continuation patterns whereby none of their predictive power which is found to exist in the in-sample are consistent with the out-of-sample test. Based on Table 4.29, Falling Window, In Neck, On Neck, Bearish Side-by-Side White Lines, and Two Black Gapping Candles only manage to portray bearish signals prior to trend throughout the in-sample test but such result is not supported by out-of-sample test.

Limited number of bullish continuation patterns are found to be significant in revealing bullish signals but not for both in-sample and out-of-sample test as shown in Table 4.30. Bullish Side-by-Side White Lines only show positive return rate for in-sample prior to trend while Bullish Separating Lines pattern only indicates bullish signals after identification of prevailing uptrend in out-of-sample test.

Table 4.26: Effective holding period of candlestick lines between in-sample and out-of-sample

Candlestick lines	In-sample (2000-2011)		Out-of-sample (2012-2014)	
Black Candle	4-day	-1.20 (0.0000)***	7-day	-1.13 (0.0000)***
	5-day	-1.39 (0.0000)***	12-day	-1.38 (0.0000)***
	6-day	-1.47 (0.0000)***	13-day	-1.33 (0.0005)***
	7-day	-1.61 (0.0000)***	14-day	-1.52 (0.0000)***
	8-day	-1.68 (0.0000)***	15-day	-1.62 (0.0000)***
	9-day	-1.80 (0.0000)***		
	10-day	-1.89 (0.0000)***		
	11-day	-1.96 (0.0000)***		
	12-day	-2.16 (0.0000)***		
	13-day	-1.38 (0.0000)***		
	14-day	-1.43 (0.0000)***		
	15-day	-1.31 (0.0000)***		
Short Black Candle	8-day	-1.08 (0.0000)***	5-day	-1.01 (0.0033)***
	9-day	-1.09 (0.0000)***	6-day	-1.11 (0.0050)***
	10-day	-1.26 (0.0000)***	7-day	-1.33 (0.0022)***
	11-day	-1.37 (0.0000)***	8-day	-1.51 (0.0009)***
	12-day	-1.24 (0.0000)***	9-day	-1.65 (0.0005)***
	13-day	-1.38 (0.0000)***	10-day	-1.78 (0.0004)***
	14-day	-1.43 (0.0000)***	12-day	-2.10 (0.0002)***
	15-day	-1.31 (0.0000)***	14-day	-2.45 (0.0001)***
Long Black Candle	3-day	-1.08 (0.0000)***	4-day	-1.24 (0.0033)***
	4-day	-2.05 (0.0000)***	5-day	-1.16 (0.0174)**
	5-day	-2.01 (0.0000)***	7-day	-1.42 (0.0092)***
	6-day	-1.91 (0.0000)***	9-day	-1.34 (0.0231)**
	7-day	-1.43 (0.0000)***	11-day	-2.01 (0.0027)***
	8-day	-1.68 (0.0000)***	12-day	-2.08 (0.0028)***
	9-day	-1.72 (0.0000)***	13-day	-2.07 (0.0030)***
	10-day	-2.22 (0.0000)***	14-day	-2.22 (0.0012)***
	11-day	-2.46 (0.0000)***	15-day	-2.04 (0.0039)***
	12-day	-2.45 (0.0000)***		
	13-day	-2.36 (0.0000)***		
	14-day	-2.24 (0.0000)***		
	15-day	-2.15 (0.0000)***		
Black Marubozu	1-day	-5.19 (0.0000)***		
	2-day	-5.05 (0.0000)***		
	3-day	-5.05 (0.0000)***		
	4-day	-5.05 (0.0000)***		
	5-day	-5.05 (0.0000)***		
	6-day	-5.05 (0.0000)***		
	7-day	-5.07 (0.0000)***		
	8-day	-5.09 (0.0000)***		
	9-day	-5.11 (0.0000)***		
	10-day	-5.10 (0.0000)***		
	11-day	-5.12 (0.0000)***		
	12-day	-5.14 (0.0000)***		
	13-day	-5.16 (0.0000)***		
	14-day	-5.20 (0.0000)***		
	15-day	-5.21 (0.0000)***		
White Marubozu			11-day	1.03 (0.0000)***
			14-day	1.02 (0.0000)***

The average return rate (%) for each candlestick is presented before the p-values of skewness adjusted t-test which are provided in parentheses. ** Indicates statistical significance at 5% level and *** at 1% level.

Table 4.27: Effective holding period of bearish reversal patterns
between in-sample and out-of-sample

Bearish Reversal Patterns	Before trend				After uptrend				
	In-sample (2000-2011)		Out-of-sample (2012-2014)		In-sample (2000-2011)		Out-of-sample (2012-2014)		
Belt Hold-	4-day	-1.25 (0.0000)***			4-day	-1.34 (0.0000)***			
	5-day	-1.25 (0.0000)***			5-day	-1.14 (0.0010)***			
	6-day	-1.35 (0.0000)***			6-day	-1.09 (0.0046)***			
	7-day	-1.73 (0.0000)***			7-day	-1.32 (0.0009)***			
	8-day	-1.66 (0.0000)***			8-day	-1.27 (0.0023)***			
	9-day	-1.80 (0.0000)***			9-day	-1.48 (0.0005)***			
	10-day	-2.01 (0.0000)***			10-day	-1.66 (0.0001)***			
	11-day	-2.11 (0.0000)***			11-day	-1.79 (0.0000)***			
	12-day	-2.31 (0.0000)***			12-day	-2.01 (0.0000)***			
	13-day	-2.40 (0.0000)***			13-day	-2.14 (0.0000)***			
	14-day	-2.44 (0.0000)***			14-day	-2.28 (0.0000)***			
	15-day	-2.30 (0.0000)***			15-day	-2.22 (0.0000)***			
	Dark Cloud Cover	4-day	-1.35 (0.0003)***			4-day	-1.58 (0.0118)**	1-day	-1.26 (0.0048)***
		7-day	-1.07 (0.0190)**			9-day	-2.50 (0.0062)***	2-day	-1.51 (0.0088)***
		8-day	-1.38 (0.0028)***			10-day	-2.84 (0.0019)***	3-day	-1.43 (0.0768)*
9-day		-2.17 (0.0000)***			11-day	-3.13 (0.0008)***			
10-day		-2.23 (0.0000)***			12-day	-3.80 (0.0000)***			
11-day		-2.59 (0.0000)***			13-day	-3.72 (0.0001)***			
12-day		-3.17 (0.0000)***			14-day	-3.75 (0.0000)***			
13-day		-2.99 (0.0000)***			15-day	-3.81 (0.0001)***			
14-day		-3.01 (0.0000)***							
15-day		-2.84 (0.0000)***							
Descending Hawk		11-day	-1.20 (0.0099)***			6-day	-1.02 (0.0433)**		
		12-day	-1.34 (0.0032)***			8-day	-1.52 (0.0121)**		
		13-day	-1.12 (0.0176)**			9-day	-1.65 (0.0095)***		
		14-day	-1.35 (0.0060)***			10-day	-1.98 (0.0018)***		
		15-day	-1.65 (0.0007)***			11-day	-2.35 (0.0002)***		
					12-day	-2.48 (0.0001)***			
					13-day	-2.32 (0.0005)***			
					14-day	-2.46 (0.0002)***			
					15-day	-2.82 (0.0000)***			
	Doji Star-					9-day	-1.59 (0.0217)**		
					10-day	-1.77 (0.0140)**			
					11-day	-2.07 (0.0039)***			
					12-day	-2.36 (0.0022)***			
					13-day	-2.40 (0.0071)***			
					14-day	-2.43 (0.0085)***			
					15-day	-2.01 (0.0339)**			
Engulfing-		3-day	-1.18 (0.0000)***	10-day	-1.04 (0.0020)***	3-day	-1.15 (0.0000)***		
	4-day	-1.59 (0.0000)***	11-day	-1.08 (0.0013)***	4-day	-1.81 (0.0000)***			
	5-day	-1.47 (0.0000)***	12-day	-1.13 (0.0010)***	5-day	-1.64 (0.0000)***			
	6-day	-1.46 (0.0000)***	13-day	-1.02 (0.0044)***	6-day	-1.50 (0.0000)***			
	7-day	-1.61 (0.0000)***			7-day	-1.76 (0.0000)***			
	8-day	-1.63 (0.0000)***			8-day	-1.90 (0.0000)***			
	9-day	-1.76 (0.0000)***			9-day	-2.09 (0.0000)***			
	10-day	-1.83 (0.0000)***			10-day	-2.19 (0.0000)***			
	11-day	-1.92 (0.0000)***			11-day	-2.35 (0.0000)***			
	12-day	-2.17 (0.0000)***			12-day	-2.56 (0.0000)***			
	13-day	-2.20 (0.0000)***			13-day	-2.44 (0.0000)***			
	14-day	-2.23 (0.0000)***			14-day	-2.49 (0.0000)***			
	15-day	-2.19 (0.0000)***			15-day	-2.54 (0.0000)***			

Table 4.27 Continued

Bearish Reversal Patterns	Before trend				After uptrend			
	In-sample (2000-2011)		Out-of-sample (2012-2014)		In-sample (2000-2011)		Out-of-sample (2012-2014)	
Evening Star	4-day	-1.91 (0.0644)*	10-day	-5.51 (0.0852)*	2-day	-2.25 (0.0006)***		
	5-day	-2.21 (0.0461)**			3-day	-1.56 (0.0785)*		
	6-day	-2.80 (0.0157)**			4-day	-2.46 (0.0166)**		
	7-day	-2.41 (0.0523)*			5-day	-2.65 (0.0218)**		
	11-day	-2.93 (0.0934)*			6-day	-3.01 (0.0238)**		
					7-day	-2.64 (0.0485)**		
					11-day	-3.75 (0.0513)*		
					12-day	-3.83 (0.0914)*		
					13-day	-3.45 (0.0962)*		
					14-day	-3.87 (0.0807)*		
Evening Doji Star					15-day	-4.39 (0.0549)*		
	2-day	-1.72 (0.0293)**	2-day	-1.00 (0.0395)**	2-day	-4.03 (0.0117)**		
			7-day	-3.70 (0.0846)*	3-day	-3.65 (0.0480)**		
			8-day	-3.74 (0.0842)*	4-day	-2.80 (0.0380)**		
			9-day	-4.72 (0.0750)*	5-day	-2.84 (0.0278)**		
Hanging Man			10-day	-4.32 (0.0744)*				
			12-day	-4.22 (0.0879)*				
	12-day	-1.00 (0.0000)***	11-day	-1.06 (0.0041)***	12-day	-1.05 (0.0005)***	9-day	-1.32 (0.0127)**
	13-day	-1.04 (0.0000)***	12-day	-1.27 (0.0008)***	13-day	-1.10 (0.0004)***	10-day	-1.32 (0.0157)**
	14-day	-1.17 (0.0000)***	13-day	-1.21 (0.0026)***	14-day	-1.29 (0.0001)***	11-day	-1.42 (0.0115)**
	15-day	-1.21 (0.0000)***	14-day	-1.32 (0.0013)***	15-day	-1.31 (0.0001)***	12-day	-1.74 (0.0031)***
			15-day	-1.25 (0.0025)***			13-day	-1.76 (0.0045)***
							14-day	-1.86 (0.0038)***
							15-day	-1.70 (0.0090)***
Harami-	9-day	-1.12 (0.0000)***			5-day	-1.05 (0.0000)***		
	10-day	-1.23 (0.0000)***			6-day	-1.14 (0.0000)***		
	11-day	-1.37 (0.0000)***			7-day	-1.32 (0.0000)***		
	12-day	-1.56 (0.0000)***			8-day	-1.48 (0.0000)***		
	13-day	-1.58 (0.0000)***			9-day	-1.55 (0.0000)***		
	14-day	-1.58 (0.0000)***			10-day	-1.78 (0.0000)***		
	15-day	-1.61 (0.0000)***			11-day	-1.93 (0.0000)***		
					12-day	-2.13 (0.0000)***		
					13-day	-2.15 (0.0000)***		
					14-day	-2.04 (0.0000)***		
Harami Cross-					15-day	-2.16 (0.0000)***		
	11-day	-1.05 (0.0691)*						
	12-day	-1.18 (0.0726)*						
	13-day	-1.42 (0.0302)**						
	14-day	-1.71 (0.0102)**						
Kicking Down	15-day	-1.54 (0.0290)**						
	3-day	-2.33 (0.0267)**	7-day	-2.17 (0.0581)*				
	4-day	-1.89 (0.0619)*	9-day	-2.21 (0.0682)*				
	5-day	-2.32 (0.0681)*	10-day	-2.33 (0.0718)*				
	14-day	-1.99 (0.0618)*						
Last Engulfing Top	15-day	-3.54 (0.0013)***						
	10-day	-1.16 (0.0016)***	11-day	-1.18 (0.0908)*	11-day	-1.21 (0.0382)**	13-day	-1.88 (0.0859)*
	11-day	-1.46 (0.0001)***	13-day	-1.30 (0.0891)*	12-day	-1.31 (0.0280)**	14-day	-2.17 (0.0420)**
	12-day	-1.60 (0.0000)***	14-day	-1.57 (0.0420)**	13-day	-1.79 (0.0046)***	15-day	-2.36 (0.0298)**
	13-day	-2.01 (0.0000)***	15-day	-1.94 (0.0157)**	14-day	-1.87 (0.0031)***		
	14-day	-1.95 (0.0000)***			15-day	-1.92 (0.0021)***		
	15-day	-2.01 (0.0000)***						

Table 4.27 Continued

Bearish Reversal Patterns	Before trend				After uptrend			
	In-sample (2000-2011)		Out-of-sample (2012-2014)		In-sample (2000-2011)		Out-of-sample (2012-2014)	
Meeting Lines-			3-day	-1.21 (0.0109)**	12-day	-1.22 (0.0971)*	2-day	-1.56 (0.0107)**
			4-day	-1.06 (0.0836)*	14-day	-1.41 (0.0803)*	3-day	-2.28 (0.0034)***
			5-day	-1.05 (0.0873)*			10-day	-2.85 (0.0248)**
			10-day	-1.46 (0.0426)**			11-day	-3.05 (0.0119)**
			11-day	-2.48 (0.0083)***			12-day	-2.78 (0.0158)**
			12-day	-2.00 (0.0351)**			13-day	-2.97 (0.0202)**
			13-day	-2.02 (0.0610)*			14-day	-3.24 (0.0282)**
			14-day	-2.19 (0.0844)*			15-day	-3.77 (0.0135)**
			15-day	-2.50 (0.0499)**				
Shooting Star	5-day	-1.11 (0.0009)***	8-day	-1.18 (0.0001)***	4-day	-1.02 (0.0310)**	7-day	-1.25 (0.0037)***
	6-day	-1.20 (0.0005)***	9-day	-1.08 (0.0005)***	5-day	-1.55 (0.0016)***	8-day	-1.41 (0.0012)***
	7-day	-1.69 (0.0000)***	11-day	-1.23 (0.0003)***	6-day	-1.51 (0.0024)***	9-day	-1.55 (0.0006)***
	8-day	-1.66 (0.0000)***	13-day	-1.34 (0.0001)***	7-day	-2.18 (0.0000)***	11-day	-1.86 (0.0002)***
	9-day	-1.72 (0.0000)***	14-day	-1.41 (0.0001)***	8-day	-2.45 (0.0000)***	12-day	-1.79 (0.0005)***
	10-day	-2.23 (0.0000)***			9-day	-2.41 (0.0000)***	13-day	-1.89 (0.0004)***
	11-day	-2.59 (0.0000)***			10-day	-3.02 (0.0000)***	14-day	-2.05 (0.0003)***
	12-day	-3.30 (0.0000)***			11-day	-3.49 (0.0000)***		
	13-day	-3.58 (0.0000)***			12-day	-4.62 (0.0000)***		
	14-day	-3.96 (0.0000)***			13-day	-4.60 (0.0000)***		
	15-day	-3.91 (0.0000)***			14-day	-4.62 (0.0000)***		
					15-day	-4.56 (0.0000)***		
Three Black Crows	2-day	-1.20 (0.0116)**	9-day	-2.77 (0.0969)*	2-day	-1.76 (0.0103)**	15-day	-4.05 (0.0653)*
	3-day	-1.70 (0.0032)***	10-day	-3.21 (0.0370)**	4-day	-1.50 (0.0720)*		
	4-day	-1.56 (0.0053)***	12-day	-3.37 (0.0659)*	5-day	-1.80 (0.0425)**		
	5-day	-1.79 (0.0026)***	14-day	-4.40 (0.0197)**				
	6-day	-1.68 (0.0073)***	15-day	-5.02 (0.0042)***				
	7-day	-1.47 (0.0301)**						
	10-day	-1.35 (0.0884)*						
	11-day	-1.62 (0.0580)*						
	12-day	-1.46 (0.0810)*						
	14-day	-1.54 (0.0757)*						
	15-day	-1.85 (0.0302)**						
Three Inside Down	6-day	-1.22 (0.0000)***	10-day	-1.05 (0.0218)**	4-day	-1.06 (0.0001)***		
	7-day	-1.28 (0.0000)***	11-day	-1.17 (0.0124)**	5-day	-1.02 (0.0010)***		
	8-day	-1.32 (0.0000)***	12-day	-1.42 (0.0057)***	6-day	-1.59 (0.0000)***		
	9-day	-1.61 (0.0000)***	14-day	-1.63 (0.0025)***	7-day	-1.74 (0.0000)***		
	10-day	-1.72 (0.0000)***	15-day	-1.80 (0.0011)***	8-day	-1.83 (0.0000)***		
	11-day	-1.97 (0.0000)***			9-day	-2.17 (0.0000)***		
	12-day	-2.09 (0.0000)***			10-day	-2.27 (0.0000)***		
	13-day	-2.26 (0.0000)***			11-day	-2.55 (0.0000)***		
	14-day	-2.42 (0.0000)***			12-day	-2.86 (0.0000)***		
	15-day	-2.23 (0.0000)***			13-day	-2.61 (0.0000)***		
					14-day	-2.91 (0.0000)***		
					15-day	-2.69 (0.0000)***		
Three Outside Down	2-day	-1.17 (0.0000)***	13-day	-5.48 (0.0988)*	2-day	-1.28 (0.0000)***		
	3-day	-1.93 (0.0000)***	15-day	-1.18 (0.0629)*	3-day	-2.37 (0.0000)***		
	4-day	-1.85 (0.0000)***			4-day	-2.06 (0.0000)***		
	5-day	-1.89 (0.0000)***			5-day	-1.97 (0.0000)***		
	6-day	-1.88 (0.0000)***			6-day	-1.96 (0.0000)***		
	7-day	-1.80 (0.0000)***			7-day	-2.01 (0.0000)***		
	8-day	-1.96 (0.0000)***			8-day	-2.08 (0.0000)***		
	9-day	-2.05 (0.0000)***			9-day	-2.20 (0.0000)***		
	10-day	-2.09 (0.0000)***			10-day	-2.45 (0.0000)***		
	11-day	-2.28 (0.0000)***			11-day	-2.53 (0.0000)***		
	12-day	-2.38 (0.0000)***			12-day	-2.53 (0.0000)***		
	13-day	-2.49 (0.0000)***			13-day	-2.63 (0.0000)***		
	14-day	-2.36 (0.0000)***			14-day	-2.40 (0.0000)***		
	15-day	-2.24 (0.0000)***			15-day	-2.21 (0.0000)***		

Table 4.27 Continued

Bearish Reversal Patterns	Before trend		After uptrend	
	In-sample (2000-2011)	Out-of-sample (2012-2014)	In-sample (2000-2011)	Out-of-sample (2012-2014)
Two Crows	2-day	-1.63 (0.0031)***	2-day	-1.78 (0.0237)**
	3-day	-2.25 (0.0388)**	5-day	-3.83 (0.0840)*
	4-day	-2.32 (0.0592)*	6-day	-5.21 (0.0876)*
	5-day	-3.72 (0.0138)**	7-day	-4.37 (0.0894)*
	6-day	-4.69 (0.0208)**		
	7-day	-3.79 (0.0396)**		

The average return rate (%) for each candlestick is presented before the p-values of skewness adjusted t-test which are provided in parentheses. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.28: Effective holding period of bullish reversal patterns between in-sample and out-of-sample

Bullish Reversal Patterns	Before trend		After downtrend	
	In-sample (2000-2011)	Out-of-sample (2012-2014)	In-sample (2000-2011)	Out-of-sample (2012-2014)
Belt Hold+				12-day 1.30 (0.0808)*
Doji Star+		3-day 2.39 (0.0999)*		9-day 1.66 (0.0335)**
		9-day 1.02 (0.0430)**		10-day 1.66 (0.0432)**
		11-day 1.34 (0.0191)**		11-day 2.24 (0.0107)**
		12-day 1.09 (0.0524)*		12-day 1.75 (0.0484)**
		13-day 1.10 (0.0467)**		13-day 1.79 (0.0457)**
		14-day 1.12 (0.0479)**		14-day 1.86 (0.0454)**
		15-day 1.19 (0.0444)**		15-day 1.85 (0.0569)*
Engulfing+		6-day 1.61 (0.0980)*		
Harami+		9-day 2.19 (0.0660)*		9-day 2.42 (0.0951)*
Inverted Hammer		6-day 1.63 (0.0664)*		
		7-day 14.33 (0.0942)*		
Meeting Lines+		9-day 1.00 (0.0879)*		10-day 1.52 (0.0719)*
		10-day 1.51 (0.0166)**		13-day 1.74 (0.0541)*
		11-day 1.77 (0.0069)***		15-day 1.55 (0.0898)*
		12-day 1.86 (0.0088)***		
		13-day 2.05 (0.0031)***		
		14-day 2.24 (0.0022)***		
		15-day 2.31 (0.0033)***		
Morning Star		10-day 2.19 (0.0668)*		6-day 2.46 (0.0290)**
		11-day 3.08 (0.0149)**		7-day 1.69 (0.0677)*
		12-day 4.11 (0.0034)***		10-day 2.69 (0.0573)*
		13-day 3.61 (0.0216)**		11-day 3.52 (0.0184)**
		14-day 3.52 (0.0198)**		12-day 4.71 (0.0055)***
		15-day 3.51 (0.0615)*		13-day 4.28 (0.0214)**
				14-day 4.24 (0.0177)**
Piercing				15-day 4.22 (0.0716)*
		7-day 4.44 (0.0394)**		7-day 7.54 (0.0705)*
		9-day 1.49 (0.0280)**		9-day 1.89 (0.0191)**
		10-day 1.71 (0.0207)**		10-day 1.93 (0.0176)**
		11-day 1.91 (0.0172)**		11-day 2.00 (0.0147)**
		12-day 1.47 (0.0539)*		12-day 1.52 (0.0682)*
		13-day 1.28 (0.0735)*		
Three Outside Up		5-day 8.05 (0.0613)*		8-day 1.05 (0.0463)**
				9-day 1.10 (0.0287)**
				10-day 1.08 (0.0355)**
				11-day 1.13 (0.0401)**
				12-day 1.12 (0.0586)*
Tweezers Bottom				3-day 1.06 (0.0665)*

The average return rate (%) for each candlestick is presented before the p-values of skewness adjusted t-test which are provided in parentheses. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.29: Effective holding period of bearish continuation patterns between in-sample and out-of-sample

Bearish Continuation Patterns	Before trend		After downtrend	
	In-sample (2000-2011)	Out-of-sample (2012-2014)	In-sample (2000-2011)	Out-of-sample (2012-2014)
Falling Window	9-day	-1.00 (0.0000)***	5-day	-1.18 (0.0000)***
	10-day	-1.04 (0.0000)***		
	11-day	-1.04 (0.0000)***		
In Neck	4-day	-3.16 (0.0683)*	5-day	-4.10 (0.0878)*
	5-day	-3.34 (0.0621)*	7-day	-5.52 (0.0755)*
	6-day	-4.05 (0.0452)**	9-day	-6.83 (0.0312)**
	7-day	-4.92 (0.0349)**	10-day	-6.15 (0.0582)*
	8-day	-4.29 (0.0800)*		
	9-day	-5.48 (0.0263)**		
	10-day	-5.50 (0.0322)**		
On Neck	4-day	-1.25 (0.0011)***		12-day -3.45 (0.0791)*
	5-day	-1.24 (0.0012)***		13-day -3.28 (0.0978)*
	6-day	-1.46 (0.0003)***		
	9-day	-1.20 (0.0187)**		
	10-day	-1.33 (0.0126)**		
	11-day	-1.38 (0.0127)**		
	12-day	-1.17 (0.0461)**		
	13-day	-1.20 (0.0596)*		
	14-day	-1.16 (0.0662)*		
	15-day	-1.30 (0.0402)**		
Side-by-Side White Lines-	3-day	-5.50 (0.0817)*		
Two Black Gapping Candles	4-day	-1.05 (0.0000)***		
	5-day	-1.20 (0.0000)***		
	7-day	-1.18 (0.0000)***		
	8-day	-1.24 (0.0000)***		
	9-day	-1.32 (0.0000)***		
	10-day	-1.40 (0.0000)***		
	11-day	-1.28 (0.0000)***		
	12-day	-1.15 (0.0000)***		
	14-day	-1.00 (0.0000)***		
	15-day	-1.00 (0.0000)***		

The average return rate (%) for each candlestick is presented before the p-values of skewness adjusted t-test which are provided in parentheses. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.30: Effective holding period of bullish continuation patterns between in-sample and out-of-sample

Bullish Continuation Patterns	Before trend		After uptrend	
	In-sample (2000-2011)	Out-of-sample (2012-2014)	In-sample (2000-2011)	Out-of-sample (2012-2014)
Side-by-Side White Lines+	2-day	1.51 (0.0406)**		
	6-day	2.07 (0.0962)*		
Separating Lines+			1-day	1.29 (0.0704)*

The average return rate (%) for each candlestick is presented before the p-values of skewness adjusted t-test which are provided in parentheses. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

4.7.2 Sub-sample test on trading volume

Dark Cloud Cover is the only bearish reversal pattern which has portrayed significant bearish signals consistently throughout various sub-sample tests either before or after a prevailing uptrend with effective holding period focuses on 1-day and 2-day. After a prevailing uptrend, the predictive power of bearish reversal patterns which are noticed to exist for sub-sample test with high trading volume on next day include Evening Star, Hanging Man, Last Engulfing Top, Bearish Meeting Lines, Shooting Star, Three Inside Down, Three Outside Down, and Tweezers Top. With that, Hanging Man has revealed bearish signals effectively from 8-day to 15-day holding period while Last Engulfing Top and Bearish Meeting Lines are more effective in portraying bearish signals during the 6-day to 14-day and from 1-day to 3-day holding period respectively as shown from Table 4.31.

Prior to trend, the bearish reversal patterns which have attained significant negative return rate for stocks with high trading volume in both in-sample and out-of-sample comprise of Bearish Harami Cross, Last Engulfing Top, Three Inside Down, and Three Outside Down as shown from Table 4.31. Bearish Harami Cross is more effective in predicting bearish signals during the 13-day and 14-day holding period whereas Three Outside Down shows an effective holding period of 4-day, 5-day, and 14-day. Meanwhile, Last Engulfing Top has portrayed bearishness effectively during the 10-day, 11-day, and 15-day holding period while the effective holding period for Three Inside Down lies on the 10-day to 12-day and also 14-day holding period for sub-samples with average trading volume that exceeds one million unit shares.

Bullish reversal patterns appear to be more effective in emitting predictive signals for stocks with high trading volume. With that, Homing Pigeon, Bullish Meeting Lines, and Three Outside Up are found to be more effective in portraying bullish signals before trend for sample stocks with average trading volume that exceeds one million unit shares. After comparing the

sample stocks with high average trading volume between in-sample and out-of-sample, Table 4.32 indicates that Homing Pigeon is more effective in revealing bullish signals on 15-day holding period while the effective holding period for Bullish Meeting Lines pattern lies on the first day holding period. Three Outside Up has shown effective holding period of 5-day prior to trend in sub-sample tests that consider both average trading volume and also trading volume on next day.

Meanwhile, the predictive power for most of the bullish reversal patterns are shown after identification of prevailing downtrend particularly for sample stocks with trading volume on next day that exceeds one million unit shares which include Bullish Belt Hold, Bullish Doji Star, Inverted Hammer, Bullish Meeting Lines, Morning Star, and Piercing patterns. After a prevailing downtrend, Inverted Hammer is more effective on 6-day to 7-day holding period whereas Bullish Meeting Lines show an effective holding period from 4-day to 6-day while Piercing has effectively portrayed bullish signals from 9-day to 13-day holding period as shown from Table 4.32.

On the other hand, Falling Window is the only bearish continuation patterns that show bearish signals prior to trend for samples with trading volume on next day that exceeds one million unit shares. Table 4.33 shows that significant negative returns are attained effectively by Falling Window prior to trend from 3-day until 13-day holding period.

Nevertheless, none of the bullish continuation patterns have revealed significant predictive power even after considering the trading volume of stocks in the market. Based on Table 4.34, the sub-samples which are retrieved from in-sample only prove the predictive power of Bullish Separating Lines after uptrend while Rising Window is only to reveal bullish signals effectively for sub-samples retrieved from out-of-sample. Inconsistent result between in-sample and out-of-sample does not prove the effectiveness of bullish continuation patterns.

Table 4.31: Effective holding period of bearish reversal patterns between sub-samples

Bearish Reversal Patterns	Before trend				After uptrend			
	Trading volume effect from in-sample (2000-2007)		Trading volume effect from out-of-sample (2012-2014)		Trading volume effect from in-sample (2000-2007)		Trading volume effect from out-of-sample (2012-2014)	
Dark Cloud Cover	2-day	-2.23 (0.0004)***	1-day	-1.13 (0.0329)**	1-day	-1.32 (0.0563)*	1-day	-2.31 (0.0053)***
	3-day	-1.88 (0.0094)***			2-day	-2.69 (0.0135)**	2-day	-1.98 (0.0893)*
	4-day	-2.34 (0.0125)**			3-day	-2.50 (0.0755)*		
	5-day	-2.00 (0.0401)**			4-day	-2.60 (0.0857)*		
	6-day	-1.99 (0.0423)**			15-day	-8.97 (0.0992)*		
	9-day	-4.28 (0.0473)**						
	10-day	-5.21 (0.0128)**						
	11-day	-5.53 (0.0082)***						
	12-day	-5.94 (0.0066)***						
	13-day	-4.89 (0.0379)**						
	14-day	-4.80 (0.0370)**						
	15-day	-5.14 (0.0266)**						
Descending Hawk					5-day	-2.89 (0.0446)**		
					6-day	-2.47 (0.0870)*		
					12-day	-4.35 (0.0295)**		
					13-day	-4.96 (0.0140)**		
					14-day	-5.00 (0.0130)**		
					15-day	-5.39 (0.0097)***		
Doji Star-							1-day	-3.30 (0.0203)**
							2-day	-3.33 (0.0683)*
Engulfing-	4-day	-1.33 (0.0000)***			4-day	-2.20 (0.0000)***		
	5-day	-1.36 (0.0001)***			5-day	-2.49 (0.0000)***		
	6-day	-1.21 (0.0009)***			6-day	-2.22 (0.0002)***		
	7-day	-1.47 (0.0006)***			7-day	-3.03 (0.0000)***		
	8-day	-1.45 (0.0009)***			8-day	-2.94 (0.0000)***		
	9-day	-1.42 (0.0016)***			9-day	-2.94 (0.0000)***		
	10-day	-1.73 (0.0001)***			10-day	-3.57 (0.0000)***		
	11-day	-1.81 (0.0001)***			11-day	-3.76 (0.0000)***		
	12-day	-2.20 (0.0000)***			12-day	-3.95 (0.0000)***		
	13-day	-2.18 (0.0000)***			13-day	-3.69 (0.0000)***		
	14-day	-2.33 (0.0000)***			14-day	-3.83 (0.0000)***		
	15-day	-2.08 (0.0000)***			15-day	-3.59 (0.0000)***		
Evening Star	2-day	-4.38 (0.0847)*						
	4-day	-6.83 (0.0326)**						
	5-day	-4.69 (0.0639)*						
	10-day	-7.85 (0.0789)*						
	11-day	-11.72 (0.0728)*						
Hanging Man			6-day	-1.07 (0.0957)*			7-day	-1.81 (0.0941)*
			7-day	-1.68 (0.0198)**			8-day	-2.85 (0.0194)**
			8-day	-2.05 (0.0089)***			9-day	-3.21 (0.0099)***
			9-day	-2.47 (0.0016)***			10-day	-3.42 (0.0080)***
			10-day	-2.41 (0.0040)***			11-day	-4.13 (0.0028)***
			11-day	-2.60 (0.0032)***			12-day	-4.82 (0.0026)***
			12-day	-2.98 (0.0021)***			13-day	-5.19 (0.0024)***
			13-day	-3.05 (0.0025)***			14-day	-5.32 (0.0027)***
			14-day	-3.17 (0.0020)***			15-day	-5.46 (0.0020)***
			15-day	-3.22 (0.0015)***				
Harami-	7-day	-1.06 (0.0221)**			5-day	-1.42 (0.0327)**		
	8-day	-1.15 (0.0158)**			6-day	-1.59 (0.0291)**		
	9-day	-1.55 (0.0034)***			7-day	-1.81 (0.0224)**		
	10-day	-1.58 (0.0034)***			8-day	-1.81 (0.0277)**		
	11-day	-1.82 (0.0009)***			9-day	-1.97 (0.0135)**		
	12-day	-2.29 (0.0002)***			10-day	-1.94 (0.0141)**		
	13-day	-2.25 (0.0010)***			11-day	-2.18 (0.0087)***		
	14-day	-2.28 (0.0009)***			12-day	-2.50 (0.0035)***		
	15-day	-2.17 (0.0019)***			13-day	-2.52 (0.0048)***		
					14-day	-2.56 (0.0036)***		
					15-day	-2.54 (0.0046)***		

Table 4.31 Continued

Bearish Reversal Patterns	Before trend				After uptrend			
	Trading volume effect from in-sample (2000-2007)		Trading volume effect from out-of-sample (2012-2014)		Trading volume effect from in-sample (2000-2007)		Trading volume effect from out-of-sample (2012-2014)	
Harami Cross-	3-day	-1.19 (0.0826)*	13-day	-3.35 (0.0973)*	8-day	-4.30 (0.0726)*	9-day	-2.75 (0.0392)**
	4-day	-2.89 (0.0315)**	14-day	-3.48 (0.0848)*	9-day	-4.44 (0.0708)*		
	5-day	-3.05 (0.0243)**			10-day	-4.75 (0.0587)*		
	6-day	-3.02 (0.0264)**			11-day	-4.75 (0.0691)*		
	7-day	-3.32 (0.0108)**			12-day	-5.00 (0.0486)**		
	8-day	-3.62 (0.0072)***						
	9-day	-3.66 (0.0066)***						
	10-day	-3.56 (0.0091)***						
	11-day	-3.55 (0.0116)**						
	12-day	-3.50 (0.0125)**						
	13-day	-3.79 (0.0103)**						
	14-day	-3.22 (0.0346)**						
	15-day	-3.28 (0.0422)**						
Last Engulfing Top	10-day	-1.92 (0.0856)*	10-day	-1.87 (0.0563)*			6-day	-1.81 (0.0530)*
	11-day	-1.96 (0.0857)*	11-day	-2.01 (0.0436)**			7-day	-1.79 (0.0853)*
	15-day	-2.05 (0.0875)*	12-day	-2.04 (0.0840)*			8-day	-2.29 (0.0675)*
			13-day	-2.54 (0.0580)*			9-day	-2.65 (0.0670)*
			14-day	-2.74 (0.0451)**			10-day	-3.30 (0.0267)**
			15-day	-3.36 (0.0143)**			11-day	-3.38 (0.0217)**
							12-day	-3.90 (0.0259)**
							13-day	-5.14 (0.0091)***
							14-day	-5.64 (0.0050)***
Meeting Lines-			2-day	-1.60 (0.0119)**			1-day	-1.54 (0.0715)*
			3-day	-2.99 (0.0008)***			3-day	-3.46 (0.0041)***
			4-day	-3.15 (0.0401)**			4-day	-5.20 (0.0153)**
			10-day	-3.64 (0.0683)*			5-day	-3.80 (0.0513)*
			11-day	-7.93 (0.0196)**				
			12-day	-6.34 (0.0553)*				
			13-day	-8.27 (0.0149)**				
			14-day	-8.67 (0.0231)**				
Shooting Star			15-day	-9.23 (0.0188)**	11-day	-3.89 (0.0491)**		
					12-day	-5.61 (0.0126)**		
					13-day	-7.02 (0.0013)***		
					14-day	-7.84 (0.0001)***		
					15-day	-7.12 (0.0003)***		
Three Black Crows	4-day	-1.33 (0.0557)*			3-day	-2.16 (0.0396)**		
					4-day	-2.24 (0.0309)**		
Three Inside Down	10-day	-1.57 (0.0437)**	5-day	-1.12 (0.0251)**	6-day	-2.38 (0.0511)*		
	11-day	-1.93 (0.0139)**	6-day	-1.52 (0.0051)***	8-day	-2.35 (0.0639)*		
	12-day	-1.80 (0.0309)**	7-day	-1.42 (0.0172)**	9-day	-2.47 (0.0451)**		
	14-day	-1.52 (0.0761)*	9-day	-1.17 (0.0778)*	10-day	-2.83 (0.0276)**		
			10-day	-1.55 (0.0392)**	11-day	-3.27 (0.0138)**		
			11-day	-1.41 (0.0619)*	12-day	-3.39 (0.0132)**		
			12-day	-1.42 (0.0651)*	13-day	-2.85 (0.0401)**		
			14-day	-1.86 (0.0290)**	14-day	-3.13 (0.0251)**		
			15-day	-2.29 (0.0096)***	15-day	-2.95 (0.0509)*		

Table 4.31 Continued

Bearish Reversal Patterns	Before trend				After uptrend			
	Trading volume effect from in-sample (2000-2007)		Trading volume effect from out-of-sample (2012-2014)		Trading volume effect from in-sample (2000-2007)		Trading volume effect from out-of-sample (2012-2014)	
Three Outside Down	3-day	-1.31 (0.0009)***	4-day	-1.32 (0.0459)**	3-day	-2.42 (0.0001)***		
	4-day	-1.14 (0.0088)***	5-day	-1.74 (0.0395)**	4-day	-2.28 (0.0003)***		
	5-day	-1.11 (0.0155)**	14-day	-2.33 (0.0550)*	5-day	-1.99 (0.0037)***		
	11-day	-1.39 (0.0238)**	15-day	-2.40 (0.0585)*	6-day	-1.97 (0.0051)***		
	12-day	-1.31 (0.0495)**			7-day	-1.51 (0.0367)**		
	13-day	-1.54 (0.0225)**			8-day	-1.61 (0.0227)**		
	14-day	-1.37 (0.0491)**			9-day	-2.37 (0.0024)***		
					10-day	-2.68 (0.0013)***		
Tweezers Top					11-day	-3.10 (0.0002)***		
					12-day	-2.67 (0.0050)***		
					13-day	-2.69 (0.0040)***		
					14-day	-2.53 (0.0079)***		
					15-day	-2.24 (0.0294)**		
					12-day	-1.02 (0.0080)***		
					13-day	-1.07 (0.0070)***		
					14-day	-1.18 (0.0056)***		
					15-day	-1.14 (0.0091)***		

The average return rate (%) for each candlestick is presented before the p-values of skewness adjusted t-test which are provided in parentheses. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.32: Effective holding period of bullish reversal patterns between sub-samples

Bullish Reversal Patterns	Before trend				After downtrend				
	Trading volume effect from in-sample (2000-2007)		Trading volume effect from out-of-sample (2012-2014)		Trading volume effect from in-sample (2000-2007)		Trading volume effect from out-of-sample (2012-2014)		
Belt Hold+			8-day	1.23 (0.0167)**			4-day	1.52 (0.0268)**	
			9-day	1.24 (0.0276)**			5-day	1.13 (0.0909)*	
			10-day	1.24 (0.0393)**			6-day	1.40 (0.0528)*	
			11-day	1.37 (0.0288)**			7-day	1.66 (0.0396)**	
			12-day	1.41 (0.0414)**			8-day	2.03 (0.0103)**	
			13-day	1.27 (0.0870)*			9-day	1.82 (0.0306)**	
			15-day	1.32 (0.0832)*			10-day	2.18 (0.0166)**	
							11-day	2.44 (0.0044)***	
							12-day	2.70 (0.0021)***	
							13-day	2.82 (0.0020)***	
							14-day	2.55 (0.0050)***	
							15-day	2.78 (0.0027)***	
Harami+					12-day	1.00 (0.0428)**			
					13-day	1.14 (0.0219)**			
Harami Cross+	5-day	1.24 (0.0406)**				11-day	2.40 (0.0555)*		
	6-day	1.42 (0.0268)**				12-day	2.28 (0.0600)*		
	8-day	2.44 (0.0057)***				13-day	3.00 (0.0251)**		
	9-day	1.69 (0.0606)*				14-day	3.26 (0.0250)**		
	11-day	2.08 (0.0346)**				15-day	3.77 (0.0105)**		
	12-day	1.88 (0.0728)*							
	13-day	2.14 (0.0432)**							
	14-day	2.31 (0.0307)**							
	15-day	2.41 (0.0220)**							
Homing Pigeon	13-day	1.61 (0.0963)*	15-day	1.85 (0.0983)*	15-day	2.26 (0.0899)*			
	14-day	1.76 (0.0773)*							
	15-day	2.64 (0.0091)***							
Inverted Hammer			6-day	4.50 (0.0109)**				6-day	3.74 (0.0808)*
			7-day	3.94 (0.0250)**				7-day	3.54 (0.0991)*
			8-day	3.10 (0.0684)*					
Meeting Lines+	1-day	1.10 (0.0286)**	1-day	1.38 (0.0129)**				1-day	1.06 (0.0971)*
			2-day	2.00 (0.0239)**				4-day	3.62 (0.0020)***
			3-day	2.23 (0.0358)**				5-day	2.71 (0.0060)***
			4-day	2.95 (0.0189)**				6-day	2.93 (0.0351)**
			5-day	2.57 (0.0348)**					
			6-day	3.09 (0.0099)***					
			7-day	2.73 (0.0373)**					
			8-day	3.07 (0.0121)**					
			9-day	3.89 (0.0044)***					
			10-day	3.05 (0.0350)**					
			11-day	4.31 (0.0154)**					
			12-day	4.59 (0.0181)**					
			13-day	4.88 (0.0057)***					
			14-day	4.42 (0.0499)**					
			15-day	4.79 (0.0249)**					
Piercing			7-day	11.27 (0.0728)*				6-day	1.75 (0.0747)*
			9-day	2.12 (0.0450)**				8-day	2.56 (0.0189)**
			10-day	2.24 (0.0270)**				9-day	3.03 (0.0017)***
			11-day	2.99 (0.0017)***				10-day	2.93 (0.0013)***
			12-day	2.17 (0.0416)**				11-day	3.07 (0.0025)***
								12-day	2.71 (0.0325)**
								13-day	2.98 (0.0779)*

Table 4.32 Continued

Bullish Reversal Patterns	Before trend				After downtrend			
	Trading volume effect from in-sample (2000-2007)		Trading volume effect from out-of-sample (2012-2014)		Trading volume effect from in-sample (2000-2007)		Trading volume effect from out-of-sample (2012-2014)	
Three Outside Up	2-day	1.03 (0.0000)***	5-day	22.03 (0.0614)*	2-day	1.17 (0.0004)***		
	9-day	1.05 (0.0111)**			7-day	1.32 (0.0166)**		
	10-day	1.26 (0.0052)***			9-day	1.24 (0.0271)**		
	11-day	1.27 (0.0052)***			10-day	1.16 (0.0449)**		
	12-day	1.14 (0.0190)**			11-day	1.07 (0.0764)*		
Tri Star+					7-day	5.16 (0.0294)**		
					8-day	6.97 (0.0783)*		
					9-day	7.30 (0.0223)**		
					10-day	5.88 (0.0975)*		
Tweezers Bottom			6-day	1.23 (0.0425)**				

The average return rate (%) for each candlestick is presented before the p-values of skewness adjusted t-test which are provided in parentheses. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.33: Effective holding period of bearish continuation patterns between sub-samples

Bearish Continuation Patterns	Before trend		After downtrend	
	Trading volume effect from in-sample (2000-2007)	Trading volume effect from out-of-sample (2012-2014)	Trading volume effect from in-sample (2000-2007)	Trading volume effect from out-of-sample (2012-2014)
Downside Tasuki Gap	1-day	-5.59 (0.0403)**		
Falling Window			4-day	-1.09 (0.0045)***
			5-day	-1.78 (0.0001)***
			7-day	-1.12 (0.0217)**
Separating Lines-	7-day	-2.61 (0.0789)*		
	8-day	-3.36 (0.0630)*		
Thrusting	11-day	-2.33 (0.0744)*	11-day	-3.10 (0.0798)*
	12-day	-2.52 (0.0568)*	12-day	-3.31 (0.0715)*
	15-day	-3.14 (0.0418)**	15-day	-3.58 (0.0885)*

The average return rate (%) for each candlestick is presented before the p-values of skewness adjusted t-test which are provided in parentheses. * Indicates statistical significance at 10% level, ** at 5% level, and *** at 1% level.

Table 4.34: Effective holding period of bullish continuation patterns between sub-samples

Bullish Continuation Patterns	Before trend		After uptrend			
	Trading volume effect from in-sample (2000-2007)	Trading volume effect from out-of-sample (2012-2014)	Trading volume effect from in-sample (2000-2007)		Trading volume effect from out-of-sample (2012-2014)	
			2-day	1.51 (0.0884)*	2-day	1.08 (0.0960)*
Separating Lines+					3-day	1.17 (0.0833)*
Rising Window					4-day	1.47 (0.0557)*
					5-day	1.70 (0.0392)**
					6-day	1.57 (0.0725)*
					7-day	1.69 (0.0668)*

The average return rate (%) for each candlestick is presented before the p-values of skewness adjusted t-test which are provided in parentheses. * Indicates statistical significance at 10% level and ** at 5% level.

4.8 Chapter summary

Table 4.35 summarizes the overall result on predictability for all types of candlesticks which are showing consistent predictive power significantly from both in-sample and out-of-sample tests. For candlestick lines, only the black candle lines which comprise of the Black Candle, Short Black Candle, and Long Black Candle have significantly revealed bearish signals throughout the sample period of 2000 to 2014 for both in-sample and out-of-sample.

Meanwhile, for reversal patterns, only bearish reversal patterns are found to be effective in predicting bearish movement of stocks consistently but none of the bullish reversal patterns indicate continuous bullish power. The bearish reversal patterns which have indicated bearish signals prior to trend include the Bearish Engulfing, Evening Star, Evening Doji Star, Hanging Man, Kicking Down, Last Engulfing Top, Shooting Star, Three Black Crows, Three Inside Down and Three Outside Down patterns. After a prevailing trend, only the Dark Cloud Cover, Hanging Man, Last Engulfing Top, Bearish Meeting Lines, Shooting Star, and Three Black Crows patterns are observed to be effective in predicting downtrend or bearishness for future stock movement within the fifteen years sample period from 2000 to 2014.

On the other hand, bullish reversal patterns are only found to be effective in generating bullish signals when taking into account the factor of trading volume. For instance, it is shown that prior to trend identification, Homing Pigeon, Bullish Meeting Lines, and Three Outside Up patterns are found to be effective in predicting bullish movement for sub-samples which consider high trading volume of stocks. It implies that these three bullish reversal patterns are successful in predicting future uptrend for stock movement and such signals allow traders to gain profit from short term investment following the candlestick trading strategy.

Apart from that, bearish reversal patterns of Dark Cloud Cover, Bearish Harami Cross, Last Engulfing Top, Three Inside Down, and Three Outside Down prior to trend are also found

to be effective in portraying bearish signals after considering the effect of trading volume. After prevailing trend, only Dark Cloud Cover and Bearish Harami Cross are found to be effective in forecasting future downtrend for stocks with attribute of high trading volume.

Unfortunately, none of the continuation patterns have shown significant predictive power throughout the in-sample and out-of-sample for the sample period of fifteen years from 2000 to 2014 and also after testing them on sample with high trading volume. Such result implies that continuation patterns for candlestick charting is not suitable to be implemented in the context of Malaysian stock market.

Table 4.35: Table of summary for candlesticks with significant predictive power

Candlestick lines	Reversal patterns				Trading volume effect	
	Before trend:		After prevailing trend:		Before trend:	After prevailing trend:
Black candle 	Hanging Man 	Evening Star 	Hanging Man 		Dark Cloud Cover 	Dark Cloud Cover 
Short black candle 	Shooting Star 	Evening Doji Star 	Shooting Star 		Harami Cross- 	Harami Cross- 
Long black candle 	Engulfing- 	Three Black Crows 	Dark Cloud Cover 		Last Engulfing Top 	
	Last Engulfing Top 	Three Inside Down 	Last Engulfing Top 		Three Inside Down 	
	Kicking Down 	Three Outside Down 	Meeting Lines- 		Three Outside Down 	
			Three Black Crows 		Homing Pigeon 	
					Meeting Lines+ 	
					Three Outside Up 	

After comparing the predictive power of various candlesticks between in-sample and out-of-sample from various holding periods, it is noticed that bearish reversal patterns are more effective in portraying bearish signals than bullish reversal patterns in revealing bullish signals. The investigation on trading volume effect reveals that bullish reversal patterns tend to reveal better predictive power of bullish signals after applying the candlestick trading rules on sample with characteristic of high trading volume even though bullishness is only shown prior to trend identification. However, the predictive power for continuation patterns is not detected in Malaysian stock market even after considering the trading volume factor.

The overall result for predictive power of candlesticks reject the null hypothesis formed in previous chapter which states that the average returns for candlestick trading strategy is equal to zero. In other words, the alternative hypothesis which asserts that the average returns for candlestick trading strategy is significantly different from zero is valid as the predictive power of candlesticks which has been empirically found to exist signifies that investors are capable of predicting the direction of short term price movement in the equity market.

Meanwhile, most of the candlestick patterns are observed to indicate predictive power effectively during the 15-day holding period apart from the 10-day maximum holding period as determined by Nison (1991) and Morris (1995). In the context of Malaysian stock market, the findings from the present study reveal that the overall effective holding period for candlestick patterns typically lie within the 10-day to 15-day holding period with maximum holding period focuses on both the 10-day and also 15-day holding period.

CHAPTER 5

CONCLUSIONS

5.1 Conclusions

This study empirically examines the effectiveness of candlestick trading strategy in Malaysian stock market within the sample period of fifteen years from 2000 to 2014. The overall result for the research shows evidence towards the effectiveness of candlestick charting in predicting price movement for Malaysian stock market. All the research objectives for the study have been achieved through empirical testing. The average return rate of candlesticks is computed for various holding period from 1-day to 15-day holding period. Taking into account the transaction cost of 1%, the significance of predictive ability for candlestick charting is determined with skewness adjusted t-test. All types of candlesticks have been examined in this study which include the basic candlestick lines, reversal patterns, and continuation patterns. Meanwhile, out-of-sample test is utilized as robustness checking to enhance the reliability of the results.

The first specific objective of this study is to examine the predictive ability of candlestick lines in Malaysian stock market. The results show that only basic candlestick lines of Black Candle, Short Black Candle, and Long Black Candle have significantly revealed day trading signals of bearishness after transaction cost. None of the bullish candle lines have shown bullish signals. A Long Black Candle signifies total control of bears in the market while a Short Black Candle is interpreted as a weak bearish signal. However, day trading signal itself is not strong enough to urge any short selling or buying decision as it is still dependable on the location of the candle lines for its possibility to act as a potential reversal or continuation pattern (Nison, 2012; Tam, 2015).

The second specific objective for the study is to investigate the statistical significance of candlestick reversal patterns in predicting future price movement for Malaysian stock market. As a result, the single line reversal patterns of Hanging Man and Shooting Star, two-line reversal pattern of Last Engulfing Top, and also three-line reversal pattern of Three Black Crows are found to be suitable as short selling signals both before and after a prevailing uptrend. More bearish reversal patterns are spotted to be effective in portraying bearish signals before trend identification as compared to after trend. Prior to trend identification, the two-line reversal patterns of Bearish Engulfing and Kicking Down and also three-line reversal patterns of Evening Star, Evening Doji Star, Three Inside Down, and Three Outside Down are found to generate significant bearish signals which indicate future downtrend. Meanwhile, the two-line reversal patterns of Dark Cloud Cover and Bearish Meeting Lines have also reflected bearishness effectively follow by a prevailing uptrend. Nevertheless, none of the bullish reversal patterns have revealed significant bullish signals either prior to or after a prevailing trend. The findings of significant predictive ability for the three-line reversal patterns in this study are consistent with the studies from Caginalp & Laurent (1998), Lu, Chen, and Hsu (2014), and Lu, Huang, and Hsu (2014) which also found that the Evening Star, Three Black Crows, Three Inside Down, and Three Outside Down patterns have good predictive power.

The third objective of the study is to test the statistical significance of continuation patterns in predicting future price movement for Malaysian stock market. Unfortunately, effectiveness of continuation patterns are not shown in this study as only weak predictive power is shown by the Falling Window and In Neck patterns from the in-sample test without any significant confirmation from the out-of-sample test. Therefore, it can be concluded that continuation patterns are not appropriate to be applicable in the context of Malaysian stock market with candlestick trading technique. Such findings may also provide explanation for why

none of the previous research focusing on the continuation patterns for its inability in showing any significant predictive power.

Meanwhile, the fourth objective of the study is to study the effect of trading volume on statistical significance of candlesticks in predicting future price movement for Malaysian stock market. Sample stocks with average trading volume which exceed the minimum of one million unit shares are extracted for sub-sample tests with characteristics of high trading volume. The findings show that bullish reversal patterns are more effective in predicting movement of stocks with attribute of high trading volume. Prior to any trend identification, the two-line reversal patterns of Homing Pigeon and Bullish Meeting Lines, and also three-line reversal pattern of Three Outside Up identified from samples of high trading volume have significantly illustrated bullishness which are suitable to be used as short buying signals. In conjunction with prior studies, Three Outside Up patterns are also observed to be a profitable signal as shown by Caginalp and Laurent (1998) and Lu, Chen, and Hsu (2014). Prior to trend identification, the significant predictive power for two-line reversal pattern of Last Engulfing Top and also three-line reversal patterns of Three Inside Down and Three Outside Down in predicting future downtrend are consistent with the results from prior studies (Caginalp & Laurent, 1998; Lu, Chen & Hsu, 2014; Lu, Huang & Hsu, 2014). On the other hand, Dark Cloud Cover and Bearish Harami Cross which are categorized as two-line reversal patterns have also identified to be effective in predicting future downtrend or bearish movement of stocks both before and after prevailing trend, thus verifying its practicability as short selling signals. With that, Harami pattern has also been noticed to be the best trading rule by Shiu and Lu (2011). Such findings from the current study suggest that trading volume functions significantly to control market movement especially in driving the trend upward as bullish reversal patterns only portray accurate predictive power for sample stocks with high trading volume.

Last but not least, the fifth specific objective for the study is to determine the effective holding period and/or maximum holding period of candlestick charting trading strategy in Malaysian stock market. The effective holding period is determined through the investigation of return rate for candlesticks from various holding period within the range of 1-day to 15-day. The overall result indicates that the effective holding period for candlesticks typically lies within the 10-day to 15-day holding period in the context of Malaysian stock market with the maximum holding period concentrates on the 15-day holding period and also the 10-day maximum holding period as identified by Nison (1991) and Morris (1995). Most of the prior studies have directly examined the profitability of candlesticks for the maximum holding period of ten days (Lu & Chen, 2013; Lu, 2014; Marshall et al., 2006; Marshall et al., 2008). While Goo et al. (2007) discovered that different candlestick require different holding days with bullish candle lines and reversal patterns suitable for long holding period whereas bearish candle lines and reversal patterns appropriate for short holding period, the findings from present study however show that the overall effective holding period for candlestick trading rule in Malaysian stock market typically lies within the tenth to fifteenth holding day.

In overall, the bearish patterns are more effective in predicting bearish movement of stocks than bullish patterns in forecasting bullish movement as less bullish patterns are identified to be effective in predicting future price movement. Such findings may result from immaturity of Malaysian financial system which triggers the phenomenon of market delays in the stock market. Market rest time with less volatile price movement often causes difficulty for investors to identify obvious market trend when devising market timing. Despite that, the overall result of the study is consistent with prior studies by Caginalp and Laurent (1998), Shiu and Lu (2011), Lu (2014), and Zhu et al. (2016) which also prove the effectiveness of candlestick charting in emitting useful and profitable trading signals.

In conclusion, significant predictive power of candlesticks are detected from the present study even though only certain type of candlesticks are found to be effective in predicting future price movement. These findings thus refute the assertion that Malaysian stock market are in weak form efficiency suggesting that technical trading rules typically candlestick charting can be exploited to gain abnormal returns.

5.2 Implications of the study

The findings of this research have a number of theoretical and practical implications which are important to both scholars and practitioners, especially in the field of finance. The implications are further discussed in the following section.

5.2.1 Theoretical implications

From theoretical perspective, the study on effectiveness of candlestick charting provides evidence to the theory of technical analysis which thus violates the theory of efficient market hypothesis. The predictive power of candlestick trading strategy which is confirmed to exist in Malaysian stock market thus repudiates the efficient market hypothesis particularly the weak form market efficiency. As weak form efficient market hypothesis states the impossibility to attain excess returns from historical prices, the findings of this study however provide proof on the ability of candlestick charting technique to predict future price movement.

5.2.2 Practical implications

From practical perspective, the study on efficacy of candlestick charting provides an overview on the psychology of investors in Malaysian stock market after applying candlestick trading strategy. The empirical findings on the effectiveness of candlestick trading strategy provides guide to traders in market timing through understanding on the specific candlestick patterns which portray accurate trading signals especially for the bullish reversal patterns which

shall generate profits for traders from a buy-and-hold perspective. Apart from maximizing profit, candlestick patterns also function to alert traders on future downtrend especially through bearish reversal patterns which reveal a trend reversal to bearish signals so as to minimize the loss from investment. Meanwhile, investors of Malaysian stock market can trade stock based the effective holding period of 10 to 15 days which are discovered to be most effective in portraying useful predictive power from this research.

5.3 Limitations of the study

One of the limitations for the current study is related to its sample data which focuses only on stock market in Malaysia. In fact, candlestick charting is not only restricted to the application of stock trading, but can also be used for other securities like futures contracts, bond, indexes and forex trading. Besides, the present study which focuses in Malaysia market causes the investigation on effectiveness of candlestick charting technique to be limited to only a single country while the results from other Asian countries may not support the findings according to varies financial system.

Meanwhile, the limitations of the study in terms of moving average rule for defining prior trends may be considered as different types of trend definitions may lead to different results. While the current study employs the three-day simple moving average to identify the prevailing trends, the exponential moving average which places more weight to recent prices can also be utilized to reduce the lag which in case might produce different result.

Moreover, the current study only limited to sample stocks with high trading volume to observe the volume effect. However, the sample stocks can be further divided into subgroups based on the characteristics like firm size and P/E ratio to determine whether stocks with specific characteristics tend to portray better prediction.

5.4 Recommendations for future research

As candlestick charting can both be used as a stand-alone technique or in combination with other technical analysis methods, it is suggested that future research may examine candlestick patterns in conjunction with other technical indicators such as the Relative Strength Index (RSI) or Fibonacci Sequences.

Another suggestion for future research is to consider the relative height of the upper or lower shadows and also the size of real body as these are regarded as one of the causes for the effectiveness of candlestick approach. Besides, the support or resistance level can be taken into account when investigating on the effectiveness of candlestick charting in the securities market.

Furthermore, it is also recommended to combine technical analysis with fundamental analysis in future research for a better and comprehensive research in order to investigate the most effective trading rule which minimizes the loss while maximizing profit gained in the securities market.

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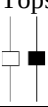
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APPENDICES

APPENDIX A: Candlestick Definitions

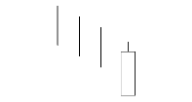
Candlestick Lines

Candlestick Line	Characteristics/Formation/Requirement	Signal
Black Candle 	A one day trading signal with a normal size black real body with opening price higher than closing price. ($O > C$)	Bullish
Short Black Candle 	A one day trading signal with a short and black real body with opening price higher than closing price. ($O > C$)	Bearish (weak selling pressure)
Long Black Candle 	A one day trading signal with a long and black real body with opening price higher than closing price. ($O > C$)	Bearish (strong selling pressure)
White Candle 	A one day trading signal with a normal size white real body with closing price higher than opening price. ($C > O$)	Bearish
Short White Candle 	A one day trading signal with a short and white real body with closing price higher than opening price. ($C > O$)	Bullish (weak buying pressure)
Long White Candle 	A one day trading signal with a long and white real body with closing price higher than opening price. ($C > O$)	Bullish (strong buying pressure)
Black Marubozu 	- A one day trading signal which has a black and long real body, but with no upper or lower shadows. - The opening price equals to the high of the day, and the closing price equals to the low of the day. ($H=O > C=L$)	Extreme bearishness
Opening Black Marubozu 	- A bearish candlestick with the opening price equals to the high of the day. ($H=O > C>L$) - A one day trading signal which has a black and long real body, but without an upper shadow. - It implies extreme bearishness (weak bearish line).	Bearish
Closing Black Marubozu 	- A one day trading signal which has a black and long real body, but without a lower shadow. - The closing price equals to the low of the day. ($H>O> C=L$)	Bearish
White Marubozu 	- A one day trading signal which has a white and long real body, but with no upper or lower shadows. - The closing price equals to the high of the day, and the opening price equals to the low of the day. ($H=C > O=L$)	Extreme bullishness
Opening White Marubozu 	- A one day trading signal which has a white and long real body, but without a lower shadow. - The opening price equals to the low of the day. ($H>C > O=L$)	Bullish

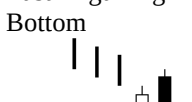
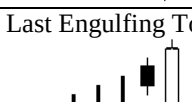
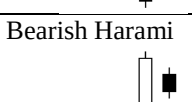
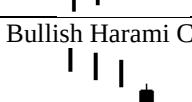
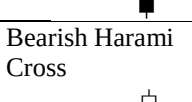
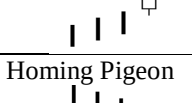
Closing White Marubozu 	- A one day trading signal which has a white and long real body, but without an upper shadow. - The closing price equals to the high of the day. ($H=C > O > L$)	Bullish
Doji 	- The opening price is equal to or very close to the closing price. ($H > O=C > L$) - The length of the body is null or near to null.	Indecision
Long-Legged Doji 	- The opening price is equal to or very close to the closing price. ($H > O=C > L$) - The length of the body is null or near to null, but with long upper and lower shadows.	Indecision
Gravestone Doji 	- The opening price is equal to the closing price, and is at or very near to the low of the day. ($H > O=C=L$) - The length of the real body is null and only have upper shadow.	Indecision/ Bearish at top of uptrend
Dragonfly Doji 	- The opening price is equal to the closing price, and is at or very near to the high of the day. ($H=O=C > L$) - The length of the real body is null and only have lower shadow.	Indecision/ Bullish at bottom of downtrend
Four-Price Doji 	- All the four price levels are equal, whereby the open, high, low, and close are the same. ($H=O=C=L$) - A rare candlestick line with zero length of real body and without upper and lower shadows.	Indecision/ Total uncertainty
Spinning Tops 	- It has a small body with upper and lower shadows longer than the length of the real body. - The color of the real body and the actual length of the shadows is not important.	Indecision
High Wave 	- A small real body with a very long upper and or lower shadows. - The color of the real body is not important.	Uncertainty

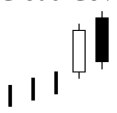
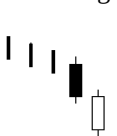
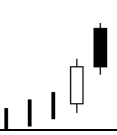
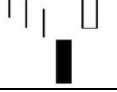
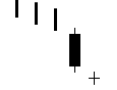
Single Line Reversal Patterns

Reversal Pattern	Trend prior to pattern	Characteristics/Requirement	Signal
Hammer 	Downtrend	- A small white body which closes at or very near to the high of the day and with no upper shadow. - A long lower shadow which is at least twice the length of the real body.	Bullish
Hanging Man 	Uptrend	- A small black body which opens at or very near to the high of the day and with no upper shadow. - A long lower shadow which is at least twice the length of the real body.	Bearish
Inverted Hammer 	Downtrend	- A small white body which opens at or very near to the low of the day and with no lower shadow. - A long upper shadow which is at least twice the length of the real body.	Bullish
Shooting Star 	Uptrend	- A small black body which closes at or very near to the low of the day and with no lower shadow. - A long upper shadow which is at least twice the length of the real body.	Bearish

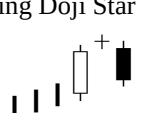
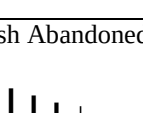
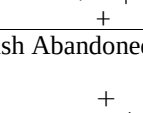
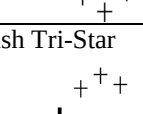
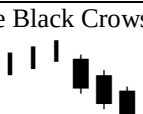
Bullish Belt Hold 	Downtrend	- It consists of a White Opening Marubozu following a prevailing downtrend. - Also known as a White Opening Shaven Bottom.	Bullish
Bearish Belt Hold 	Uptrend	- It consists of a Black Opening Marubozu following a prevailing uptrend. - Also known as a Black Opening Shaven Head.	Bearish

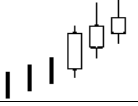
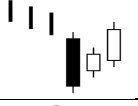
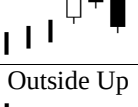
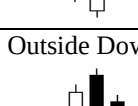
Two-line Reversal Patterns

Reversal Pattern	Trend prior to pattern	Characteristics	Signal
Bullish Engulfing 	Downtrend	- The first day is a small black body. - The second day is a long white candlestick which engulfs the prior day's real body completely.	Bullish (Bottom reversal signal)
Bearish Engulfing 	Uptrend	- The first day is a small white body. - The second day is a long black candlestick which engulfs the prior day's real body completely.	Bearish (Top reversal signal)
Last Engulfing Bottom 	Downtrend	- The first day is a small white body. - The second day is a long black candlestick which engulfs the prior day's real body completely.	Bullish
Last Engulfing Top 	Uptrend	- The first day is a small black body. - The second day is a long white candlestick which engulfs the prior day's real body completely.	Bearish
Bullish Harami 	Downtrend	- The first day is an unusually large black candlestick. - The second day is a small white body which is completely engulfed by the prior day's real body.	Bullish
Bearish Harami 	Uptrend	- The first day is an unusually large white candlestick. - The second day is a small black body which is completely engulfed by the prior day's real body.	Bearish
Bullish Harami Cross 	Downtrend	- The first day is a black candlestick. - The second day is a doji which is completely engulfed by the prior day's black body. - More bullish than a regular Bullish Harami	Bullish
Bearish Harami Cross 	Uptrend	- The first day is a white candlestick. - The second day is a doji which is completely engulfed by the prior day's white body. - More bearish than a regular Bearish Harami.	Bearish
Homing Pigeon 	Downtrend	- The first day is a long black candle. - The second day's black candle is completely engulfed by the first day's black body.	Bullish

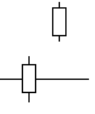
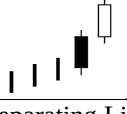
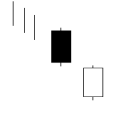
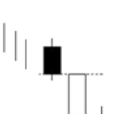
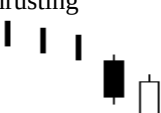
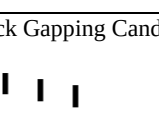
	Uptrend	- The first day is a long white candle. - The second day's white candle is completely engulfed by the first day's white body.	Bearish
	Downtrend	- The first day is a black candlestick. - The second day is a white candlestick which opens with a gap down below the prior candlestick's low. It then closes above the midpoint of the prior day's black body but still within the prior day's real body.	Bullish
	Uptrend	- The first day is a white candlestick. - The second day is a black candlestick which opens above the prior candlestick's high. It then closes below the midpoint of the prior day's white body but still within the prior day's real body.	Bearish
	Downtrend	- The first day is a long black candlestick. - The second day is a long white candlestick with the same close as the previous day's candlestick.	Bullish
	Uptrend	- The first day is a long white candlestick. - The second day is a long black candlestick with the same close as the previous day's candlestick.	Bearish
	Downtrend	- The first day is a black Marubozu. - The second day is a white Marubozu which gaps up above the previous candlestick with a higher open price.	Bullish
	Uptrend	- The first day is a white Marubozu. - The second day is a black Marubozu which gaps down below the previous candlestick with a lower open price.	Bearish
	Downtrend	- The first day is a long black candlestick. - The second day is a doji which gaps down from the previous day's black candlestick.	Bullish
	Uptrend	- The first day is a long white candlestick. - The second day is a doji which gaps up from the previous day's white candlestick.	Bearish
	Downtrend	- The first day is a black candlestick. - The second day can be a Doji, black or white candle with its lowest price equals to the first candle's low.	Bullish
	Uptrend	- The first day is a white candlestick. - The second day can be a Doji, black or white candle with its highest price equals to the first candle's high.	Bearish

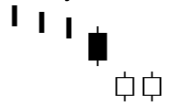
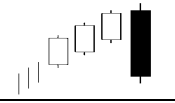
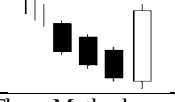
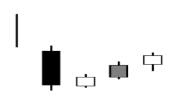
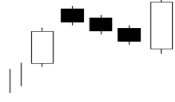
Three-line Reversal Patterns

Reversal Pattern	Trend prior to pattern	Characteristics	Signal
Morning Star 	Downtrend	- The first day is a long black candlestick. - The second day is a small real body, either white or black, which gaps lower to form a star. - The third day is a white candlestick which closes within the first day's black real body.	Bullish
Evening Star 	Uptrend	- The first day is a long white candlestick. - The second day is a small real body, either white or black, which gaps up to form a star. - The third day is a black candlestick which closes within the first day's white real body.	Bearish
Morning Doji Star 	Downtrend	- The first day is a long black candlestick. - The second day is a doji which gaps down to form a doji star. - The third day is a white candlestick which closes within the first day's black real body. - More bullish than a regular Morning Star.	Bullish
Evening Doji Star 	Uptrend	- The first day is a long white candlestick. - The second day is a doji which gaps up to form doji star. - The third day is a black candlestick which closes within the first day's white real body. - More bearish than a regular Evening Star.	Bearish
Bullish Abandoned Baby 	Downtrend	- The first day is a black candlestick. - The second day is a doji whose shadows gap below the lower shadow of the previous candlestick. - The third day is a white candlestick which closes within the first day's black real body.	Bullish
Bearish Abandoned Baby 	Uptrend	- The first day is a white candlestick. - The second day is a doji whose shadows gap above the upper shadow of the previous candlestick. - The third day is a black candlestick which closes within the first day's white real body.	Bearish
Bullish Tri-Star 	Downtrend	- It consists of three consecutive doji. - The doji on the second day gaps below the first and the third doji.	Bullish
Bearish Tri-Star 	Uptrend	- It consists of three consecutive doji. - The doji on the second day gaps above the first and the third doji.	Bearish
Three White Soldiers 	Downtrend	- A group of three long white candlesticks which consecutively close at higher prices. - Each candlestick opens within the previous day's body. - Each candlestick closes at or near the high of the day.	Bullish
Three Black Crows 	Uptrend	- A group of three long black candlesticks which consecutively open at lower prices. - Each candlestick opens within the previous day's body. - Each candlestick closes at or near the low of the day.	Bearish

Advance Block 	Uptrend	- The first day is a white candlestick. - The second and third day are two white candlesticks with each close above the previous day's close and opens within the previous day's body.	Bearish
Deliberation 	Uptrend	- The first day is a white candlestick. - The second day is another white candlestick which closes above the previous day's close and opens within the range of previous day's body. - The third day is a small white candlestick which gaps above the second day's candlestick, and is probably a spinning top or Doji.	Bearish
Upside Gap Two Crows 	Uptrend	- The first day is a long white candlestick. - The second day is a short black candlestick that gaps higher. - The third day is a black candlestick that opens above the second day's open and closes below the second day's close, but still above the first day's close.	Bearish
Two Crows 	Uptrend	- The first day is a long white candlestick. - The second day is a black candlestick which gaps up. - The third day is another black candlestick which opens inside the body of the second day and closes inside the body of the first day.	Bearish
Downside Gap Two Rabbits 	Downtrend	- The first day is a long black candlestick. - The second day is a short white candlestick that gaps lower. - The third day is a white candlestick that opens below the second day's open and closes above the second day's close, but still below the first day's close.	Bullish
Two Rabbits 	Downtrend	- The first day is a long black candlestick. - The second day is a white candlestick which gaps down. - The third day is another white candlestick which opens inside the body of the second day and closes inside the body of the first day.	Bullish
Three Inside Up 	Downtrend	Bullish Harami pattern is followed by a white candlestick on the third day which closes at a higher price for the three days.	Bullish
Three Inside Down 	Uptrend	Bearish Harami pattern is followed by a black candlestick on the third day which closes at a lower price for the three days.	Bearish
Three Outside Up 	Downtrend	Bullish Engulfing pattern is followed by a white candlestick on the third day which closes at a higher price for the three days.	Bullish
Three Outside Down 	Uptrend	Bearish Engulfing pattern is followed by a black candlestick on the third day which closes at a lower price for the three days.	Bearish

Continuation Patterns

Continuation Pattern	Trend prior to pattern	Characteristics	Signal
Rising Window 	Uptrend	- The first and second day can be made up of basic candles of long or short line except for Four-Price Doji. - A gap appears between the first candle's high with the second candle's low.	Bullish
Falling Window 	Downtrend	- The first and second day can be made up of basic candles of long or short line except for Four-Price Doji. - A gap appears between the first candle's low with the second candle's high.	Bearish
Bullish Separating Lines 	Uptrend	- The first day is a black candlestick. - The second day is a white candlestick with the same opening price as previous candlestick and then closes higher.	Bullish
Bearish Separating Lines 	Downtrend	- The first day is a white candlestick. - The second day is a black candlestick with the same opening price as previous candlestick and then closes lower.	Bearish
On Neck 	Downtrend	- The first day is a black candlestick. - The second day is a white candlestick which opens below the low of the previous day and closes at or near the low of the first day's black candlestick.	Bearish
In Neck 	Downtrend	- The first day is a black candlestick. - The second day is a white candlestick which opens below the low of the previous day and closes at or above the low of the first day's black candlestick.	Bearish
Thrusting 	Downtrend	- The first day is a black candlestick. - The second day is a white candlestick which opens at a lower price than the low of the first day and closes within the body of the first day's body, but still below the midpoint of the first day's black candlestick.	Bearish
Two Black Gapping Candles 	Downtrend	- The first day is a black candle with opening price gaps lower from the previous candle. - The second day is also a black candle with opening price below prior candle's opening but higher than its low and with closing price below the prior candle's closing.	Bearish
Upside Tasuki Gap 	Uptrend	- The first day is a white candlestick which represents the prevailing trend. - The second day is another white candlestick which gaps higher from previous white candlestick. - The third day is a black candlestick of about the same size which opens within the previous day's white real body and closes under the previous white body.	Bullish

Downside Tasuki Gap 	Downtrend	- The first day is a black candlestick which represents the prevailing trend. - The second day is another black candlestick which gaps lower from previous black candlestick. - The third day is a white candlestick of about the same size which opens within the previous day's black real body and closes above the previous black body.	Bearish
Bullish Side-by-Side White Lines 	Uptrend	- The first day is a white candle. - It is then followed by two consecutive small white candles of similar size that gap above the first day's white candle.	Bullish
Bearish Side-by-Side White Lines 	Downtrend	- The first day is a long black candle. - It is then followed by two consecutive small white candles of similar size that gap below the first day's black candle.	Bearish
Bullish Three-Line Strike 	Uptrend	- It begins with three consecutive white candles with higher highs. - It then ends up with a long black candle that plunges to a lower low than the first white candle.	Bullish
Bearish Three-Line Strike 	Downtrend	- It begins with three consecutive black candles with lower lows. - It then ends up with a long white candle which rallies above the high of the first black candle.	Bearish
Rising Three Methods 	Uptrend	- A long white candlestick is followed by three small black real bodies which hold within the first day's white real body. - The fifth line is a long white candlestick which closes at a new high for the move.	Bullish
Falling Three Methods 	Downtrend	- A long black candlestick is followed by three small white real bodies which hold within the first day's black real body. - The fifth line is a long black candlestick which opens at a new low for the move.	Bearish
Mat Hold 	Uptrend	- The first day is a long white candlestick. - The second day is a small black real body which gaps higher. - The next two days are two small black candlesticks with lower closes. - The fifth day is a white candlestick with a new high closing price.	Bullish

APPENDIX B:

Company List for Main Sample

1	A & M Realty Berhad [S]
2	Abric Berhad [S]
3	Advance Synergy Berhad
4	Advanced Packaging Technology (M) Bhd [S]
5	Aeon Co. (M) Bhd [S]
6	Affin Holdings Berhad
7	Ahb Holdings Berhad [S]
8	Ahmad Zaki Resources Berhad [S]
9	Ajinomoto (Malaysia) Berhad [S]
10	Ajiya Berhad [S]
11	Al-`Aqar Healthcare Reit [S]
12	Alliance Financial Group Berhad
13	Allianz Malaysia Berhad
14	Aluminium Company Of Malaysia Berhad [S]
15	Amalgamated Industrial Steel Berhad [S]
16	Amcorp Properties Berhad [S]
17	Ammb Holdings Berhad
18	Amtek Holdings Berhad [S]
19	Amtel Holdings Berhad
20	Amway (Malaysia) Holdings Berhad [S]
21	Ancom Logistics Berhad
22	Ann Joo Resources Berhad
23	Anzo Holdings Berhad
24	Apb Resources Berhad [S]
25	Apex Equity Holdings Berhad
26	Apm Automotive Holdings Berhad [S]
27	Apollo Food Holdings Berhad [S]
28	Asia Brands Berhad
29	Asia Knight Berhad
30	Asian Pac Holdings Berhad [S]
31	Astral Asia Berhad [S]
32	Astral Supreme Berhad [S]
33	Atlan Holdings Bhd.
34	Atta Global Group Berhad
35	Awc Berhad [S]
36	Axiata Group Berhad [S]
37	B.I.G. Industries Berhad [S]
38	Batu Kawan Berhad [S]
39	Bcb Berhad
40	Berjaya Assets Berhad

41	Berjaya Corporation Berhad
42	Berjaya Land Berhad
43	Berjaya Sports Toto Berhad
44	Bertam Alliance Berhad [S]
45	Bimb Holdings Berhad [S]
46	Bina Darulaman Berhad [S]
47	Bina Puri Holdings Bhd
48	Bintai Kinden Corporation Berhad
49	Bonia Corporation Berhad [S]
50	Borneo Oil Berhad
51	Boustead Heavy Industries Corporation Bhd [S]
52	Boustead Holdings Berhad
53	Box-Pak (Malaysia) Berhad [S]
54	Brahim's Holdings Berhad [S]
55	Brem Holding Berhad
56	Bright Packaging Industry Berhad
57	British American Tobacco (Malaysia) Berhad
58	Btm Resources Berhad [S]
59	C.I. Holdings Berhad
60	Cahya Mata Sarawak Berhad [S]
61	Carlsberg Brewery Malaysia Berhad
62	Cb Industrial Product Holding Berhad [S]
63	Cck Consolidated Holdings Berhad [S]
64	Central Industrial Corporation Berhad [S]
65	Chee Wah Corporation Berhad [S]
66	Chemical Company Of Malaysia Berhad [S]
67	Chin Teck Plantations Berhad
68	Chin Well Holdings Berhad [S]
69	Choo Bee Metal Industries Bhd [S]
70	Cimb Group Holdings Berhad
71	Cme Group Berhad [S]
72	Cn Asia Corporation Bhd [S]
73	Comfort Gloves Berhad
74	Compugates Holdings Berhad [S]
75	Computer Forms (Malaysia) Berhad [S]
76	Concrete Engineering Products Berhad [S]
77	Country Heights Holdings Bhd
78	Crescendo Corporation Berhad [S]
79	Crest Builder Holdings Berhad [S]
80	Cycle & Carriage Bintang Berhad [S]

81	Dagang Nexchange Berhad [S]
82	Daibochi Plastic And Packaging Industry Berhad [S]
83	Daiman Development Bhd [S]
84	Damansara Realty Bhd [S]
85	Dataprep Holdings Bhd [S]
86	Denko Industrial Corporation Berhad [S]
87	Dialog Group Berhad [S]
88	Dkls Industries Bhd [S]
89	Dksh Holdings (Malaysia) Berhad [S]
90	Dolomite Corporation Berhad
91	Drb-Hicom Berhad [S]
92	Dutaland Berhad [S]
93	Dutch Lady Milk Industries Berhad [S]
94	Eastern & Oriental Berhad [S]
95	Ecm Libra Financial Group Berhad
96	Eco World Development Group Berhad [S]
97	Ecofirst Consolidated Bhd [S]
98	Eden Inc. Berhad [S]
99	Eg Industries Berhad [S]
100	Ekovest Berhad [S]
101	Eksons Corporation Berhad [S]
102	Emico Holdings Berhad [S]
103	Enra Group Berhad [S]
104	Ep Manufacturing Bhd [S]
105	Eupe Corporation Berhad [S]
106	Facb Industries Incorporated Berhad
107	Fajarbaru Builder Group Bhd [S]
108	Far East Holdings Berhad [S]
109	Farlim Group (Malaysia) Bhd [S]
110	Farm's Best Berhad [S]
111	Fcw Holdings Berhad [S]
112	Federal Furniture Holdings (M) Berhad [S]
113	Fiamma Holdings Berhad [S]
114	Fima Corporation Berhad [S]
115	Fitters Diversified Berhad [S]
116	Fraser & Neave Holdings Bhd [S]
117	Fsbm Holdings Berhad [S]
118	Gadang Holdings Bhd [S]
119	Gamuda Berhad [S]
120	Genting Berhad
121	Genting Malaysia Berhad
122	Genting Plantations Berhad [S]
123	George Kent (Malaysia) Berhad

124	Globetronics Technology Berhad [S]
125	Goh Ban Huat Berhad [S]
126	Golden Land Berhad [S]
127	Golden Pharos Berhad [S]
128	Gopeng Berhad [S]
129	Grand Central Enterprises Bhd
130	Grand Hoover Berhad [S]
131	Gromutual Berhad [S]
132	Gsb Group Berhad
133	Guh Holdings Berhad [S]
134	Guinness Anchor Berhad
135	Gunung Capital Berhad [S]
136	Guocoland (Malaysia) Berhad
137	Hap Seng Consolidated Berhad [S]
138	Harbour-Link Group Berhad [S]
139	Harrisons Holdings (Malaysia) Berhad
140	Hexza Corporation Berhad
141	Hil Industries Berhad [S]
142	Ho Hup Construction Company Bhd [S]
143	Hock Seng Lee Berhad [S]
144	Hong Leong Bank Berhad
145	Hong Leong Capital Berhad
146	Hong Leong Financial Group Berhad
147	Hong Leong Industries Berhad
148	Hubline Berhad [S]
149	Hume Industries Berhad [S]
150	Hwa Tai Industries Berhad [S]
151	Hwang Capital (Malaysia) Berhad
152	I-Berhad [S]
153	Ideal United Bintang Berhad [S]
154	Inch Kenneth Kajang Rubber Public Ltd Co [S]
155	Industronics Berhad [S]
156	Innoprise Plantations Berhad [S]
157	Insas Berhad
158	Integrated Logistics Bhd [S]
159	Ioi Corporation Berhad
160	Ipmuda Berhad [S]
161	Ireka Corporation Berhad
162	Iskandar Waterfront City Berhad [S]
163	Jasa Kita Berhad
164	Java Berhad [S]
165	Jaya Tiasa Holdings Bhd [S]
166	Jiankun International Berhad [S]

167	Jkg Land Berhad
168	Jmr Conglomeration Berhad [S]
169	Johan Holdings Berhad
170	K & N Kenanga Holdings Berhad
171	Kaf-Seagroatt & Campbell Berhad
172	Kamdar Group (M) Berhad [S]
173	Karambunai Corp Bhd
174	Keck Seng (Malaysia) Berhad
175	Ken Holdings Berhad [S]
176	Kesm Industries Berhad
177	Khee San Berhad [S]
178	Khind Holdings Berhad [S]
179	Kia Lim Berhad [S]
180	Kian Joo Can Factory Berhad [S]
181	Kim Hin Industry Berhad [S]
182	Kkb Engineering Berhad [S]
183	Kluang Rubber Company (Malaya) Berhad
184	Kobay Technology Berhad [S]
185	Komarkcorp Berhad
186	Konsortium Transnasional Berhad [S]
187	Kossan Rubber Industries Berhad [S]
188	Kps Consortium Berhad [S]
189	Kretam Holdings Berhad [S]
190	Kuala Lumpur Kepong Berhad [S]
191	Kuantan Flour Mills Bhd [S]
192	Kub Malaysia Berhad [S]
193	Kuchai Development Berhad
194	Kulim (Malaysia) Berhad [S]
195	Kumpulan Fima Berhad [S]
196	Kumpulan H & L High-Tech Berhad [S]
197	Kumpulan Jetson Berhad [S]
198	Kumpulan Perangsang Selangor Berhad [S]
199	Kwantas Corporation Berhad [S]
200	Kym Holdings Berhad [S]
201	Lafarge Malaysia Berhad [S]
202	Land & General Berhad [S]
203	Landmarks Berhad
204	Latitude Tree Holdings Berhad [S]
205	Lay Hong Berhad [S]
206	Lbi Capital Berhad [S]
207	Leader Steel Holdings Berhad
208	Lebtech Berhad [S]
209	Lee Swee Kiat Group Berhad [S]

210	Len Cheong Holding Berhad [S]
211	Lien Hoe Corporation Berhad
212	Lingkar Trans Kota Holdings Berhad [S]
213	Lion Corporation Berhad
214	Lion Forest Industries Berhad [S]
215	Lion Industries Corporation Berhad [S]
216	Lpi Capital Bhd
217	Lysaght Galvanized Steel Berhad [S]
218	Maa Group Berhad
219	Magna Prima Berhad [S]
220	Mah Sing Group Berhad [S]
221	Majuperak Holdings Berhad [S]
222	Malayan Banking Berhad
223	Malayan Flour Mills Berhad [S]
224	Malayan United Industries Berhad
225	Malaysia Airports Holdings Berhad
226	Malaysia Building Society Berhad
227	Malaysia Pacific Corporation Berhad
228	Malaysia Packaging Industry Berhad
229	Malaysia Smelting Corporation Berhad
230	Malaysian Pacific Industries Berhad [S]
231	Malaysian Resources Corporation Berhad [S]
232	Malpac Holdings Berhad
233	Malton Berhad [S]
234	Marco Holdings Berhad [S]
235	Master-Pack Group Berhad [S]
236	Mbm Resources Bhd [S]
237	Media Prima Berhad
238	Mega First Corporation Berhad [S]
239	Melewar Industrial Group Berhad
240	Menang Corporation (M) Berhad
241	Mentiga Corporation Berhad [S]
242	Mercury Industries Berhad [S]
243	Merge Energy Bhd [S]
244	Mesb Berhad [S]
245	Mesiniaga Berhad [S]
246	Metrod Holdings Berhad
247	Mieco Chipboard Berhad [S]
248	Milux Corporation Berhad [S]
249	Minho (M) Berhad [S]
250	Mintye Industries Bhd [S]
251	Misc Berhad [S]
252	Mitrajaya Holdings Berhad [S]

253	Mk Land Holdings Berhad [S]
254	Mkh Berhad [S]
255	MI Global Berhad
256	Mmc Corporation Berhad [S]
257	Mnrb Holdings Berhad
258	Mtd Acpi Engineering Berhad [S]
259	Muda Holdings Berhad [S]
260	Muhibbah Engineering (M) Bhd [S]
261	Mui Properties Berhad [S]
262	Mulpha International Berhad
263	Multi-Code Electronics Industries (M) Bhd [S]
264	Multi-Usage Holdings Berhad [S]
265	Mwe Holdings Berhad
266	Mycron Steel Berhad [S]
267	Naim Indah Corporation Berhad [S]
268	Nakamichi Corporation Berhad
269	Nationwide Express Courier Services Berhad [S]
270	Ncb Holdings Berhad [S]
271	Negri Sembilan Oil Palms Berhad [S]
272	Nestle (Malaysia) Berhad [S]
273	New Hoong Fatt Holdings Berhad [S]
274	Nylex (Malaysia) Berhad [S]
275	O&C Resources Berhad
276	Ocb Berhad [S]
277	Olympia Industries Berhad
278	Oriental Holdings Berhad
279	Oriental Interest Berhad [S]
280	Osk Holdings Berhad
281	Osk Ventures International Berhad
282	Pacific & Orient Berhad
283	Pan Malaysia Corporation Berhad
284	Pan Malaysia Holdings Berhad
285	Panasonic Manufacturing Malaysia Berhad
286	Paragon Union Berhad [S]
287	Paramount Corporation Berhad [S]
288	Parkson Holdings Berhad [S]
289	Pasdec Holdings Berhad [S]
290	Pccs Group Berhad [S]
291	Pdz Holdings Bhd [S]
292	Pelikan International Corporation Berhad [S]
293	Pensonic Holdings Berhad
294	Perak Corporation Berhad [S]
295	Permaju Industries Berhad [S]

296	Pesona Metro Holdings Berhad
297	Petaling Tin Berhad [S]
298	Petrol One Resources Berhad
299	Petron Malaysia Refining & Marketing Bhd [S]
300	Petronas Dagangan Bhd [S]
301	Petronas Gas Berhad [S]
302	Pharmaniaga Berhad [S]
303	Pinehill Pacific Berhad [S]
304	Pintaras Jaya Bhd [S]
305	Pj Development Holdings Berhad [S]
306	Plb Engineering Berhad [S]
307	Pls Plantations Berhad [S]
308	Pne Pcb Berhad [S]
309	Poly Glass Fibre (M) Berhad [S]
310	Pos Malaysia Berhad [S]
311	Ppb Group Berhad [S]
312	Premier Nalfin Berhad
313	Press Metal Berhad [S]
314	Prestar Resources Berhad
315	Prinsiptek Corporation Berhad [S]
316	Prolexus Berhad [S]
317	Public Bank Berhad
318	Public Packages Holdings Bhd [S]
319	Puncak Niaga Holdings Berhad
320	Quality Concrete Holdings Berhad [S]
321	Ralco Corporation Berhad [S]
322	Rapid Synergy Berhad
323	Rce Capital Berhad
324	Reliance Pacific Berhad
325	Rex Industry Berhad [S]
326	Rhb Capital Berhad
327	Riverview Rubber Estates Berhad [S]
328	Rubberex Corporation (M) Berhad [S]
329	S P Setia Berhad [S]
330	Sam Engineering & Equipment (M) Berhad [S]
331	Sanbumi Holdings Berhad [S]
332	Sapura Industrial Berhad [S]
333	Sapura Resources Berhad [S]
334	Sarawak Consolidated Industries Berhad [S]
335	Sbc Corporation Berhad [S]
336	Scientex Berhad [S]
337	Scomi Energy Services Bhd [S]
338	Scomi Engineering Bhd

339	Seacera Group Berhad [S]
340	Seal Incorporated Berhad [S]
341	See Hup Consolidated Berhad [S]
342	Seg International Bhd [S]
343	Selangor Dredging Berhad
344	Selangor Properties Berhad
345	Seni Jaya Corporation Berhad
346	Shangri-La Hotels (Malaysia) Berhad
347	Shell Refining Company (Federation Of Malaya) Berhad
348	Shh Resources Holdings Berhad [S]
349	Shl Consolidated Bhd
350	Sime Darby Berhad [S]
351	Sino Hua-An International Berhad [S]
352	Sinotop Holdings Berhad [S]
353	South Malaysia Industries Berhad [S]
354	Southern Acids (M) Berhad [S]
355	Southern Steel Berhad
356	Star Media Group Berhad [S]
357	Suiwah Corporation Berhad [S]
358	Sungei Bagan Rubber Company (Malaya) Berhad
359	Sunsuria Berhad
360	Suria Capital Holdings Berhad [S]
361	Syarikat Takaful Malaysia Berhad [S]
362	Sycal Ventures Berhad [S]
363	Symphony Life Berhad [S]
364	Ta Ann Holdings Berhad [S]
365	Ta Enterprise Berhad
366	Tadmax Resources Berhad
367	Tahps Group Berhad
368	Talam Transform Berhad [S]
369	Taliworks Corporation Berhad [S]
370	Tan Chong Motor Holdings Berhad [S]
371	Tanco Holdings Berhad [S]
372	Tasek Corporation Berhad [S]
373	Tdm Berhad [S]
374	Teck Guan Perdana Berhad [S]
375	Tecnic Group Berhad [S]
376	Tekala Corporation Berhad
377	Telekom Malaysia Berhad [S]
378	Teo Guan Lee Corporation Berhad [S]
379	Texchem Resources Berhad
380	The Store Corporation Berhad [S]

381	Theta Edge Berhad [S]
382	Thong Guan Industries Berhad [S]
383	Thrive Global Berhad
384	Tien Wah Press Holdings Berhad
385	Tiger Synergy Berhad [S]
386	Timberwell Berhad [S]
387	Tiong Nam Logistics Holdings Berhad [S]
388	Tomypak Holdings Berhad [S]
389	Tong Herr Resources Berhad [S]
390	Transocean Holdings Bhd [S]
391	Tropicana Corporation Berhad [S]
392	Tsh Resources Berhad [S]
393	Turiya Berhad [S]
394	Uem Edgenta Berhad [S]
395	Uem Sunrise Berhad [S]
396	Ums Holdings Berhad [S]
397	Umw Holdings Berhad [S]
398	Unisem (M) Berhad [S]
399	United Plantations Berhad [S]
400	Upa Corporation Bhd [S]
401	Utusan Melayu (Malaysia) Berhad [S]
402	Warisan Tc Holdings Berhad [S]
403	Watta Holding Berhad [S]
404	Wct Holdings Berhad [S]
405	White Horse Berhad [S]
406	Widetech (Malaysia) Berhad
407	Wing Tai Malaysia Berhad [S]
408	Wong Engineering Corporation Berhad [S]
409	Woodlandor Holdings Bhd [S]
410	Wtk Holdings Berhad [S]
411	Y&G Corporation Bhd [S]
412	Yee Lee Corporation Bhd [S]
413	Yinson Holdings Berhad
414	Ykgi Holdings Berhad [S]
415	Yli Holdings Berhad [S]
416	Yong Tai Berhad
417	Ytl Corporation Berhad
418	Ytl Power International Bhd
419	Zecon Berhad [S]
420	Zelan Berhad [S]

APPENDIX C:
Company List for Out-of-Sample

1	1 Utopia Berhad [S]
2	Ablegroup Berhad
3	Acme Holdings Berhad [S]
4	Acoustech Berhad [S]
5	Advance Information Marketing Berhad
6	Adventa Berhad [S]
7	Ae Multi Holdings Berhad
8	Aeon Credit Service (M) Berhad
9	Airasia Berhad
10	Alam Maritim Resources Berhad [S]
11	Amanah Harta Tanah Pnb
12	Amanahraya Real Estate Investment Trust
13	Amfirst Real Estate Investment Trust
14	Analabs Resources Berhad [S]
15	Ancom Berhad
16	Apex Healthcare Berhad [S]
17	Apft Berhad [S]
18	Appasia Berhad [S]
19	A-Rank Berhad [S]
20	Ark Resources Berhad [S]
21	Asdion Berhad [S]
22	Asia Bioenergy Technologies Berhad
23	Asia File Corporation Bhd [S]
24	Asia Media Group Berhad [S]
25	Asia Poly Holdings Berhad [S]
26	Asiaep Resources Berhad [S]
27	Asiamet Education Group Berhad [S]
28	Astino Berhad [S]
29	At Systematization Berhad [S]
30	Atrium Real Estate Investment Trust
31	Aturmaju Resources Berhad [S]
32	Axis Real Estate Investment Trust [S]
33	Ays Ventures Berhad [S]
34	Barakah Offshore Petroleum Berhad [S]
35	Benalec Holdings Berhad [S]
36	Berjaya Food Berhad
37	Berjaya Media Berhad
38	Bhs Industries Berhad [S]
39	Bintulu Port Holdings Berhad [S]
40	Bio Osmo Berhad [S]

41	Bld Plantation Bhd. [S]
42	Boon Koon Group Berhad [S]
43	Borneo Aqua Harvest Berhad [S]
44	Bp Plastics Holding Bhd [S]
45	Brite-Tech Berhad
46	Bsl Corporation Berhad [S]
47	Bumi Armada Berhad [S]
48	Bursa Malaysia Berhad
49	Cab Cakaran Corporation Berhad [S]
50	Caely Holdings Bhd [S]
51	Cam Resources Berhad [S]
52	Can-One Berhad [S]
53	Capitamalls Malaysia Trust
54	Careplus Group Berhad [S]
55	Ccm Duopharma Biotech Berhad [S]
56	Censof Holdings Berhad
57	Century Bond Bhd
58	Century Logistics Holdings Berhad [S]
59	Cepatwawasan Group Berhad [S]
60	Cheetah Holdings Berhad [S]
61	China Ouhua Winery Holdings Limited
62	Chuan Huat Resources Bhd
63	Classic Scenic Berhad [S]
64	Cni Holdings Berhad [S]
65	Coastal Contracts Bhd [S]
66	Cocoland Holdings Berhad [S]
67	Comintel Corporation Bhd [S]
68	Complete Logistic Services Berhad [S]
69	Connectcounty Holdings Berhad [S]
70	Country View Berhad [S]
71	Csc Steel Holdings Berhad [S]
72	Cuscapi Berhad [S]
73	Cworks Systems Berhad [S]
74	Cybertowers Berhad [S]
75	Cyl Corporation Berhad [S]
76	Cymao Holdings Berhad [S]
77	Cypark Resources Berhad [S]
78	D&O Green Technologies Berhad [S]
79	D.B.E. Gurney Resources Berhad [S]
80	Daya Materials Berhad [S]

81	Dayang Enterprise Holdings Berhad [S]
82	Degem Berhad [S]
83	Deleum Berhad [S]
84	Destini Berhad [S]
85	Digi.Com Berhad [S]
86	Digistar Corporation Berhad
87	Diversified Gateway Solutions Berhad [S]
88	D'nonce Technology Bhd
89	Dominant Enterprise Berhad [S]
90	Dps Resources Berhad [S]
91	Dufu Technology Corp. Berhad
92	Ea Holdings Berhad [S]
93	Eastland Equity Bhd [S]
94	Ecs Ict Berhad [S]
95	Edaran Berhad [S]
96	Eduspec Holdings Berhad [S]
97	Efficient E-Solutions Berhad [S]
98	Eka Noodles Berhad [S]
99	Ekowood International Berhad [S]
100	Elsoft Research Berhad [S]
101	Emas Kiara Industries Berhad [S]
102	Encorp Berhad
103	Eng Kah Corporation Berhad [S]
104	Engtex Group Berhad
105	Eonmetall Group Berhad [S]
106	Es Ceramics Technology Bhd
107	Esthetics International Group Berhad [S]
108	Euro Holdings Berhad [S]
109	Eurospan Holdings Berhad [S]
110	Evergreen Fibreboard Berhad [S]
111	Eversendai Corporation Berhad [S]
112	Ewein Berhad
113	Excel Force Msc Berhad
114	Favelle Favco Berhad [S]
115	Fibon Berhad
116	Flonic Hi-Tec Bhd
117	Focus Dynamics Group Berhad
118	Focus Point Holdings Berhad
119	Formosa Prosonic Industries Berhad [S]
120	Freight Management Holdings Berhad [S]
121	Frontken Corporation Berhad [S]
122	Fututech Berhad [S]
123	G Neptune Berhad [S]

124	Gd Express Carrier Berhad [S]
125	Genetec Technology Berhad [S]
126	Ge-Shen Corporation Berhad [S]
127	Ghl Systems Berhad [S]
128	Global Oriental Berhad [S]
129	Glomac Berhad [S]
130	Golden Plus Holdings Berhad
131	Goldis Berhad
132	Goodway Integrated Industries Berhad
133	Gpa Holdings Berhad [S]
134	Grand-Flo Berhad [S]
135	Green Ocean Corporation Berhad [S]
136	Green Packet Berhad [S]
137	Greenyard Berhad [S]
138	Guan Chong Berhad
139	Hai-O Enterprise Berhad
140	Halex Holdings Berhad [S]
141	Handal Resources Berhad [S]
142	Hap Seng Plantations Holdings Berhad [S]
143	Harn Len Corporation Bhd [S]
144	Hartalega Holdings Berhad [S]
145	Hb Global Limited
146	Hck Capital Group Berhad [S]
147	Heitech Padu Berhad [S]
148	Hektar Real Estate Investment Trust
149	Heveaboard Berhad [S]
150	Hiap Teck Venture Berhad
151	Hibiscus Petroleum Berhad
152	Ho Wah Genting Berhad
153	Hock Heng Stone Industries Bhd [S]
154	Homeritz Corporation Berhad [S]
155	Hovid Berhad [S]
156	Hua Yang Berhad [S]
157	Huat Lai Resources Berhad
158	Hunza Properties Berhad [S]
159	Hup Seng Industries Berhad [S]
160	Ibraco Berhad [S]
161	Icapital.Biz Berhad
162	Ideal Sun City Holdings Berhad
163	Ifca Msc Berhad [S]
164	Igb Corporation Berhad
165	Ijm Corporation Berhad [S]
166	Ijm Plantations Berhad [S]

167	Imaspro Corporation Berhad [S]
168	Ingenuity Consolidated Berhad [S]
169	Inix Technologies Holdings Berhad [S]
170	Innity Corporation Berhad [S]
171	Instacom Group Berhad [S]
172	Iq Group Holdings Berhad [S]
173	Ire-Tex Corporation Berhad [S]
174	Iris Corporation Berhad
175	Ivory Properties Group Berhad [S]
176	Jadi Imaging Holdings Berhad [S]
177	Jag Berhad [S]
178	Jaks Resources Berhad
179	Jaycorp Berhad [S]
180	Jcy International Berhad [S]
181	Jerasia Capital Berhad [S]
182	Jf Technology Berhad [S]
183	Jhm Consolidation Berhad [S]
184	Jobstreet Corporation Berhad [S]
185	Johore Tin Berhad [S]
186	Karyon Industries Berhad [S]
187	Kawan Food Berhad [S]
188	Kbes Berhad [S]
189	Kein Hing International Berhad [S]
190	Kejuruteraan Samudra Timur Berhad
191	Kelington Group Berhad [S]
192	Key Alliance Group Berhad [S]
193	Key Asic Berhad [S]
194	Kim Loong Resources Berhad [S]
195	Kimlun Corporation Berhad [S]
196	Kinsteel Bhd
197	Klcc Prop&Reits-Stapled Sec [S]
198	Knm Group Berhad [S]
199	Knusford Berhad [S]
200	K-One Technology Berhad [S]
201	Kotra Industries Berhad [S]
202	Kpj Healthcare Berhad [S]
203	Ksl Holdings Berhad [S]
204	K-Star Sports Limited [S]
205	Kumpulan Europlus Berhad
206	Kumpulan Powernet Berhad [S]
207	Lb Aluminium Berhad [S]
208	Lbs Bina Group Berhad [S]
209	Lcth Corporation Berhad

210	Leweko Resources Berhad [S]
211	Lfe Corporation Berhad [S]
212	Lii Hen Industries Bhd. [S]
213	Lion Diversified Holdings Berhad
214	Lng Resources Berhad [S]
215	London Biscuits Berhad [S]
216	Ltkm Berhad [S]
217	Luster Industries Bhd. [S]
218	Luxchem Corporation Berhad
219	M N C Wireless Berhad
220	M3 Technologies (Asia) Berhad [S]
221	Magni-Tech Industries Berhad [S]
222	Magnum Berhad
223	Malaysia Marine And Heavy Engineering Holdings Berhad [S]
224	Malaysia Steel Works (Kl) Bhd [S]
225	Malaysian Bulk Carriers Berhad [S]
226	Managepay Systems Berhad [S]
227	Manulife Holdings Berhad
228	Maxis Berhad [S]
229	Maxwell International Holdings Berhad
230	Mct Berhad [S]
231	Meda Inc. Berhad [S]
232	Media Chinese International Limited [S]
233	Melati Ehsan Holdings Berhad [S]
234	Metronic Global Berhad [S]
235	Mexter Technology Berhad
236	Mhc Plantations Bhd [S]
237	Microlink Solutions Berhad [S]
238	Mikro Msc Berhad [S]
239	Minetech Resources Berhad [S]
240	Mlabs Systems Berhad [S]
241	M-Mode Berhad
242	Mms Ventures Berhad [S]
243	Mq Technology Berhad [S]
244	Mrcb-Quill Reit
245	Msm Malaysia Holdings Berhad [S]
246	Mtouche Technology Berhad
247	Muar Ban Lee Group Berhad
248	Mudajaya Group Berhad [S]
249	Multi Sports Holdings Ltd
250	My E.G. Services Berhad [S]
251	N2n Connect Berhad

252	Naim Holdings Berhad [S]
253	Netx Holdings Berhad [S]
254	Nexgram Holdings Berhad [S]
255	Ni Hsin Resources Berhad [S]
256	Niche Capital Emas Holdings Berhad [S]
257	Notion Vtec Berhad [S]
258	Nova Msc Berhad [S]
259	Npc Resources Berhad [S]
260	Ntpm Holdings Berhad [S]
261	Nwp Holdings Berhad [S]
262	Oceancash Pacific Berhad [S]
263	Oka Corporation Bhd [S]
264	Omesti Berhad [S]
265	Opcom Holdings Berhad [S]
266	Opensys (M) Berhad [S]
267	Oriental Food Industries Holdings Berhad [S]
268	Oriented Media Group Berhad
269	Ornapaper Berhad [S]
270	P.A. Resources Berhad [S]
271	P.I.E. Industrial Berhad [S]
272	Padini Holdings Berhad [S]
273	Palette Multimedia Berhad [S]
274	Panpages Berhad [S]
275	Pansar Berhad [S]
276	Pantech Group Holdings Berhad [S]
277	Paos Holdings Berhad [S]
278	Pavilion Real Estate Investment Trust
279	Pba Holdings Bhd [S]
280	Pelangi Publishing Group Bhd. [S]
281	Pentamaster Corporation Berhad [S]
282	Perdana Petroleum Berhad
283	Perisai Petroleum Teknologi Bhd [S]
284	Perusahaan Sadur Timah Malaysia (Perstima) Bhd [S]
285	Perwaja Holdings Berhad
286	Petra Energy Berhad [S]
287	Petronas Chemicals Group Berhad [S]
288	Pineapple Resources Berhad
289	Pjbumi Berhad [S]
290	Plastrade Technology Berhad [S]
291	Plenitude Berhad
292	Pmb Technology Berhad [S]
293	Poh Huat Resources Holdings Berhad [S]
294	Poh Kong Holdings Berhad [S]

295	Power Root Berhad [S]
296	Prg Holdings Berhad [S]
297	Priceworth International Berhad [S]
298	Privasia Technology Berhad [S]
299	Progressive Impact Corporation Berhad [S]
300	Protasco Berhad [S]
301	Puc Founder (Msc) Berhad [S]
302	Pw Consolidated Bhd [S]
303	Ql Resources Berhad [S]
304	R&A Telecommunication Group Berhad [S]
305	Raya International Berhad [S]
306	Redtone International Berhad [S]
307	Resintech Berhad [S]
308	Rexit Berhad
309	Rgb International Bhd
310	Rimbunan Sawit Berhad [S]
311	Salcon Berhad [S]
312	Samchem Holdings Berhad
313	Sanichi Technology Berhad [S]
314	Sarawak Cable Berhad [S]
315	Sarawak Oil Palms Berhad [S]
316	Sarawak Plantation Berhad [S]
317	Saudee Group Berhad [S]
318	Scan Associates Berhad [S]
319	Scanwolf Corporation Berhad [S]
320	Scc Holdings Berhad
321	Scgm Bhd [S]
322	Scicom (Msc) Berhad [S]
323	Scomi Group Berhad
324	Scope Industries Berhad [S]
325	Sealink International Berhad
326	Seremban Engineering Berhad [S]
327	Sern Kou Resources Berhad [S]
328	Sersol Berhad [S]
329	Shin Yang Shipping Corporation Berhad [S]
330	Sig Gases Berhad [S]
331	Signature International Berhad [S]
332	Silk Holdings Berhad [S]
333	Silver Ridge Holdings Bhd [S]
334	Sin Heng Chan (Malaya) Berhad [S]
335	Skb Shutters Corporation Berhad [S]
336	Skp Resources Bhd [S]
337	Slp Resources Berhad [S]

338	Smis Corporation Berhad [S]
339	Smrt Holdings Berhad [S]
340	Solution Engineering Holdings Berhad [S]
341	Spring Gallery Berhad [S]
342	Spritzer Bhd [S]
343	Stemlife Berhad
344	Stone Master Corporation Berhad [S]
345	Subur Tiasa Holdings Berhad [S]
346	Success Transformer Corporation Berhad [S]
347	Sumatec Resources Berhad [S]
348	Sunway Berhad [S]
349	Sunway Real Estate Investment Trust
350	Sunzen Biotech Berhad
351	Supercomnet Technologies Berhad [S]
352	Superlon Holdings Berhad [S]
353	Supermax Corporation Berhad [S]
354	Sws Capital Berhad [S]
355	Syf Resources Berhad [S]
356	Symphony House Bhd [S]
357	Systech Bhd [S]
358	Ta Global Berhad
359	Ta Win Holdings Berhad
360	Tafi Industries Berhad [S]
361	Tambun Indah Land Berhad [S]
362	Tanjung Offshore Berhad [S]
363	Tas Offshore Berhad [S]
364	Tasco Berhad [S]
365	Tatt Giap Group Berhad
366	Techfast Holdings Berhad [S]
367	Technodex Bhd [S]
368	Tek Seng Holdings Berhad [S]
369	Tenaga Nasional Bhd [S]
370	Teo Seng Capital Berhad [S]
371	Tex Cycle Technology (M) Berhad [S]
372	Tfp Solutions Berhad [S]
373	Th Heavy Engineering Berhad [S]
374	Th Plantations Berhad [S]
375	The Media Shoppe Berhad [S]
376	Three-A Resources Berhad [S]
377	Time Dotcom Berhad [S]
378	Tmc Life Sciences Berhad
379	Tomei Consolidated Berhad [S]
380	Top Glove Corporation Bhd [S]

381	Tower Real Estate Investment Trust
382	Toyo Ink Group Berhad [S]
383	Tpc Plus Berhad
384	Trc Synergy Berhad [S]
385	Triplc Berhad
386	Trive Property Group Berhad
387	Tsr Capital Berhad [S]
388	Turbo-Mech Berhad
389	Uchi Technologies Berhad [S]
390	Ums-Neiken Group Berhad [S]
391	Unimech Group Berhad [S]
392	United Malacca Berhad [S]
393	United U-Li Corporation Berhad [S]
394	Uoa Development Bhd [S]
395	Uoa Real Estate Investment Trust
396	Uzma Berhad [S]
397	V.S. Industry Berhad [S]
398	Versatile Creative Berhad [S]
399	Visdynamics Holdings Berhad [S]
400	Vitrox Corporation Berhad [S]
401	Voir Holdings Berhad [S]
402	Vsolar Group Berhad
403	Wah Seong Corporation Berhad [S]
404	Wang-Zheng Berhad
405	Weida (M) Bhd [S]
406	Wellcall Holdings Berhad [S]
407	Willowglen Msc Berhad
408	Wintoni Group Berhad [S]
409	Wz Satu Berhad [S]
410	Xian Leng Holdings Berhad [S]
411	Xidelang Holdings Ltd [S]
412	Xingquan International Sports Holdings Limited
413	Y.S.P.Southeast Asia Holding Berhad [S]
414	Yen Global Berhad [S]
415	Yfg Berhad [S]
416	Ygl Convergence Berhad [S]
417	Yi-Lai Berhad [S]
418	Yoong Onn Corporation Berhad [S]
419	Ytl E-Solutions Berhad
420	Ytl Hospitality Reit
421	Ytl Land & Development Berhad
422	Zhulian Corporation Berhad [S]

APPENDIX D: Company List by Average Trading Volume for Main Sample

		Average trading volume (unit)
1	Alliance Financial Group Berhad	1,731,415.16
2	AMMB Holdings Berhad	3,576,575.70
3	Asian Pac Holdings Berhad [S]	1,355,589.56
4	Axiata Group Berhad [S]	3,721,169.26
5	Berjaya Corporation Berhad	3,066,140.60
6	Berjaya Sports Toto Berhad	2,067,550.00
7	Borneo Oil Berhad	1,305,669.10
8	CIMB Group Holdings Berhad	3,672,674.33
9	Compugates Holdings Berhad [S]	3,024,907.08
10	Dagang Nexchange Berhad [S]	4,691,720.32
11	Damansara Realty Bhd [S]	1,047,089.70
12	Dialog Group Berhad [S]	5,021,279.11
13	DRB-Hicom Berhad [S]	1,223,501.78
14	Ecm Libra Financial Group Berhad	6,625,109.43
15	Ecofirst Consolidated Bhd [S]	1,749,140.22
16	Eden Inc. Berhad [S]	2,486,369.87
17	Gamuda Berhad [S]	3,511,874.59
18	Genting Berhad	7,536,434.84
19	Genting Malaysia Berhad	7,770,963.67
20	Golden Land Berhad [S]	2,113,886.81
21	GSB Group Berhad	1,183,103.57
22	Hubline Berhad [S]	3,485,138.74
23	IOI Corporation Berhad	9,171,665.40
24	Iskandar Waterfront City Berhad [S]	4,120,539.77
25	JKG Land Berhad	1,107,975.60
26	Karambunai Corp Bhd	5,051,573.34
27	KUB Malaysia Berhad [S]	1,511,662.27
28	Land & General Berhad [S]	5,638,191.29
29	Landmarks Berhad	1,045,564.20
30	Lion Industries Corporation Berhad [S]	1,398,967.61
31	Malayan Banking Berhad	5,512,386.72
32	Malayan United Industries Berhad	1,846,925.54
33	Malaysian Resources Corporation Berhad [S]	5,621,739.36
34	Mk Land Holdings Berhad [S]	1,073,829.60
35	Mulpha International Berhad	1,316,297.61
36	Naim Indah Corporation Berhad [S]	2,420,993.57
37	Per maju Industries Berhad [S]	1,003,593.02
38	Pinehill Pacific Berhad [S]	1,057,913.43
39	Pj Development Holdings Berhad [S]	1,217,461.21
40	Press Metal Berhad [S]	1,325,080.17

41	Public Bank Berhad	1,747,771.71
42	RCE Capital Berhad	1,107,552.31
43	Reliance Pacific Berhad	1,607,588.07
44	RHB Capital Berhad	1,725,790.46
45	S P Setia Berhad [S]	1,632,935.27
46	Sanbumi Holdings Berhad [S]	2,232,881.47
47	SEAL Incorporated Berhad [S]	1,756,030.03
48	SEG International Bhd [S]	1,075,519.15
49	Sime Darby Berhad [S]	2,118,944.03
50	TA Enterprise Berhad	1,514,468.05
51	Talam Transform Berhad [S]	5,206,777.33
52	Tanco Holdings Berhad [S]	1,188,942.35
53	Telekom Malaysia Berhad [S]	5,068,533.69
54	Teo Guan Lee Corporation Berhad [S]	10,027,618.94
55	Uem Edgenta Berhad [S]	1,085,502.26
56	Uem Sunrise Berhad [S]	5,780,862.32
57	Unisem (M) Berhad [S]	1,000,984.32
58	YTL Corporation Berhad	5,787,017.13
59	YTL Power International Bhd	1,566,884.38

APPENDIX E: Company List by Average Trading Volume for Out-of-Sample

		Average trading volume (unit)
1	1 Utopia Berhad [S]	9,655,677.18
2	Airasia Berhad	7,688,609.36
3	Alam Maritim Resources Berhad [S]	3,472,323.21
4	APFT Berhad [S]	1,132,041.15
5	Appasia Berhad [S]	2,185,379.87
6	Asia Bioenergy Technologies Berhad	8,664,501.54
7	Asia Media Group Berhad [S]	3,460,740.56
8	Asiaep Resources Berhad [S]	2,083,226.02
9	Asiamet Education Group Berhad [S]	2,630,620.64
10	At Systematization Berhad [S]	6,027,301.15
11	Barakah Offshore Petroleum Berhad [S]	2,247,546.64
12	Benalec Holdings Berhad [S]	3,690,561.11
13	Bio Osmo Berhad [S]	2,019,710.00
14	Bumi Armada Berhad [S]	5,470,017.05
15	Capitamalls Malaysia Trust	1,118,076.61
16	Censof Holdings Berhad	4,951,942.82
17	China Ouhua Winery Holdings Limited	1,392,583.97
18	Cuscapi Berhad [S]	1,102,291.79
19	Cybertowers Berhad [S]	495,256.92
20	D.B.E. Gurney Resources Berhad [S]	4,937,417.31
21	Daya Materials Berhad [S]	11,262,294.74
22	Dayang Enterprise Holdings Berhad [S]	1,414,899.49
23	Destini Berhad [S]	3,081,028.59
24	Digi.Com Berhad [S]	8,711,984.36
25	Digistar Corporation Berhad	1,897,965.38
26	Diversified Gateway Solutions Berhad [S]	1,498,417.44
27	DPS Resources Berhad [S]	1,533,442.69
28	EA Holdings Berhad [S]	5,948,314.62
29	Eduspec Holdings Berhad [S]	1,150,359.10
30	Efficient E-Solutions Berhad [S]	4,266,656.15
31	Eka Noodles Berhad [S]	1,200,305.00
32	Es Ceramics Technology Bhd	1,565,477.56
33	Euro Holdings Berhad [S]	1,121,911.92
34	Flonic Hi-Tec Bhd	7,090,546.41
35	Focus Dynamics Group Berhad	5,931,429.23
36	Frontken Corporation Berhad [S]	5,634,256.79
37	G Neptune Berhad [S]	4,683,821.03
38	GHL Systems Berhad [S]	2,270,803.85
39	Global Oriental Berhad [S]	2,272,187.05
40	GPA Holdings Berhad [S]	2,806,225.00

41	Green Ocean Corporation Berhad [S]	2,982,750.38
42	Green Packet Berhad [S]	4,608,334.74
43	Heveaboard Berhad [S]	1,457,174.36
44	Hibiscus Petroleum Berhad	1,325,551.68
45	Ho Wah Genting Berhad	3,724,703.85
46	Hovid Berhad [S]	2,606,736.67
47	IFCA Msc Berhad [S]	6,194,482.44
48	IJM Corporation Berhad [S]	2,765,122.44
49	Ingenuity Consolidated Berhad [S]	17,079,634.10
50	Inix Technologies Holdings Berhad [S]	2,134,664.36
51	Instacom Group Berhad [S]	5,508,984.62
52	Iris Corporation Berhad	12,736,431.54
53	Jadi Imaging Holdings Berhad [S]	1,279,426.03
54	JAG Berhad [S]	5,880,238.72
55	JAKS Resources Berhad	2,923,914.23
56	JCY International Berhad [S]	5,915,218.97
57	Karyon Industries Berhad [S]	1,096,914.74
58	Key Alliance Group Berhad [S]	3,284,576.54
59	Kinsteel Bhd	2,624,412.05
60	KNM Group Berhad [S]	12,547,933.72
61	K-One Technology Berhad [S]	1,547,464.74
62	KPJ Healthcare Berhad [S]	1,674,941.03
63	KSL Holdings Berhad [S]	1,442,476.03
64	LB Aluminium Berhad [S]	1,093,165.77
65	LBS Bina Group Berhad [S]	1,401,697.31
66	Luster Industries Bhd. [S]	19,602,125.26
67	M N C Wireless Berhad	2,973,607.05
68	Malaysia Marine And Heavy Engineering Holdings Berhad [S]	1,035,727.82
69	Malaysian Bulk Carriers Berhad [S]	1,170,419.74
70	Managepay Systems Berhad [S]	4,465,369.23
71	Maxis Berhad [S]	5,161,399.49
72	Metronic Global Berhad [S]	12,283,537.82
73	Minetech Resources Berhad [S]	8,061,748.46
74	MMS Ventures Berhad [S]	1,492,008.21
75	MQ Technology Berhad [S]	2,253,431.92
76	My E.G. Services Berhad [S]	2,566,216.15
77	Netx Holdings Berhad [S]	13,309,957.69
78	Nexgram Holdings Berhad [S]	13,262,482.31
79	Ni Hsin Resources Berhad [S]	1,913,297.69
80	Nova Msc Berhad [S]	2,577,512.31
81	Opensys (M) Berhad [S]	2,175,226.54
82	P.A. Resources Berhad [S]	1,522,744.10
83	Padini Holdings Berhad [S]	1,340,780.64

84	Palette Multimedia Berhad [S]	1,516,723.85
85	Pantech Group Holdings Berhad [S]	1,710,656.92
86	Pavilion Real Estate Investment Trust	1,150,846.57
87	Perdana Petroleum Berhad	2,634,803.46
88	Perisai Petroleum Teknologi Bhd [S]	5,524,672.95
89	Petronas Chemicals Group Berhad [S]	3,759,637.56
90	Priceworth International Berhad [S]	2,459,678.85
91	Privasia Technology Berhad [S]	2,566,247.56
92	PUC Founder (Msc) Berhad [S]	2,127,418.85
93	R&A Telecommunication Group Berhad [S]	3,532,510.00
94	Raya International Berhad [S]	1,028,782.05
95	Redtone International Berhad [S]	1,932,380.26
96	RGB International Bhd	3,140,076.15
97	Rimbunan Sawit Berhad [S]	1,400,923.33
98	Salcon Berhad [S]	3,071,366.67
99	Sanichi Technology Berhad [S]	5,941,453.72
100	Scomi Group Berhad	6,262,682.05
101	Sersol Berhad [S]	2,492,002.69
102	Silk Holdings Berhad [S]	1,909,557.82
103	SKP Resources Bhd [S]	3,030,996.67
104	SMRT Holdings Berhad [S]	1,148,758.59
105	Solution Engineering Holdings Berhad [S]	5,117,369.62
106	Stone Master Corporation Berhad [S]	1,871,437.95
107	Sumatec Resources Berhad [S]	30,799,961.15
108	Sunway Real Estate Investment Trust	1,349,154.43
109	Supercomnet Technologies Berhad [S]	2,110,986.79
110	Supermax Corporation Berhad [S]	2,208,273.97
111	SYF Resources Berhad [S]	2,026,297.69
112	Symphony House Bhd [S]	2,424,617.18
113	Systech Bhd [S]	2,401,257.31
114	TA Global Berhad	2,084,689.87
115	Tanjung Offshore Berhad [S]	2,653,759.62
116	Tas Offshore Berhad [S]	1,183,570.00
117	Technodex Bhd [S]	2,510,786.15
118	Tek Seng Holdings Berhad [S]	1,178,833.08
119	Tenaga Nasional Bhd [S]	7,852,408.08
120	TH Heavy Engineering Berhad [S]	8,462,787.56
121	The Media Shoppe Berhad [S]	7,831,058.21
122	Time Dotcom Berhad [S]	1,029,113.85
123	TMC Life Sciences Berhad	1,806,361.41
124	Trive Property Group Berhad	6,275,652.44
125	UOA Development Bhd [S]	1,277,625.71
126	Visdynamics Holdings Berhad [S]	3,614,561.62

127	Vsolar Group Berhad	1,595,989.74
128	Wintoni Group Berhad [S]	5,884,991.54
129	Xidelang Holdings Ltd [S]	8,198,499.74
130	YFG Berhad [S]	1,144,485.13
131	YGL Convergence Berhad [S]	1,526,188.46

APPENDIX F: Sample Candlestick Construction for Individual Stock

AXIATA GROUP BERHAD



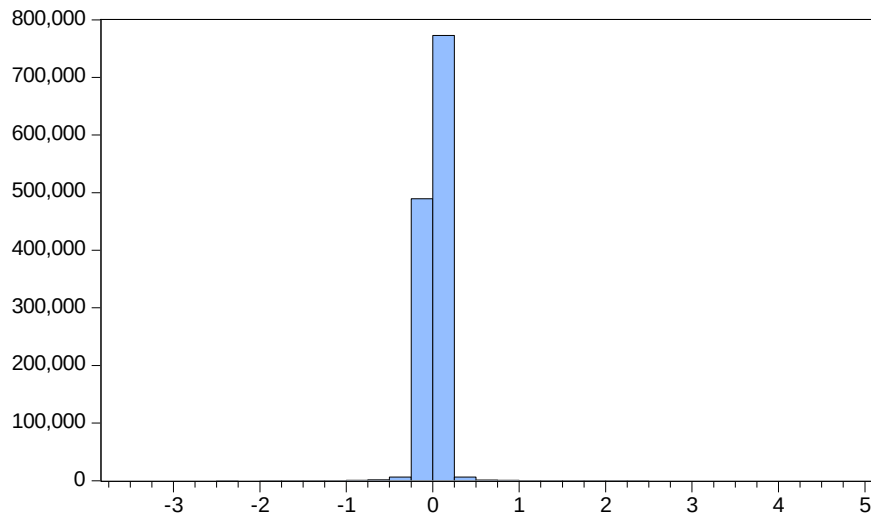
APPENDIX G: Sample Candle Scanner Output in Tabular Form

AXIATA GROUP BERHAD

Date	Open	High	Low	Close	Chg	Chg +/-	% chg	% chg +/-	Basic Candlestick	Bullish Patterns	Bearish Patterns
29-Jul-11	5.11	5.12	5.07	5.1	-0.02	-0.04	-0.0039	-0.0078	Black Spinning Top		Harami–
01-Aug-11	5.1	5.12	5.09	5.1	0	-0.04	0	-0.0078	Doji		
02-Aug-11	5.1	5.12	5.07	5.1	0	-0.04	0	-0.0078	Long-Legged Doji		Tweezers Top
03-Aug-11	5.1	5.1	5.06	5.07	-0.03	-0.07	-0.0059	-0.0136	Opening Black Marubozu		
04-Aug-11	5.08	5.11	5.05	5.07	0	-0.07	0	-0.0136	High Wave		
05-Aug-11	5.05	5.08	5.04	5.07	0	-0.07	0	-0.0136	White Candle		
08-Aug-11	5.05	5.07	4.94	4.99	-0.08	-0.15	-0.0158	-0.0292	Black Candle		Separating Lines–
09-Aug-11	4.52	5	4.52	4.94	-0.05	-0.2	-0.01	-0.0389	Opening White Marubozu	Belt Hold+	
10-Aug-11	4.99	5	4.89	4.9	-0.04	-0.24	-0.0081	-0.0467	Black Candle		
11-Aug-11	4.75	4.95	4.75	4.9	0	-0.24	0	-0.0467	Opening White Marubozu	Meeting Lines+	
12-Aug-11	4.92	4.94	4.9	4.92	0.02	0.02	0.0041	0.0041	Doji		
15-Aug-11	4.93	4.97	4.92	4.96	0.04	0.06	0.0081	0.0122	Short White Candle		
16-Aug-11	5	5	4.97	4.98	0.02	0.08	0.004	0.0163	Opening Black Marubozu		
17-Aug-11	5	5.01	4.98	4.98	0	0.08	0	0.0163	Closing Black Marubozu		
18-Aug-11	5	5.01	4.98	5	0.02	0.1	0.004	0.0204	Doji		
19-Aug-11	4.96	5	4.93	5	0	0.1	0	0.0204	Closing White Marubozu		
22-Aug-11	4.92	5	4.92	4.98	-0.02	-0.02	-0.004	-0.004	Opening White Marubozu		
23-Aug-11	4.98	4.99	4.96	4.98	0	-0.02	0	-0.004	Doji		
24-Aug-11	4.97	4.97	4.83	4.85	-0.13	-0.15	-0.0261	-0.03	Opening Black Marubozu		
25-Aug-11	4.88	4.88	4.56	4.63	-0.22	-0.37	-0.0454	-0.074	Opening Black Marubozu		
26-Aug-11	4.6	4.75	4.43	4.72	0.09	0.09	0.0194	0.0194	White Spinning Top		
29-Aug-11	4.72	4.76	4.62	4.72	0	0.09	0	0.0194	Doji		
02-Sep-11	4.7	4.79	4.66	4.71	-0.01	-0.01	-0.0021	-0.0021	High Wave		
05-Sep-11	4.66	4.7	4.6	4.65	-0.06	-0.07	-0.0127	-0.0148	High Wave		
06-Sep-11	4.61	4.76	4.6	4.71	0.06	0.06	0.0129	0.0129	White Candle	Engulfing+, Tweezers Bottom	

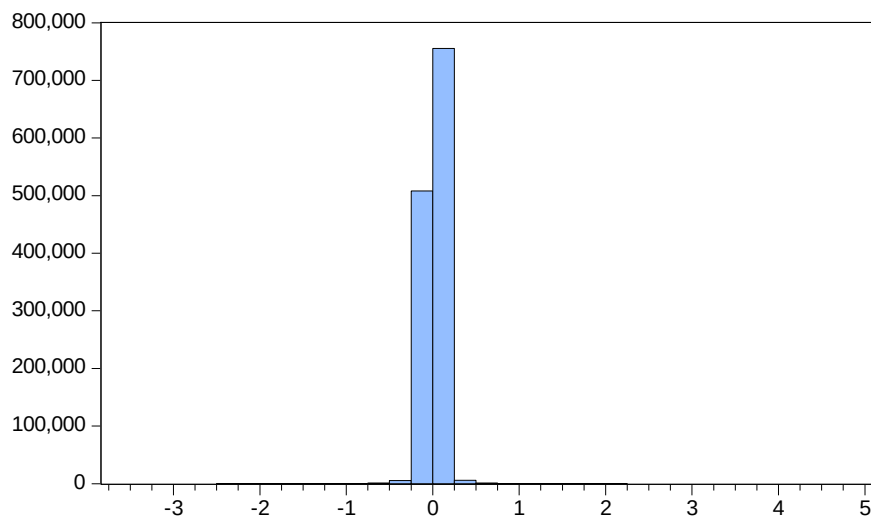
APPENDIX H: Summary statistics result from EViews

OPEN series



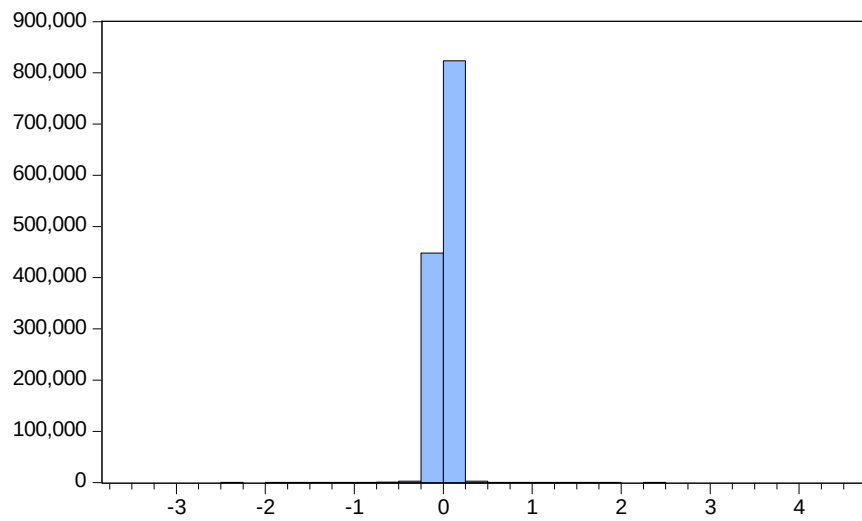
Series: OPEN	
Sample 1 1278921	
Observations 1278921	
Mean	-0.000312
Median	0.000000
Maximum	4.820282
Minimum	-3.636905
Std. Dev.	0.073193
Skewness	0.094526
Kurtosis	171.1478
Jarque-Bera	1.51e+09
Probability	0.000000

HIGH series



Series: HIGH	
Sample 1 1278921	
Observations 1278921	
Mean	-0.000322
Median	0.000000
Maximum	4.952300
Minimum	-3.636905
Std. Dev.	0.070195
Skewness	0.509588
Kurtosis	191.1190
Jarque-Bera	1.89e+09
Probability	0.000000

LOW series

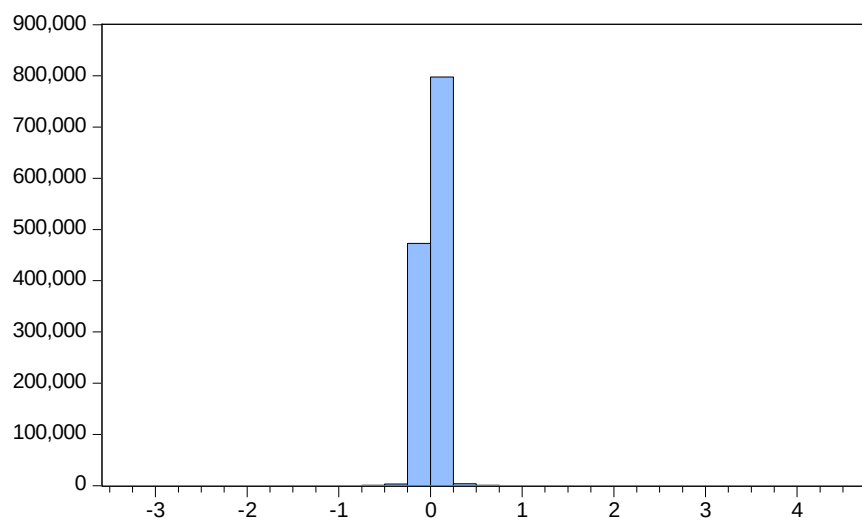


Series: LOW
Sample 1 1278921
Observations 1278921

Mean	-0.000312
Median	0.000000
Maximum	4.644391
Minimum	-3.583519
Std. Dev.	0.052671
Skewness	-0.240698
Kurtosis	440.8630

Jarque-Bera	1.02e+10
Probability	0.000000

CLOSE series



Series: CLOSE
Sample 1 1278921
Observations 1278921

Mean	-0.000323
Median	0.000000
Maximum	4.677491
Minimum	-3.308484
Std. Dev.	0.055059
Skewness	0.653263
Kurtosis	324.2433

Jarque-Bera	5.50e+09
Probability	0.000000

APPENDIX I: Number of Correct Signals and p-values for Binomial Test

Correspond to Table 4.2 (page 95)

		Number of bearish signals (Profit < 0) & p-values for Binomial Test														
Bearish Line	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Black Candle	17331	8094	8745	9181	9383	9396	9366	9372	9416	9449	9492	9470	9495	9460	9435	9405
		0.0000	0.2301	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Short Black Candle	3157	1570	1605	1630	1653	1681	1663	1706	1677	1657	1677	1696	1667	1693	1692	1680
		0.7795	0.3524	0.0688	0.0085	0.0003	0.0028	0.0000	0.0005	0.0054	0.0005	0.0000	0.0017	0.0000	0.0001	0.0003
Long Black Candle	1229	535	570	594	668	670	641	614	617	614	625	624	627	629	619	594
		0.0000	0.0121	0.2543	0.0025	0.0017	0.1389	1.0000	0.9124	1.0000	0.5687	0.6101	0.4965	0.4237	0.8181	0.2543
Black Marubozu	278069	128122	149470	154807	157666	159337	160179	161067	161938	162383	162842	163316	163404	163739	164067	164038
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Opening Black Marubozu	51440	21148	23679	24519	24982	25310	25401	25467	25620	25623	25847	25832	26006	26072	26027	26038
		0.0000	0.0000	0.0000	0.0000	0.0003	0.0050	0.0257	0.3789	0.3953	0.2627	0.3271	0.0117	0.0019	0.0069	0.0051
Closing Black Marubozu	26509	10500	11626	12185	12540	12602	12654	12778	12809	12889	13017	13064	13141	13193	13205	13229
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0036	0.0198	0.1645	0.4533	0.5485	0.7566

Correspond to Table 4.3 (page 95)

		Number of bullish signals (Profit > 0) & p-values for Binomial Test														
Bullish Line	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
White Candle	15642	6027	6478	6477	6549	6604	6602	6571	6566	6587	6559	6607	6605	6545	6564	6577
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Short White Candle	2224	858	967	982	999	1004	1010	1031	1020	1027	1042	1053	1060	1051	1048	1049
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007	0.0001	0.0003	0.0032	0.0131	0.0293	0.0102	0.0071	0.0080
Long White Candle	2705	960	939	948	964	967	991	989	1002	1030	1031	1013	999	1000	994	979
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
White Marubozu	165046	58222	64490	66317	67116	67641	68274	68659	68934	69063	69264	69301	69184	69244	69331	69602
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Opening White Marubozu	49019	18909	20660	21221	21423	21557	21547	21614	21711	21708	21821	21769	21678	21688	21655	21616
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Closing White Marubozu	44808	18411	18948	19019	19058	19058	19146	19148	19318	19293	19350	19283	19309	19099	19108	19072
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Correspond to Table 4.4 (page 99)

		Number of bearish signals (Profit < 0)) & p-values for Binomial Test														
Bearish Reversal Patterns	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Abandoned Baby-	7	3	5	4	2	3	1	3	2	1	3	4	4	3	3	4
		1.0000	0.4531	1.0000	0.4531	1.0000	0.1250	1.0000	0.4531	0.1250	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Belt Hold-	1351	631	698	722	754	749	746	748	735	765	763	776	777	783	770	758
		0.0168	0.2301	0.0124	0.0000	0.0001	0.0001	0.0001	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Dark Cloud Cover	541	207	267	274	284	275	276	288	288	291	292	311	320	310	308	311
		0.0000	0.7949	0.7949	0.2627	0.7339	0.6672	0.1443	0.1443	0.0854	0.0703	0.0006	0.0000	0.0008	0.0015	0.0006
Deliberation	36	13	16	14	17	20	21	18	18	18	18	21	19	19	18	18
		0.1336	0.6171	0.2420	0.8650	0.6171	0.4065	1.0000	1.0000	1.0000	1.0000	0.4065	0.8650	0.8650	1.0000	1.0000
Descending Hawk	675	234	304	296	299	321	316	333	339	346	344	352	347	347	358	367
		0.0000	0.0111	0.0016	0.0034	0.2187	0.1052	0.7566	0.9362	0.5353	0.6455	0.2801	0.4902	0.4902	0.1236	0.0257
Doji Star-	419	155	170	190	182	195	197	197	196	191	206	207	211	207	200	199
		0.0000	0.0001	0.0629	0.0083	0.1707	0.2420	0.2420	0.2041	0.0784	0.7718	0.8415	0.9203	0.8415	0.3789	0.3271
Engulfing-	6659	2878	3274	3476	3586	3563	3541	3549	3532	3594	3623	3626	3689	3680	3688	3690
		0.0000	0.1770	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Evening Star	55	21	31	36	34	39	41	38	36	36	39	38	39	37	35	36
		0.1052	0.4179	0.0308	0.1052	0.0030	0.0004	0.0069	0.0308	0.0308	0.0030	0.0069	0.0030	0.0151	0.0588	0.0308
Evening Doji Star	32	14	16	17	15	16	15	14	16	14	17	15	17	16	17	17
		0.5961	1.0000	0.8572	0.8572	1.0000	0.8572	0.5961	1.0000	0.5961	0.8572	0.8572	0.8572	1.0000	0.8572	0.8572
Hanging Man	3857	1502	1790	1852	1894	1916	1929	1958	1986	1995	1979	2024	2042	2052	2041	2065
		0.0000	0.0000	0.0143	0.2757	0.6965	1.0000	0.3524	0.0658	0.0332	0.1074	0.0022	0.0003	0.0001	0.0003	0.0000
Harami-	4464	1791	2059	2175	2243	2265	2301	2303	2340	2329	2346	2375	2401	2373	2378	2369
		0.0000	0.0000	0.0910	0.7566	0.3320	0.0404	0.0349	0.0013	0.0039	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000
Harami Cross-	259	88	109	116	123	126	128	136	127	127	130	136	139	141	145	143
		0.0000	0.0128	0.1052	0.4533	0.7114	0.9045	0.4533	0.8026	0.8026	1.0000	0.4533	0.2627	0.1707	0.0629	0.1052

Kicking Down	52	20	20	28	20	27	24	26	26	24	29	28	26	26	26	30
		0.1260	0.1260	0.6745	0.1260	0.8887	0.6745	1.0000	1.0000	0.6745	0.4902	0.6745	1.0000	1.0000	1.0000	0.3320
Last Engulfing Top	1442	573	678	682	712	733	755	770	764	770	769	791	791	813	815	814
		0.0000	0.0251	0.0424	0.6527	0.5419	0.0784	0.0108	0.0251	0.0108	0.0124	0.0003	0.0003	0.0000	0.0000	0.0000
Meeting Lines-	300	113	116	121	135	139	133	139	143	140	142	149	146	151	153	157
		0.0000	0.0001	0.0010	0.0949	0.2263	0.0561	0.2263	0.4533	0.2713	0.3843	0.9522	0.6892	0.9522	0.7718	0.4533
Shooting Star	922	460	472	501	517	509	522	536	517	530	528	533	542	538	543	530
		0.9761	0.4902	0.0093	0.0003	0.0017	0.0001	0.0000	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Three Black Crows	309	157	154	161	161	153	157	142	155	155	154	158	159	159	166	171
		0.8181	1.0000	0.4965	0.4965	0.9124	0.8181	0.1707	1.0000	1.0000	1.0000	0.7339	0.6455	0.6455	0.2113	0.0688
Three Inside Down	1897	752	886	916	954	967	1000	997	1024	1022	1033	1043	1037	1040	1048	1040
		0.0000	0.0044	0.1416	0.8181	0.4065	0.0193	0.0278	0.0006	0.0008	0.0001	0.0000	0.0001	0.0000	0.0000	0.0000
Three Outside Down	2482	1095	1267	1365	1353	1367	1366	1363	1372	1376	1370	1382	1401	1405	1386	1393
		0.0000	0.3077	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tri Star-	63	20	16	21	22	25	28	31	30	30	27	26	29	28	24	28
		0.0056	0.0002	0.0117	0.0232	0.1310	0.4473	1.0000	0.8026	0.8026	0.3125	0.2077	0.6171	0.4473	0.0784	0.4473
Tweezers Top	24031	7746	9445	10044	10495	10645	10824	11048	11118	11307	11369	11518	11554	11677	11684	11704
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
Two Crows	26	11	19	20	18	19	16	17	16	17	16	17	17	17	16	15
		0.5552	0.0308	0.0108	0.0767	0.0308	0.3271	0.1707	0.3271	0.1707	0.3271	0.1707	0.1707	0.1707	0.3271	0.5552

Correspond to Table 4.4 (page 99)

		Number of bearish signals (Profit < 0) & p-values for Binomial Test														
Bearish Reversal Patterns	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After uptrend:																
Belt Hold-	691	329	367	375	404	388	381	386	373	391	386	394	400	397	400	389
		0.2225	0.1096	0.0271	0.0000	0.0014	0.0078	0.0024	0.0404	0.0006	0.0024	0.0003	0.0000	0.0001	0.0000	0.0011
Dark Cloud Cover	244	101	124	124	127	127	124	137	132	136	136	139	151	146	141	142
		0.0088	0.8493	0.8493	0.5619	0.5619	0.8493	0.0629	0.2225	0.0836	0.0836	0.0349	0.0003	0.0026	0.0178	0.0124
Deliberation	25	9	12	10	13	15	15	13	14	14	13	15	13	12	12	12
		0.2301	1.0000	0.4237	1.0000	0.4237	0.4237	1.0000	0.6892	0.6892	1.0000	0.4237	1.0000	1.0000	1.0000	1.0000
Descending Hawk	334	113	143	142	143	161	164	172	178	179	183	188	186	185	193	201
		0.0000	0.0102	0.0074	0.0102	0.5485	0.7872	0.6241	0.2501	0.2077	0.0891	0.0251	0.0434	0.0549	0.0053	0.0002
Doji Star-	191	66	71	91	89	96	98	106	108	104	110	112	113	114	109	111
		0.0000	0.0005	0.5619	0.3843	1.0000	0.7718	0.1471	0.0819	0.2460	0.0424	0.0203	0.0139	0.0093	0.0601	0.0300
Engulfing-	3120	1396	1608	1701	1748	1721	1671	1686	1690	1732	1755	1768	1789	1751	1753	1740
		0.0000	0.0891	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Evening Star	36	16	21	23	25	28	28	26	25	23	27	26	26	23	22	25
		0.6171	0.4065	0.1336	0.0300	0.0015	0.0015	0.0124	0.0300	0.1336	0.0047	0.0124	0.0124	0.1336	0.2420	0.0300
Evening Doji Star	13	7	8	7	8	7	8	6	6	7	8	7	6	7	7	6
		1.0000	0.5823	1.0000	0.5823	1.0000	0.5823	1.0000	1.0000	1.0000	0.5823	1.0000	1.0000	1.0000	1.0000	1.0000
Hanging Man	1725	707	830	861	862	877	865	880	915	913	893	908	926	930	940	947
		0.0000	0.1236	0.9601	1.0000	0.5029	0.9203	0.4122	0.0124	0.0160	0.1499	0.0300	0.0024	0.0012	0.0002	0.0001
Harami-	2084	872	1025	1074	1109	1101	1122	1116	1132	1115	1133	1153	1172	1153	1164	1155
		0.0000	0.4715	0.1676	0.0036	0.0105	0.0005	0.0013	0.0001	0.0015	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
Harami Cross-	119	39	46	48	50	52	54	59	56	56	58	57	61	58	58	60
		0.0002	0.0173	0.0434	0.0989	0.2005	0.3576	1.0000	0.5823	0.5823	0.8572	0.7114	0.8572	0.8572	0.8572	1.0000
Last Engulfing Top	726	284	343	350	359	356	375	374	371	380	381	387	393	397	400	391
		0.0000	0.1471	0.3524	0.7949	0.6312	0.3953	0.4354	0.5755	0.2225	0.1936	0.0819	0.0285	0.0128	0.0067	0.0414

Meeting Lines-	133	54	54	55	59	61	57	63	59	64	62	68	69	67	68	68
		0.0375	0.0375	0.0561	0.2263	0.3843	0.1188	0.6031	0.2263	0.7263	0.4902	0.8650	0.7263	1.0000	0.8650	0.8650
Shooting Star	470	268	257	265	270	272	275	282	280	280	279	281	288	288	297	282
		0.0027	0.0477	0.0065	0.0015	0.0008	0.0003	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
Three Black Crows	172	91	91	90	91	87	88	74	82	82	77	83	87	89	91	97
		0.4902	0.4902	0.5961	0.4902	0.9362	0.8181	0.0801	0.5961	0.5961	0.1936	0.7039	0.9362	0.7039	0.4902	0.1096
Three Inside Down	940	395	463	476	492	504	517	510	517	520	520	532	545	534	533	529
		0.0000	0.6745	0.7188	0.1615	0.0285	0.0024	0.0099	0.0024	0.0012	0.0012	0.0001	0.0000	0.0000	0.0000	0.0001
Three Outside Down	1318	609	704	749	750	748	750	763	773	777	770	769	771	765	746	759
		0.0063	0.0143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tri Star-	23	8	9	11	11	12	11	13	13	12	11	11	10	10	9	8
		0.2113	0.4065	1.0000	1.0000	1.0000	1.0000	0.6745	0.6745	1.0000	1.0000	1.0000	0.6745	0.6745	0.4065	0.2113
Tweezers Top	9372	3301	3852	4110	4304	4378	4436	4519	4557	4556	4626	4710	4705	4760	4728	4743
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0080	0.0074	0.2187	0.6241	0.7039	0.1285	0.3898	0.2420
Two Crows	18	8	13	13	12	12	9	10	9	10	11	11	11	12	10	10
		0.8103	0.0989	0.0989	0.2380	0.2380	1.0000	0.8103	1.0000	0.8103	0.4777	0.4777	0.4777	0.2380	0.8103	0.8103

Correspond to Table 4.5 (page 101)

		Number of bullish signals (Profit > 0) & p-values for Binomial Test														
Bullish Reversal Patterns	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Abandoned Baby+	23	6	8	8	8	8	7	9	8	8	6	6	7	7	5	7
		0.0366	0.2113	0.2113	0.2113	0.2113	0.0949	0.4065	0.2113	0.2113	0.0366	0.0366	0.0949	0.0949	0.0124	0.0949
Belt Hold+	1863	679	787	783	800	819	794	815	829	839	853	854	871	841	846	868
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0004	0.0054	0.0000	0.0001	0.0035
Doji Star+	1296	415	469	486	479	496	525	532	520	525	522	541	537	537	529	532
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Engulfing+	8575	3026	3253	3264	3309	3384	3382	3396	3449	3487	3583	3612	3553	3575	3554	3563
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hammer	3377	1278	1327	1324	1415	1435	1420	1422	1394	1392	1387	1391	1419	1429	1421	1422
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Harami+	5966	2001	2251	2350	2411	2463	2501	2496	2554	2516	2607	2602	2689	2702	2717	2747
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Harami Cross+	573	184	222	227	240	247	260	257	253	245	252	251	274	270	273	281
		0.0000	0.0000	0.0000	0.0001	0.0011	0.0300	0.0155	0.0058	0.0006	0.0045	0.0035	0.3173	0.1802	0.2757	0.6745
Homing Pigeon	1209	386	397	439	441	454	485	488	492	493	493	495	535	552	559	551
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0028	0.0096	0.0023
Inverted Hammer	419	164	183	182	180	188	192	200	202	199	196	210	205	200	203	204
		0.0000	0.0111	0.0083	0.0047	0.0404	0.0969	0.3789	0.4965	0.3271	0.2041	1.0000	0.6965	0.3789	0.5552	0.6241
Kicking Up	93	34	24	33	31	35	35	38	37	38	40	39	41	35	33	35
		0.0128	0.0000	0.0069	0.0019	0.0226	0.0226	0.0969	0.0615	0.0969	0.2150	0.1471	0.2983	0.0226	0.0069	0.0226
Last Engulfing Bottom	1827	582	692	709	721	743	763	773	778	836	824	820	831	826	839	806
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000	0.0000	0.0001	0.0000	0.0005	0.0000
Meeting Lines+	379	122	148	156	166	163	160	173	173	176	175	184	178	170	165	171
		0.0000	0.0000	0.0007	0.0183	0.0076	0.0029	0.1010	0.1010	0.1802	0.1499	0.6101	0.2585	0.0512	0.0135	0.0643

Morning Star	48	14	23	22	22	25	23	23	20	22	20	21	21	22	18	19
		0.0061	0.8887	0.6672	0.6672	0.8887	0.8887	0.8887	0.3125	0.6672	0.3125	0.4715	0.4715	0.6672	0.1118	0.1936
Morning Doji Star	43	12	15	17	15	17	18	19	16	17	16	15	15	17	17	17
		0.0061	0.0673	0.2225	0.0673	0.2225	0.3628	0.5419	0.1285	0.2225	0.1285	0.0673	0.0673	0.2225	0.2225	0.2225
Piercing	826	263	324	320	329	334	328	331	337	346	369	367	358	354	341	354
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0024	0.0015	0.0002	0.0000	0.0000	0.0000
Three Inside Up	1564	545	633	629	647	675	687	689	708	715	721	757	769	753	743	724
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0008	0.0022	0.2150	0.5287	0.1499	0.0512	0.0036
Three Outside Up	1971	774	872	844	816	797	832	829	863	884	891	885	886	872	873	874
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Three White Soldiers	230	106	102	91	91	99	94	96	104	102	98	102	100	99	99	97
		0.2627	0.0989	0.0019	0.0019	0.0414	0.0069	0.0147	0.1676	0.0989	0.0293	0.0989	0.0561	0.0414	0.0414	0.0209
Tri Star+	111	34	31	37	40	39	36	38	35	37	38	42	42	45	41	41
		0.0001	0.0000	0.0006	0.0044	0.0024	0.0003	0.0012	0.0001	0.0006	0.0012	0.0135	0.0135	0.0574	0.0078	0.0078
Tweezers Bottom	30757	9589	11057	11652	11884	12148	12312	12370	12412	12528	12696	12678	12764	12759	12806	12875
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Correspond to Table 4.5 (page 101)

		Number of bullish signals (Profit > 0) & p-values for Binomial Test														
Bullish Reversal Patterns	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After downtrend:																
Abandoned Baby+	11	3	3	5	4	3	1	2	3	2	1	1	2	2	2	2
		0.2263	0.2263	1.0000	0.5485	0.2263	0.0160	0.0703	0.2263	0.0703	0.0160	0.0160	0.0703	0.0703	0.0703	0.0703
Belt Hold+	1177	424	517	490	506	520	498	526	536	535	547	555	564	535	540	553
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0024	0.0020	0.0168	0.0549	0.1615	0.0020	0.0051	0.0414
Doji Star+	698	233	264	267	272	275	278	284	268	273	274	280	279	276	274	274
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Engulfing+	3875	1422	1577	1559	1540	1554	1570	1579	1604	1638	1686	1714	1655	1664	1654	1661
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hammer	1745	658	671	691	748	754	753	742	730	730	720	730	749	755	753	733
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Harami Cross+	302	104	120	121	130	133	138	135	134	128	134	132	148	147	145	146
		0.0000	0.0004	0.0007	0.0183	0.0444	0.1499	0.0751	0.0574	0.0096	0.0574	0.0332	0.7718	0.6892	0.5287	0.6031
Harami+	3079	1054	1223	1264	1302	1292	1313	1323	1333	1316	1376	1389	1452	1436	1431	1442
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0017	0.0002	0.0001	0.0005
Homing Pigeon	639	216	212	229	232	238	260	262	261	262	256	261	276	289	294	293
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007	0.0178	0.0477	0.0394
Inverted Hammer	267	106	110	106	109	116	118	120	124	121	119	128	125	122	124	115
		0.0010	0.0048	0.0010	0.0033	0.0375	0.0658	0.1118	0.2713	0.1416	0.0873	0.5419	0.3271	0.1770	0.2713	0.0278
Kicking Up	28	9	5	5	6	9	11	10	11	11	14	14	14	13	12	13
		0.0891	0.0013	0.0013	0.0047	0.0891	0.3472	0.1868	0.3472	0.3472	1.0000	1.0000	1.0000	0.8493	0.5687	0.8493
Last Engulfing Bottom	920	290	355	366	374	379	391	391	398	430	424	425	432	424	434	415
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0512	0.0193	0.0232	0.0703	0.0193	0.0930	0.0034
Meeting Lines+	180	55	71	78	82	85	81	84	83	85	85	85	84	83	78	83
		0.0000	0.0058	0.0873	0.2627	0.5029	0.2041	0.4122	0.3320	0.5029	0.5029	0.5029	0.4122	0.3320	0.0873	0.3320

Morning Star	24	7	10	9	10	13	12	14	10	13	12	13	11	9	8	7
		0.0658	0.5419	0.3077	0.5419	0.8415	1.0000	0.5419	0.5419	0.8415	1.0000	0.8415	0.8415	0.3077	0.1527	0.0658
Morning Doji Star	21	8	11	9	8	8	9	9	7	8	8	8	8	8	8	8
		0.3843	1.0000	0.6599	0.3843	0.3843	0.6599	0.6599	0.1902	0.3843	0.3843	0.3843	0.3843	0.3843	0.3843	0.3843
Piercing	439	147	183	172	179	174	178	181	180	185	195	200	193	191	183	185
		0.0000	0.0006	0.0000	0.0001	0.0000	0.0000	0.0003	0.0002	0.0012	0.0220	0.0703	0.0131	0.0076	0.0006	0.0012
Three Inside Up	828	306	349	336	353	366	371	366	389	387	390	409	410	405	395	390
		0.0000	0.0000	0.0000	0.0000	0.0010	0.0032	0.0010	0.0891	0.0658	0.1031	0.7566	0.8103	0.5552	0.1971	0.1031
Three Outside Up	971	407	433	412	400	389	416	416	441	446	450	444	440	440	428	426
		0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0048	0.0124	0.0244	0.0085	0.0039	0.0039	0.0003	0.0002
Three White Soldiers	132	61	58	53	50	55	52	53	58	56	52	54	51	50	51	52
		0.4354	0.1902	0.0293	0.0069	0.0673	0.0188	0.0293	0.1902	0.0989	0.0188	0.0455	0.0117	0.0069	0.0117	0.0188
Tri Star+	30	7	5	10	10	10	11	15	13	12	11	12	11	15	12	12
		0.0061	0.0005	0.1010	0.1010	0.1010	0.2005	1.0000	0.5823	0.3628	0.2005	0.3628	0.2005	1.0000	0.3628	0.3628
Tweezers Bottom	12234	4099	4533	4779	4855	4964	4996	4994	4963	5002	5116	5151	5179	5144	5188	5197
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Correspond to Table 4.6 (page 104)

		Number of bearish signals (Profit < 0) & p-values for Binomial Test														
Bearish Continuation Patterns	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Downside Tasuki Gap	9	5	4	3	4	3	5	5	5	3	2	2	2	2	2	2
		1.0000	1.0000	0.5078	1.0000	0.5078	1.0000	1.0000	1.0000	0.5078	0.1797	0.1797	0.1797	0.1797	0.1797	0.1797
Falling Window	16803	6625	7576	8069	8349	8493	8399	8442	8480	8493	8653	8603	8538	8556	8448	8484
		0.0000	0.0000	0.0000	0.4237	0.1615	0.9761	0.5353	0.2301	0.1615	0.0001	0.0019	0.0357	0.0173	0.4777	0.2041
In Neck	22	10	9	11	12	13	16	13	15	15	13	13	13	14	13	13
		0.8337	0.5222	1.0000	0.8337	0.5222	0.0549	0.5222	0.1362	0.1362	0.5222	0.5222	0.5222	0.2846	0.5222	0.5222
On Neck	276	102	136	142	136	140	136	138	143	142	142	142	148	154	140	146
		0.0000	0.8572	0.6745	0.8572	0.8572	0.8572	1.0000	0.5892	0.6745	0.6745	0.6745	0.2543	0.0615	0.8572	0.3681
Separating Lines-	279	84	109	111	109	117	120	114	116	125	127	121	122	124	131	134
		0.0000	0.0003	0.0008	0.0003	0.0085	0.0226	0.0028	0.0060	0.0930	0.1499	0.0308	0.0414	0.0719	0.3371	0.5485
Side-by-Side White Lines-	7	2	5	5	4	4	4	4	6	5	5	4	4	5	4	4
		0.4531	0.4531	0.4531	1.0000	1.0000	1.0000	1.0000	0.1250	0.4531	0.4531	1.0000	1.0000	0.4531	1.0000	1.0000
Three-Line Strike-	9	6	4	4	4	5	5	3	4	4	3	3	6	5	6	4
		0.5078	1.0000	1.0000	1.0000	1.0000	1.0000	0.5078	1.0000	1.0000	0.5078	0.5078	0.5078	1.0000	0.5078	1.0000
Thrusting	340	133	146	153	161	155	154	154	155	165	172	166	162	151	162	161
		0.0001	0.0108	0.0735	0.3576	0.1164	0.0930	0.0930	0.1164	0.6241	0.8729	0.7039	0.4179	0.0444	0.4179	0.3576
Two Black Gapping Candles	1642	743	804	838	859	844	852	864	841	848	845	847	855	840	835	821
		0.0001	0.4179	0.4179	0.0643	0.2670	0.1310	0.0357	0.3371	0.1902	0.2460	0.2077	0.0989	0.3628	0.5029	1.0000
After downtrend:																
Falling Window	5088	2106	2379	2520	2594	2632	2609	2613	2639	2624	2661	2636	2602	2575	2520	2543
		0.0000	0.0000	0.5093	0.1645	0.0143	0.0703	0.0549	0.0080	0.0257	0.0011	0.0102	0.1074	0.3898	0.5093	0.9920
In Neck	16	8	7	8	9	10	12	11	10	12	10	9	10	10	10	10
		1.0000	0.8026	1.0000	0.8026	0.4533	0.0801	0.2113	0.4533	0.0801	0.4533	0.8026	0.4533	0.4533	0.4533	0.4533

On Neck	148	56	73	70	60	64	65	66	70	70	67	68	76	78	70	73
		0.0040	0.9362	0.5619	0.0264	0.1188	0.1615	0.2187	0.5619	0.5619	0.2846	0.3681	0.8026	0.5619	0.5619	0.9362
Separating Lines-	101	33	45	39	40	45	41	44	37	42	42	39	40	40	41	41
		0.0007	0.3173	0.0285	0.0466	0.3173	0.0735	0.2340	0.0096	0.1118	0.1118	0.0285	0.0466	0.0466	0.0735	0.0735
Thrusting	196	81	80	86	89	82	86	86	85	91	95	94	92	84	92	90
		0.0183	0.0124	0.1010	0.2263	0.0271	0.1010	0.1010	0.0735	0.3524	0.7188	0.6171	0.4295	0.0536	0.4295	0.2846
Two Black Gapping Candles	846	371	400	410	433	414	432	440	434	435	430	430	436	426	428	419
		0.0004	0.1211	0.3898	0.5157	0.5619	0.5619	0.2585	0.4715	0.4295	0.6527	0.6527	0.3898	0.8650	0.7566	0.8103

Correspond to Table 4.7 (page 105)

	Number of bullish signals (Profit > 0) & p-values for Binomial Test															
Bullish Continuation Patterns	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Rising Window	13231	4714	5435	5585	5542	5663	5652	5619	5648	5590	5548	5493	5501	5473	5417	5394
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Separating Lines+	197	73	87	85	88	102	93	99	93	96	89	88	89	93	84	92
		0.0004	0.1164	0.0643	0.1556	0.6672	0.4777	1.0000	0.4777	0.7795	0.2005	0.1556	0.2005	0.4777	0.0466	0.3953
Side-by-side White Lines+	16	10	8	8	8	10	8	8	8	10	11	12	9	8	9	8
		0.4533	1.0000	1.0000	1.0000	0.4533	1.0000	1.0000	1.0000	0.4533	0.2113	0.0801	0.8026	1.0000	0.8026	1.0000
Three-Line Strike+	5	2	1	2	3	2	3	4	3	4	4	3	4	4	4	4
		1.0000	0.3750	1.0000	1.0000	1.0000	1.0000	0.3750	1.0000	0.3750	0.3750	1.0000	0.3750	0.3750	0.3750	0.3750
Upside Tasuki Gap	8	4	5	4	3	1	1	3	3	3	3	2	2	2	2	2
		1.0000	0.7266	1.0000	0.7266	0.0703	0.0703	0.7266	0.7266	0.7266	0.7266	0.2891	0.2891	0.2891	0.2891	0.2891
After uptrend:																
Rising Window	3123	1163	1314	1359	1321	1356	1296	1267	1257	1251	1229	1222	1213	1222	1209	1236
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Separating Lines+	93	39	46	47	45	50	45	46	42	42	40	42	41	43	41	45
		0.1471	1.0000	1.0000	0.8337	0.5353	0.8337	1.0000	0.4065	0.4065	0.2150	0.4065	0.2983	0.5353	0.2983	0.8337

APPENDIX J: p-values for Skewness Adjusted t-test

Correspond to Table 4.8 (page 107)

		p-values of skewness adjusted t-test (main sample)														
Basic candlestick line	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Black Candle	17331	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Short Black Candle	3157	0.0000	0.0000	0.0005	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Long Black Candle	1229	0.0043	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Black Marubozu	278069	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Opening Black Marubozu	51440	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Closing Black Marubozu	26509	0.0001	0.0310	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
White Candle	15642	0.6078	0.2092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Short White Candle	2224	0.3335	0.8936	0.6812	0.0874	0.0535	0.0023	0.0438	0.0524	0.0311	0.0855	0.1967	0.0641	0.0302	0.0527	0.0353
Long White Candle	2705	0.0027	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
White Marubozu	165046	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Opening White Marubozu	49019	0.0001	0.0428	0.0551	0.6864	0.0740	0.0005	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Closing White Marubozu	44808	0.0000	0.5157	0.0487	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Doji	104241	0.0050	0.0115	0.3574	0.0903	0.5207	0.1900	0.0354	0.0011	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Long-legged Doji	11918	0.0000	0.0000	0.0000	0.0051	0.0391	0.4911	0.4091	0.6080	0.1780	0.6291	0.8402	0.4590	0.3600	0.0806	0.1064
Dragonfly Doji	19732	0.0000	0.0000	0.0014	0.1966	0.5288	0.8986	0.1294	0.2088	0.1061	0.0353	0.1112	0.1470	0.1380	0.0324	0.0206
Gravestone Doji	14689	0.0002	0.0000	0.0000	0.0000	0.0002	0.0002	0.0023	0.0001	0.0025	0.0533	0.0419	0.0086	0.0069	0.0601	0.0434
Four-price Doji	254948	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Black Spinning Top	89657	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
White Spinning Top	91580	0.0000	0.0000	0.2967	0.1894	0.0013	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
High Wave	35389	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Correspond to Table 4.9 (page 108)

		p-values of skewness adjusted t-test (out-of-sample)														
Basic candlestick line	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Black candle	2788	0.6085	0.0004	0.0004	0.7865	0.0000	0.0000	0.0000	0.5637	0.4095	0.4364	0.3398	0.0000	0.0005	0.0000	0.0000
Short black candle	492	0.0008	0.1442	0.0422	0.0242	0.0033	0.0050	0.0022	0.0009	0.0005	0.0004	0.6188	0.0002	0.7237	0.0001	0.7656
Long black candle	315	0.0616	0.1053	0.0202	0.0033	0.0174	0.0798	0.0092	0.3680	0.0231	0.3811	0.0027	0.0028	0.0030	0.0012	0.0039
Black Marubozu	35232	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Opening Black Marubozu	10056	0.2388	0.1312	0.0001	0.3399	0.6937	0.7476	0.4484	0.4202	0.7813	0.6487	0.7006	0.6171	0.1386	0.0839	0.5615
Closing Black Marubozu	5327	0.3489	0.2371	0.0533	0.0707	0.2974	0.0018	0.0005	0.3460	0.9672	0.8290	0.4009	0.5982	0.4824	0.6951	0.6391
White candle	2900	0.0060	0.2154	0.7522	0.4757	0.8509	0.0862	0.8218	0.0734	0.0500	0.0147	0.1651	0.0114	0.0127	0.0256	0.0445
Short white candle	392	0.8098	0.9155	0.8057	0.8177	0.8782	0.9778	0.8773	0.3884	0.7939	0.7783	0.9924	0.6813	0.5482	0.6979	0.5942
Long white candle	683	0.3191	0.0018	0.0091	0.0774	0.0526	0.0362	0.0712	0.0369	0.0555	0.0243	0.0381	0.0416	0.0218	0.0068	0.0112
White Marubozu	39132	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Opening White Marubozu	10843	0.0036	0.0628	0.1248	0.2684	0.1198	0.2001	0.1064	0.2465	0.8691	0.0634	0.5089	0.0252	0.8216	0.8018	0.1526
Closing White Marubozu	7359	0.0000	0.3989	0.2664	0.8731	0.1381	0.1744	0.3783	0.2258	0.0888	0.8459	0.7963	0.0136	0.0307	0.5129	0.0395
Doji	24280	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Long-legged Doji	4714	0.010	0.155	0.013	0.147	0.073	0.043	0.870	0.024	0.258	0.270	0.816	0.603	0.354	0.726	0.423
Dragonfly Doji	9039	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gravestone Doji	8647	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Four-price Doji	118596	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Black Spinning Top	20717	0.745	0.026	0.435	0.365	0.779	0.444	0.776	0.343	0.551	0.423	0.055	0.590	0.625	0.624	0.860
White Spinning Top	20893	0.000	0.002	0.002	0.087	0.000	0.046	0.019	0.763	0.078	0.269	0.963	0.424	0.209	0.979	0.304
High Wave	5994	0.258	0.431	0.027	0.945	0.825	0.034	0.021	0.749	0.000	0.001	0.530	0.011	0.071	0.014	0.046

Correspond to Table 4.10 (page 114)

		p-values of skewness adjusted t-test (main sample)														
Bearish Reversal	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Abandoned Baby-	7	0.6449	0.7510	0.7295	0.1340	0.2082	0.1393	0.2761	0.0680	0.0630	0.1466	0.3181	0.5636	0.3387	0.2877	0.8087
Belt Hold-	1351	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Dark Cloud Cover	541	0.2005	0.1353	0.0082	0.0003	0.0116	0.0390	0.0190	0.0028	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deliberation	36	0.5019	0.9801	0.9763	0.6779	0.9033	0.9734	0.6019	0.3497	0.3424	0.4168	0.3572	0.3093	0.3801	0.2907	0.3712
Descending Hawk	675	0.1109	0.7271	0.7292	0.2657	0.1041	0.2590	0.1893	0.0853	0.0582	0.0306	0.0099	0.0032	0.0176	0.0060	0.0007
Doji Star-	419	0.7881	0.0034	0.4182	0.5637	0.7711	0.7140	0.8025	0.8189	0.7739	0.5906	0.4706	0.5307	0.7307	0.8126	0.9869
Engulfing-	6659	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Evening Star	55	0.9341	0.2110	0.2182	0.0644	0.0461	0.0157	0.0523	0.2762	0.2881	0.1828	0.0934	0.1593	0.3049	0.3448	0.1893
Evening Doji Star	32	0.4692	0.0293	0.1083	0.5401	0.4300	0.7718	0.6276	0.3089	0.7653	0.8294	0.4609	0.3807	0.3987	0.4119	0.2833
Hanging Man	3857	0.0303	0.1423	0.0010	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Harami-	4464	0.0068	0.0147	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Harami Cross-	259	0.2685	0.7973	0.6136	0.5440	0.1939	0.2014	0.0716	0.2782	0.1834	0.1098	0.0691	0.0726	0.0302	0.0102	0.0290
Kicking Down	52	0.1447	0.3017	0.0267	0.0619	0.0681	0.7095	0.5491	0.1059	0.5639	0.4679	0.2973	0.3063	0.3176	0.0618	0.0013
Last Engulfing Top	1442	0.0065	0.1409	0.1337	0.2589	0.1065	0.0483	0.0314	0.0174	0.0129	0.0016	0.0001	0.0000	0.0000	0.0000	0.0000
Meeting Lines-	300	0.6582	0.1668	0.3082	0.4390	0.7546	0.6613	0.4730	0.5328	0.8405	0.4867	0.3500	0.3627	0.2069	0.1523	0.3146
Shooting Star	922	0.0139	0.0711	0.0101	0.0037	0.0009	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Three Black Crows	309	0.0152	0.0116	0.0032	0.0053	0.0026	0.0073	0.0301	0.1309	0.1086	0.0884	0.0580	0.0810	0.1152	0.0757	0.0320
Three Inside Down	1897	0.2876	0.0048	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Three Outside Down	2482	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tri Star-	63	0.6618	0.0324	0.0279	0.0523	0.1430	0.3164	0.9592	0.5292	0.7537	0.5523	0.3169	0.3906	0.4665	0.2429	0.6777
Tweezers Top	24031	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Two Crows	26	0.2122	0.0031	0.0388	0.0592	0.0138	0.0208	0.0396	0.3184	0.2261	0.2105	0.2095	0.3551	0.2416	0.2132	0.2162

Correspond to Table 4.10 (page 114)

		p-values of skewness adjusted t-test (main sample)														
Bearish Reversal	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After uptrend:																
Belt Hold-	691	0.0063	0.0027	0.0001	0.0000	0.0010	0.0046	0.0009	0.0023	0.0005	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
Dark Cloud Cover	244	0.3038	0.6589	0.1308	0.0118	0.1120	0.3610	0.1507	0.1086	0.0062	0.0019	0.0008	0.0000	0.0001	0.0000	0.0001
Deliberation	25	0.4687	0.9220	0.8921	0.6715	0.8643	0.9900	0.9380	0.7256	0.7405	0.9016	0.7446	0.6526	0.7249	0.7455	0.7885
Descending Hawk	334	0.2025	0.7930	0.4195	0.2916	0.0567	0.0433	0.0740	0.0121	0.0095	0.0018	0.0002	0.0001	0.0005	0.0002	0.0000
Doji Star-	191	0.1982	0.0639	0.7872	0.7409	0.3036	0.2543	0.1538	0.1083	0.0217	0.0140	0.0039	0.0022	0.0071	0.0085	0.0339
Engulfing-	3120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Evening Star	36	0.2394	0.0006	0.0785	0.0166	0.0218	0.0238	0.0485	0.2118	0.1570	0.1087	0.0513	0.0914	0.0962	0.0807	0.0549
Evening Doji Star	13	0.0605	0.0117	0.0480	0.0380	0.0278	0.1088	0.1002	0.1605	0.5529	0.3818	0.2283	0.1996	0.2830	0.3113	0.2613
Hanging Man	1725	0.5868	0.0052	0.0016	0.0004	0.0001	0.0002	0.0003	0.0005	0.0005	0.0062	0.0038	0.0005	0.0004	0.0001	0.0001
Harami-	2084	0.0033	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Harami Cross-	119	0.4133	0.1988	0.6804	0.9404	0.6035	0.8468	0.4988	0.5457	0.4643	0.2793	0.4647	0.2084	0.2945	0.5507	0.6541
Last Engulfing Top	726	0.0022	0.0445	0.1188	0.5798	0.3409	0.3844	0.2688	0.3521	0.3033	0.1030	0.0382	0.0280	0.0046	0.0031	0.0021
Meeting Lines-	133	0.8992	0.8635	0.5726	0.5930	0.7266	0.4753	0.3317	0.4166	0.5278	0.3416	0.2449	0.0971	0.1252	0.0803	0.2975
Shooting Star	470	0.0004	0.0020	0.0111	0.0310	0.0016	0.0024	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Three Black Crows	172	0.3653	0.0103	0.1130	0.0720	0.0425	0.1440	0.5333	0.7194	0.6499	0.6613	0.3406	0.3692	0.3182	0.4302	0.1882
Three Inside Down	940	0.1229	0.0036	0.0003	0.0001	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Three Outside Down	1318	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tri Star-	23	0.8234	0.1616	0.2721	0.1890	0.2480	0.2293	0.3835	0.2080	0.2906	0.3208	0.3174	0.1538	0.4161	0.1570	0.3977
Tweezers Top	9372	0.1056	0.2201	0.0132	0.0069	0.0005	0.0010	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Two Crows	18	0.1750	0.0237	0.2618	0.2984	0.0840	0.0876	0.0894	0.4624	0.3964	0.2206	0.3476	0.5593	0.3745	0.4143	0.4211

Correspond to Table 4.11 (page 116)

		p-values of skewness adjusted t-test (main sample)														
Bullish Reversal	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Abandoned Baby+	23	0.4817	0.8253	0.2822	0.4716	0.1087	0.5029	0.6002	0.2585	0.4132	0.2031	0.3358	0.2497	0.2741	0.0413	0.0132
Belt Hold+	1863	0.1118	0.1626	0.3913	0.4174	0.0931	0.0023	0.0019	0.0070	0.0053	0.0223	0.0803	0.0766	0.0203	0.0396	0.0145
Doji Star+	1296	0.0737	0.0024	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Engulfing+	8575	0.3224	0.0338	0.0033	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004	0.0004	0.0000	0.0000	0.0000	0.0000
Hammer	3377	0.6534	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Harami+	5966	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0021	0.0098	0.0012	0.0005
Harami Cross+	573	0.2907	0.1516	0.2130	0.2004	0.3388	0.6838	0.5020	0.9156	0.4028	0.4088	0.4913	0.5613	0.7595	0.6786	0.4456
Homing Pigeon	1209	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0027	0.0014	0.0092
Inverted Hammer	419	0.1581	0.7778	0.9324	0.0498	0.1593	0.2767	0.2651	0.2098	0.2090	0.0905	0.2245	0.5450	0.8245	0.5959	0.3463
Kicking Up	93	0.3935	0.2050	0.3414	0.4850	0.5131	0.9797	0.5435	0.5550	0.5895	0.0803	0.1008	0.0117	0.0092	0.0020	0.0036
Last Engulfing Bottom	1827	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0000
Meeting Lines+	379	0.6725	0.9512	0.8034	0.6605	0.4040	0.7027	0.9835	0.4328	0.4535	0.6519	0.7303	0.7746	0.3889	0.1700	0.2341
Morning Star	48	0.0315	0.9292	0.5479	0.9982	0.3735	0.7780	0.7017	0.6892	0.7642	0.6791	0.7491	0.8859	0.8248	0.8758	0.8298
Morning Doji Star	43	0.0230	0.0928	0.2140	0.3403	0.6990	0.6525	0.6882	0.5621	0.5117	0.6002	0.5954	0.3404	0.4001	0.3156	0.1566
Piercing	826	0.0541	0.5202	0.1393	0.0821	0.1135	0.0236	0.0467	0.1013	0.0194	0.0524	0.1984	0.1463	0.1103	0.0230	0.0194
Three Inside Up	1564	0.1941	0.9935	0.1065	0.1722	0.8469	0.4637	0.3734	0.6534	0.7460	0.5966	0.1088	0.1458	0.6365	0.5653	0.9753
Three Outside Up	1971	0.0030	0.0006	0.2999	0.8267	0.2221	0.2827	0.8098	0.6446	0.5579	0.1863	0.2915	0.7205	0.3806	0.3112	0.0444
Three White Soldiers	230	0.0073	0.1503	0.9752	0.6424	0.9977	0.8317	0.9986	0.8695	0.6208	0.9631	0.9779	0.8160	0.8024	0.9318	0.9117
Tri Star+	111	0.5101	0.1633	0.2222	0.0983	0.2624	0.1314	0.5383	0.4649	0.2495	0.4489	0.4277	0.6719	0.8452	0.6581	0.7943
Tweezers Bottom	30757	0.1105	0.0392	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Correspond to Table 4.11 (page 116)

		p-values of skewness adjusted t-test (main sample)														
Bullish Reversal	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After downtrend:																
Abandoned Baby+	11	0.1090	0.3860	0.5749	0.5708	0.1093	0.0184	0.0285	0.0616	0.0307	0.0076	0.1382	0.0773	0.1026	0.0298	0.0053
Belt Hold+	1177	0.2771	0.8037	0.6454	0.4553	0.1396	0.0030	0.0211	0.0492	0.0176	0.0974	0.3756	0.3457	0.1987	0.1809	0.0900
Doji Star+	698	0.1769	0.0112	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0002
Engulfing+	3875	0.4218	0.7621	0.2193	0.0057	0.0009	0.0000	0.0001	0.0010	0.0002	0.0088	0.0414	0.0163	0.0159	0.0009	0.0033
Hammer	1745	0.8386	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Harami+	3079	0.0002	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0018	0.0300	0.2344	0.2189	0.0406	0.0196
Harami Cross+	302	0.0038	0.0096	0.0207	0.0401	0.0525	0.2433	0.1713	0.7002	0.1444	0.1665	0.3385	0.4474	0.7875	0.9466	0.7593
Homing Pigeon	639	0.1056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004	0.0001	0.0000	0.0005	0.0071	0.0375	0.0246	0.0400
Inverted Hammer	267	0.1585	0.7203	0.5446	0.0618	0.0292	0.0440	0.0372	0.0136	0.0636	0.0108	0.0585	0.1875	0.2726	0.1107	0.0334
Kicking Up	28	0.9431	0.3753	0.0013	0.4696	0.2483	0.5326	0.1537	0.2520	0.3378	0.2875	0.3319	0.0918	0.0670	0.0691	0.0540
Last Engulfing Bottom	920	0.0000	0.0000	0.0001	0.0001	0.0005	0.0002	0.0000	0.0003	0.0241	0.0115	0.0136	0.0487	0.0179	0.0268	0.0011
Meeting Lines+	180	0.9056	0.4875	0.8888	0.9417	0.6611	0.3192	0.2709	0.0957	0.0990	0.2115	0.0751	0.0840	0.0851	0.0103	0.0401
Morning Star	24	0.5272	0.8232	0.7391	0.7638	0.6846	0.6724	0.4147	0.3800	0.7124	0.7399	0.5339	0.6290	0.7247	0.7809	0.8728
Morning Doji Star	21	0.4123	0.1547	0.1123	0.3033	0.5517	0.5089	0.4466	0.3094	0.2669	0.3064	0.3359	0.2763	0.2456	0.1896	0.0992
Piercing	439	0.6471	0.4633	0.9282	0.3335	0.1704	0.1788	0.1834	0.2123	0.0680	0.0574	0.2050	0.0755	0.0690	0.0122	0.0112
Three Inside Up	828	0.5444	0.8691	0.0354	0.1534	0.8283	0.4971	0.4855	0.6858	0.9648	0.4780	0.1050	0.1929	0.7541	0.8149	0.7988
Three Outside Up	971	0.0002	0.0038	0.5921	0.5426	0.5542	0.8426	0.8517	0.7549	0.7343	0.2700	0.4585	0.5661	0.7648	0.6031	0.3819
Three White Soldiers	132	0.0300	0.4429	0.6642	0.6301	0.5030	0.5893	0.3947	0.7724	0.6363	0.5037	0.4197	0.2775	0.4681	0.4241	0.4270
Tri Star+	30	0.7502	0.0109	0.2731	0.1677	0.7741	0.9357	0.3693	0.4564	0.4304	0.2634	0.2985	0.3452	0.2525	0.5561	0.4524
Tweezers Bottom	12234	0.4990	0.0067	0.0035	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Correspond to Table 4.12 (page 118)

		p-values of skewness adjusted t-test (out-of-sample)														
Bearish Reversal	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Belt Hold-	241	0.4819	0.1149	0.3418	0.9622	0.7461	0.9327	0.3166	0.4732	0.7142	0.4097	0.4742	0.3726	0.6205	0.1779	0.5588
Dark Cloud Cover	86	0.0420	0.9125	0.8042	0.6697	0.2810	0.6353	0.5958	0.5056	0.8042	0.4324	0.5156	0.5422	0.7424	0.9994	0.7690
Deliberation	15	0.3798	0.7702	0.3124	0.1867	0.7963	0.9921	0.9382	0.9285	0.4367	0.3230	0.5740	0.6145	0.6958	0.4904	0.6821
Descending Hawk	123	0.4713	0.3801	0.3987	0.9673	0.7115	0.8805	0.4886	0.6025	0.5330	0.2973	0.3265	0.3374	0.2831	0.2317	0.3727
Doji Star-	118	0.3034	0.3387	0.0669	0.1405	0.3768	0.4988	0.7685	0.9862	0.8984	0.9975	0.6612	0.9023	0.9356	0.6671	0.4930
Engulfing-	1038	0.4568	0.1406	0.1394	0.2796	0.0945	0.0796	0.5430	0.0046	0.3896	0.0020	0.0013	0.0010	0.0044	0.2699	0.6728
Evening Star	9	0.6617	0.9996	0.8562	0.2199	0.8295	0.9605	0.5841	0.5419	0.4834	0.0852	0.1809	0.2099	0.2452	0.1849	0.1526
Evening Doji Star	12	0.7056	0.0395	0.4266	0.2993	0.6956	0.2804	0.0846	0.0842	0.0750	0.0744	0.1379	0.0879	0.1943	0.1132	0.1537
Hanging Man	644	0.1099	0.0089	0.0070	0.1480	0.0853	0.2773	0.1081	0.0686	0.0038	0.0091	0.0041	0.0008	0.0026	0.0013	0.0025
Harami-	992	0.0009	0.0094	0.1096	0.3302	0.5370	0.4850	0.2607	0.4085	0.3699	0.5030	0.4717	0.6089	0.3850	0.4514	0.3973
Harami Cross-	60	0.5416	0.9992	0.9428	0.5912	0.9916	0.3986	0.3210	0.7491	0.5588	0.6668	0.6794	0.5309	0.8918	0.9449	0.9872
Kicking Down	11	0.8204	0.9782	0.7258	0.1276	0.6114	0.2131	0.0581	0.1291	0.0682	0.0718	0.1591	0.2264	0.2254	0.1245	0.1074
Last Engulfing Top	235	0.1387	0.7316	0.2941	0.2314	0.1167	0.5514	0.8811	0.8951	0.5746	0.1330	0.0908	0.1357	0.0891	0.0420	0.0157
Meeting Lines-	61	0.2049	0.0269	0.0109	0.0836	0.0873	0.2775	0.1961	0.2820	0.1751	0.0426	0.0083	0.0351	0.0610	0.0844	0.0499
Shooting Star	1008	0.1787	0.1141	0.0275	0.0061	0.0116	0.0050	0.0011	0.0001	0.0005	0.9560	0.0003	0.9100	0.0001	0.0001	0.2624
Separating Lines-	96	0.6374	0.7826	0.7956	0.8487	0.1403	0.1408	0.8981	0.6125	0.5603	0.6033	0.3692	0.7323	0.7207	0.5520	0.3104
Three Black Crows	59	0.1961	0.6413	0.7459	0.5221	0.6483	0.9200	0.6972	0.2375	0.0969	0.0370	0.1401	0.0659	0.2381	0.0197	0.0042
Three Inside Down	369	0.5975	0.0429	0.1278	0.1715	0.0510	0.0220	0.0190	0.0488	0.0707	0.0218	0.0124	0.0057	0.4077	0.0025	0.0011
Three Outside Down	420	0.6865	0.3682	0.2269	0.0264	0.0647	0.2699	0.4266	0.5322	0.2903	0.2225	0.1201	0.1928	0.0988	0.3211	0.0629
Tri Star-	13	0.0394	0.0368	0.0097	0.1778	0.1148	0.1539	0.4121	0.3459	0.4897	0.5867	0.7034	0.6147	0.2446	0.2581	0.2492
Tweezers Top	6314	0.0004	0.0002	0.0007	0.0190	0.0047	0.0322	0.6416	0.0060	0.2604	0.1375	0.1317	0.8832	0.0176	0.0130	0.1596

Correspond to Table 4.12 (page 118)

		p-values of skewness adjusted t-test (out-of-sample)														
Bearish Reversal	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After uptrend:																
Belt Hold-	136	0.3719	0.1368	0.2891	0.9352	0.3792	0.3874	0.3603	0.4526	0.4736	0.3269	0.5191	0.3270	0.4921	0.1667	0.5568
Dark Cloud Cover	29	0.0048	0.0088	0.0768	0.2398	0.5088	0.1512	0.1472	0.4231	0.6082	0.8279	0.9973	0.9988	0.8785	0.7338	0.7841
Deliberation	10	0.7257	0.3130	0.3157	0.1244	0.4381	0.5002	0.3947	0.2352	0.2036	0.1476	0.2566	0.2331	0.1622	0.1400	0.2753
Descending Hawk	59	0.3562	0.0679	0.7494	0.2575	0.4650	0.3358	0.8878	0.8970	0.9732	0.7848	0.8277	0.7869	0.8161	0.8676	0.8394
Doji Star-	50	0.2242	0.1021	0.1601	0.5189	0.2751	0.1691	0.4156	0.9662	0.7052	0.4353	0.6049	0.6090	0.9357	0.4376	0.3468
Engulfing-	483	0.8086	0.3044	0.3500	0.1900	0.7649	0.4286	0.4339	0.2702	0.3083	0.2947	0.4419	0.3620	0.6590	0.1903	0.8310
Evening Star	6	0.6099	0.2905	0.3503	0.2118	0.5484	0.6437	0.4833	0.4693	0.4621	0.3721	0.4411	0.5605	0.5631	0.4840	0.4820
Evening Doji Star	6	0.1169	0.4267	0.1676	0.1332	0.9249	0.2261	0.2631	0.2315	0.2655	0.2818	0.1927	0.2600	0.3926	0.3320	0.4333
Hanging Man	321	0.3551	0.1496	0.0356	0.0747	0.0625	0.0832	0.1101	0.0694	0.0127	0.0157	0.0115	0.0031	0.0045	0.0038	0.0090
Harami-	476	0.1189	0.0569	0.6652	0.2049	0.3924	0.3537	0.3119	0.5105	0.7872	0.7015	0.6267	0.6873	0.5440	0.5855	0.2734
Harami Cross-	23	0.5475	0.8314	0.4155	0.7239	0.9357	0.3372	0.7743	0.7977	0.7859	0.8979	0.9461	0.5746	0.9047	0.8475	0.8120
Last Engulfing Top	128	0.3743	0.9105	0.5078	0.4398	0.3796	0.6447	0.9577	0.9383	0.7069	0.2286	0.2914	0.2589	0.0859	0.0420	0.0298
Meeting Lines-	23	0.2673	0.0107	0.0034	0.1170	0.1218	0.3117	0.1232	0.1200	0.1006	0.0248	0.0119	0.0158	0.0202	0.0282	0.0135
Shooting Star	436	0.2359	0.2146	0.1219	0.1096	0.4030	0.0735	0.0037	0.0012	0.0006	0.6089	0.0002	0.0005	0.0004	0.0003	0.5564
Three Black Crows	40	0.2242	0.7016	0.6739	0.4216	0.4845	0.8269	0.8638	0.3048	0.3259	0.1457	0.2853	0.2310	0.1552	0.1324	0.0653
Three Inside Down	203	0.9533	0.7338	0.6258	0.6219	0.4235	0.3881	0.5429	0.9798	0.9162	0.4133	0.4345	0.2011	0.1664	0.1980	0.1638
Three Outside Down	199	0.6862	0.6753	0.1601	0.6098	0.7128	0.8629	0.8322	0.3791	0.6084	0.6058	0.9858	0.7657	0.1143	0.7561	0.9129
Tri Star-	6	0.0886	0.0474	0.0240	0.1292	0.2173	0.2180	0.4234	0.5294	0.6131	0.5270	0.5724	0.6194	0.3331	0.4282	0.4534
Tweezers Top	2272	0.0371	0.0253	0.2758	0.8114	0.7079	0.6003	0.1502	0.5238	0.1610	0.6140	0.2478	0.2195	0.6783	0.5149	0.8669

Correspond to Table 4.13 (page 120)

		p-values of skewness adjusted t-test (out-of-sample)														
Bullish Reversal	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Belt Hold+	336	0.0077	0.1576	0.5780	0.2620	0.3802	0.7322	0.1609	0.6441	0.4242	0.6115	0.5296	0.4833	0.6581	0.8148	0.6839
Doji Star+	228	0.0067	0.2413	0.0999	0.2419	0.8625	0.6012	0.3848	0.2290	0.0430	0.0992	0.0191	0.0524	0.0467	0.0479	0.0444
Engulfing+	1517	0.0563	0.3060	0.2708	0.5825	0.0795	0.0980	0.1932	0.2408	0.4227	0.6709	0.6911	0.2792	0.3382	0.3699	0.2576
Hammer	546	0.1869	0.4184	0.3373	0.1345	0.4138	0.5269	0.7153	0.9430	0.5899	0.8376	0.9044	0.8181	0.7838	0.7582	0.6579
Harami+	1141	0.3328	0.2083	0.2312	0.1785	0.3189	0.8917	0.1033	0.9684	0.0660	0.9718	0.6817	0.0725	0.9712	0.7757	0.9162
Harami Cross+	114	0.7406	0.0230	0.0003	0.0008	0.0001	0.0000	0.0013	0.0005	0.0000	0.0000	0.0000	0.0001	0.0000	0.0003	0.0001
Homing Pigeon	146	0.0253	0.0146	0.0245	0.2238	0.2150	0.6559	0.1225	0.1600	0.2141	0.9461	0.9622	0.4743	0.6274	0.3851	0.4197
Inverted Hammer	86	0.8897	0.9342	0.8109	0.9707	0.3573	0.0664	0.0942	0.1596	0.6067	0.9817	0.8762	0.6617	0.6968	0.8692	0.6591
Kicking Up	33	0.1813	0.0522	0.0916	0.1178	0.2177	0.4033	0.9271	0.8929	0.5464	0.4385	0.7806	0.8006	0.3716	0.3630	0.2811
Last Engulfing Bottom	177	0.0631	0.4088	0.1984	0.5876	0.4655	0.9065	0.4511	0.1054	0.1116	0.0905	0.1697	0.1012	0.1490	0.1144	0.1805
Meeting Lines+	95	0.0005	0.4592	0.0866	0.0772	0.1154	0.0680	0.0429	0.1234	0.0879	0.0166	0.0069	0.0088	0.0031	0.0022	0.0033
Morning Star	11	0.0675	0.5276	0.7532	0.9111	0.6609	0.2201	0.5121	0.3569	0.2376	0.0668	0.0149	0.0034	0.0216	0.0198	0.0615
Morning Doji Star	9	0.3937	0.9953	0.9583	0.5559	0.8646	0.9039	0.7405	0.9916	0.6986	0.5040	0.7068	0.6607	0.3433	0.4704	0.5581
Piercing	120	0.9924	0.3404	0.1392	0.4725	0.3910	0.1811	0.0394	0.1138	0.0280	0.0207	0.0172	0.0539	0.0735	0.2824	0.3172
Three Inside Up	305	0.3709	0.1853	0.0232	0.0724	0.0405	0.5360	0.3103	0.1593	0.1949	0.2584	0.6024	0.9441	0.7773	0.8418	0.6185
Three Outside Up	335	0.9396	0.2259	0.6885	0.1642	0.0613	0.0607	0.4324	0.8661	0.8371	0.6808	0.1818	0.9498	0.8298	0.7093	0.5671
Three White Soldiers	36	0.4888	0.6485	0.8182	0.5446	0.6667	0.8555	0.8498	0.7244	0.8141	0.7904	0.7953	0.7143	0.7484	0.8107	0.6717
Tri Star+	44	0.6360	0.0875	0.3135	0.2334	0.2883	0.1599	0.1464	0.6032	0.4230	0.9251	0.7454	0.8743	0.8530	0.6366	0.8245
Tweezers Bottom	8657	0.1248	0.0462	0.0061	0.0077	0.5855	0.0240	0.4563	0.0179	0.1328	0.4038	0.1928	0.9402	0.2803	0.1386	0.8929

Correspond to Table 4.13 (page 120)

		p-values of skewness adjusted t-test (out-of-sample)														
Bullish Reversal	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After downtrend:																
Belt Hold+	200	0.0427	0.1547	0.4076	0.7939	0.8623	0.8419	0.1245	0.2567	0.1770	0.1607	0.1274	0.0808	0.1351	0.1895	0.1375
Doji Star+	114	0.0125	0.3695	0.1133	0.4458	0.1943	0.4663	0.1987	0.1012	0.0335	0.0432	0.0107	0.0484	0.0457	0.0454	0.0569
Engulfing+	715	0.1100	0.1272	0.0787	0.3523	0.1692	0.3683	0.3847	0.9704	0.4766	0.3512	0.2020	0.0573	0.4308	0.4204	0.5620
Hammer	268	0.8743	0.5335	0.8029	0.6864	0.7872	0.8810	0.6125	0.6235	0.9615	0.8175	0.6686	0.5137	0.5557	0.7755	0.5548
Harami+	589	0.5043	0.4438	0.4518	0.9244	0.8390	0.2760	0.1059	0.2723	0.0951	0.3825	0.2592	0.1307	0.4273	0.2786	0.6167
Harami Cross+	66	0.3822	0.0947	0.0151	0.0319	0.0032	0.0018	0.0673	0.0317	0.0031	0.0093	0.0018	0.0026	0.0014	0.0021	0.0011
Homing Pigeon	71	0.0214	0.0254	0.0212	0.0588	0.0649	0.1455	0.0337	0.0119	0.0417	0.5021	0.3478	0.6457	0.5953	0.8273	0.9598
Inverted Hammer	56	0.9723	0.7584	0.9959	0.5692	0.6093	0.1727	0.1069	0.1070	0.3508	0.8481	0.7940	0.6833	0.7175	0.8614	0.9824
Kicking Up	5	0.2867	0.7067	0.9797	0.9797	0.7504	0.8533	0.7771	0.7440	0.5924	0.7557	0.8958	0.9046	0.3449	0.4574	0.6376
Last Engulfing Bottom	93	0.2242	0.9250	0.6502	0.9750	0.9074	0.5996	0.9647	0.6586	0.7435	0.5481	0.4842	0.4583	0.5270	0.3484	0.4872
Meeting Lines+	41	0.0198	0.9070	0.3340	0.2409	0.1061	0.1006	0.9449	0.9526	0.3856	0.0719	0.1800	0.1531	0.0541	0.1382	0.0898
Morning Star	9	0.0337	0.7452	0.9810	0.4591	0.4586	0.0290	0.0677	0.1136	0.1348	0.0573	0.0184	0.0055	0.0214	0.0177	0.0716
Morning Doji Star	5	0.1697	0.2018	0.1584	0.2162	0.1232	0.2034	0.8961	0.7323	0.9761	0.7780	0.9151	0.9498	0.6519	0.7884	0.8595
Piercing	63	0.6015	0.4909	0.1465	0.6095	0.3579	0.1589	0.0705	0.1452	0.0191	0.0176	0.0147	0.0682	0.1396	0.4079	0.4086
Three Inside Up	160	0.5559	0.5358	0.0547	0.3031	0.1869	0.7407	0.5559	0.2938	0.3044	0.3907	0.6481	0.8304	0.6895	0.9266	0.6974
Three Outside Up	189	0.8916	0.7324	0.1836	0.6804	0.6641	0.8632	0.4067	0.0463	0.0287	0.0355	0.0401	0.0586	0.1387	0.1695	0.2577
Three White Soldiers	18	0.7322	0.0584	0.0277	0.1564	0.1327	0.0676	0.1246	0.1281	0.1325	0.1157	0.1660	0.3451	0.5957	0.5411	0.6135
Tri Star+	19	0.9107	0.5088	0.8264	0.8185	0.9844	0.5813	0.5001	0.8527	0.9469	0.7652	0.6816	0.9443	0.7830	0.8505	0.8411
Tweezers Bottom	3145	0.0129	0.1642	0.0665	0.2407	0.0019	0.6923	0.0453	0.3985	0.3386	0.3279	0.7588	0.5792	0.8533	0.1211	0.5983

Correspond to Table 4.14 (page 124)

		p-values of skewness adjusted t-test (main sample)														
Bearish Continuation	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Downside Tasuki Gap	9	0.1612	0.9467	0.8977	0.5643	0.1438	0.8782	0.8831	0.9171	0.0333	0.0794	0.5258	0.4899	0.6043	0.6359	0.9852
Falling Window	16803	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
In Neck	22	0.7763	0.1772	0.3296	0.0683	0.0621	0.0452	0.0349	0.0800	0.0263	0.0322	0.1561	0.1407	0.1874	0.1201	0.1158
On Neck	276	0.0546	0.0034	0.0025	0.0011	0.0012	0.0003	0.0467	0.0607	0.0187	0.0126	0.0127	0.0461	0.0596	0.0662	0.0402
Separating Lines-	279	0.0077	0.1903	0.1092	0.0488	0.5132	0.3531	0.6620	0.5337	0.8135	0.9362	0.7907	0.9688	0.4023	0.3738	0.9387
Side-by-Side White Lines-	7	0.7182	0.2209	0.0817	0.1678	0.1927	0.1915	0.1525	0.1489	0.1568	0.1273	0.1417	0.1366	0.1023	0.1280	0.1148
Three-Line Strike-	9	0.3794	0.4964	0.8448	0.8082	0.6718	0.9589	0.6263	0.5715	0.6517	0.8467	0.9964	0.6066	0.7099	0.3405	0.6297
Thrusting	340	0.3034	0.1399	0.2638	0.8094	0.4806	0.7065	0.5326	0.9023	0.4327	0.4595	0.7774	0.9023	0.3560	0.3185	0.6745
Two Black Gapping Candles	1642	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.0011	0.0012
After downtrend:																
Falling Window	5088	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.0008
In Neck	16	0.8487	0.2383	0.5926	0.1435	0.0878	0.1179	0.0755	0.1313	0.0312	0.0582	0.2846	0.1963	0.2655	0.1993	0.1794
On Neck	148	0.0329	0.0500	0.1594	0.3282	0.3612	0.3593	0.6988	0.6139	0.8719	0.6349	0.7669	0.8572	0.9530	0.8175	0.9446
Separating Lines-	101	0.6166	0.2715	0.6162	0.3739	0.4474	0.6174	0.9684	0.6505	0.9419	0.7437	0.7811	0.7772	0.2255	0.1430	0.5042
Thrusting	196	0.1683	0.0055	0.0290	0.0819	0.3689	0.3955	0.2988	0.1668	0.4340	0.2972	0.2530	0.3435	0.0325	0.0517	0.1782
Two Black Gapping Candles	846	0.0826	0.0246	0.0097	0.0006	0.0013	0.0089	0.0019	0.0032	0.0061	0.0096	0.0329	0.0486	0.1414	0.0798	0.0356

Correspond to Table 4.15 (page 125)

	p-values of skewness adjusted t-test (main sample)															
Bullish Continuation	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Rising Three Methods	5	0.5098	0.7340	0.6970	0.9074	0.6399	0.8100	0.7020	0.4747	0.4198	0.5252	0.6300	0.5725	0.6075	0.6322	0.6118
Rising Window	13231	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Separating Lines+	197	0.4463	0.5818	0.4470	0.5275	0.4567	0.3526	0.4940	0.9455	0.6764	0.4291	0.4289	0.2404	0.6187	0.4585	0.8190
Side-by-Side White Lines+	16	0.0305	0.0406	0.3086	0.3401	0.1295	0.0962	0.2683	0.2571	0.1615	0.1627	0.4195	0.5097	0.5943	0.4110	0.9241
Three-Line Strike+	5	0.3858	0.9664	0.6523	0.2286	0.2258	0.1894	0.3697	0.4462	0.1149	0.0682	0.2076	0.1261	0.1816	0.1896	0.2004
Upside Tasuki Gap	8	0.1508	0.9879	0.4814	0.0599	0.0843	0.0584	0.0863	0.1619	0.2239	0.2915	0.2552	0.2809	0.3823	0.2371	0.2854
After uptrend:																
Rising Window	3123	0.0048	0.0665	0.0183	0.0199	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Separating Lines+	93	0.6433	0.1841	0.3827	0.7752	0.7353	0.6375	0.9341	0.6033	0.2128	0.1465	0.1798	0.2422	0.8181	0.9156	0.6684

Correspond to Table 4.16 & Table 4.17 (page 126 & 127)

		p-values of skewness adjusted t-test (out-of-sample)														
Continuation Patterns	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Bearish Continuation																
Before trend:																
Falling Window	1913	0.0031	0.0808	0.8117	0.0892	0.0269	0.0572	0.0148	0.0095	0.0010	0.0024	0.0011	0.0003	0.0000	0.0000	0.0000
On Neck	35	0.1251	0.5904	0.5250	0.2147	0.4471	0.2467	0.8703	0.8137	0.6083	0.6920	0.6314	0.7269	0.6151	0.5768	0.3524
Thrusting	44	0.6185	0.7395	0.8318	0.2513	0.0695	0.1360	0.0678	0.0426	0.0253	0.0868	0.0291	0.0550	0.0400	0.0282	0.0162
Two Black Gapping Candles	208	0.2358	0.8320	0.3844	0.4803	0.3549	0.2425	0.0432	0.0250	0.0276	0.0158	0.0506	0.0493	0.0374	0.0375	0.0471
After downtrend:																
Falling Window	604	0.0000	0.0002	0.0014	0.0081	0.0000	0.0083	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
On Neck	17	0.8996	0.7618	0.3248	0.3017	0.4431	0.5268	0.7773	0.6341	0.2016	0.2343	0.1603	0.0791	0.0978	0.2275	0.1603
Separating Lines-	28	0.3855	0.1086	0.5848	0.6467	0.4385	0.2359	0.0941	0.1438	0.1711	0.3349	0.0768	0.1383	0.1542	0.0749	0.0508
Thrusting	28	0.5133	0.6415	0.5237	0.1459	0.0207	0.0483	0.0235	0.0184	0.0126	0.0346	0.0081	0.0126	0.0062	0.0073	0.0052
Two Black Gapping Candles	102	0.4810	0.5942	0.1442	0.7479	0.9451	0.7304	0.2513	0.1910	0.1270	0.0775	0.0467	0.1060	0.0705	0.0416	0.0447
Bullish Continuation																
Before trend:																
Rising Window	2275	0.3737	0.0016	0.7145	0.0176	0.4614	0.1032	0.0422	0.0064	0.9894	0.0003	0.6439	0.5626	0.0001	0.0000	0.5317
Separating Lines+	80	0.8103	0.1972	0.1427	0.2028	0.0387	0.1951	0.0484	0.0407	0.0534	0.3902	0.2078	0.0460	0.1060	0.0555	0.0944
After Uptrend:																
Rising Window	523	0.8465	0.5450	0.1372	0.5114	0.6855	0.4841	0.3974	0.1071	0.0628	0.0219	0.4365	0.0312	0.0163	0.0102	0.0183
Separating Lines+	24	0.0704	0.4380	0.4229	0.4490	0.4081	0.1490	0.4855	0.5332	0.6994	0.9943	0.8089	0.9366	0.9877	0.7699	0.9940

Correspond to Table 4.18 (page 131)

		p-values of skewness adjusted t-test (average trading volume for in-sample)														
Bearish Reversal	No.	Profit 1	Profit 2	Profit 3	Profit 4	Profit 5	Profit 6	Profit 7	Profit 8	Profit 9	Profit 10	Profit 11	Profit 12	Profit 13	Profit 14	Profit 15
Before trend:																
Belt Hold-	174	0.3820	0.3865	0.6366	0.8116	0.4916	0.3655	0.6011	0.4917	0.6919	0.9689	0.7234	0.5105	0.6839	0.4594	0.4130
Dark Cloud Cover	76	0.2324	0.0004	0.0094	0.0125	0.0401	0.0423	0.1556	0.1710	0.0473	0.0128	0.0082	0.0066	0.0379	0.0370	0.0266
Descending Hawk	48	0.9625	0.4929	0.2546	0.2369	0.2590	0.7524	0.8416	0.7989	0.7642	0.7408	0.7773	0.7122	0.5819	0.4099	0.3034
Doji Star-	31	0.9145	0.1482	0.1221	0.3282	0.6884	0.8377	0.8478	0.7300	0.5400	0.7157	0.8425	0.2941	0.3240	0.3290	0.7242
Engulfing-	905	0.5338	0.1973	0.0067	0.0000	0.0001	0.0009	0.0006	0.0009	0.0016	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000
Evening Star	4	0.2599	0.0847	0.4008	0.0326	0.0639	0.1021	0.1377	0.1372	0.1463	0.0789	0.0728	0.1414	0.1888	0.2417	0.3214
Evening Doji Star	4	0.3587	0.3344	0.8573	0.5331	0.6973	0.4646	0.2962	0.2557	0.1853	0.3001	0.2597	0.1582	0.1587	0.1621	0.0373
Hanging Man	512	0.3764	0.5066	0.1868	0.7408	0.2839	0.3232	0.3290	0.1605	0.0970	0.0777	0.2326	0.0798	0.1438	0.1146	0.1081
Harami-	597	0.2963	0.6396	0.5164	0.0484	0.0373	0.0253	0.0221	0.0158	0.0034	0.0034	0.0009	0.0002	0.0010	0.0009	0.0019
Harami Cross-	46	0.5404	0.1894	0.0826	0.0315	0.0243	0.0264	0.0108	0.0072	0.0066	0.0091	0.0116	0.0125	0.0103	0.0346	0.0422
Last Engulfing Top	165	0.1468	0.3711	0.4755	0.7685	0.4307	0.2797	0.1691	0.1574	0.3261	0.0856	0.0857	0.2504	0.3042	0.1153	0.0875
Meeting Lines-	15	0.4552	0.2330	0.2962	0.3783	0.1456	0.1174	0.2692	0.2441	0.2360	0.3469	0.4012	0.3939	0.3312	0.4939	0.5174
Three Black Crows	61	0.1200	0.4990	0.2312	0.0557	0.1180	0.2234	0.6761	0.7987	0.7999	0.7672	0.8906	0.8973	0.9285	0.6586	0.8866
Three Inside Down	297	0.7338	0.6231	0.5983	0.4848	0.7613	0.2060	0.2653	0.2194	0.1314	0.0437	0.0139	0.0309	0.1045	0.0761	0.1383
Three Outside Down	404	0.2340	0.2172	0.0009	0.0088	0.0155	0.1142	0.3331	0.3381	0.1762	0.1218	0.0238	0.0495	0.0225	0.0491	0.1178
Tri Star-	5	0.7238	0.6518	0.3899	0.2553	0.7940	0.9409	0.6350	0.4234	0.2996	0.9240	0.7461	0.9232	0.9639	0.9577	0.8888
Tweezers Top	3264	0.0014	0.0029	0.0055	0.1989	0.0905	0.1665	0.9041	0.7860	0.2661	0.0610	0.0687	0.0519	0.0634	0.0504	0.0612

Correspond to Table 4.19 (page 133)

		p-values of skewness adjusted t-test (average trading volume for in-sample)														
Bearish Reversal	No.	Profit 1	Profit 2	Profit 3	Profit 4	Profit 5	Profit 6	Profit 7	Profit 8	Profit 9	Profit 10	Profit 11	Profit 12	Profit 13	Profit 14	Profit 15
After uptrend:																
Belt Hold-	97	0.1997	0.3423	0.8825	0.6140	0.9833	0.5344	0.7809	0.5879	0.7125	0.9960	0.8183	0.5776	0.4653	0.4089	0.3991
Dark Cloud Cover	32	0.0563	0.0135	0.0755	0.0857	0.1881	0.6353	0.8449	0.9283	0.1486	0.1222	0.1056	0.1062	0.1625	0.1349	0.0992
Descending Hawk	27	0.9213	0.3181	0.1106	0.1628	0.0446	0.0870	0.2814	0.4478	0.3494	0.3202	0.1325	0.0295	0.0140	0.0130	0.0097
Doji Star-	13	0.8653	0.8253	0.9009	0.8006	0.3628	0.1311	0.2977	0.8779	0.8641	0.9050	0.5702	0.5074	0.5096	0.4695	0.3428
Engulfing-	455	0.9844	0.0965	0.0064	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hanging Man	248	0.6588	0.4897	0.2741	0.5019	0.2804	0.3989	0.5097	0.2961	0.2344	0.1869	0.4120	0.1718	0.2298	0.2037	0.1864
Harami-	277	0.0691	0.7977	0.5894	0.0934	0.0327	0.0291	0.0224	0.0277	0.0135	0.0141	0.0087	0.0035	0.0048	0.0036	0.0046
Harami Cross-	24	0.3516	0.8462	0.9763	0.1497	0.1372	0.1178	0.1167	0.0726	0.0708	0.0587	0.0691	0.0486	0.1012	0.1651	0.2466
Last Engulfing Top	93	0.5244	0.6724	0.7349	0.7651	0.9524	0.7508	0.9343	0.9666	0.7258	0.5151	0.6865	0.8002	0.9216	0.5762	0.5311
Meeting Lines-	8	0.5845	0.5724	0.5692	0.9549	0.8779	0.8521	0.2157	0.4200	0.6222	0.4834	0.5503	0.5329	0.6099	0.4669	0.6179
Shooting Star	63	0.3346	0.3870	0.9489	0.6662	0.9224	0.8888	0.1631	0.4505	0.4397	0.1308	0.0491	0.0126	0.0013	0.0001	0.0003
Three Black Crows	33	0.1896	0.1329	0.0396	0.0309	0.1627	0.4247	0.8205	0.8345	0.5757	0.4905	0.6632	0.7021	0.7193	0.4929	0.6684
Three Inside Down	139	0.7100	0.5384	0.7865	0.1775	0.3973	0.0511	0.1069	0.0639	0.0451	0.0276	0.0138	0.0132	0.0401	0.0251	0.0509
Three Outside Down	218	0.2829	0.0532	0.0001	0.0003	0.0037	0.0051	0.0367	0.0227	0.0024	0.0013	0.0002	0.0050	0.0040	0.0079	0.0294
Tweezers Top	1312	0.6995	0.1584	0.1058	0.8137	0.8737	0.7229	0.1266	0.1291	0.0571	0.0082	0.0083	0.0080	0.0070	0.0056	0.0091

Correspond to Table 4.19 (page 133)

		p-values of skewness adjusted t-test (average trading volume for in-sample)														
Bullish Reversal	No.	Profit 1	Profit 2	Profit 3	Profit 4	Profit 5	Profit 6	Profit 7	Profit 8	Profit 9	Profit 10	Profit 11	Profit 12	Profit 13	Profit 14	Profit 15
Before trend:																
Belt Hold+	276	0.1543	0.7897	0.8493	0.3588	0.1980	0.0474	0.0058	0.0858	0.1159	0.2687	0.3936	0.5738	0.7472	0.6449	0.2850
Doji Star+	195	0.9500	0.4983	0.0432	0.0191	0.0161	0.1074	0.1640	0.0950	0.3042	0.2843	0.2351	0.4493	0.4940	0.5072	0.6189
Engulfing+	1264	0.6292	0.7534	0.3481	0.4642	0.9477	0.4054	0.3938	0.6474	0.5897	0.9071	0.7536	0.8440	0.6689	0.2948	0.5709
Hammer	534	0.8935	0.1154	0.0043	0.0206	0.0133	0.0866	0.0583	0.0816	0.0648	0.0896	0.0610	0.0487	0.1034	0.0208	0.0472
Harami+	1063	0.0038	0.0028	0.2753	0.0143	0.0379	0.0214	0.0072	0.0648	0.0078	0.2428	0.6791	0.8661	0.4875	0.6105	0.9091
Harami Cross+	142	0.5553	0.6001	0.2616	0.0982	0.0406	0.0268	0.1622	0.0057	0.0606	0.1046	0.0346	0.0728	0.0432	0.0307	0.0220
Homing Pigeon	137	0.7282	0.1367	0.1302	0.2946	0.8636	0.8874	0.7291	0.5786	0.6443	0.5689	0.9273	0.4940	0.0963	0.0773	0.0091
Inverted Hammer	67	0.3064	0.1830	0.4757	0.7001	0.8745	0.6452	0.5615	0.8095	0.4314	0.3492	0.6188	0.5649	0.6447	0.6311	0.5140
Last Engulfing Bottom	252	0.0207	0.0331	0.1700	0.9458	0.5584	0.6722	0.5068	0.6729	0.2847	0.3377	0.5712	0.4136	0.4174	0.1733	0.1846
Meeting Lines+	28	0.0286	0.5119	0.1911	0.4649	0.4393	0.5740	0.5302	0.6688	0.6384	0.5643	0.4009	0.4865	0.6089	0.6122	0.6784
Morning Star	5	0.2492	0.7145	0.9095	0.7721	0.8246	0.8629	0.2718	0.4754	0.4318	0.3254	0.5508	0.6124	0.7084	0.6555	0.8545
Morning Doji Star	9	0.9041	0.8140	0.1478	0.5226	0.2463	0.4958	0.4090	0.5419	0.8160	0.8261	0.7230	0.7453	0.7631	0.8835	0.7823
Piercing	111	0.7307	0.9597	0.9627	0.1960	0.8001	0.8860	0.8493	0.6982	0.2347	0.5775	0.9778	0.4742	0.5833	0.4076	0.3648
Three Inside Up	336	0.3480	0.8511	0.4246	0.8497	0.7235	0.6449	0.7303	0.4331	0.2182	0.1683	0.1987	0.1116	0.3706	0.4009	0.3750
Three Outside Up	360	0.0589	0.0000	0.0832	0.0324	0.2172	0.1629	0.0285	0.0959	0.0111	0.0052	0.0052	0.0190	0.1418	0.1013	0.3180
Three White Soldiers	48	0.6616	0.9718	0.3591	0.7757	0.4917	0.9940	0.8187	0.4059	0.5362	0.6687	0.8424	0.9377	0.8665	0.8563	0.9669
Tri Star+	17	0.9608	0.3634	0.6499	0.2832	0.7622	0.6649	0.9775	0.8629	0.8742	0.7250	0.6620	0.7076	0.7918	0.8601	0.7079
Tweezers Bottom	4840	0.0000	0.2409	0.1150	0.5289	0.3654	0.6965	0.8164	0.5712	0.9954	0.8896	0.4294	0.8944	0.8623	0.7552	0.7966

Correspond to Table 4.19 (page 133)

		p-values of skewness adjusted t-test (average trading volume for in-sample)														
Bullish Reversal	No.	Profit 1	Profit 2	Profit 3	Profit 4	Profit 5	Profit 6	Profit 7	Profit 8	Profit 9	Profit 10	Profit 11	Profit 12	Profit 13	Profit 14	Profit 15
After downtrend:																
Belt Hold+	192	0.2210	0.1888	0.3385	0.6771	0.3380	0.1113	0.0683	0.3104	0.4226	0.8130	0.8701	0.5389	0.6840	0.9600	0.7150
Doji Star+	107	0.8222	0.6076	0.9082	0.2814	0.2450	0.8857	0.9134	0.6329	0.9818	0.9916	0.8977	0.7856	0.6335	0.4981	0.3836
Engulfing+	630	0.9497	0.4609	0.0594	0.9807	0.5663	0.9996	0.8617	0.7166	0.7731	0.2438	0.2085	0.3637	0.3577	0.9437	0.5748
Hammer	302	0.4010	0.4261	0.0393	0.2368	0.0850	0.3132	0.1855	0.2123	0.1889	0.2448	0.4856	0.3726	0.5398	0.3974	0.4704
Harami+	577	0.2603	0.7247	0.6216	0.4242	0.4435	0.4527	0.3823	0.8916	0.5554	0.4675	0.1351	0.0428	0.0219	0.0714	0.1635
Harami Cross+	69	0.0420	0.0337	0.8241	0.4653	0.4088	0.2141	0.3441	0.0549	0.1690	0.2338	0.0555	0.0600	0.0251	0.0250	0.0105
Homing Pigeon	70	0.5186	0.0526	0.0206	0.0185	0.6615	0.6918	0.7597	0.9269	0.9598	0.9651	0.7383	0.6956	0.3181	0.2604	0.0899
Inverted Hammer	44	0.5504	0.9159	0.8327	0.6814	0.6000	0.8681	0.8426	0.7114	0.2083	0.1358	0.2240	0.1658	0.2748	0.1878	0.1903
Last Engulfing Bottom	146	0.1535	0.2037	0.2717	0.7443	0.4125	0.5948	0.4812	0.5119	0.5969	0.7143	0.9324	0.8897	0.8960	0.5846	0.6694
Meeting Lines+	17	0.2188	0.5996	0.1498	0.1290	0.3144	0.6263	0.6853	0.6390	0.8883	0.9545	0.9624	0.8614	0.8383	0.9617	0.9800
Morning Doji Star	5	0.5874	0.2804	0.2311	0.6209	0.3264	0.5122	0.4736	0.5701	0.8464	0.9159	0.9100	0.9734	0.9692	0.8142	0.8632
Piercing	67	0.8934	0.2886	0.4281	0.9091	0.5539	0.2010	0.3284	0.6509	0.7655	0.7536	0.5296	0.8992	0.7852	0.9718	0.8397
Three Inside Up	201	0.7765	0.8599	0.5098	0.7713	0.7497	0.5620	0.3552	0.2736	0.2726	0.2129	0.2382	0.1120	0.3799	0.4376	0.3753
Three Outside Up	192	0.0526	0.0004	0.0924	0.0726	0.0707	0.1075	0.0166	0.0941	0.0271	0.0449	0.0764	0.1200	0.4687	0.3448	0.8271
Three White Soldiers	30	0.3369	0.9280	0.7493	0.8436	0.6757	0.8042	0.7525	0.4821	0.5326	0.5410	0.6764	0.9820	0.9295	0.5681	0.9514
Tri Star+	5	0.2527	0.0543	0.1429	0.0842	0.7948	0.1010	0.0294	0.0783	0.0223	0.0975	0.3057	0.3830	0.3274	0.5580	0.5580
Tweezers Bottom	2008	0.0033	0.2560	0.1223	0.3019	0.2682	0.2754	0.6037	0.6146	0.5053	0.3524	0.1793	0.4187	0.3420	0.6651	0.6137

Correspond to Table 4.20 (page 135)

		p-values of skewness adjusted t-test (average trading volume for in-sample)														
Bearish Continuation	No.	Profit 1	Profit 2	Profit 3	Profit 4	Profit 5	Profit 6	Profit 7	Profit 8	Profit 9	Profit 10	Profit 11	Profit 12	Profit 13	Profit 14	Profit 15
Before trend:																
Downside Tasuki Gap	4	0.0403	0.3215	0.6084	0.1308	0.3042	0.4393	0.8695	0.9643	0.2280	0.0444	0.1238	0.1104	0.0736	0.0791	0.1076
Falling Window	1268	0.6039	0.3105	0.2435	0.0339	0.0010	0.0925	0.0236	0.0348	0.0579	0.0275	0.0843	0.7600	0.8996	0.4250	0.9430
On Neck	19	0.7001	0.4668	0.9665	0.9207	0.5381	0.9515	0.8742	0.8775	0.9979	0.9321	0.9898	0.6394	0.4809	0.4368	0.4024
Separating Lines-	16	0.7034	0.5598	0.9985	0.6572	0.7476	0.3300	0.0789	0.0630	0.1260	0.1382	0.1425	0.1884	0.3961	0.8291	0.6396
Thrusting	37	0.4264	0.5951	0.9613	0.3047	0.4129	0.8528	0.6771	0.2494	0.2952	0.2152	0.0744	0.0568	0.2206	0.1143	0.0418
Two Black Gapping Candles	153	0.1420	0.8968	0.9008	0.9934	0.8260	0.8815	0.9418	0.9405	0.9901	0.8149	0.6205	0.4004	0.3832	0.4716	0.3144
After downtrend:																
Falling Window	427	0.1749	0.8072	0.0791	0.0045	0.0001	0.0376	0.0217	0.2067	0.6221	0.8661	0.9269	0.2329	0.2150	0.0359	0.0569
On Neck	10	0.1046	0.1000	0.8316	0.6618	0.4650	0.9941	0.1314	0.6662	0.5091	0.2875	0.3728	0.2303	0.1312	0.0891	0.0591
Separating Lines-	5	0.7528	0.2118	0.8316	0.6755	0.6244	0.3370	0.1993	0.2738	0.3021	0.1834	0.2992	0.4409	0.6552	0.9436	0.8025
Thrusting	23	0.8054	0.7118	0.8906	0.2736	0.1507	0.3020	0.2679	0.1031	0.2621	0.1831	0.0798	0.0715	0.2711	0.1174	0.0885
Two Black Gapping Candles	84	0.1311	0.2726	0.9266	0.8470	0.9939	0.9495	0.7569	0.6817	0.9364	0.6061	0.5469	0.5609	0.4587	0.6623	0.6512

Correspond to Table 4.21 (page 136)

		p-values of skewness adjusted t-test (average trading volume for in-sample)														
Bullish Continuation	No.	Profit 1	Profit 2	Profit 3	Profit 4	Profit 5	Profit 6	Profit 7	Profit 8	Profit 9	Profit 10	Profit 11	Profit 12	Profit 13	Profit 14	Profit 15
Before trend:																
Rising Window	904	0.2523	0.1472	0.2483	0.1280	0.1222	0.0644	0.0119	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Separating Lines+	21	0.7459	0.3000	0.2228	0.8326	0.4159	0.3359	0.8281	0.6404	0.9276	0.2783	0.1886	0.2101	0.5332	0.7331	0.8026
After uptrend:																
Rising Window	214	0.0438	0.0675	0.2952	0.1058	0.0518	0.0093	0.0032	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Separating Lines+	14	0.3252	0.0884	0.1612	0.7853	0.4279	0.3987	0.7748	0.5954	0.9391	0.4219	0.5686	0.5779	0.6914	0.4171	0.6408

Correspond to Table 4.22 (page 139)

		p-values of skewness adjusted t-test (average trading volume for out-of-sample)														
Bearish Reversal	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Belt Hold-	78	0.4913	0.3046	0.5614	0.6622	0.4639	0.5046	0.2884	0.2448	0.2792	0.2340	0.3580	0.2392	0.4148	0.1794	0.3361
Dark Cloud Cover	28	0.0329	0.5374	0.5587	0.8467	0.6430	0.6028	0.7907	0.7931	0.9034	0.6187	0.6271	0.5772	0.7812	0.9412	0.7582
Descending Hawk	24	0.1656	0.2373	0.0434	0.1222	0.2243	0.1875	0.0143	0.1435	0.0814	0.0948	0.2357	0.2489	0.2537	0.2347	0.0390
Doji Star-	29	0.1251	0.2330	0.3923	0.2189	0.6322	0.7579	0.8626	0.9770	0.7736	0.9889	0.9985	0.9618	0.5008	0.4426	0.6282
Engulfing-	390	0.9569	0.7705	0.5765	0.1964	0.4799	0.4466	0.5121	0.2576	0.2186	0.2727	0.2727	0.2615	0.3114	0.2710	0.3426
Hanging Man	177	0.0879	0.3192	0.1469	0.2005	0.0871	0.0957	0.0198	0.0089	0.0016	0.0040	0.0032	0.0021	0.0025	0.0020	0.0015
Harami-	348	0.6833	0.2406	0.1763	0.7669	0.3805	0.4930	0.2121	0.4453	0.3465	0.5281	0.3107	0.2744	0.1714	0.2478	0.3051
Harami Cross-	22	0.5093	0.7763	0.6252	0.2007	0.6536	0.8281	0.2813	0.4482	0.1795	0.2703	0.3186	0.1577	0.0973	0.0848	0.1669
Last Engulfing Top	83	0.6947	0.6235	0.2927	0.8748	0.4071	0.6042	0.3348	0.3049	0.2743	0.0563	0.0436	0.0840	0.0580	0.0451	0.0143
Meeting Lines-	15	0.5554	0.0119	0.0008	0.0401	0.2776	0.2402	0.4289	0.2940	0.2316	0.0683	0.0196	0.0553	0.0149	0.0231	0.0188
Shooting Star	60	0.7596	0.6847	0.6532	0.4002	0.2268	0.2783	0.1889	0.3940	0.8604	0.8900	0.6237	0.5567	0.2926	0.3595	0.3689
Three Black Crows	24	0.3759	0.6462	0.9711	0.7123	0.6209	0.5833	0.5805	0.4641	0.8605	0.5651	0.7523	0.4641	0.3602	0.3321	0.2912
Three Inside Down	145	0.5553	0.0273	0.2451	0.1192	0.0251	0.0051	0.0172	0.1101	0.0778	0.0392	0.0619	0.0651	0.2225	0.0290	0.0096
Three Outside Down	160	0.7435	0.6511	0.1980	0.0459	0.0395	0.1866	0.2790	0.5022	0.3084	0.2483	0.1661	0.2116	0.2540	0.0550	0.0585
Tweezers Top	2578	0.0121	0.0049	0.0121	0.0328	0.0369	0.0954	0.6712	0.0193	0.2631	0.3766	0.6318	0.7931	0.0436	0.0382	0.3839

Correspond to Table 4.22 (page 139)

		p-values of skewness adjusted t-test (average trading volume for out-of-sample)														
Bearish Reversal	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After Uptrend:																
Belt Hold-	44	0.3545	0.8278	0.9191	0.3876	0.2166	0.3437	0.4144	0.4740	0.5310	0.4871	0.7410	0.4680	0.6448	0.1571	0.6444
Dark Cloud Cover	13	0.0053	0.0893	0.2992	0.5066	0.5915	0.2901	0.3759	0.9253	0.8577	0.7722	0.5945	0.6504	0.7369	0.8912	0.7956
Descending Hawk	12	0.2845	0.5219	0.0810	0.2433	0.3583	0.0663	0.0225	0.0675	0.0862	0.1002	0.1588	0.1433	0.4285	0.4752	0.0419
Doji Star-	12	0.0203	0.0683	0.2737	0.5135	0.6924	0.8673	0.6134	0.8178	0.4907	0.6062	0.8150	0.8945	0.5346	0.4474	0.6509
Engulfing-	173	0.3076	0.7261	0.8113	0.1667	0.7878	0.9754	0.9604	0.6687	0.7600	0.8619	0.9394	0.9307	0.6929	0.1352	0.8550
Hanging Man	87	0.8984	0.9684	0.4107	0.2270	0.1177	0.1289	0.0941	0.0194	0.0099	0.0080	0.0028	0.0026	0.0024	0.0027	0.0020
Harami-	162	0.7913	0.2282	0.6707	0.2367	0.6074	0.6116	0.9576	0.6998	0.4147	0.4248	0.8957	0.8954	0.9837	0.8836	0.1648
Harami Cross-	9	0.9733	0.8038	0.7823	0.8150	0.7354	0.9802	0.9534	0.6136	0.0392	0.6560	0.8228	0.8881	0.7167	0.6195	0.8760
Last Engulfing Top	47	0.7207	0.1165	0.2013	0.5500	0.1192	0.0530	0.0853	0.0675	0.0670	0.0267	0.0217	0.0259	0.0091	0.0050	1.0000
Meeting Lines-	6	0.0715	0.1044	0.0041	0.0153	0.0513	0.1208	0.2710	0.2855	0.3797	0.1963	0.1398	0.3168	0.3388	0.4064	1.0000
Shooting Star	32	0.7102	0.6824	0.4814	0.6034	0.4065	0.3309	0.2499	0.3193	0.8861	0.8758	0.9886	0.9048	0.6632	0.5047	0.6126
Three Black Crows	16	0.3053	0.6614	0.9162	0.7575	0.6560	0.6582	0.6604	0.5827	0.4142	0.6673	0.6461	0.9611	0.9830	0.8733	0.8827
Three Inside Down	75	0.9327	0.8145	0.8675	0.7237	0.5736	0.3085	0.5940	0.6963	0.9238	0.6088	0.7881	0.8270	0.8486	0.6530	0.4567
Three Outside Down	67	0.6803	0.7727	0.1771	0.2342	0.3685	0.6423	0.6209	0.8273	0.9753	0.9582	0.6201	0.8533	0.1516	0.4819	0.5290
Tweezers Top	816	0.0710	0.1756	0.8507	0.9855	0.9731	0.5169	0.5390	0.2879	0.4936	0.6312	0.6162	0.4104	0.3584	0.2782	0.4417

Correspond to Table 4.23 (page 141)

		p-values of skewness adjusted t-test (average trading volume for out-of-sample)														
Bullish Reversal	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Before trend:																
Belt Hold+	129	0.1096	0.5169	0.6151	0.1518	0.3198	0.1196	0.1019	0.0167	0.0276	0.0393	0.0288	0.0414	0.0870	0.1157	0.0832
Doji Star+	77	0.9908	0.5156	0.2046	0.0816	0.0230	0.1447	0.5277	0.5660	0.9669	0.4175	0.5049	0.5414	0.6756	0.5316	0.6185
Engulfing+	519	0.7719	0.0806	0.2602	0.0511	0.0065	0.0901	0.0248	0.0350	0.1135	0.0642	0.1416	0.6877	0.3472	0.4290	0.3211
Hammer	163	0.6564	0.5159	0.5149	0.2638	0.2936	0.4347	0.1607	0.3017	0.1112	0.0932	0.1069	0.1101	0.1551	0.1481	0.2137
Harami+	464	0.0918	0.0700	0.0196	0.0942	0.0966	0.2516	0.6810	0.1061	0.0908	0.2039	0.1756	0.4213	0.1637	0.3179	0.2756
Harami Cross+	65	0.9847	0.0260	0.0008	0.0003	0.0000	0.0001	0.0123	0.0069	0.0003	0.0008	0.0010	0.0025	0.0010	0.0099	0.0044
Homing Pigeon	52	0.3401	0.0210	0.1166	0.3707	0.1924	0.7249	0.5345	0.4808	0.9942	0.3335	0.3367	0.2132	0.3424	0.2349	0.0983
Inverted Hammer	36	0.6793	0.9154	0.6093	0.9506	0.2409	0.0109	0.0250	0.0684	0.3399	0.6318	0.5511	0.8210	0.7071	0.8063	0.7199
Kicking Up	6	0.1491	0.2728	0.2233	0.3442	0.3726	0.6774	0.1326	0.3547	0.3746	0.3958	0.3554	0.4668	0.2287	0.3793	0.3484
Last Engulfing Bottom	67	0.0277	0.9952	0.9689	0.8016	0.7946	0.6972	0.8952	0.4481	0.2515	0.1361	0.2280	0.2934	0.4500	0.3636	0.5079
Meeting Lines+	22	0.0129	0.0239	0.0358	0.0189	0.0348	0.0099	0.0373	0.0121	0.0044	0.0350	0.0154	0.0181	0.0057	0.0499	0.0249
Piercing	42	0.8780	0.7210	0.1444	0.7935	0.3648	0.2154	0.0728	0.1255	0.0450	0.0270	0.0017	0.0416	0.1097	0.5639	0.5339
Three Inside Up	129	0.7611	0.6189	0.9335	0.6790	0.4759	0.5285	0.5827	0.6793	0.5721	0.5956	0.4244	0.3560	0.4268	0.4690	0.5720
Three Outside Up	123	0.0453	0.0020	0.1290	0.0159	0.0614	0.0150	0.2015	0.5396	0.4015	0.5915	0.2231	0.6877	0.6489	0.4346	0.5082
Three White Soldiers	15	0.8225	0.3259	0.7654	0.5518	0.7578	0.7484	0.6006	0.5048	0.7341	0.8091	0.7956	0.9102	0.9715	0.9532	0.9030
Tri Star+	24	0.8476	0.0872	0.4200	0.5951	0.7060	0.4280	0.6104	0.7244	0.7997	0.4806	0.8578	0.6380	0.4061	0.2573	0.3276
Tweezers Bottom	3798	0.3663	0.2479	0.6767	0.3683	0.8224	0.0425	0.6778	0.3323	0.3902	0.4875	0.2844	0.4143	0.0314	0.1479	0.9128

Correspond to Table 4.23 (page 141)

		p-values of skewness adjusted t-test (average trading volume for out-of-sample)														
Bullish Reversal	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
After downtrend:																
Belt Hold+	77	0.0226	0.1367	0.2245	0.0268	0.0909	0.0528	0.0396	0.0103	0.0306	0.0166	0.0044	0.0021	0.0020	0.0050	0.0027
Doji Star+	39	0.7809	0.9368	0.1712	0.1792	0.4854	0.6095	0.9200	0.8596	0.7158	0.9343	0.8070	0.9190	0.9513	0.8860	0.9220
Engulfing+	260	0.2409	0.1707	0.0908	0.2391	0.0995	0.1707	0.2344	0.6926	0.8310	0.8336	0.9774	0.9556	0.9347	0.7978	0.8347
Hammer	88	0.5643	0.8875	0.7965	0.6189	0.7646	0.9169	0.8685	0.9574	0.4953	0.5963	0.5818	0.6623	0.6544	0.5401	0.7763
Harami+	245	0.3412	0.3722	0.0845	0.3834	0.3562	0.7698	0.4354	0.5396	0.1763	0.7711	0.4509	0.7245	0.5680	0.7369	0.6603
Harami Cross+	37	0.5444	0.1030	0.0617	0.0464	0.0099	0.0256	0.3664	0.2446	0.0595	0.1002	0.0444	0.0507	0.0529	0.0920	0.0514
Homing Pigeon	26	0.4203	0.0531	0.1492	0.2379	0.0475	0.0768	0.0387	0.0304	0.2508	0.7998	0.7222	0.8636	0.9541	0.9876	0.7718
Inverted Hammer	27	0.7919	0.9003	0.8282	0.4784	0.5306	0.0808	0.0991	0.1196	0.3616	0.7681	0.7235	0.9715	0.9424	0.9325	0.8169
Last Engulfing Bottom	38	0.2021	0.7808	0.5733	0.4816	0.6883	0.8345	0.6950	0.8287	0.7242	0.5426	0.5233	0.4772	0.6269	0.4727	0.5913
Meeting Lines+	10	0.0971	0.3105	0.1821	0.0020	0.0060	0.0351	0.2065	0.2700	0.1444	0.1093	0.2359	0.2934	0.1074	0.3937	0.2062
Piercing	21	0.7789	0.6729	0.1610	0.9828	0.5610	0.0747	0.1011	0.0189	0.0017	0.0013	0.0025	0.0325	0.0779	0.6100	0.3420
Three Inside Up	62	0.9279	0.5081	0.9679	0.9044	0.7961	0.4167	0.4864	0.6780	0.5633	0.3963	0.3713	0.3970	0.4889	0.5675	0.5659
Three Outside Up	65	0.2708	0.1350	0.8954	0.3307	0.4808	0.3506	0.9490	0.3961	0.3886	0.5342	0.3954	0.3732	0.4762	0.7441	0.7550
Three White Soldiers	8	0.7349	0.1007	0.0453	0.0302	0.0253	0.0214	0.0450	0.0383	0.0139	0.0088	0.0143	0.0298	0.0165	0.0086	0.0073
Tri Star+	8	0.6234	0.3334	0.7344	0.2972	0.3423	0.4378	0.3710	0.2565	0.1532	0.1082	0.1195	0.2809	0.1429	0.1411	0.1543
Tweezers Bottom	1272	0.0002	0.4759	0.5497	0.6123	0.0000	0.6873	0.0059	0.5325	0.5254	0.9256	0.2458	0.1648	0.2693	0.2380	0.5754

Correspond to Table 4.24 & Table 4.25 (page 143 & 144)

		p-values of skewness adjusted t-test (average trading volume for out-of-sample)														
Continuation Patterns	No.	1 day	2 day	3 day	4 day	5 day	6 day	7 day	8 day	9 day	10 day	11 day	12 day	13 day	14 day	15 day
Bearish Continuation																
Before trend:																
Falling Window	439	0.0667	0.8359	0.4448	0.4030	0.9403	0.1542	0.3508	0.4510	0.2291	0.5245	0.4077	0.4177	0.0475	0.0709	0.0417
On Neck	7	0.8591	0.2440	0.7771	0.7639	0.4768	0.5427	0.3946	0.6829	0.4405	0.2939	0.1575	0.2352	0.3189	0.2124	0.4260
Separating Lines-	31	0.8200	0.7790	0.2918	0.6510	0.1558	0.1582	0.4832	0.6925	0.8387	0.8175	0.8527	0.9496	0.8512	0.7592	0.5406
Thrusting	17	0.4925	0.7595	0.8735	0.9813	0.7602	0.7091	0.5216	0.3270	0.2000	0.3194	0.1680	0.2032	0.1857	0.0727	0.0807
Two Black Gapping Candles	60	0.1341	0.4410	0.2668	0.8124	0.5623	0.6768	0.3176	0.1257	0.1369	0.0655	0.1015	0.1367	0.1216	0.1701	0.2326
After downtrend:																
Falling Window	160	0.0003	0.0008	0.0151	0.0295	0.0003	0.0390	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Separating Lines-	9	0.9230	0.5974	0.4691	0.4899	0.5849	0.6934	0.7719	0.5000	0.5337	0.6397	0.8695	0.9714	0.6051	0.4934	0.5182
Thrusting	10	0.6131	0.9542	0.9773	0.8683	0.5520	0.6615	0.4566	0.3641	0.2757	0.3789	0.1711	0.1746	0.1243	0.1002	0.1089
Two Black Gapping Candles	33	0.6692	0.6629	0.1870	0.6620	0.9362	0.8741	0.5218	0.3915	0.2536	0.0612	0.0307	0.0408	0.0544	0.0244	0.0457
Bullish Continuation																
Before trend:																
Rising Window	496	0.2551	0.2125	0.1661	0.4640	0.7612	0.8772	0.6946	0.8665	0.2955	0.1676	0.3285	0.0760	0.0394	0.0047	0.7793
Bullish Separating Lines	28	0.0931	0.0493	0.1521	0.2120	0.0538	0.1797	0.3104	0.3422	0.2753	0.1440	0.0490	0.0113	0.0294	0.0415	0.0390
After uptrend:																
Rising Window	112	0.6114	0.0960	0.0833	0.0557	0.0392	0.0725	0.0668	0.1713	0.5692	0.9598	0.9725	0.9888	0.6626	0.4565	0.4093
Separating Lines+	11	0.3915	0.6044	0.8657	0.7672	0.9372	0.1832	0.9531	0.9950	0.9253	0.3283	0.2405	0.4675	0.5676	0.3731	0.4364